Memorandum

on

U.S. Infrastructure Investment and Jobs Act 2021

December 15, 2021

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MEMORANDUM[1]

To: Our Friends and Clients

From: Kaamil Ansar

Re: U.S. Infrastructure Investment and Jobs Act 2021

Date: August 24, 2022

Ladies and Gentlemen:

We hope you are well.

We are pleased to analyze for you below, key features of the landmark legislative initiative of President Joe Biden's administration: the Infrastructure Investment and Jobs Act 2021 (the IIJA or the Act).

Background:

The IIJA was passed by the Senate on November 6, 2021, and signed into law by President Biden on November 15, 2021.

The second major legislative initiative of of President Biden's administration, the Build Back Better Bill was passed by the House of Representatives on November 19, 2021, but was not passed by the Senate due to opposition by Senator Joe Manchin III, Democrat of West Virginia, and Senator Kyrsten Sinema, Democrat of Arizona. See our memo on the Inflation Reduction Act, dated August 24, 2022, forwarded to you separately.

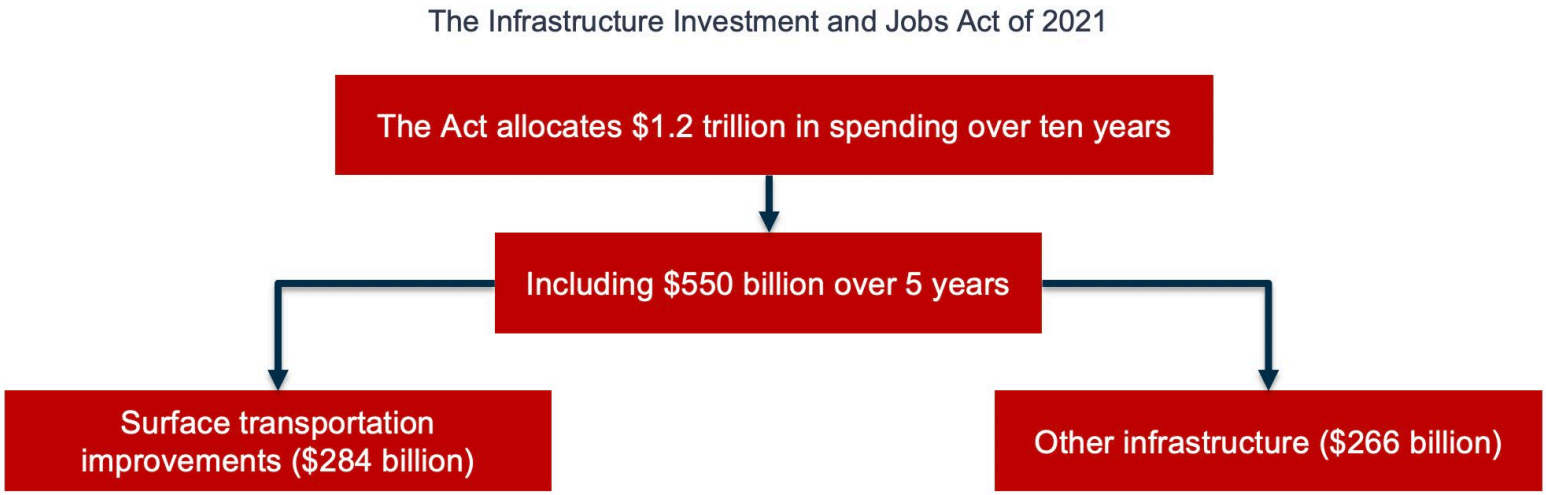
The IIJA:

Introduction:

The IIJA introduces significant investments in surface transportation and other infrastructure and its funding components are summarized in Charts I, II, and III:

[1] The Ansar Law Firm (the Firm) is not regulated by the UK Solicitors Regulation Authority (SRA). Mr. Kaamil Ansar, a partner of the Firm, is a solicitor of the senior courts of England and Wales and is regulated by the SRA.

Chart I [2,3]



[2] Fact Sheet: "President Biden announces support for the Bipartisan Infrastructure Framework," June 24, 2021, whitehouse.gov. Detailed appropriations for each of the major components of the Act are listed in "Appropriations" below. See also, Justin Badlam, Tony D'Emidio, Adi Kumar, Sara O'Rourke, and Rob Dunn, McKinsey & Company, "The U.S. Infrastructure Investment and Jobs Act, Breaking it down", November 12, 2021, https://www.mckinsey.com/industries/public-and-social-sector/our-insights/the-us-infrastructure-investment-and-jobs-act-breaking-it-down (last accessed November 19, 2021); and Ed Crooks, Wood Mackenzie, "US Infrastructure bill bets on breakthrough technologies", November 12, 2021, https://www.woodmac.com/news/opinion/infrastructure-bill-bets-on-breakthrough-technologies/ (last accessed November 19, 2021).

[3] The White House, Updated Fact Sheet: "Bipartisan Infrastructure Investment and Jobs Act, "August 2, 2021, whitehouse.gov. The White House, Fact Sheet: "The Bipartisan Infrastructure Deal," November 6, 2021, whitehouse.gov [November 6 Fact Sheet], and "White House Releases Updated State Fact Sheets Highlighting the Impact of the Infrastructure Investment and Jobs Act Nationwide", August 04, 2021 Sources: Senate RPC, Legislative Notices, Infrastructure Investment and Jobs Act, H.R. 3684, 117th Cong. (2021)

Chart II

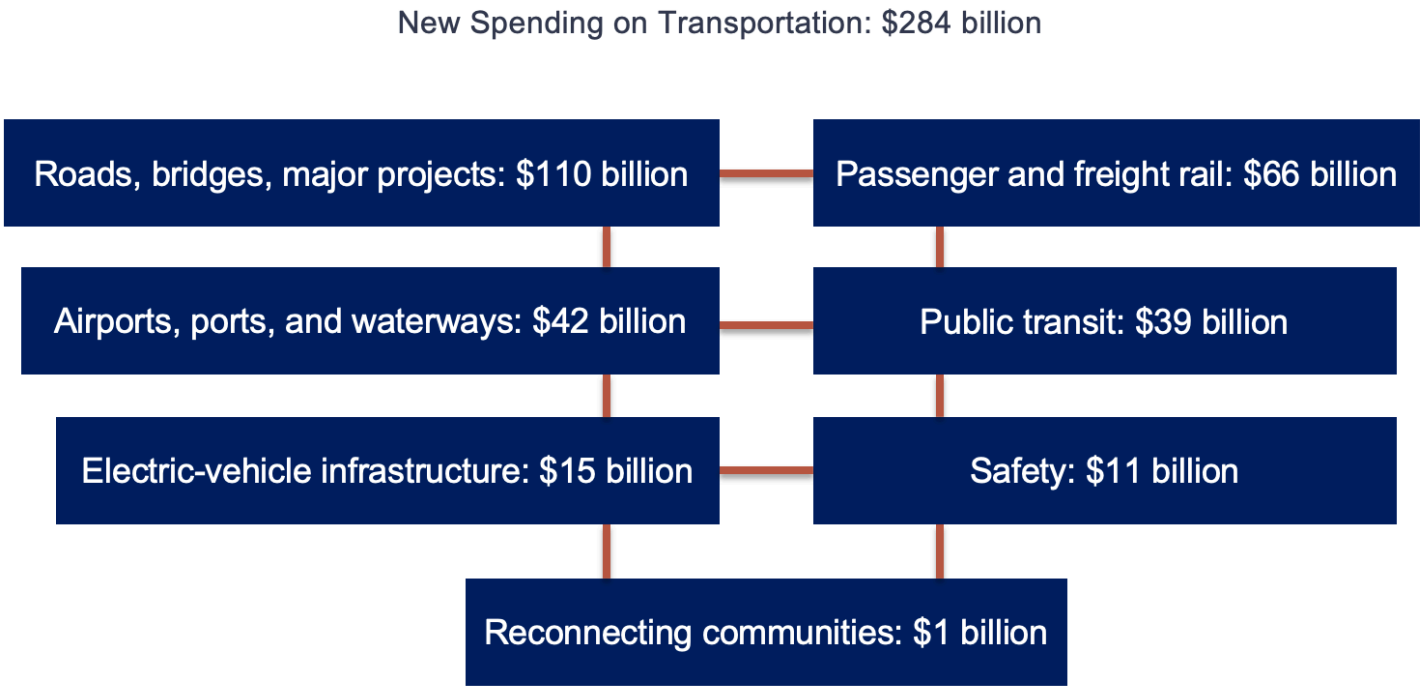
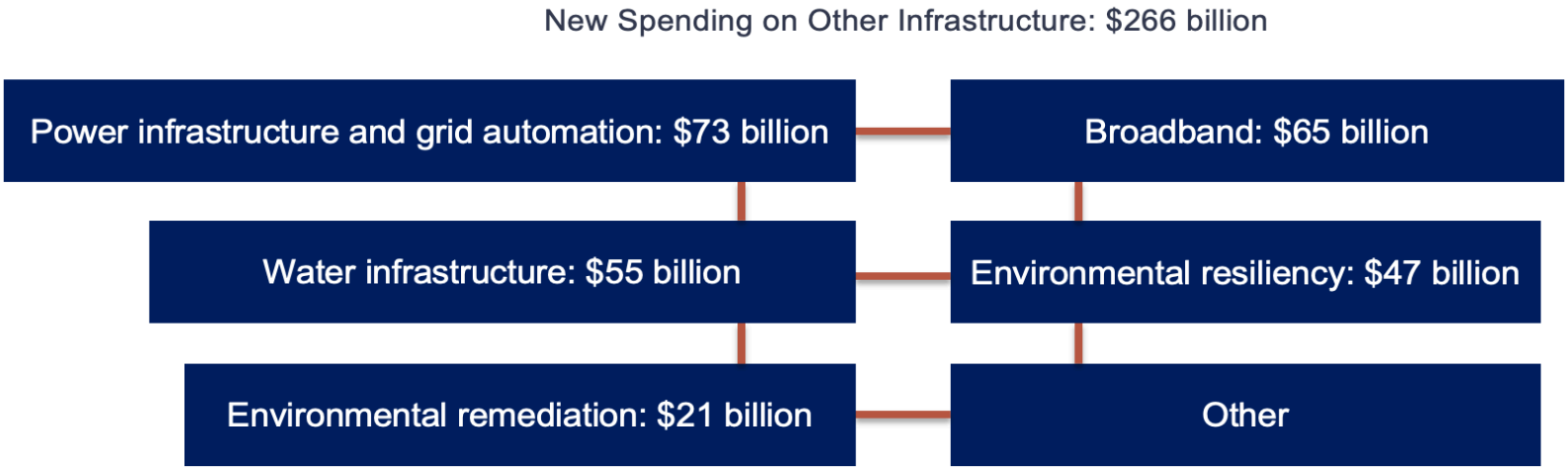


