

An Infrastructure Policy Framework for the U.S. Aluminum Industry



Background

America's infrastructure – the backbone of our economy – is in a state of disrepair that now urgently requires new funding, innovative thinking and decisive action. While many policy issues are important but abstract, underinvestment in infrastructure is a concern that has tangible effects on the daily lives of every family, community and manufacturer in the United States.

In its latest Failure to Act report, the American Society of Civil Engineers estimates that inaction by Congress will cost the average American household \$3,300 per year over the next two decades, result in more than 3 million jobs lost (half of which are high-wage and high-production jobs like manufacturing) and lead to \$10.3 trillion in lost GDP growth by 2039.¹ Politicians and voters across the political spectrum agree that Congress must make thoughtful changes to status quo investment levels that will provide taxpayers with a return on their investment over the next 20 years.

The investment gap in infrastructure also presents Congress with a unique opportunity to influence the trajectory of our economy for years to come – and the United States is not the only nation to recognize that. In the midst of the COVID-19 pandemic, the European Union's long-term budget coupled with a stimulus package, known as NextGenerationEU, will invest €1.8 trillion to make Europe greener and more resilient. More than 50 percent of their investment is in new priorities such as research and innovation, climate preparedness, and resilience.² In the wake of President Xi Jinping's UN announcement that China will peak its CO2 emissions before 2030 and reach carbon neutrality before 2060, Premier Li Keqiang announced a vast infrastructure-focused approach to the recovery that includes digital infrastructure, smart cities and smart manufacturing, in addition to regular infrastructure projects.³ China will also be making large investments in research and development, as well as smart energy infrastructure that analysts expect to total ¥10 trillion to 17.5 trillion by 2025.⁴ Our nation's top competitors are leveraging the opportunity to use their COVID recovery funds to invest in tomorrow's economy

Aluminum is one of only eight mineral commodities on the United States Geological Survey (USGS) Critical Minerals List that are listed as essential to all critical sectors of the U.S. economy.⁵ It has attributes that make it the material of choice in our electric grid, in electric vehicles, in energy-efficient building construction, and in the resilient bridges of the future. Aluminum is the ideal material for the 21st century circular economy because both the material and the market-driven economics work together, and it can be recycled over and over again without degradation. Among competing materials, aluminum stands out as the best solution to the resiliency issues that have plagued our nation's aging infrastructure.

The Aluminum Association urges the Biden Administration and Congress to:

1. Increase long-term funding and programmatic support to our nation's recycling infrastructure to increase material collection and to deploy next-generation technology that can make recycling even more cost-effective and efficient.
2. Place a down payment on modernizing our electric grid in order to make it more resilient and more secure, and to expand opportunities for a modern fleet of electric vehicles.
3. Expand the buildout of energy-efficient buildings that last longer and reduce operating costs.
4. Improve bridge safety by utilizing recent advances in engineering that allow green construction and by retrofitting with materials like aluminum that have been shown to last longer and be cost effective.
5. Increase truck weight limits on interstate highway systems to accommodate modern freight capacity.
6. Promote a reliable and resilient supply chain for aluminum as a critical material for infrastructure projects. A coordinated federal strategy would support innovation and invest in the long-term stability of primary aluminum production, fund the deployment of technology to increase U.S. production of high purity aluminum, and facilitate crucial supply chain partnerships.

Guiding Principles & Critical Applications

- The economy of tomorrow will be circular, and aluminum is critical to the success of that economy. A private sector-led shift from linear to circular economy brings efficiency gains that will generate an estimated \$1 trillion GDP boost annually and create more than 100,000 new jobs by 2025.⁶ From From Apple iPads to the rise of canned drinking water, companies are recognizing the business model efficiencies aluminum brings as a material. While aluminum is the most valuable material in the recycling bin, over \$800 million worth of aluminum is lost each year in aluminum cans that are thrown in trash bins instead of getting recycled. Congress should leverage the material benefits of aluminum by investing in our nation's recycling infrastructure.
- The United States will need to produce more aluminum – both primary and secondary – to meet growing demand for this sustainable material in the 21st century. Innovations and efficiencies will help the industry reduce its environmental impact across the board, and recycled (secondary) aluminum allows manufacturers to reduce emissions and save more than 90 percent of the energy required to smelt new (primary) aluminum.
- Sustainable energy generation depends on aluminum. The nation is beginning to benefit from aluminum's critical role in enabling renewable energy projects as well as energy storage. Notably, more than 85 percent of solar photovoltaic components are made from aluminum.⁷ There have also been recent breakthroughs in aluminum-ion batteries that allow for both high-capacity storage and ultrafast charging in a wide range of applications.⁸
- With a better conductivity-to-weight ratio than copper and significant economic benefits, aluminum has for decades been used for wiring power grids, including high-voltage long distance power transmission lines as well as local power distribution systems. While the Department of Energy's recent announcement of an \$8.25 billion loan program to expand and improve the nation's transmission grid is a promising start, Congress still needs consider additional opportunities to modernize the grid. Congress should direct investment to modernize the aging patchwork system of power generating plants, transmission and distribution lines and substations that foster smart and cohesive operational techniques to power the growing demands for electricity from both homes and businesses and to connect renewable energy sources with those who need to access it.

