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Related Links

- Framework for a TIEER Pilot Study
- Qualitative Lifecycle Analysis of Rail Tie Materials Report
- Locomotive Replacement Initiative First Year Summary
- Rail Resiliency Bulletin - July 2024
- FRA Justice40 Rail Explorer Tool
- Locomotive Replacement Grant Information and Tools
- U.S. National Blueprint for Energy and Emissions Innovation in Transportation

Contact FRA's Climate and Sustainability Program

Email:
FRASustainability@dot.gov

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FRA's Climate and Sustainability Program

A transportation goal of the Infrastructure Investment and Jobs Act (IIJA), passed in November 2021, is to improve public safety and climate resilience. FRA is also required by Executive Order #14057 to decarbonize and reduce FRA's own impact on the environment through its actions and facilities. In response, FRA has pledged to help make our nation's rail network safer, more reliable, resilient, sustainable, and equitable.

As part of this effort, FRA launched its Climate and Sustainability Program. The Program coordinates FRA activities and initiatives that improve air quality and reduce greenhouse gas (GHG) emissions, and also promotes the sustainability and resiliency of the rail network. This work happens across multiple FRA offices.

- FRA grant programs are aimed at expanding and improving the passenger and freight rail network to encourage freight and passenger mode shift to efficient rail transportation.
    - IIJA provisions in the Consolidated Rail Infrastructure and Safety Improvements (CRISI) grant program fund the purchase of cleaner locomotives as well as fund the largest expansion of America's passenger rail network since the creation of Amtrak.
- The Office of Railroad Safety is responsible for assuring the safety of new technologies operating on the rail network.
- The Office of Research, Data, and Innovation funds and conducts research and studies to provide critical information related to rail safety and technology to the rail industry and public.

The Climate and Sustainability Program organizes these and other efforts to assist the rail industry in reducing pollution, building resilient infrastructure, and creating a sustainable rail network. The Program has three primary focus areas covering emissions reductions, resiliency, and sustainability, with individual initiatives supporting the goals of each focus area. The three focus areas are:

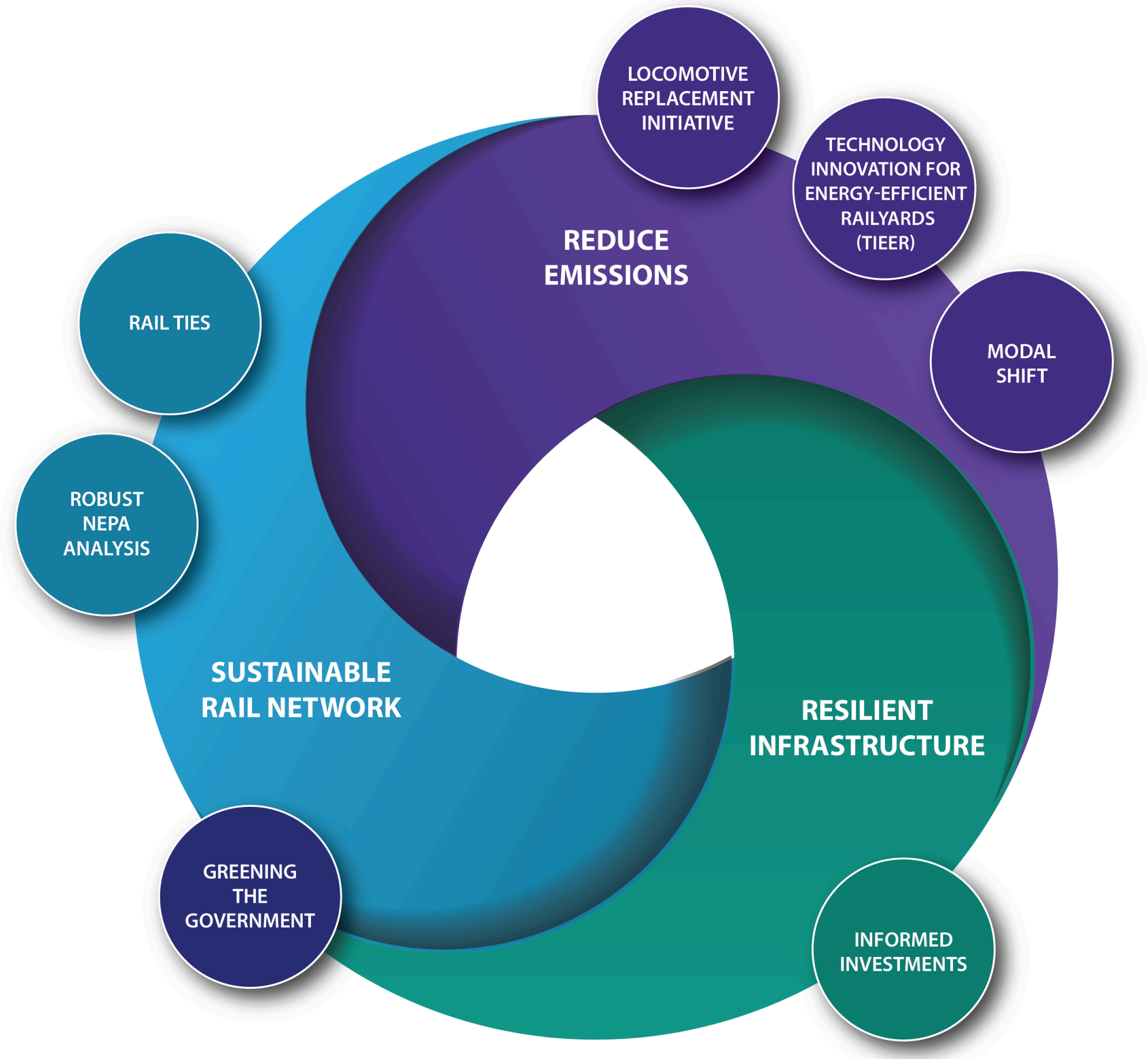
- **Focus Area I: Reduce Emissions**
  This focus area centers on reducing pollution and GHG emissions from the rail sector, specifically from locomotives and railyard equipment. Locomotive emissions are the primary source of both EPA criteria pollutants and GHG emissions, but this focus area also includes reducing emissions from maintenance and construction and reducing the embodied carbon in materials used in the rail network. Modal shift efforts also support the goal of reducing emissions from the transportation sector.

- **Focus Area II: Resilient Infrastructure**
  This focus area addresses resiliency and the impacts of severe weather and sea level rise on new and existing rail infrastructure. The goal of this focus area is to integrate resiliency concepts into FRA's programs, including programs that fund infrastructure to ensure federal investments consider present and future climate change–related effects. In addition, initiatives under this area will focus on developing more information on how the rail network can serve as a critical asset in emergency response, evacuation, and rebuilding activities from climate disasters.

  Threats from climate change include increased and stronger hurricanes, tornados, and storm intensities. Extreme heat can buckle rails, creating slowdowns and derailments. Sea level rise threatens coastal infrastructure, and increased rainfall/precipitation events threaten rail infrastructure near rivers and valleys. Building resilient infrastructure ensures an easier-to-maintain state of good repair and sound fiscal investments from FRA grant programs. However, key data is often lacking for all modes of transportation to inform engineering standards that would best support resilient infrastructure investments.

- **Focus Area III: Sustainable Rail Network**
  Beyond reducing emissions and assuring resiliency, FRA works to ensure that construction projects and maintenance of the rail network adhere to all applicable environmental requirements to minimize impacts on the environment. This focus area covers a range of sustainability activities, including alternative uses for transportation rights-of-way, climate education and workforce development, and analyzing the environmental effects of FRA-funded projects, including effects from climate change. Sustainability activities also include having a robust process to check compliance with the National Environmental Policy Act (NEPA) and associated laws, as well as providing information on the products and materials used in the rail network. Initiatives under this focus area will also include research activities and information gathering on the use of sustainable materials to address the full lifecycle of impacts from the rail sector.

Individual initiatives or actions fall within the three focus areas as shown by this graphic. Click on an initiative to find out more about it.



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Individual Initiatives

Reduce Emissions

FRA Locomotive Replacement Initiative
The goal of the FRA Locomotive Replacement Initiative (LRI) is to encourage railroads to replace older, high-polluting, and less fuel-efficient locomotives with newer low- and zero-emission locomotives. The LRI seeks to leverage FRA's existing funding and research programs to support industry efforts.