Chart III



I. Surface Transportation:[4]

A. *Roads and bridges*:

- The Act will direct investment to rebuilding roads and bridges and support major transformational projects. It will reauthorize surface transportation programs for five years.

- It will make the single largest investment in repairing and reconstructing the nation's bridges since construction of the interstate highway system. It will rebuild the most economically significant bridges in the country.

- The Act will provide 90% of the total amount from the Highway Trust Fund allocated to surface transportation to state departments of transportation to address their surface transportation needs. See below.

- The Act will authorize funding for the Transportation Infrastructure Finance and Innovation program; Nationally Significant Freight and Highway projects; the Tribal Transportation Program; the Federal Lands Transportation Program; the Federal Lands Access Program; and the Territorial and Puerto Rico Highway Program.

- The Act will create a competitive grant program to improve bridges.

- The Act will create a competitive grant program to address the surface transportation infrastructure of rural communities.

- The Act will create several programs to mitigate transportation emissions and address climate change, including a grant program to support alternative charging and fueling infrastructure (see also below), a program to curb truck idling and emissions at ports, a program to minimize transportation emissions, and a program to address traffic congestion.

- The Act will create the Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation program to improve the resiliency of roads and bridges through both formula funding to all states and grants on a competitive basis.

- Funding will be provided through DOT[5] and DOI[6] to state highway and transportation agencies through the Highway Trust Fund to upgrade roads and bridges and address climate change and greenhouse gas emissions.

- Under the Surface Transportation Act 2021, this act will:

    - Create within DOT an Office of Multimodal Freight Infrastructure and Policy charged with overseeing and facilitating freight policy.

[4] Division A – Surface Transportation: Title I – Federal-Aid Highways.
[5] Department of Transportation.
[6] Department of Interior.

- Create a competitive grant program to fund national and regional transportation projects. Also, this act will create a competitive grant program to fund local and regional transportation projects.

- Create the Rural and Tribal Assistance pilot program under the Build America Bureau.

- Authorize funding for the Federal Motor Carrier Safety Administration, including to facilitate the safety assistance program.

- Authorize funding for the National Highway Traffic Safety Administration, including for highway safety programs.

- Create the Safe Streets and Roads for All program to facilitate grants to stem deaths and injuries.

- Authorize the Interagency Infrastructure Permitting Improvement Center with the stated purpose of bolstering federal coordination and improving the efficiency of permitting and environmental processes.

- Authorize the Rural Opportunities to Use Transportation for Economic Success, or ROUTES, to support the transportation needs of rural communities.

- Authorize appropriations for hazardous materials safety programs.

B. Transit:[7]

- Through the largest investment in public transit in U.S. history, the Act will invest $39 billion from the Mass Transit Account in the Highway Trust Fund, to modernize transit, continue existing transit programs for five years as part of surface transportation reauthorization, and in total, new investments and reauthorization under the IIJA will provide $89.9 billion in guaranteed funding for public transit over the next five years.

- The Act will authorize $3 billion annually for the Federal Transit Administration's Capital Investment Grants program for FY 2022 through FY 2026.

- The IIJA will expand public transit options in every state, replace thousands of deficient transit vehicles, including buses, with clean, zero emission vehicles and improve accessibility for elderly and people with disabilities.

[7] Division C – Transit.

C. *Airports, Ports and Waterways*:

- The Act will upgrade airports and ports, strengthen supply chains, prevent disruptions that have caused inflation, improve U.S. competitiveness, and create more and better jobs at these hubs.

- The Act will provide $17 billion in port infrastructure and waterways, and $25 billion in airports to address repair and maintenance backlogs, reduce congestion and emissions near ports and airports, and drive electrification and other low-carbon technologies.

- The IIJA will make fundamental long overdue changes for the nation's ports, waterways, and airports.[8]

- Resilient, and sustainable port, airport, and freight infrastructure will strengthen supply chains and support U.S. competitiveness by removing bottlenecks, expedite commerce, and reduce the environmental impact on neighbouring communities.

D. *Rail*:[9]

- The Act will make the largest investment in passenger rail since the creation of Amtrak 50 years ago and will position rail to play a central role in the nation's transportation and economic future.

- Additional rail funding will be provided to eliminate Amtrak's maintenance backlog, modernize the Northeast Corridor, and provide world-class rail service to areas outside the northeast and the mid-Atlantic.

- The Act will seek to create safe, efficient, and climate friendly alternatives for moving people and freight.

- The Act will reauthorize the Railroad Rehabilitation and Improvement Financing program.

- The Act will authorize funding for the Federal Railroad Administration, including for safety and operations and authorize funding for FRA's research and development.

- The Act will authorize $1 billion annually for FY 2022 through FY 2026 for Consolidated Rail Infrastructure and Safety Improvement, or CRISI, grants.

- The Act will require DOT to promulgate safety regulations for high-speed rail and consult with high-speed rail developers before promulgating such regulations.

[8] Subdivision A, Title I – Subtitle D – Climate Change.
[9] Subdivision A, Title II – Rail.

E. Transportation Projects Carried Out Through Public-Private Partnerships:

- The term ‘‘public-private partnership’’ means an agreement between a public agency and a private entity to finance, build, and maintain or operate a project.
- With respect to a public-private partnership, as a condition of receiving Federal financial assistance for a project, within a prescribed period, the secretary of transportation will require the public partner to conduct a review of the project, including a review of the compliance of the private partner with the terms of the public-private partnership agreement, to certify to the secretary of transportation that the private partner of the public-private partnership is meeting the terms of the public-private partnership agreement for the project, or notify the secretary of transportation that the private partner of the public-private partnership has not met one or more of the terms of the public-private partnership agreement for the project, including a brief description of each violation of the public-private partnership agreement, and include a detailed value for money analysis or similar comparative analysis for the project, and the appropriateness of the public-private partnership agreement.
- For transportation projects that have an estimated total cost in excess of $750 million, carried out by a public entity that is a State, territory, Indian Tribe, unit of local government, transit agency, port authority, metropolitan planning organization, airport authority, or other political subdivision of a State or local government, and in a State in which there is in effect a State law authorizing the use and implementation of public-private partnerships for transportation projects, the entity carrying out the project shall, during the planning and project development process and prior to signing any Project Development Agreement, conduct a value for money analysis or comparable analysis of the project that shall include:
    - An evaluation of the life-cycle cost and project delivery schedule
    - The costs of using public funding versus private financing for the project
    - A description of the key assumptions made in developing the analysis, including an analysis of any Federal grants or loans and subsidies received or expected (including tax depreciation costs)
    - The key terms of the proposed public-private partnership agreement, if applicable (including the expected rate of return for private debt and equity), and major compensation events
    - A discussion of the benefits and costs associated with the allocation of risk
    - The determination of risk premiums assigned to various project delivery scenarios
    - Assumptions about use, demand, and any user fee revenue generated by the project

- Any external benefits for the public generated by the project, and
- A forecast of user fees and other revenues expected to be generated by the project.

II. Electric-vehicle chargers:

A. Electric Vehicles:

- The Act will create a working group comprised of government and industry stakeholders and led by the secretaries of DOT and the Department of Energy (DOE) to consider and make recommendations for the adoption of electric vehicles (EVs) in the transportation sector.
- The Act will build a national network of EV chargers and build out a national network of EV chargers in the U.S., to fight climate change and create U.S. manufacturing jobs – the first national investment in EV charging infrastructure.
- The Act will create a grant program to aid EV charging infrastructure.
- The Act will provide funding for deployment of EV chargers along highway corridors to facilitate long-distance travel and within communities to provide convenient charging points where people live, work, and shop.
- The Act will build a network of 500,000 EV chargers to accelerate adoption of EVs, reduce emissions, improve air quality, and create jobs across the country.
- The initiative will include buses and transit along highways and in rural and disadvantaged communities and funds to electrify school and transit buses and passenger ferries.
- The Act will establish a grant program to strategically deploy publicly accessible EV charging infrastructure, hydrogen fuelling infrastructure, propane fuelling infrastructure, and natural gas fuelling infrastructure along designated alternative fuel corridors or in certain other locations that will be accessible to all drivers of electric vehicles, hydrogen vehicles, propane vehicles, and natural gas vehicles.
- The Act requires the secretary of energy report to Congress on “the cradle to grave environmental impact of electric vehicles.”