- Most major car manufacturers will be transitioning to an electric vehicle fleet by 2040.⁹ The electric vehicle revolution depends on aluminum. National labs have verified that the properties of aluminum allow for safer, higher performing, more efficient and cost-effective vehicle construction.¹⁰ Aluminum chassis, shock towers, motor and battery housings and internal panels allow electric vehicles to travel further, safer. Our nation's aging infrastructure remains unresponsive to the market and has not provided the necessary charging infrastructure that modern electric vehicles need. Congress must provide additional funding to the programs outlined by the Department of Transportation that can be used to reach the goal of 500,000 new electric vehicles by 2030.¹¹
- Aluminum is used extensively as a building material in large public transportation building projects, combining incomparable visual aesthetics with a high strength to weight ratio, corrosion resistance and desirable thermal properties – and aluminum's durability means it can serve its function in a building for many decades, reducing maintenance costs. When used for construction, aluminum structures can weigh 35 to 65 percent less than steel while providing comparable strength. Aluminum can also help qualify a building for green building status under the Leadership in Energy and Environmental Design (LEED) framework. In 2019, ACI-NA reported that our nation's airports require nearly \$130 billion of investment by 2023, with more than half of those needs inside aging terminals.¹² Despite the recent drop in travel, efficient airports will continue to be important to the economic vitality of established metropolitan areas as well as to burgeoning regions and small communities. Further, ASCE's latest Infrastructure Report Card cited overdue maintenance and underinvestment in giving the U.S. transit sector a low grade of D-.¹³ Making sustainable investments in our nation's transportation infrastructure will increase capacity while reducing carbon pollution.
- In 2020, ASCE found that 42 percent of the bridges in the United States are at least 50 years old.¹⁴ To make matters worse, 7.5 percent of the bridge inventory is classified as structurally deficient, and more than 94,000 bridges are inadequate in terms of vertical and horizontal clearances. The United States will need to significantly increase annual spending on bridge rehabilitation or risk additional deterioration becoming overwhelming. Aluminum alloys allow for reduced maintenance and a greater service lifespan for a cheaper cost over the entire life cycle of a bridge.¹⁵ Aluminum decks also offer an attractive means of increasing bridge load ratings by reducing the dead load of the bridge itself. Such solutions can be installed at much lower cost and reduced traffic downtime, thus aluminum decking also brings those benefits to bridge rehabilitation.

- Manufacturers, including aluminum producers throughout the value chain, can better contribute to the economy when goods and services flow efficiently through the nation’s transportation network. Lifting the interstate highway weight limits for trucks would alleviate the freight capacity shortage, the driver shortage and highway congestion. It would also help companies and drivers navigate what is now a patchwork of state rules as freight volume continues to grow, requiring all modes of transportation to operate as efficiently as possible.
- The modern U.S. aluminum industry is part of a closely integrated global supply chain. Today, all bauxite and most of the alumina ultimately used to produce primary aluminum in the United States is imported. The United States is also increasingly reliant on primary aluminum imports to meet demand from aluminum manufacturers. Production of primary aluminum in the United States, even with operations at full capacity, does not meet demand for the semi-fabricated aluminum products manufactured in the United States. Our supply chain is secured through close association with our NATO partners and those countries – like Canada – that comprise the U.S. defense industrial base. “Buy Clean” and “Buy America(n)” procurement requirements can best support U.S. manufacturers by taking into account the global supply chain of our critical industry.
- While aluminum is already the sustainable material of choice, the industry has reduced emissions by 59 percent from 2005-2018. In addition, the proliferation of carbon-free smelting technology will further reduce aluminum’s industrial process carbon footprint. Public-private collaboration is at the core of these technological breakthroughs and research dollars should be directed at these efforts.

