



## The Inflation Reduction Act is Spurring a Tsunami of Inbound US Investment

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President Joe Biden's [Inflation Reduction Act \(IRA\)](#) was signed into law in August 2022. This is the single largest action ever taken to mitigate the impacts of climate change in the US, involving US\$369bn of subsidies and incentives, plus allowing the Department of Energy (DoE) to create US\$250bn in low-interest loans. This has made renewable energy more competitive, likely driving over \$1 trillion of new US rooftop and utility solar, plus on- and offshore wind investments this decade, whilst incentivising 6.5GW pa of new domestic solar manufacturing. It has in turn seen Brookfield, ENGIE and RWE make over \$10bn of US renewables developer acquisitions since the IRA was launched.

The IRA provides up to \$7,500 subsidy for electric vehicles (EV), if built in the US using US or allied critical minerals, spurring massive investment in new critical minerals mining and refining, battery manufacturing and recycling, plus EV factories. The IRA also reduces the cost of US manufactured green hydrogen by up to 75% and embeds [Dr Saul Griffith's Electrify Everything](#) strategy by massively incentivising distributed energy resources (DER).

We examine the massive crowding in of private investments and manufacturing into the US as a result of the IRA. While the US is still far [behind China on all things decarbonisation](#) related, this certainly puts the US back in this key global technology race.

### The Inflation Reduction Act (IRA) and Associated Programs

The IRA includes US\$369bn in green energy-related tax credits, incentives and other provisions intended to help companies tackle climate change, increase investments in renewable energy and EVs, enhance energy efficiency and boost research and development. While it also introduced a [\\$85/t subsidy for CCS](#), \$60/t for CCUS, and \$180/t for DAC, on the positive side of the climate ledger it included a transformative [\\$1,500/t tax on methane](#) emissions.

The **Energy Infrastructure Reinvestment Program** (Section 1706 of Inflation Reduction Act) enables the [DoE Loan Program Office to create US\\$250bn in low-interest loans](#) to transform the nation's energy infrastructure landscape. The loan program expires at the end of 2026.

This builds on the December 2021 [executive orders by President Biden](#) to make the US Federal Government zero emissions by 2050, with an interim target of a 65% reduction by 2030. Biden's plan broadly encompasses the 300,000 buildings, 600,000 cars and trucks and \$650bn in purchases that are part of the federal government's operations. The order sets multiple goals across those operations, including 100% EV acquisitions by 2035 and A net-zero emissions building portfolio by 2045, including a 50% emissions reduction by 2032.

## Electric Vehicle Production

The IRA offers subsidies of up to \$7,500-a-car for EV makers but only if those cars are assembled in North America and local content requirements are met. Minerals must be extracted from or processed in countries the US has a free trade agreement with, and a large percentage of battery components need to be manufactured or assembled in the US.

The Canadian Government sealed agreements with [Volkswagen AG and Mercedes-Benz Group AG](#) for the security of nickel, cobalt, and lithium supply across their North American manufacturing networks. The agreement was a result of the deepening connection and cooperation in North American sustainable battery manufacturing and critical mineral supply chains. Supporting the IRA, the Canadian Government released the 2030 Emissions Reduction Plan, with C\$3.8bn to develop [Canada's first Critical Minerals Strategy](#).

August 2022 saw **Panasonic** expanding their footprint of planned investments in the US, with discussions commencing for an additional [US\\$4bn battery facility in Oklahoma](#), in addition to their US\$4bn Kansas battery plant announced the month prior. In October, Panasonic announced the commencement of [construction of the Kansas facility](#), with a planned capacity of 30GWh of 2170 batteries, the key component of Tesla's Model 3. The [Model 3 represented over 27% of US EV sales in 2022](#).

**Panasonic** signed supply agreements with [Redwood Materials](#) to secure domestic, sustainable supply of critical minerals and precursor materials for Panasonic's Kansas and proposed Oklahoma battery facility. Redwood announced a multi-billion investment to develop a 100GWh cathode facility to support the company's anode and copper foil pipeline. The supply agreement marks the first gigafactory-scale cathode manufacturing operation in North America, a critical milestone for the objectives of the IRA. A key differentiation for Redwood Materials is to have the highest recycled lithium, cobalt, and nickel content available.

**Redwood Materials** formed a partnership with [Volkswagen America](#) to recycle end-of-life batteries as supply for the company's cathode and anode pipeline. Redwood recovers 95% of metals including nickel, copper, cobalt, and lithium from batteries and injects back into the domestic supply chain, rather than exporting. Redwood's initiative is imperative to the targets of the IRA in onshoring supply, creating a robust, circular domestic battery manufacturing value chain.

In October 2022, **LG Energy Solutions** and **Honda** committed a joint [US\\$3.5bn investment](#) for a new 40GWh battery plant in Columbus, Ohio. Creating 2,200 new manufacturing jobs, the plant is expected to become online by the end of 2024, supplying Honda's growing EV ecosystem. [LG Energy Solutions](#) raised their 2022 sales outlook by 14% in October, with LG stressing the critical importance North American markets had on the company's performance and growth plan. The South Korean company updated its targets for North American growth, with internal compounded annual growth forecasts in the US to outperform European and Chinese markets.

**LG Chem** announced in November 2022 the investment of [US\\$3bn to develop the nation's largest cathode manufacturing facility](#) in Tennessee, with a target of 120ktpa by 2027. LG will provide domestically-produced battery materials to automakers. The facility will be 100% powered by renewable energy, sourced from solar and hydro plants.