B. EV Battery Second-Life Applications for Grid Services:

- The Act provides that the secretary of transportation will enter into a program to carry out a project to demonstrate second life applications of EV batteries as aggregated energy storage installations to provide services to the electric grid.
- The purpose of this initiative is to demonstrate power safety and the reliability of the applications demonstrated under the program, to demonstrate the ability of EV batteries to provide ancillary services for grid stability and management, and reduce the peak loads of homes and businesses, extend the useful life of EV batteries and the

components of these batteries before collection, recycling, and reprocessing of the batteries and components, and increase acceptance of, and participation in, the use of second-life applications of EV batteries by utilities.

C. *Recycling of Batteries*:

- The Act directs the administrator of the Environmental Protection Agency (the EPA) to produce best practices for the recycling of batteries. It also creates a program within EPA to issue voluntary labeling guidelines to bolster battery recycling.

D. *Battery Processing and Manufacturing*:

- The Act provides that the secretary of transportation within a prescribed period will establish a Battery Material Processing Grant Program under which the secretary will award grants to:
  - Ensure that the United States has a viable battery materials processing industry to supply the North American battery supply chain
  - Expand the capabilities of the United States in advanced battery manufacturing
  - Enhance national security by reducing the reliance of the United States on foreign competitors for critical materials and technologies and
  - Enhance domestic processing capacity of minerals necessary for battery materials and advanced batteries.

III. Safety:

- The Act provides funds for safety programs to reduce crashes and fatalities and doubled funding to improve safety of people and vehicles, including highway safety, truck safety, and pipeline and hazardous materials.

IV. Reconnecting Communities:

- The Act provides for the first ever national investment in communities divided by transportation infrastructure.

V. Forest Service Legacy Road and Trail Remediation:

- The Act creates the Forest Service Legacy Road and Trail Remediation program to update road and trail routes within the National Forest System.

VI. Other Infrastructure:

A. *Upgrade the Grid*:[10]

[10] Division D – Energy, Title I – Grid Infrastructure and Resiliency.

- The Act requires the DOE within a prescribed period to establish a program to:
  - Make grants on a competitive basis to provide Federal financial assistance to an electric grid operator, an electricity storage operator, an electricity generator, a transmission owner or operator, a distribution provider, a fuel supplier, or any other relevant entity
  - Demonstrate innovative approaches to transmission, storage, and distribution infrastructure to harden and enhance resilience and reliability and
  - Demonstrate new approaches to enhance regional grid resilience, implemented through states by public and rural electric cooperative entities on a cost-shared basis.
- The overall objectives include:
  - Upgrading the power infrastructure and build thousands of miles of new, resilient transmission lines to facilitate expansion of renewable and clean energy, while lowering costs
  - Deliver clean, reliable energy across the country and deploy cutting-edge energy technology to achieve a zero-emissions future and
  - Fund new programs to support development, demonstration, and deployment of clean energy technologies to accelerate the transition to a zero-emission economy

B. *Carbon Reduction*:

- The Act directs DOT to establish a carbon reduction program to reduce transportation emissions by the states.
- The program is designed to identify projects and strategies to reduce transportation emissions, which may include projects and strategies for safe, reliable, and cost-effective options, and
- The Act provides for DOT to provide discretionary grants on a competitive basis to eligible entities to advance innovative, integrated, and multimodal solutions for congestion relief in the most congested metropolitan areas of the United States.

C. *Emerging Alternative Fuel Vehicles and Infrastructure*:

- The Act requires DOT to submit a report to Congress within a prescribed period for evaluating emerging alternative fuel vehicles fuelled by hydrogen, natural gas, or propane, and to help guide future investments and requirements for infrastructure for the development of such vehicles.

D. Transmission:

- The Act provides for the establishment of a transmission facilitation program to facilitate transmission projects generally with a capacity of 1,000 megawatts, or 500 megawatts, in the case of an upgrade of an existing or new transmission project, that are designed to:
- Construct a new or replace an existing eligible electric power transmission line.
- Increase the transmission capacity of an existing eligible electric power transmission line.
- Connect an isolated microgrid to an existing transmission, transportation, or telecommunications infrastructure corridor located in certain states or a territory of the United States.
- The Act establishes the Transmission Facilitation Fund within the Treasury Department to carry out the program and permits the secretary of the treasury to loan sums for the program.
- The Act provides that the secretary of energy may enter into public-private partnerships with eligible entities to facilitate transmission projects in electric transmission corridors to accommodate an actual or projected increase in demand for electric transmission capacity across more than one state or transmission planning region.
- Under the Act, the secretary of energy is required to:
    - Facilitate projects that use technology to enhance the capacity, efficiency, resiliency, or reliability of an electric power transmission system
    - Improve the resiliency and reliability of an electric power transmission system
    - Facilitate interregional transfer capacity that supports strong and equitable economic growth and
    - Contribute to national or subnational goals to lower electricity sector greenhouse gas emissions.
    - The Act provides that the secretary of energy may designate as a national interest electric transmission corridor any geographic area that is experiencing electric energy transmission capacity constraints or congestion that adversely affects consumers or is expected to experience energy transmission capacity constraints or congestion.

E. Technologies to Enhance Grid Flexibility:

- The Act requires the use of certain technologies to enhance grid flexibility, including:
    - Advanced transmission technologies that increase the operational transfer capacity of a transmission network.

- Providing flexibility to improve the visibility of the electrical system to grid operators that can quickly rebalance the electrical system with autonomous controls.
- The ability to facilitate the aggregation or integration of distributed energy resources to serve as assets for the grid.
- The ability to provide energy storage to meet fluctuating electricity demand.
- Provide voltage support.
- Integrate intermittent generation sources, including vehicle-to-grid technologies.
- The ability of hardware, software, and associated protocols applied to existing transmission facilities to increase the operational transfer capacity of a transmission network.
- The ability to anticipate and mitigate impacts of extreme weather or natural disasters on grid resiliency.
- The ability to facilitate the integration of renewable energy resources, EV charging infrastructure, and vehicle-to-grid technologies, and
- The ability to reliably meet increased demand from EVs and the electrification of appliances and other sectors.

- The Act directs the secretary of energy to create the Program Upgrading Our Electric Grid and Ensuring Reliability and Resiliency to facilitate aid to and boost collaboration with grid owners and operators.
- The Act directs the secretary of energy to create a program to facilitate aid to states and tribes to reduce the risk of electricity outages through the modernization of infrastructure.
- The Act authorize $3 billion for the Smart Grid Investment Matching Grant Program from FY 2022 through FY 2026.
- The investment of more than $65 billion represents the largest investment in clean energy transmission and upgrading the grid in U.S. history.

VII. Broadband:

A. Framework:

- The Act defines “unserved location” as a location that has no access to broadband or lacks reliable access to broadband with a speed of not less than 25 Mbps for downloads, and 3 Mbps for uploads.

- The Act defines “underserved location” as a location that lacks reliable access to broadband with a speed of not less than 100 Mbps for downloads, and 20 Mbps for uploads.

B. Funding and Implementation:

- The Act authorizes $42.5 billion to carry out a new grant program administered by the Commerce Department to provide grants to states to expand broadband to unserved and underserved areas and help bridge the digital divide.

- The Act requires the Commerce Department and the Federal Communications Commission (the FCC) to create a public website that allows consumers to determine whether they are eligible for a subsidy or low-cost broadband service.

- The Act requires the FCC to submit a report to Congress on the future of the Universal Service Fund and its role in achieving the goal of universal service for broadband.

- The Act authorizes $60 million for planning grants to states to develop "digital equity plans."

- The Act authorizes $240 million for state "digital equity capacity" grants in FY 2022; $300 million annually for FY 2023-2026.

- The Act authorizes $250 million annually for FY 2022 to FY 2026 for a digital equity competitive grant program and authorizes $1 billion for "middle mile deployment" grants.

- The Act renames the Emergency Broadband Program administered by the FCC, the Affordable Connectivity Program, and extends it indefinitely. The program provides subsidies for broadband services to low-income and other qualifying people.

VIII. Drinking Water and Wastewater Infrastructure:

Objectives:

- The Act authorizes funding for the Environmental Protection Agency (the EPA) to provide technical assistance and grants for emergencies affecting public water systems.

- The Act authorizes funding for technical assistance to small public water systems.

- The Act authorizes increased funding for the Drinking Water State Revolving Loan Fund.

- The Act authorizes funding for Assistance for Small and Disadvantaged Communities.

- The Act authorizes funding for the Drinking Water System Infrastructure Resilience and Sustainability program and stipulates a 90% federal cost share for aid to small, rural, and disadvantaged communities.

- The Act requires the EPA to carry out a study examining community water needs, including in rural areas, and provide recommendations on how to better provide affordable and safe drinking water and wastewater.

- The Act creates a program to facilitate grants to link households to public water infrastructure.

A. *Reducing lead in drinking water*:

- The Act facilitates several initiatives to reduce lead in drinking water infrastructure, including a pilot program to help communities use mapping information. It also authorizes funding to address lead in school drinking water systems.

- The Act authorizes funding under the Federal Water Pollution Control Act, or the Clean Water Act, for research, investigations, training, and information at $75 million annually for FY 2022 through FY 2026.

- The Act authorizes funding for sewer overflow and stormwater reuse municipal grants at $280 million annually for FY 2022 through FY 2026, placing a particular emphasis on projects in rural communities.

- The Act directs EPA to create a clean water infrastructure resiliency and sustainability program to provide grants aimed at protecting water systems from weather events and cybersecurity risks.

- The Act directs EPA to create an efficiency grant program for small publicly owned treatment works to support water and energy efficiency in disadvantaged communities, as well as those in rural areas with a population of less than 10,000.