Immediate Action Items for Congress

Increase Long-Term Funding and Programmatic Support to our Nation's Recycling Infrastructure

- Authorize and appropriate funds for a recycling infrastructure program that awards grants on a competitive basis to states and local governments to support and expand the recycling infrastructure and recycling programs – with the purpose of increasing recycling rates, expanding curbside recycling programs, increasing collection points, improving recycled material quality, improving material and alloy segregation and developing the recycling process to increase return rates of high-quality feedstocks to aluminum manufacturers.
 - Make public and private materials recovery facilities (MRFs) eligible to receive grants for capital investments in eddy current separators, robotic sorting technology, wind sifters, induction-based sensor sorting, ballistic separators, and near-infrared sorting. These equipment upgrades will vastly increase quality of scrap material and help manufacturers achieve the efficiency that a true circular economy provides.
- Authorize and appropriate funds for grants or provide tax credits for capital investment into recycling equipment by manufacturers that are processing scrap material – turning “recyclable” into “recycled.”
- Authorize and fund new Department of Energy program to promote the efficient recycling of critical minerals and to provide grants for capital expenditures by secondary aluminum producers as well as accelerated tax treatment for investments in new recycling technology.

Place a Down Payment on Modernizing the Electric Grid and Electric Vehicle Infrastructure

- Authorize and appropriate funds for the Department of Energy to:
 - Carry out projects related to the modernization of the electric grid, including for distributed system technologies and accommodating rapidly increasing renewable electricity generation.
 - Develop hybrid microgrid systems to serve isolated communities and to increase the resilience of critical infrastructure.
- Utilize the Highway Trust Fund to establish a competitive grant program to strategically deploy alternative fuel vehicle charging and fueling infrastructure along designated alternative fuel corridors that will be accessible to all drivers of electric vehicles.
- Direct the Department of Energy to update model building codes as necessary to account for changes in electric vehicle supply equipment, electric vehicle parking, and electric vehicle power.
- Authorize and appropriate funds for a program at the Department of Energy to provide financial assistance to states that are incorporating electric vehicles into their energy plan.

Expand the Buildout of Energy-Efficient Buildings

- Utilize the Airport and Airway Trust Fund to:
 - Create a new Airport and Airway Investment Program focused on investing in modernization projects that enhance airport and airspace capacity.
 - Support the buildout of charging infrastructure at airport facilities to increase customer convenience and assist rental car fleets to transition toward electric vehicles.
- Increase bus funding and invest in bus and transit facilities.
- Incentivize green building design and construction by promoting LEED (Leadership in Energy and Environmental Design) certification.
 - Create a federal tax incentive for the construction of LEED-certified buildings.
 - Create a preference for LEED in Fannie Mae and Freddy Mac loan evaluation criteria.
 - An average of about 85,000 manufactured housing units were purchased annually from 2014-2020.¹⁶ According to the Department of Energy, there are “currently no energy conservation standards for manufacture[d] housing,” leaving many low-income families to shoulder the costs of energy waste.¹⁷ As the Department considers new conservation standards, consider the incorporation of the LEED-H Framework.

Construct and Retrofit Greener, More Cost Effective, and Longer Lasting Bridges

- Instruct the Department of Transportation to encourage states to consider the entire lifecycle costs of a bridge in their procurement processes.
- Authorize and appropriate funds for a Department of Transportation study on aluminum decking that expands on the innovative research at the Florida Department of Transportation.¹⁸
- Ensure new bridge projects are designed for a modern transportation system by evaluating them based upon their service life expectancy, live load carrying capacity, structure and dead load characteristics, initial and long-term quality, corrosion resistance, ease of maintenance, speed of construction, skid resistance and safety.

Increase Modern Truck Weight Limits

- Allow states to increase truck gross vehicle weight limits on Interstate System highways within their borders to 91,000 pounds as long as those trucks are equipped with an additional sixth axle. The federal GVW limit for Interstate highways has been set at 80,000 pounds since 1982.

Promote a Reliable and Resilient Supply Chain for Aluminum, As A Critical Material

- Establish grants or forgivable loans for capital investment in next generation, low carbon primary aluminum smelting capacity. Ensure a transition period to the next generation of smelters by providing grants or incentives for equipment upgrades, environmental compliance projects, and other efficiency gains.
- Preserve the strategic alliances that provide reliable, secure trading partnerships – including the U.S. aluminum industry’s integrated North American supply chain.
- Directly fund the deployment of technology and equipment to increase production of high purity aluminum in the United States.

