

CALSTART U.S. EV Battery Leadership Initiative
To Support U.S. Electric Vehicle Battery Supply Chain and Manufacturing
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Globally, the vehicle market is in a period of disruptive change, as established manufacturers, start-ups, and others are making billion-dollar investments in the transition away from internal combustion engines to electric powertrains. The global market for electric vehicle (EV) batteries will likely exceed \$5 trillion by the end of this decade. U.S. companies led the global development and production of internal combustion engines in the 1900's. Will the U.S. win the global EV battery market? Consistent with President Biden's goal of a 100% clean electric grid in 2035 and his American Jobs Plan, electrifying the U.S. transportation sector can address the climate crisis and create new manufacturing jobs. However, new policies are required to establish a domestic supply chain for EV batteries that results in job creation and economic development. A domestic, competitive battery manufacturing supply chain reduces U.S. economic vulnerabilities with importing materials and offers new prospects for economic growth and national security by supplying EV battery materials and components to global markets.

CALSTART, an internationally recognized clean transportation industry organization with offices in multiple states, is leading the advocacy of new, national initiatives to build public-private technology development partnerships, expand domestic battery component manufacturing and create clean energy jobs. **The EV Battery Leadership Initiative is a nonpartisan advocacy campaign to advance the competitiveness of the United States electric vehicle supply chain by securing \$17 billion in smart and effective federal policy incentives and investment by the end of the decade.** From mining and processing of critical minerals to fabricating electrodes and electrolytes, development of battery supply chain manufacturing capabilities establishes economic development opportunities. CALSTART also supports targeted development and upskilling of the manufacturing workforce in regions of the country impacted by the changing energy landscape in response to climate change.

- **Through investment in EV battery innovation, and in public-private partnerships that leverage the National Laboratories as well as academia and private sector expertise to advance EV battery manufacturing technologies and processes,** the United States will bolster its competitive advantage by rapidly innovating and scaling new EV battery manufacturing technologies and breakthroughs.
- **With new competitive grants for EV battery and component manufacturing, refundable or direct pay Investment Tax Credits that support EV battery manufacturing at the facility-, assembly line-, and equipment-levels, Production Tax Credits to accelerate battery and cell manufacturing, and through direct DOE loans for light-, medium- and heavy-duty EV components alike,** the United States can win the EV market and spur vital EV battery supply chain investment, securing domestic supply and creating good-paying jobs.
- **And by investing in new workforce training and standards for communities typically underrepresented in EV manufacturing workforce or displaced by the shift away from conventional vehicle technologies and component manufacturing,** the United States can support a good-paying, skilled workforce that leverages the skills and ambitions of all Americans.

Battery-powered cars and trucks eliminate vehicle criteria and greenhouse gas emissions. While the global EV battery market is well out of the starting gates and growing fast, it is not too late for the U.S. to engage and become a leader. Tesla already has one "Gigafactory" operational and is making EV battery packs in Nevada. General Motors is building an EV battery plant in Ohio and considering a second in Tennessee (both with partner LG Chem). Leading start-ups in San Francisco and Colorado have developed solid-state EV batteries that will be lower cost and provide more range. The number of light-duty EVs on U.S. roads is estimated to increase 10-fold to 18.7 million by 2030 (up from 1.8 million in 2019). It is estimated that there will be in excess of 100,000 medium and heavy-duty electric trucks on the road in California alone by 2030 (up from a few hundred in 2019). The domestic battery manufacturing capacity will need to grow

significantly beyond current plans for the U.S. not to be dependent on others for this critical vehicle component. In addition, it is critical that domestic raw materials supply chains also expand dramatically if the U.S. is to win the EV market to enable the highest level possible of domestic content in these products.

The U.S. EV industry employed approximately 130,000 people in 2019.¹ The Blue Green Alliance and American Council for an Energy Efficient Economy estimated that up to 570,000 new net EV-related jobs could be created by 2030 with higher U.S. fuel economy standards at 54 miles per gallon.² With the President's American Jobs Plan and the CALSTART-led advocacy for new national initiatives, this number is expected to grow even more as the U.S. deploys more electric vehicles.

This is an economy and national security issue: other nations have prioritized EV battery manufacturing as a strategic priority and the U.S. is already importing these batteries. China's national and state governments have made enormous investments and provided financing for its large EV battery manufacturing sector much like they did with photovoltaics. EV battery companies in South Korea and Japan are also doing well in the international market as their governments have also targeted this technology. In the past five or so years, countries in the European Union, particularly Germany, have taken action to accelerate EV battery manufacturing. Compared to these other nations, the U.S. has done comparatively little in recent years to ensure that this nation is not only able to produce enough batteries to meet its own needs, but also be competitive on a global basis.

Given this outlook, we must put in place a multi-prong, comprehensive federal policy approach to make sure that we are not dependent on other nations for EV batteries and that we maximize job creation here at home.

Growing the EV battery industry means the U.S. should examine the materials supply chain and, wherever possible, find domestic sources for the raw materials and ensure they are produced in ways that are environmentally and socially responsible. We do not want to be dependent on other nations for key materials where the environmental and labor protections are beneath acceptable standards.

As part of the Biden-Harris administration's proposed \$174 billion investment in EVs and their supply chain, CALSTART's 270 member organizations from across the clean transportation supply chain will work with the Administration and Congress to advocate for a coordinated national policy agenda that results in U.S. global leadership in the fast growing, and highly important global EV battery industry. This policy agenda includes \$17B in research, development, and demonstration (RD&D) and manufacturing grants to be expended over 10 years, not including tax credits and loan authorities, to:

Accelerate RD&D: Congress should appropriate funding for a coordinated innovation agenda to fund startups, corporations, universities, and National Labs to develop new and better EV batteries. The U.S. has already demonstrated the ability to innovate in this sector. We should accelerate our efforts to develop domestically sourced supply chains and catalyze more innovation to keep the U.S. at the forefront of EV battery technology.