- The Act authorizes funding for the Clean Water State Revolving Loan Funds.

- The Act reauthorizes the Innovative Water Infrastructure Workforce Development program at $5 million annually for FY 2022 through FY 2026.

B. The Act also creates a federal interagency working group to report to Congress on bolstering the water and wastewater utility workforce.

C. The Act directs EPA to create a water data sharing pilot program aimed at ensuring the coordination of data and information regarding water quality and needs between state and local governments.

D. The Act reauthorizes the Water Infrastructure Financing and Innovation Act program at $50 million annually for FY 2022 through FY 2026.

E. The Act authorizes $1.1 billion for FY 2022 through FY 2026 to support projects to address storage for water and groundwater.

IX. Environmental Resiliency:

- The Act will make infrastructure resilient against impacts of climate change, cyber-attacks, and extreme weather events.

- The Act will mitigate the impact of climate change on millions of Americans particularly for people of colour who may be more vulnerable to climate change-related weather events.

- The IIJA will make communities safer and the nation's infrastructure more resilient to impacts of climate change and cyber-attacks: the aim will be to protect against droughts, heat, floods, and wildfires, in addition to investment in weatherization.

- The $47 billion investment represents the largest investment in the resilience of physical and natural systems in U.S. history.

X. Environmental Remediation:

- The Act will make the largest investment to tackle legacy pollution in U.S. history, to clean up Superfund and brownfield sites, and reclaim abandoned mines, and cap orphaned oil and gas wells (see also below).

- The IIJA will fund projects to remediate environmental harms, address legacy pollution that harms the public health of communities, and create union jobs, and advance overdue environmental justice objectives.

- The Act will seek to clean-up hundreds of thousands of former industrial and energy Superfund sites that are idle and sources of pollution in rural and urban communities and can cause elevated levels of lead in children's blood.

- The investment will benefit disadvantaged communities of colour and Hispanic communities that live in close proximity to Superfund sites.

XI. Other:

- The Act creates the Advanced Research Projects Agency-Infrastructure, or ARPA-I, program to fund projects and research to improve core infrastructure through technology and innovation.

XII. Other Key Provisions of the Act:

Carbon Removal:[11]

Carbon Capture, Storage, Utilization, and Transportation Infrastructure[12]:

In light of Congress's findings that carbon capture and storage technologies are necessary to reduce hard-to-abate emissions from the industrial sector, which emits nearly 25 percent of carbon dioxide emissions in the United States:

- Carbon removal and storage technologies, including direct air capture[13], must be deployed at large-scale in the coming decades to remove carbon dioxide directly from the atmosphere.
- Large-scale deployment of carbon capture, removal, utilization, transport, and storage is critical to achieve mid-century climate goals, and will drive regional economic development, technological innovation, and high-wage employment.
- Carbon capture, removal, and utilization technologies require a backbone system of shared carbon dioxide transport and storage infrastructure to enable large-scale deployment, realize economies of scale, and create an interconnected carbon management market.
- Carbon dioxide transport infrastructure and permanent geological storage are proven and safe technologies with existing Federal and State regulatory frameworks.
- Carbon dioxide transport and storage infrastructure share similar barriers to deployment previously faced by other types of critical national infrastructure, such as high capital

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[11] Division D – Title III – Fuels and Technology Infrastructure Investments.

[12] Ryan W. J. Edwards and Michael A. Celia, Infrastructure to enable deployment of carbon capture, utilization, and storage in the United States, PNAS September 18, 2018 115 (38) E8815-E8824; first published September 4, 2018; https://doi.org/10.1073/pnas.1806504115 (last accessed November 29, 2021). Climate change mitigation assessments consistently find that carbon capture, utilization, and storage is a crucial technology needed to reduce emissions of carbon dioxide to the atmosphere sufficiently to limit warming to the 2°C target of the Paris Agreement.

[13] Direct air capture (DAC) technologies extract CO_2 directly from the atmosphere. The CO_2 can be permanently stored in deep geological formations (thereby achieving negative emissions or carbon removal) or it can be used, for example in food processing or combined with hydrogen to produce synthetic fuels. Two technology approaches are used to capture CO_2 from the air: liquid and solid DAC. Liquid systems pass air through chemical solutions (e.g., a hydroxide solution), that removes the CO_2. The system reintegrates the chemicals back into the process by applying high-temperature heat while returning the rest of the air to the environment. Solid DAC technology makes use of solid sorbent filters that chemically bind with CO_2. When the filters are heated and placed under a vacuum, they release the concentrated CO_2, which is then captured for storage or use. Direct Air Capture – Analysis - IEA (last accessed November 30, 2021).

costs that require Federal and State support, in combination with private investment, to be overcome and

- Each state should take into consideration, with respect to new carbon dioxide transportation infrastructure qualifying the infrastructure as pollution control devices under applicable laws (including regulations) of the state and establish a waiver of ad valorem and property taxes for the infrastructure for a period of not less than 10 years.

1. *Carbon Utilization Program*:

   - Under the Act, an eligible entity will be entitled to use a grant to procure and use commercial or industrial products that use or are derived from anthropogenic or man-made carbon oxides and demonstrate significant net reductions in lifecycle greenhouse gas emissions compared to incumbent technologies, processes, and products.
   - A program for carbon capture technologies shall include a front-end engineering and design program for carbon dioxide transport infrastructure necessary to enable deployment of carbon capture, utilization, and storage technologies.

2. *Carbon Storage Validation and Testing*:

   - The Act requires the secretary of energy to establish a commercialization program under which the secretary will provide funding for the development of new or expanded commercial large-scale carbon sequestration projects and associated carbon dioxide transport infrastructure, including funding for the feasibility, site characterization, permitting, and construction stages of project development.
   - The term ‘carbon sequestration’ means the act of storing carbon dioxide that has been removed from the atmosphere or captured through physical, chemical, or biological processes that can prevent the carbon dioxide from reaching the atmosphere.

3. *Geologic Carbon Sequestration on the Outer Continental Shelf*:

- The term ‘carbon dioxide stream’ means carbon dioxide that has been captured and consists overwhelmingly of carbon dioxide plus incidental associated substances derived from the source material or capture process, and any substances added to the stream for the purpose of enabling or improving the injection process.
- The term ‘carbon dioxide stream’ does not include additional waste or other matter added to the carbon dioxide stream for the purpose of disposal.

4. *Direct Air Capture Hubs*:

- The Act provides for the establishment of regional direct air capture hubs or a network of direct air capture projects, potential carbon dioxide utilization off-takers, connected carbon dioxide transport infrastructure, subsurface resources, and sequestration infrastructure located within a region.
- The Act requires the secretary of energy to establish a program to provide funding for eligible projects that contribute to the development of regional direct air capture hubs.

- Each hub developed under the program:
    - Will be a regional direct air capture hub that facilitates the deployment of direct air capture projects
    - Has the capacity to capture and sequester, and utilize at least 1,000,000 metric tons of carbon dioxide from the atmosphere annually from a single unit or multiple interconnected units
    - Demonstrates the capture, processing, delivery, and sequestration or end-use of captured carbon and
    - Could be developed into a regional or interregional carbon network to facilitate sequestration or carbon utilization.
    - Each direct air capture hub eligible project will be located in a region with existing carbon-intensive fuel production or industrial capacity, or carbon-intensive fuel production or industrial capacity that has retired or closed in the preceding 10 years.
    - The Act requires eligible projects to contribute to the development of regional direct air capture hubs located in different regions of the United States.

5. *CIFIA*:

- The Act creates a Carbon Dioxide Transportation Infrastructure Finance and Innovation, or CIFIA, program to facilitate loans for projects to support carbon capture infrastructure.

A. *Hydrogen*:

1. *Hydrogen Research and Development*:

In light of Congress's findings that:

- Hydrogen plays a critical part in the comprehensive energy portfolio of the United States.
- The use of hydrogen resources of the United States promotes energy security and resilience.
- Provides economic value and environmental benefits for diverse applications across multiple sectors of the economy, and
- Hydrogen can be produced from a variety of domestically available clean energy sources, including renewable energy, biomass, fossil fuels with carbon capture, utilization, and storage, and nuclear power.

The Act establishes a program to:

- Accelerate research, development, demonstration, and deployment of hydrogen from clean energy sources by establishing a clean hydrogen strategy and roadmap for the United States.

- Develop a robust clean hydrogen supply chain and workforce by prioritizing clean hydrogen demonstration projects in major shale gas regions, regional clean hydrogen hubs, and authorizing appropriations to carry out the DOE Hydrogen Program Plan.
- The goals of the program will be to:
    - Advance research and development to demonstrate and commercialize the use of clean hydrogen in the transportation, utility, industrial, commercial, and residential sectors, and
    - Demonstrate a standard of clean hydrogen production in the transportation, utility, industrial, commercial, and residential sectors by 2040.
- The Act requires the secretary of energy in partnership with the private sector to:
    - Conduct activities to advance and support the establishment of a series of technology cost goals oriented toward achieving a standard of clean hydrogen production.
    - Facilitate the production of clean hydrogen from diverse energy sources, including fossil fuels with carbon capture, utilization, and sequestration, hydrogen-carrier fuels (including ethanol and methanol), renewable energy resources, including biomass, and nuclear energy.
    - Establish the use of clean hydrogen for commercial, industrial, and residential electric power generation, including in steelmaking, cement, chemical feedstocks, and process heat, for use as a fuel source for both residential and commercial comfort heating and hot water requirements.
    - Establish safe and efficient delivery of hydrogen or hydrogen carrier fuels, including transmission by pipelines, retrofitting existing natural gas transportation infrastructure systems to enable a transition to transport and deliver increasing levels of clean hydrogen, clean hydrogen blends, or clean hydrogen carriers, tanks, and other distribution methods.
    - Establish convenient and economic refuelling of vehicles, locomotives, maritime vessels, or planes at central refuelling stations, or through distributed onsite generation, advanced vehicle, locomotive, maritime vessel, or plane technologies, including engine and emission control systems, energy storage, electric propulsion, and hybrid systems, automotive, locomotive, maritime vessel, or plane materials, other advanced vehicle, locomotive, maritime vessel, or plane technologies, storage of hydrogen or hydrogen-carrier fuels, including the development of materials for safe and economic storage in gaseous, liquid, or solid form.
    - Establish the development of safe, durable, affordable, and efficient fuel cells, including fuel-flexible fuel cell power systems, improved manufacturing processes, high-temperature membranes, cost-effective fuel processing for

natural gas, fuel cell stack and system reliability, low-temperature operation, and cold start capability.