Citations

- 1** American Society of Civil Engineers, Failure to Act: Economic Impact of Status Quo Investment Across Infrastructure Systems, (Reston: ASCE, 2021), 3, 8, and 13. Accessed April 30, 2021. https://infrastructurereportcard.org/wp-content/uploads/2021/03/FTA_Econ_Impacts_Status_Quo.pdf
- 2** European Commission, The EU's 2021-2027 Long-Term Budget and NextGenerationEU: Facts and Figures, (Luxembourg: Publications Office of the European Union, 2021), 11. Accessed April 30, 2021. <https://op.europa.eu/en/publication-detail/-/publication/d3e77637-a963-11eb-9585-01aa75ed71a1>
- 3** Zhang Yue, "China to speed up development of new infrastructure facilities" The State Council of the People's Republic of China. April 28, 2020. Accessed April 30, 2021. http://english.www.gov.cn/premier/news/202004/28/content_W55ea84adbc6d0b3f0e9496999.html
- 4** Caroline Meinhardt, "Short Analysis: China bets on 'new infrastructure' to pull the economy out of post-Covid doldrums" Merics. June 04, 2020. Accessed April 30, 2021. <https://merics.org/en/short-analysis/china-bets-new-infrastructure-pull-economy-out-post-covid-doldrums>
- 5** Steven M. Fortier, Nedal T. Nassar, Graham W. Lederer, Jamie Brainard, Joseph Gambogi, and Erin A. McCullough, Draft Critical Mineral List—Summary of Methodology and Background Information USGS Technical Input Document in Response to Secretarial Order No. 3359, U.S. Geological Survey Open-File Report 2018–1021, 2018. <https://pubs.usgs.gov/of/2018/1021/ofr20181021.pdf> (accessed April 30, 2021).
- 6** U.S Chamber of Commerce Foundation, Achieving A Circular Economy: How the Private Sector is Reimagining the Future of Buisness, (Washington D.C.: U.S. Chamber of Commerce Foundation, 2015). Accessed April 30, 2021. <https://www.uschamberfoundation.org/sites/default/files/Circular%20Economy%20Best%20Practices.pdf>
- 7** Kirsten Hund, Daniele La Porta, Thao P. Fabregas, Tim Lang, and John Drexhage, Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition, (Washington D.C.: The World Bank, 2020). Accessed April 30, 2021. <https://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf>
- 8** Xuejing Shen, Tao Sun, Lei Yang, Alexy Krasnoslobodtsev, Renat Sabirianov, Michael Sealy, Wai-Ning Mei, Zhanjun Wu, and Li Tan, Ultra-fast charging in aluminum-ion batteries: electric double layers on active anode, Nature Communications 12, no. 820 (February 2021). Accessed April 30, 2021. <https://www.nature.com/articles/s41467-021-21108-4#Sec9>
- 9** General Motors, General Motors, the Largest U.S. Automaker, Plans to be Carbon Neutral by 2040, (Detroit: GM Press Release, 2021). Accessed April 30, 2021. <https://media.gm.com/media/us/en/gm/home.detail.html/content/Pages/news/us/en/2021/jan/0128-carbon.html>
- 10** Sujit Das, Life Cycle Energy and Environmental Assessment of Aluminum-Intensive Vehicle Design, (Detroit: Oak Ridge National Lab Publication, 2014). Accessed April 30, 2021. <https://www.ornl.gov/publication/life-cycle-energy-and-environmental-assessment-aluminum-intensive-vehicle-design>

- 11** U.S. Department of Transportation's Federal Highway Administration, Federal Funding is Available For Electric Vehicle Charging Infrastructure On the National Highway System, (Washington D.C.: DOT, 2021). Accessed April 30, 2021. https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/resources/ev_funding_report_2021.pdf
- 12** Airports Council International – North America, Terminally Challenged: Addressing the Infrastructure Funding Shortfall of America's Airports (Washington D.C. ACI-NA, 2019). Accessed April 30, 2021. <https://airportscouncil.org/wp-content/uploads/2019/02/2019TerminallyChallenged-Web-Final.pdf>
- 13** American Society of Civil Engineers, 2021 Infrastructure Report Card, (Washington D.C.: ASCE, 2021). Accessed April 30, 2021. <https://infrastructurereportcard.org/category/transit/>
- 14** American Society of Civil Engineers, 2021 Infrastructure Report Card, (Washington D.C.: ASCE, 2021). Accessed April 30, 2021. <https://infrastructurereportcard.org/wp-content/uploads/2020/12/Bridges-2021.pdf>
- 15** Miami International & Aluminum Association of Canada, Market Study for Aluminum Use in Roadway Bridges, (Quebec: AAC, 2013) Accessed April 30, 2021 <https://aluminium.ca/uploader/publications/executivesummary-marketstudyforaluminumuseinroadwaybridges28-...pdf>
- 16** United States Census. Manufactured Housing Annual Shipments to States: 2014-2021, (Washington D.C.: U.S. Census, 2021). Accessed April 30, 2021. <https://www.census.gov/data/tables/time-series/econ/mhs/shipments.html>
- 17** U.S. Department of Energy. Manufactured Housing, Appliance and Equipment Standards Rulemakings and Notices Website. Accessed April 30, 2021. https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=64
- 18** Florida Department of Transportation, Aluminum Orthotropic Deck Research, (Tallahassee: FDOT, 2017). Accessed April 30, 2021. <https://bridges.transportation.org/wp-content/uploads/sites/19/2018/04/Aluminum-Bridge-Decking-Research-for-Bascule-Bridges-FDOT-Study-George-Patton.pdf>