- **Materials Research:** Provide \$2.3B for early-stage research and development on battery electrodes, electrolytes, cells and chemistries at DOE. Through this multi-year investment, innovators at universities, startups, and commercial entities will develop the next generation materials that lower the cost and increase the performance and durability of EV batteries.

¹ Environmental Defense Fund EV Market Report, September 2020 Update, Dana Lowell and Alissa Huntington, M.J. Bradley & Associates, p. 13.

² Creating the Clean Energy Economy, Analysis of the Electric Vehicle Industry, International Economic Development Council, Jennifer Todd lead author, 2013, p.13.

- DOE National Lab Consortium: Invest \$2.0B to establish a DOE-led Battery Manufacturing Laboratory Consortium, modeled after the Grid Modernization Laboratory Consortium, to focus on developing and demonstrating innovative materials synthesis and manufacturing concepts at a laboratory scale. This multi-year funding includes partnering with industry on process development for extracting, separating, processing and refining of critical materials and rare earth materials used in batteries and EV components, respectively. In addition, manufacturing R&D of new battery chemistries and materials will be conducted, which includes a moderate volume cell manufacturing “User Facility.” With laboratory-to-industry technology transfer, this investment ultimately enables increased U.S. competitiveness by deploying more innovative, low-cost manufacturing.
- Industry-Led Manufacturing Institutes/Hubs: Invest \$500M to create industry-led manufacturing innovation institutes and/or energy innovation hubs. These private-public partnerships would be modeled after the Manufacturing USA innovation institutes at the Departments of Energy (DOE), Commerce and Defense, the U.S. Advanced Battery Consortium and/or the DOE energy innovation hubs. They would carry out robust applied research, development, and demonstration over 5-7 years on EV battery materials, components, cells and pack manufacturing, assembly, electric drive components and recycling. This investment would result in scale-up of processes from the laboratory to pre-pilot scale and enable industry to make follow-on investments in low-rate initial production.

Incentivize Manufacturing: With the EV battery industry essential to the Nation’s energy, environmental and economic security, the U.S. should pursue incentives to spur domestic manufacturing investment. In recent bipartisan legislation introduced in Congress, there are several measures being considered to support the onshoring of the U.S. semiconductor industry. The same types of financial incentives considered for critical semiconductor manufacturing should also be considered for the EV and other battery markets. For instance, the U.S. grid-level energy storage market is expected to grow 5X from 2020 to 2025. Manufacturing incentives should each emphasize domestic content of products and include:

- Battery and EV Component Supply Chain Manufacturing Grants: Provide for \$12B to be expended over 10 years for 1:1 cost share match with private sector for establishing or enhancing battery and EV component supply chain manufacturing facilities.
- Manufacturing Tax Credits: Establish a 30% refundable or direct pay investment tax credit for EV battery materials, cell, and pack manufacturing, assembly, and recycling equipment and facilities, and create a new tax credit to incentivize battery cell and pack production.
 - To support domestic EV battery manufacturing production and assembly line and facility buildout and retooling, pass the “American Jobs in Energy Manufacturing Act of 2021,” introduced by Senators Debbie Stabenow (D-MI) and Joe Manchin (D-WV), to reauthorize the Section 48C Investment Tax Credit (ITC) providing a credit of 30% of qualifying advanced energy projects, originally created under the American Recovery and Reinvestment Act (ARRA) of 2009. This includes working with the Treasury Department to ensure battery material supply chains are eligible under energy property designed to reduce greenhouse gas emissions.
 - To incent the domestic manufacturer of EV battery cells, modules, and battery packs, and to boost domestic supply of batteries for the EV supply chain, create a new Production Tax Credit (PTC) to accelerate EV battery domestic manufacturing and assembly.
 - To address tax equity uncertainty and spur manufacturing for businesses of all sizes quickly, make these mechanisms direct pay or “cash in-lieu” of tax credits model for

entities without tax liabilities to offset. Qualified energy projects should include energy storage/battery supply chain materials and components.

- Direct DOE Loans: Expand the DOE Advanced Technology Vehicles Manufacturing (ATVM) Program to emphasize that projects supporting the light-duty and medium- and heavy-duty vehicle EV supply chain are eligible for direct loans.

Train the EV Workforce: The U.S. needs a highly skilled workforce if it is to win the EV global market. CALSTART supports new Federal efforts, in partnership with State and local programs, to train and upskill workers for building new grid infrastructure, charging stations, advanced batteries and material supply chains.

- Training Programs: Invest \$100M to create and fund new training programs to target workers that have lost jobs because of the clean energy transition underway. This includes workers who might be displaced due to the shift away from the production and servicing of internal combustion vehicles. Training programs should increase participation in the EV battery workforce by disadvantaged and underrepresented people, veteran populations, and rural communities where unemployment is relatively high.
- Standards: With various stakeholders across the EV battery supply chain including the National Institute of Standards and Technology, invest \$100M to develop industry standards to ensure battery manufacturing workers are fully trained and qualified across the EV battery value chain.

This paper has been developed by CALSTART, a national consortium of more than 260 companies working to accelerate the growth of the U.S. clean transportation industry. CALSTART has 70 employees working in six different states. www.calstart.org