  - Establish the ability of domestic clean hydrogen equipment manufacturers to manufacture commercially available competitive technologies in the United States, and
  - Establish the use of clean hydrogen in the transportation sector, including in light, medium-, and heavy-duty vehicles, rail transport, aviation, and maritime applications and in coordination with relevant agencies, the development of appropriate, uniform codes and standards for the safe and consistent deployment and commercialization of clean hydrogen production, processing, delivery, and end-use technologies.

- The Act requires the secretary of energy to establish a program to develop four regional clean hydrogen hubs for $8 billion that demonstrate the production, processing, delivery, storage, and end-use of clean hydrogen, that can be developed into a national clean hydrogen network to facilitate a clean hydrogen economy based on feedstock end-use, and geographic diversity, and hubs in natural gas-producing regions.
- The Act requires the secretary to develop a national strategy and roadmap to:
  - Facilitate widescale production, processing, delivery, storage, and use of clean hydrogen including from natural gas, coal, renewable energy sources, nuclear energy, and biomass.
  - Identify potential barriers, pathways, and opportunities, including Federal policy needs, to transition to a clean hydrogen economy.
  - Identify economic opportunities for the production, processing, transport, storage, and use of clean hydrogen that exist in the major shale natural gas-producing regions of the United States, or for merchant nuclear power plants operating in deregulated markets.
  - Identify environmental risks associated with potential deployment of clean hydrogen technologies in those regions, and ways to mitigate those risks.
  - Identify approaches, including strategies, that reflect geographic diversity across the country, to advance clean hydrogen based on resources, industry sectors, environmental benefits, and economic impacts in regional economies.
  - Identify opportunities to use, and barriers to using, existing infrastructure, including all components of the natural gas infrastructure system, the carbon dioxide pipeline infrastructure system, end-use local distribution networks, end-use power generators, LNG terminals, industrial users of natural gas, and residential and commercial consumers of natural gas, for clean hydrogen deployment.

  - Identify needs for and barriers and pathways to developing clean hydrogen hubs (including, where appropriate, clean hydrogen hubs coupled with carbon capture, utilization, and storage hubs) that are regionally dispersed across the United States.
  - Identify opportunities to leverage natural gas to the maximum extent practicable and demonstrate the efficient production, processing, delivery, and use of clean hydrogen, including transportation corridors and modes of transportation, including transportation of clean hydrogen by pipeline and rail and through ports, and where appropriate, to serve as joint clean hydrogen and carbon capture, utilization, and storage hubs.
  - Prioritize activities that improve the ability of the DOE to develop tools to model, analyze, and optimize single-input, multiple-output integrated hybrid energy systems and multiple-input, multiple-output integrated hybrid energy systems that maximize efficiency in providing hydrogen, high-value heat, electricity, and chemical synthesis services.
  - Identify appropriate points of interaction between and among Federal agencies involved in the production, processing, delivery, storage, and use of clean hydrogen and clarifying the responsibilities of those Federal agencies.
  - Clarify potential regulatory obstacles and recommendations for modifications, in order to support the deployment of clean hydrogen, and geographic zones or regions in which clean hydrogen technologies can efficiently and economically be introduced to transition existing infrastructure to rely on clean hydrogen, in support of decarbonizing all relevant sectors of the economy.

- The Act provides that multiyear grants may be provided to eligible entities for research, development, and demonstration projects to advance new clean hydrogen production, processing, delivery, storage, and use equipment manufacturing technologies and techniques.
- The Act provides for multiyear grants to be awarded to eligible entities for research, development, and demonstration projects to:
  - Create innovative and practical approaches to increase the reuse and recycling of clean hydrogen technologies, including by increasing the efficiency and cost-effectiveness of the recovery of raw materials from clean hydrogen technology components and systems, including enabling technologies such as electrolyzers and fuel cells.
  - Minimize environmental impacts from the recovery and disposal processes, address any barriers to research, development, demonstration, and commercialization of technologies and processes for disassembly and recycling of devices used for clean hydrogen production.
  - Process, deliver, store, and use alternative materials, designs, manufacturing processes, and other aspects of clean hydrogen technologies.

- Develop alternative disassembly and resource recovery processes that enable efficient, cost-effective, and environmentally responsible disassembly of, and resource recovery from, clean hydrogen technologies, and
- Develop strategies to increase consumer acceptance of, and participation in, the recycling of fuel cells.

2. *Clean Hydrogen Electrolysis Program*:

- Under the Act, the secretary of energy is required to establish a research, development, demonstration, commercialization, and deployment program for purposes of commercialization to improve the efficiency, increase the durability, and reduce the cost of producing clean hydrogen using electrolyzers (i.e., systems that produce hydrogen using electrolysis).
- The goals of the program are to reduce the cost of hydrogen produced using electrolyzers to less than $2 per kilogram of hydrogen by 2026.
- The secretary will fund projects to demonstrate technologies that produce clean hydrogen using electrolyzers, and validate information on the cost, efficiency, durability, and feasibility of commercial deployment of electrolyzers.
- The program will focus on research that relates to:
    - The development, demonstration, and deployment of low-temperature electrolyzers, including liquid-alkaline electrolyzers, membrane-based electrolyzers, and other advanced electrolyzers, capable of converting intermittent sources of electric power to clean hydrogen with enhanced efficiency and durability.
    - High temperature electrolyzers that combine electricity and heat to improve the efficiency of clean hydrogen production, advanced reversible fuel cells that combine the functionality of an electrolyzer and a fuel cell.
    - New highly active, selective, and durable electrolyzer catalysts and electro-catalysts that reduce or eliminate the need for platinum group metals, and enable electrolysis of complex mixtures with impurities, including seawater, modular electrolyzers for distributed energy systems.
    - Low-cost membranes or electrolytes and separation materials that are durable in the presence of impurities or seawater, improved component design and material integration, including with respect to electrodes, porous transport layers and bipolar plates, and balance-of-system components, to allow for scale-up and domestic manufacturing of electrolyzers at a high volume, and
    - Clean hydrogen storage technologies, technologies that integrate hydrogen production with clean hydrogen compression and drying technologies, clean hydrogen storage, and transportation or stationary systems, and integrated systems that combine hydrogen production with renewable power or nuclear

power generation technologies, including hybrid systems with hydrogen storage.

B. *Hydroelectric production incentives*:

1. *Incentive payments*:

The Act provides that the secretary of energy will make incentive payments to owners or operators of qualified hydroelectric facilities for capital improvements directly related to:

- Improving grid resiliency, including adapting more quickly to changing grid conditions, providing ancillary services (including black start capabilities, voltage support, and spinning reserves[14]).
- Integrating other variable sources of electricity generation and managing accumulated reservoir sediments.
- Improving dam safety to ensure acceptable performance under all loading conditions (including static, hydrologic, and seismic conditions), including the maintenance or upgrade of spillways or other appurtenant structures.
- Dam stability improvements, including erosion repair and enhanced seepage controls, and upgrades or replacements of floodgates or natural infrastructure restoration or protection to improve flood risk reduction.
- Environmental improvements, including adding or improving safe and effective fish passage, including new or upgraded turbine technology, fish ladders, fishways, and all other associated technology, equipment, or other fish passage technology to a qualified hydroelectric facility.
- Improving the quality of the water retained or released by a qualified hydroelectric facility.
- Promoting downstream sediment transport processes and habitat maintenance, and
- Improving recreational access to the project vicinity, including roads, trails, boat ingress and egress, flows to improve recreation, and infrastructure that improves river recreation opportunity.

[14] Spinning reserves refers to generation capacity that is on-line but unloaded and that can respond within 10 minutes to compensate for generation or transmission outages. "Frequency-responsive" spinning reserve responds within 10 seconds to maintain system frequency. Spinning reserves are the first type used when shortfalls occur. Energy Storage Association, https://energystorage.org/spinning-reserve (last accessed December 1, 2021).

- Incentive payments shall not exceed 30 percent of the costs of the applicable capital improvement.

- The Act provides that not more than one incentive payment may be made with respect to capital improvements at a single qualified hydroelectric facility in any one fiscal year, the amount of which shall not exceed $5,000,000.

2. *Pumped Storage Hydropower Wind and Solar Integration System*:

- Under the Act, within a prescribed period, the secretary of energy shall enter into an agreement with certain eligible entities to provide financial assistance to carry out project design, transmission studies, power market assessments, and permitting for a pumped storage hydropower project[15] to facilitate the long-duration storage of intermittent renewable electricity.

- To be eligible for financial assistance a project shall be designed to provide not less than 1,000 megawatts of storage capacity, be able to provide energy and capacity for use in more than one organized electricity market, be able to store electricity generated by intermittent renewable electricity projects located on Tribal land and have received a preliminary permit from the Federal Energy Regulatory Commission.