Technology Innovation for Energy-Efficient Railyards (TIEER)
This initiative focuses on developing criteria to reduce hazardous air pollutants and GHGs from equipment use in railyards and, consistent with existing authorities, prioritizing railyards that affect disadvantaged communities, including communities with environmental justice concerns. Similar to the LRI, FRA aims to leverage its existing authorities to integrate these efforts across its financial assistance, research, and safety programs, though new funding may be required to achieve the goals of the initiative.

Modal Shift

This initiative focuses on shifting freight and passenger trips to rail in markets where other modes (e.g., air or highway) are less efficient. The Infrastructure Investment and Jobs Act (IIJA) established new authorities for passenger rail development and provided an infusion of funding for existing FRA programs. This initiative aims to ensure that decarbonization and the goal of net-zero emissions is integrated into FRA's IIJA implementation.

Resilient Infrastructure

Informed Investments

Under IIJA, FRA administers billions of dollars in grant programs, most of which construct new or maintain existing rail infrastructure. The known threats to rail infrastructure should inform investments that can withstand predicted climate impacts. However, more information is needed for project managers and applicants to identify at-risk infrastructure and to determine the appropriate level of engineering to prevent anticipated impacts. This initiative aligns with FRA's goals to make sound financial investments and to assure the proper expenditure of grant funding. Recent executive orders also require consideration of climate resiliency in grant funding.

Sustainable Rail Network

Rail Ties

The Rail Ties initiative helps the industry identify ways to reduce the environmental impact from rail ties, including the disposal of used creosote-treated rail ties. Other materials such as concrete can be used for rail ties. This initiative seeks to provide information and guidance on minimizing lifecycle environmental impacts of rail ties. In addition, changing the composition of concrete to reduce carbon dioxide (CO_2) emissions requires an understanding of how different concrete mixtures affect the durability of concrete rail ties.

Robust National Environmental Policy Act (NEPA) Analysis

The Robust NEPA Analysis initiative ties in with existing FRA goals to conduct the NEPA analysis for project delivery in an efficient, complete, and timely manner. Recent guidance from the Council on Environmental Quality (CEQ), which promulgates NEPA regulations, focuses on how to address GHG emissions and resiliency in NEPA analysis. In addition, the goal of NEPA is to avoid, minimize, or mitigate significant environmental impacts from FRA-funded projects. These actions contribute to sustainable rail infrastructure development.

Recent FRA activities, reports, research, resources, and other helpful information is available below.

Greening the Government

Executive Order (E.O.) 14057, "Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability," requires the Federal government to lead by example to achieve a carbon pollution–free electricity sector by 2035 and net-zero emissions economy-wide by no later than 2050. FRA's implementation of E.O. 14057 includes utilizing renewable energy for FRA-owned physical facilities; transitioning FRA's leased light-duty vehicle fleet to zero-emission vehicles; and supporting net-zero emissions from Federal procurement, including a Buy Clean policy to promote the use of construction materials with lower embodied emissions.

FRA Recent Events

International Workshop on Rail Decarbonization: The FRA Offices of Railroad Safety, and Research, Data and Innovation hosted an international workshop on rail decarbonization from May 15-18, 2023 in Denver, CO. The workshop convened in-person discussions between U.S. and international rail and clean energy experts on rail decarbonization technologies and strategies. Presentations covered topics related to advanced energy storage and rail propulsion systems, hydrogen fuel, bioenergy technologies, and more. Discussions also focused on the safety of clean energy technologies, operating best practices for improving efficiency, and reducing Greenhouse Gas Emissions (GHGs) from freight and passenger rail systems in the U.S. and globally.