- An eligible entity that receives financial assistance shall provide matching funds equal to or greater than the amount of financial assistance provided.

C. *Energy storage*:

- The Act provides that the secretary of energy will conduct a study of types and commercial applications of codes and standards applied to stationary energy storage systems, mobile energy storage systems, and energy storage systems that move between stationary and mobile applications, such as EV batteries or batteries repurposed for new applications.

- The secretary of energy is required to identify barriers, foster collaboration, and increase conformity across sectors that relate to:

  - Use of emerging energy storage technologies and vehicle-to-grid integration.

  - Existing codes and standards that apply to energy storage systems.

  - Codes and standards that require revision or enhancement.

[15] Pumped storage hydropower (PSH) is a type of hydroelectric energy storage. It is a configuration of two water reservoirs at different elevations that can generate power as water moves down from one to the other (discharge), passing through a turbine. The system also requires power as it pumps water back into the upper reservoir (recharge). PSH acts similarly to a giant battery because it can store power and then release it when needed. Water Power Technologies Office, U.S. Department of Energy, Pumped Storage Hydropower | Department of Energy (last accessed November 30, 2021).

- Enhancing the safe implementation of energy storage systems, and
- Receive formal input from stakeholders regarding existing codes and standards, and new or revised codes and standards.

- The secretary is required to consult with all relevant standards-developing organizations and other entities with expertise regarding energy storage system safety.

D. Solar Energy Technologies on Current and Former Mine Land:

- The Act requires the secretary of energy to establish a program to demonstrate the technical and economic viability of carrying out clean energy projects on current and former mine land.

- A clean energy project means solar, micro-grids, geothermal, direct air capture, fossil-fuelled electricity generation with carbon capture, utilization, and sequestration, energy storage, including pumped storage hydropower, compressed air storage, and advanced nuclear technologies.

- The secretary will give priority to the selection of solar projects, in particular, that provide opportunities for the greatest job-creation, have the greatest potential for technological innovation and commercial deployment, have the lowest levelized cost of generated or stored energy, have the lowest rate of greenhouse gas emissions per unit of electricity generated or stored, and have the shortest project time from permitting to completion.

Energy Efficiency:[16]

- The Act requires the secretary of energy to create a competitive grant program to provide support to states and other eligible entities to put into effect updated building energy codes.

- The Act creates a grant program to provide assistance to manufacturers to make updates to improve energy efficiency and cut waste and emissions.

- The Act creates a grant program to facilitate energy efficiency updates at schools.

- The Act creates a pilot program to facilitate grants to address the energy efficiency of non-profit buildings.

- The Act authorizes $3.5 billion for the Weatherization Assistance Program in FY 2022 and authorizes $550 million for the Energy Efficiency and Conservation Block Grant program in FY 2022.

[16] Division D – Title V – Energy Efficiency and Building Infrastructure.

E. Advanced Energy Manufacturing and Recycling Grant Program:

- The Act provides that the secretary of energy will develop a grant program for advanced energy properties that include:
    - Property designed to be used to produce energy from the sun, water, wind, geothermal or hydrothermal resources.
    - Enhanced geothermal systems, or other renewable resources, fuel cells, microturbines, or energy storage systems and components.
    - Electric grid modernization equipment or components.
    - Property designed to capture, remove, use, or sequester carbon oxide emissions.
    - Equipment designed to refine, electrolyze, or blend any fuel, chemical, or product that is renewable, or low-carbon and low-emission property designed to produce energy conservation technologies (including for residential, commercial, and industrial applications).
    - Light-, medium-, or heavy-duty electric or fuel cell vehicles.
    - Electric or fuel cell locomotives, electric or fuel cell maritime vessels, or electric or fuel cell planes, technologies, components, and materials of those vehicles, locomotives, maritime vessels, or planes.
    - Charging or refuelling infrastructure associated with those vehicles, locomotives, maritime vessels, or planes, and
    - Certain hybrid vehicles, and technologies, components, and materials for those vehicles, and other advanced energy property designed to reduce greenhouse gas emissions.
- The program will cover:
    - Qualifying energy projects that re-equips, expands, or establishes a manufacturing or recycling facility for the production or recycling, as applicable, of advanced energy property.
    - Re-equips an industrial or manufacturing facility with equipment designed to reduce the greenhouse gas emissions of that facility substantially below the greenhouse gas emissions under current best practices through the installation of low- or zero-carbon process heat systems, carbon capture, transport, utilization, and storage systems, technology relating to energy efficiency and reduction in waste from industrial processes, or
    - Any other industrial technology that significantly reduces greenhouse gas emissions that has a reasonable expectation of commercial viability and is located in particular geographic entities within counties.

F. Nuclear:

- The Act requires DOE to consider ways to enhance energy resilience and reduce carbon emissions with the use of micro-reactors (small nuclear modular reactors with an electric power production capacity that is not greater than 50 megawatts), and small modular reactors (an advanced nuclear reactor with a rated capacity of less than 300 electrical megawatts).

- The Act requires DOE to evaluate the current resilience and carbon reduction requirements for energy for facilities of DOE to determine whether changes are needed to address the need to provide uninterrupted power to facilities of DOE for at least three days during power grid failures, protection against cyber threats and electromagnetic pulses, and resilience to extreme natural events, including earthquakes, volcanic activity, tornados, hurricanes, floods, tsunamis, landslides, large quantities of snowfall, and very low or high temperatures.

- The Act requires DOE to develop a strategy for using nuclear energy to meet resilience and carbon reduction goals of facilities of DOE, and to partner with private industry to develop and deploy micro-reactors and small modular reactors to remote communities to replace diesel generation and other fossil fuels.

- The Act also requires DOE to assess the value associated with enhancing the resilience of a facility of DOE by transitioning to power from micro-reactors and small modular reactors and to co-located nuclear facilities with the capability to provide dedicated power to a DOE facility during a grid outage or failure.

- The Act directs the secretary of energy to create a program to evaluate nuclear reactors that are projected to cease operation and allocate credits sufficient to sustain operation.

G. Orphaned oil and gas wells:

- The Act directs the secretary of energy to create a program to provide aid to states to address orphaned oil and gas wells on federal lands, and also directs the secretary to create a program to provide similar assistance to tribes. In total, the Act authorizes $4.7 billion to help address orphaned wells.

H. Miscellaneous:

- The Act authorizes $3.3 billion for several activities to address and mitigate wildfires in FY 2022.

- The Act authorizes $2.1 billion for several activities to support ecosystem restoration for FY 2022 through FY 2026.

- The Act authorizes $3.2 billion for the Bureau of Reclamation to execute extraordinary maintenance work.

XI. Cybersecurity:

- The Act authorizes the secretary of the Department of Homeland Security (DHS) and the national cyber director to declare a "significant cybersecurity incident" and coordinate a federal response.
- The Act establishes a Cyber Response and Recovery Fund to assist federal, state, local, and tribal entities respond to and recover from a declared significant incident.
- The Act establishes a state and local cybersecurity grant program administered by DHS.

XII. Auction of Spectrum:

- The Act directs the FCC, in consultation with the Commerce Department, to conduct an auction of spectrum the Federal government has determined could be made available on a shared basis between federal and non-federal use.

XIII. Critical Minerals Supply Chains:

- The Act requires improvements in the quality and timeliness of Federal permitting and review processes and related supply chains with respect to critical mineral production on Federal land in light of Congress's direction that critical minerals are fundamental to the economy, competitiveness and security of the United States.

XIV. Build America Buy America:

- The Act provides for the Build America Buy America program in accordance with Congress's requirements that have been part of domestic content procurement preference laws for over 75 years to ensure that the United States can build and rebuild the infrastructure of the United States with high-quality American-made materials.
- The Act provides that domestic content procurement preference laws are fully consistent with the international obligations of the United States, and together with government procurements to which the laws apply, are important instruments for ensuring that United States manufacturers can access the government procurement markets of the trading partners of the United States.
- The term ''domestic content procurement preference'' means a requirement that no amounts made available through a program for Federal financial assistance may be obligated for a project unless all iron and steel used in the project are produced in the United States, the manufactured products used in the project are produced in the United States, or the construction materials used in the project are produced in the United States.
- The Act requires the development of a domestic supply base to support intermodal transportation in the United States, such as intercity high speed rail transportation, public