U.S. National Blueprint for Transportation Decarbonization: On January 10, 2023, the Biden-Harris Administration released The U.S. National Blueprint for Transportation Decarbonization: A Joint Strategy to Transform Transportation. Developed by the Departments of Energy, Transportation, Housing and Urban Development, and the Environmental Protection Agency, the Blueprint is a landmark strategy for cutting all greenhouse emissions from the transportation sector by 2050. It exemplifies the Biden-Harris Administration's whole-of-government approach to addressing the climate crisis and meeting President Biden's goals of securing a 100% clean electrical grid by 2035 and reaching net-zero carbon emissions by 2050. The Blueprint builds on the Infrastructure Investment and Jobs Act and Inflation Reduction Act, which together represent historic investments in the future of our nation that will transform how we move and live while we build the backbone of a safer and more sustainable transportation system.

FRA Climate Challenge: On April 22, 2022 in its Earth Day Press Release, FRA announced its rail industry Climate Challenge. The agency is asking owners and operators along the national rail network, and manufacturers of rail equipment, to join FRA's commitment to reach net-zero greenhouse gas emissions in the rail industry and rail transportation by 2050. Achieving this target will contribute to FRA's key goals of building a safe, efficient, and modern transportation system that will expand economic opportunities, create cleaner and safer communities, and help avert the worst effects of climate change. Simultaneously, FRA's Climate Challenge will promote the country's global leadership in innovation and climate protection.

Environmentally Sustainable Energy Workshop: In September 2021, FRA brought together industry and agency experts to discuss the next-gen technologies that will power the future of rail transportation and support decarbonization. The domestic and international participants included Class I railroads, AAR, UIC Shift2Rail, EPA, Sandia National Labs, and railroad equipment manufacturers. The workshop highlighted research on energy efficiency and technologies to address climate change and advanced the short- and long-term research roadmap.

NEC FUTURE: NEC FUTURE is FRA's comprehensive plan for improving the Northeast Corridor (NEC) from Washington, D.C., to Boston, MA. Through NEC FUTURE, FRA has worked closely with NEC states, railroads, stakeholders, and the public to define a long-term vision for the corridor's future. The Record of Decision describes this vision, referred to as the Selected Alternative. FRA will work with the NEC Commission, as well as states and railroads, on service development planning in support of the Selected Alternative. Learn more about the progress made.

FRA Research

Climate Change: Climate change results in an increasing risk to the safety, effectiveness, equity, and sustainability of our transportation infrastructure and the communities it serves. FRA will also be a leader within the rail network to fight climate change as the industry continues to move goods and people around the country.

- Technical Reports and Research Results on Rail-Related Climate Change

Energy: Transforming railroad power to clean and renewable fuels is critical in responsibly protecting the environment. Shifting the propulsion and general operation of locomotives from traditional energy to sustainable fuel sources will be beneficial to the health of the rail industry and our planet.

- Technical Reports and Research Results on Rail-Related Energy

Resilience: The rail network faces challenges from the impacts of climate change including increased heat events, more frequent and severe flooding, sea-level rise, hurricanes, tornadoes and other storm events exacerbated by the changing climate. FRA must ensure its investments will be able to withstand the impacts of climate change and will focus on building to standards that create a resilient rail network.

- Technical Reports and Research Results on Rail-Related Resilience

Funding Opportunities

Climate Funding Opportunities for Rail

Federal funding sources may apply to rail projects to address climate-related issues. Note that not all funding sources may be listed in this document as new initiatives may become available after the publication of this chart. In addition, other FRA grant programs for rail development may not be specifically focused on climate issues but are also available to rail stakeholders.

Administration and Departmental Resources

Administration Climate Efforts

- FACT SHEET: President Biden's Leaders Summit on Climate
- FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies
- FACT SHEET: President Biden Takes Executive Actions to Tackle the Climate Crisis at Home and Abroad, Create Jobs, and Restore Scientific Integrity Across Federal Government

U.S. DOT Climate Efforts

- U.S. DOT Climate Change Center
- Federal Aviation Administration: Climate Action Plan
- Federal Highway Administration: Environment
- Federal Transit Administration: Climate Considerations

Resources from Rail Partners

EPA SmartWay Program: Helps companies advance supply chain sustainability by measuring, benchmarking, and improving freight transportation efficiency.

AAR Climate Change Report

Amtrak Climate Adaptation

International Energy Agency's June 2020 Report

U.S. Department of Energy's Transportation Energy Data Book

Rail: Getting On Track for Decarbonization

Last updated: Thursday, January 16, 2025

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