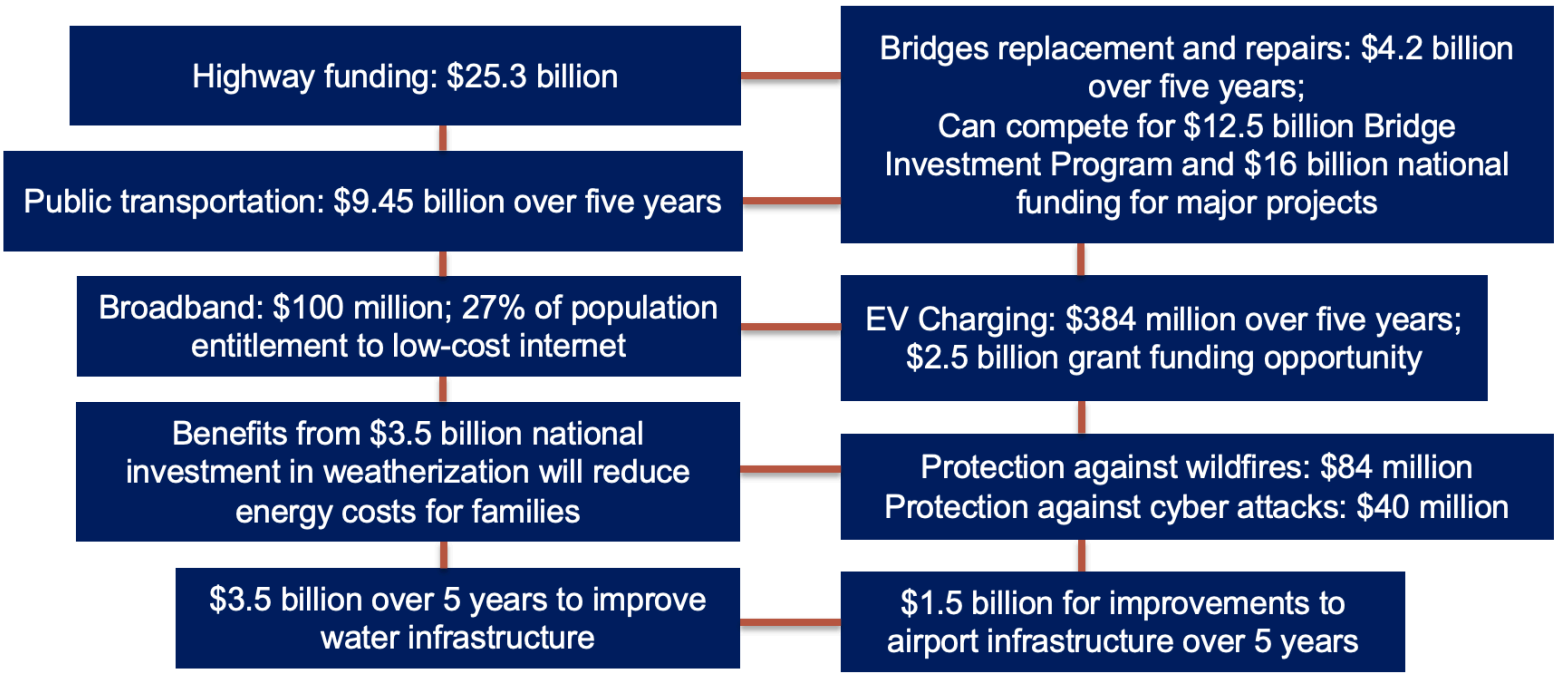
transportation systems, highway construction or reconstruction, airport improvement projects, and other infrastructure projects.

XV. Impact of the Act on States:

- Under the Act, each state is allocated funding to meet its infrastructure needs. Approximately, $300 billion in formula grants, including allocations to the Highway Trust Fund, will be disbursed through the Act. These formula grants provide predetermined funding to states based on various factors, such as population size. Most formula-based funding is dedicated to roads and bridges.

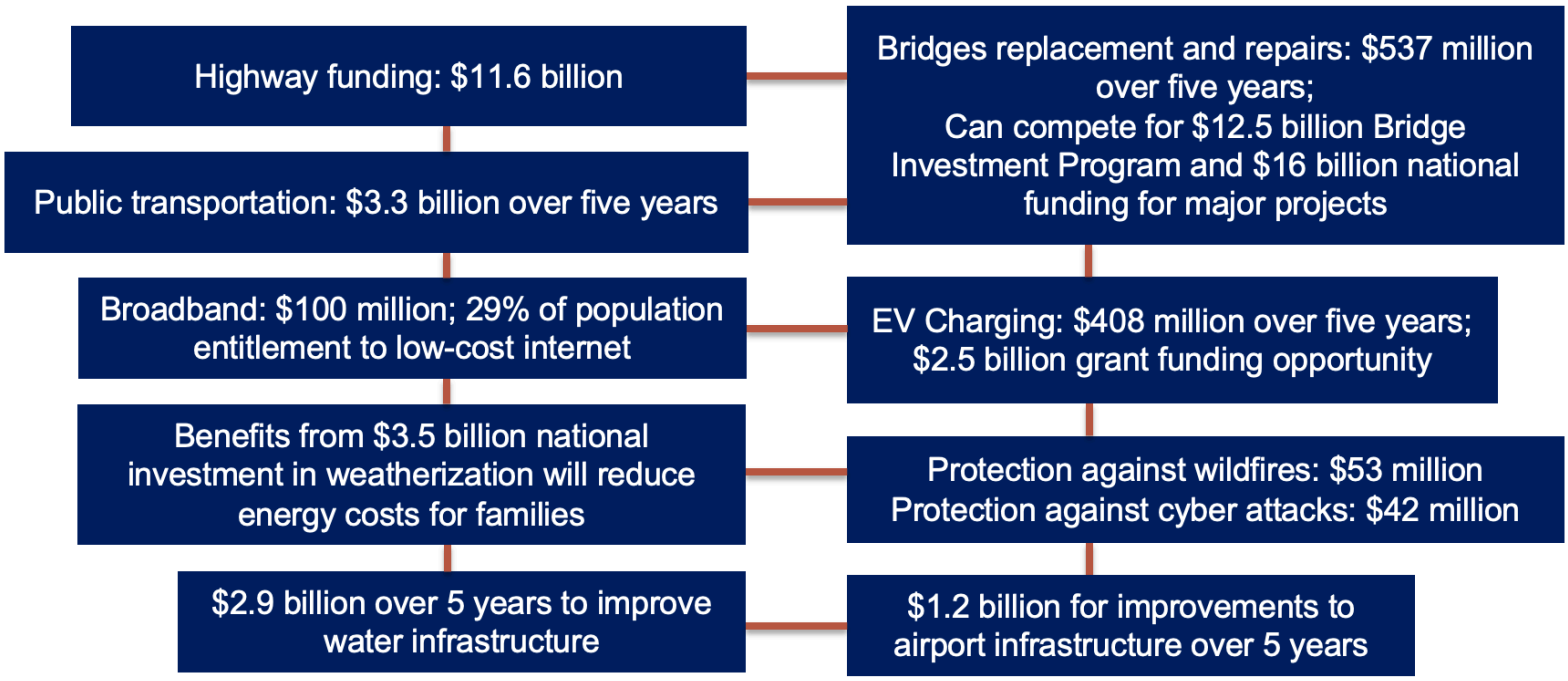
- Set forth below are examples of how the Act will impact California, New York, and Texas, three of the four largest states in the nation.[17]

A. ***California***:

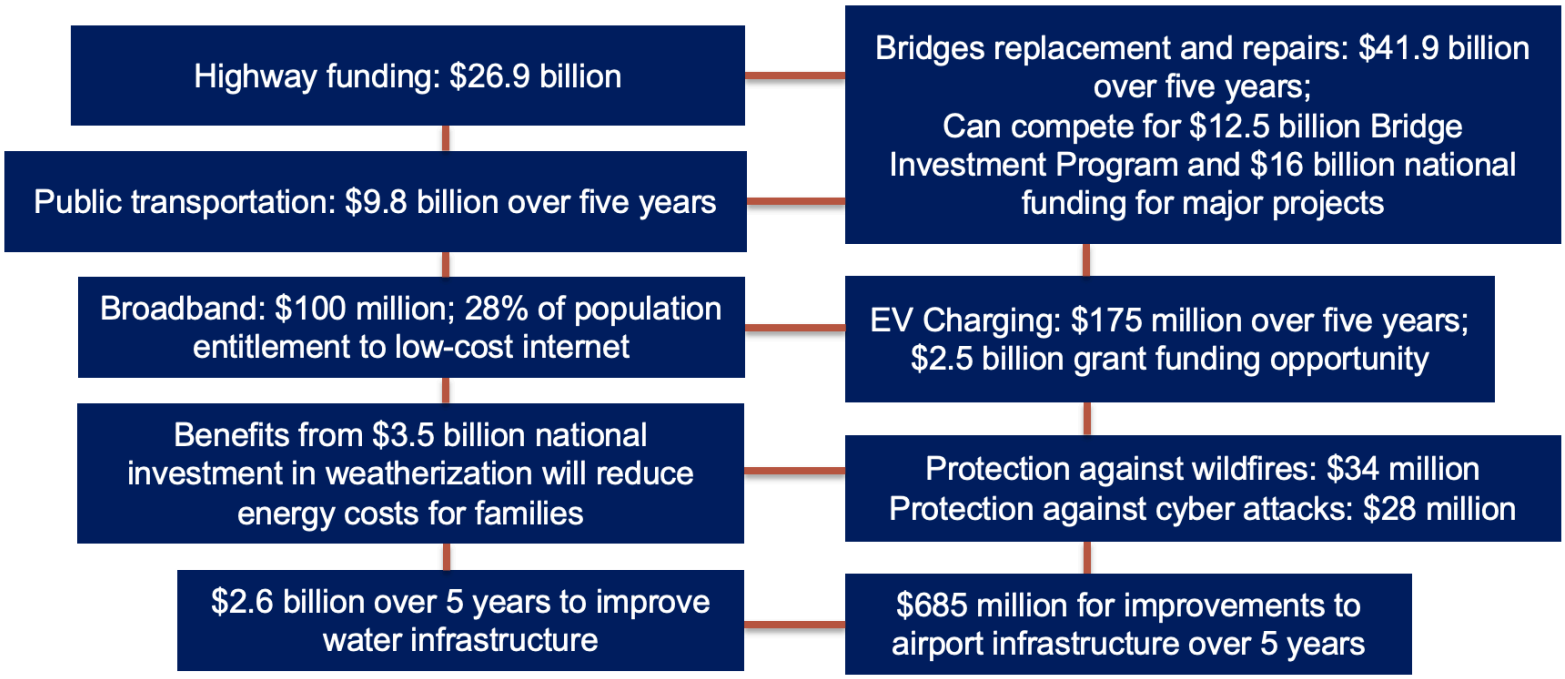


[17] Estimates subject to change.

B. ***New York***:



C. ***Texas***:



XVIII. Proposed Financing Sources for New Investment under IIJA:

- Reduce the Internal Revenue Service tax gap.[18]
- Unemployment insurance program integrity.[19]
- Redirect unused unemployment insurance relief funds.
- Repurpose unused relief funds from 2020 emergency relief legislation.
- State and local investment in broadband infrastructure.
- Allow states to sell or purchase unused toll credits for infrastructure.
- Extend expiring customs user fees.
- Reinstate Superfund fees for chemicals.
- 5G spectrum auction proceeds.
- Extend mandatory sequester.[20]
- Strategic petroleum reserve sale
- Public-private partnerships, private activity bonds, direct pay bonds and asset recycling for infrastructure investment.
- Macroeconomic impact of infrastructure investment.

XIX. Cost:

- The Congressional Budget Office estimates[21] that over the 2021-2031 period, enacting Senate Amendment 2137 to H.R. 3684 would decrease direct spending by $110 billion,

[18] The tax gap is the gap between what taxpayers owe the U.S. government, and what the government actually collects from taxpayers. Tax compliance efforts ensure that tax law applies evenly to all taxpayers. Reducing the tax gap is, on the margin, a good way to raise revenue, but is not without costs. Policymakers should consider compliance costs for law abiding taxpayers as well as administrative costs for the IRS when evaluating measures to reduce the tax gap. Improvements to the IRS's technological infrastructure could reduce the tax gap while not creating new burdens for taxpayers. Simplifications to the tax code itself could help reduce both the tax gap and compliance costs.

[19] With a few simple data checks, states can ensure that those receiving unemployment payments are actually eligible and can protect and restore program integrity, preserving resources for the truly needy and saving tax dollars.

[20] Sequestration is a cancellation of budgetary resources by the President—required by statute—in all non-exempt programs and accounts.

increase revenues by $50 billion, and increase discretionary spending by $415 billion. The legislation would therefore add $256 billion to projected deficits over that period.

IX. Appropriations:

The principal appropriations[22] under the Act are as follows:

1. $2.8 billion for the National Oceanic and Atmospheric Administration (NOAA).
2. $11.6 billion for U.S. Army Corps of Engineers construction, with which the secretary of army is permitted to initiate new construction starts.
3. $2 billion for the Rural Utilities Service distance learning, telemedicine, and broadband program.
4. $42.5 billion for the Broadband Equity, Access, and Deployment Program.
5. $2 billion to the Broadband Connectivity Fund for grants under the Tribal Broadband Connectivity Program.
6. $2.8 billion for Digital Equity.
7. $1 billion for middle mile deployment.
8. $5 billion for the Federal Energy Management Agency (FEMA) flood mitigation and pre-disaster mitigation programs.
9. $450 million for recycling, consumer materials management, and pollution prevention grants at the EPA.

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[21] Congressional Budget Office, Cost Estimate Senate Amendment 2137 to H.R. 3684, the Infrastructure Investment and Jobs Act, as Proposed on August 1, 2021, revised August 9, 2019, Senate Amendment 2137 to H.R. 3684, the Infrastructure Investment and Jobs Act | Congressional Budget Office (cbo.gov) (last accessed December 1, 2021).

[22] An appropriation is a legislative act authorizing the expenditure of a designated amount of public funds for a specific purpose. It may also be used synonymously with annexation to refer to the unification or merging by incorporation of something, such as land. The Federal Government Accountability Office (GAO) publishes the Principles of Federal Appropriations Law, which includes a discussion of the statutes and regulations governing appropriations matters as well as references to significant issues rendered by the Comptroller General and the courts.

Some states, to assure adequate funding, require that no general appropriation law or other law appropriating money for any state purpose shall be enacted if the appropriation contained in it, together with all prior appropriations made for the same fiscal period, exceeds the total amount of revenue on hand and anticipated which will be available to meet such appropriations during such fiscal period.

10. $618 million for the Department of Agriculture Natural Resources Conservation Service Watershed program.

11. $75 million for Water Infrastructure and Finance and Innovation Act (WIFIA).[23]

12. $8.3 billion for the Bureau of Reclamation's water and related resources projects.

13. $16.2 billion for energy efficiency and renewable energy within DOE.

14. $8.1 billion for electricity within DOE.

15. $6 billion for nuclear energy to carry out activities within the Civil Nuclear Credit Program.

16. $7.4 billion for fossil energy and carbon management within DOE.

17. $2.1 billion for Carbon Dioxide Transportation Infrastructure Finance and Innovation Program Account, as created under the Act within DOE.

18. $21.4 billion for Office of Clean Energy Demonstrations within DOE.

19. $1.3 billion for the Appalachian Development Highway System.

20. $11.2 billion for Abandoned Mine Reclamation Fund.

21. $1.4 billion for wildland fire management within DOI.

22. $4.6 billion for an Energy Community Revitalization program within DOI to address orphaned oil and gas wells.

23. $696 million for Forest Service wildland fire management.

24. $2.1 billion for National Forest System hazardous fuels reduction.

25. $1.5 billion for state and private forestry funds for wildfire mitigation efforts.

26. $55.4 billion for EPA state and tribal assistance grants, including to support clean water state revolving funds and drinking water state revolving funds.

27. An additional $13.8 billion for Clean Water State Revolving Fund and Drinking Water State Revolving fund from FY 2022 through FY 2026.

28. $3.5 billion for Indian health facilities within the Department of Health and Human Services.

[23] A federal credit program administered by the EPA for eligible water and wastewater infrastructure projects to improve dams.

29. $3.4 billion for ecosystem restoration programs at the EPA, U.S. Fish and Wildlife Service, and NOAA.

30. $100 million for the Cyber Response and Recovery Fund through the Cybersecurity and Infrastructure Security Agency.

31. $1 billion for a state, tribal, and territorial grant program administered by FEMA.

32. $157.5 million for the DHS's Science and Technology Directorate for Research and Development.

33. $35 million for Risk Sector Management through the Cybersecurity and Infrastructure Security Agency.

34. $21 million for the Office of the National Cyber Director.

35. $5 billion for the EPA's Superfund and Brownfields Program.

36. $3.4 billion to the General Services Administration for construction, acquisition, repairs, and alterations of border stations and land ports of entry.

37. $15 billion to the Drinking Water State Revolving Fund program to replace lead service lines, with 49% of the funding distributed by the states as forgivable loans or grants.

38. $10 billion to address per- and polyflouroalkyl substances.

39. $14.2 billion for the renamed broadband affordability program, the "Affordable Connectivity Fund."

40. $12.5 billion for National Infrastructure Investments grants, previously known as TIGER and BUILD grants.

41. $5 billion for Facilities and Equipment within the Federal Aviation Administration.

42. $15 billion for Airport Infrastructure Grants.

43. $5 billion for an Airport Terminal Program to update terminal infrastructure.

44. $27.5 billion to the Federal Highway Administration for the improvement of bridges.

45. $5 billion for a National Electric Vehicle Formula Program to support necessary infrastructure for electric vehicles.

46. $3.2 billion for infrastructure grants under the Act.

47. $9.2 billion for the Bridge Investment Program.

48. $5 billion for the Federal Railroad Administration's Consolidated Rail Infrastructure and Safety Improvements grant program.

49. $6 billion for Amtrak's Northeast Corridor and $16 billion for Amtrak's National Network.
50. $36 billion for Federal-State Partnership for Intercity Passenger Rail Grants.
51. $8 billion for the Federal Transit Administration's (FTA) Capital Investment Grants.
52. $5.3 billion for the FTA's Low or No Emission grant program.
53. $4.8 billion for the FTA's State of Good Repair grant program.
54. $2.2 billion for the Aging Infrastructure Account.
55. $500 million for the Western Area Power Administration.
56. $100 million for the Drought Contingency Plan.
57. $1 million for the Soil and Snowpack Monitoring Pilot Program.

XXI*. *Concluding Observations:

The Act is expected to have a significant impact not only on surface transportation, replacing lead water pipes, and building out broadband networks, but also on critical aspects of the energy transition.

The IIJA provides support for technologies, including low carbon hydrogen, carbon, capture, use and storage, direct air capture, energy efficiency, and nuclear energy that may be particularly important for the U.S. as it moves towards net-zero emissions before 2050, which is when President Biden hopes the U.S. will meet this target.

The Act is likely to favorably impact equipment manufacturers and developers of infrastructure assets, including distributed energy resources, transmission capacity, and EV chargers.

The Act's provisions designed to facilitate energy storage and pumped hydro storage are likely to contribute materially to the successful development of these projects by developers.

The express support for public-private partnerships in the transportation sector and for transmission projects, in particular, is likely to be beneficial since these types of projects have had difficulty in gaining traction in the past.

Since the Act was passed with bipartisan support, it stands the best chance of remaining resilient in changes to future administrations before 2050.

Wide-ranging and comprehensive legislation of the kind contemplated by the Act is likely to have some omissions and drawbacks.

The Buy America provisions of the Act may lead to increases in costs, particularly if U.S. industry is not competitive with goods sourced from competitors of the U.S., such as China.

Federal and state administrations will face challenges in administering and implementing the provisions of the Act on a sustainable basis, including balancing equity and efficiency, scaling-up grant and loan programs rapidly, and avoiding delays that undermine the objectives of the Act.

Overall, though the Act commits billions of dollars and regulatory changes to accelerate development of technologies that may not be cost-competitive now but may have a role to play in the future, including hydrogen, carbon capture, and advanced nuclear.