September 2022 saw [Hyundai Motor Group of Korea](#) announce the possible acceleration of construction timeline for its [US\\$5.5bn EV factory near Savannah, Georgia](#). Hyundai and South Korean officials expressed public concerns over the new regulations in the IRA to receive the tax incentives, and its disproportionate effects on automakers. The Savannah Economic Development Authority announced Hyundai will begin construction of the facility in October. A significant component of Hyundai's decision was the State incentive package valued at over US\$1.8bn for Hyundai to commit to the facility.

The announcement marked a historic moment for Georgia, the largest economic development project in state history, creating over 8,100 new manufacturing and supply jobs. **Hyundai Mobis**, the South Korean automakers electrification component division, announced a further [US\\$1.3bn for the construction of an EV components factory](#) to support Hyundai and Kia's local operations to qualify for domestic production credits.

November 2022 saw **Hyundai Motor Group** sign an agreement with battery supplier, **SK On**, for a proposed [US\\$1.9bn 20GWh](#) to supply Hyundai's first US EV-dedicated facilities. The joint venture (JV) will strengthen the connection between the South Korean giants, with the partnership already supplying the successful Hyundai IONIQ5, IONIQ6, and Kia EV6.

In support of the partnership, **SK On** announced a lithium hydroxide supply agreement from **SQM**, to strengthen security of supply for its expanding US operations. The supply of 57ktpa lithium hydroxide from 2023 will be sufficient to power 1.2 million EVs. The agreement is in response to the critical mineral requirements for EV value chains under the IRA, with the supply from SQM's Chilean operations, a free-trade partner of the US.

## **Battery Material Supply Chain**

The IRA requires at least 40% of the monetary value of critical minerals for batteries to be supplied by the nation, or a US free-trade partner to qualify for the EV tax credits. The threshold will increase to 80% in 2027.

The US DoE Loan Program awarded US\$2.8bn in grants to battery materials processing, manufacturing, and recycling projects under the [Bipartisan Infrastructure Law \(BIL\)](#). The federal grants provided significant support to 20 firms critical to securing the domestic value of the energy transition and onshoring of supply chains.

**Albemarle** announced the development of a [lithium concentration facility](#) to produce spodumene concentrate after being awarded a US\$150m grant from the DoE. The spodumene would provide feedstock for Albemarle's previously announced mega-flex lithium conversion facility, originally proposed to process concentrate from various sources, producing 100ktpa of lithium hydroxide (LHM). The concentration facility would provide domestic supply of hard-rock concentrate to support the manufacture of 1.6 million EVs pa.

**ASX-listed Piedmont Lithium's** [US\\$600m lithium project in Tennessee](#), will provide 30ktpa of LHM to the US battery value chain. The proposed facility was spurred by a US\$142m grant under BIL to accelerate the project's timeline. The support from the IRA is a critical injection for Piedmont to enable the engineering and construction of the plant, with operations expected to commence in 2025.

**ASX-listed Syrah Resources** received a US\$220m BIL grant for the expansion of its [Vidalia Active Anode Material facility](#). CEF previously discussed the global significance of the [Vidalia natural graphite processing facility](#) as the only large-scale supplier outside of China. The BIL

grant supports Syrah's progression into Phase 3 expansion, which will provide [45ktpa of domestic anode material](#) to Tesla, SK On and LG Energy Solutions.

The [US\\$2.8bn in federal support for battery manufacturing](#) and value chain projects supported under Inflation Reduction Act, has spurred **US\$6.25bn of private capital investment**. The BIL battery manufacturing initiative has catalysed the creation of over 6,000 new jobs in the US.

The new infrastructure has provided security and diversification of risk across the supply network of precursor materials vital to onshoring the manufacture of cathodes, anodes, separators, drive-trains, wind turbines, and solar.

## Solar Manufacturing

November 2022 saw [First Solar US](#) confirm it will build a [US\\$1.1bn 3.5GW annual capacity](#) US solar module manufacturing operation in Alabama. With an expected commissioning by 2025, the facility will create 700 new direct manufacturing jobs. August 2022 saw First Solar announce an [US\\$185m upgrade](#) of its existing three factories in Ohio by 0.6GW to 3.6GW pa capacity for Series 6 thin film solar modules, including upgrading one facility to produce world-leading Series 7 modules that is scheduled to come online in the first half of 2023. In October 2022 First Solar announced that it plans to [invest \\$270m in a dedicated R&D innovation centre](#) in Perrysburg, Ohio, creating 100 R&D jobs.

November 2022 saw [ENEL of Italy](#) announce it will replicate its under construction 3GW pa solar module manufacturing facility in Sicily by building a 3GW high-performance bifacial PV modules and cells annually factory in the [US](#), generating 1,500 jobs. Enel has plans to then double to 6GW pa in phase 2.

## Solar

Clean-energy developers are forecast to install 215GW of solar during the next five years, according to the Solar Energy Industries Association, 40% more than expected prior to the IRA, reaching almost 50GW pa by 2027. Additionally, [BNEF forecasts residential rooftop](#) solar installations will increase by 25% yoy to 5.6 GW in 2022 (7.5GW including C&I).

## Offshore Wind

In September 2022 President Biden set a goal of deploying 30GW of offshore wind by 2030, an investment of US\$100bn (and [110GW by 2050](#)). Additionally, the [Floating Offshore Wind Shot](#) targets 15GW by 2035 and aims to reduce the costs of floating technologies by 70% to \$45/MWh. Additionally, California announced a goal to deploy [25GW of floating offshore wind](#) by 2045.

October 2022 saw [Hitachi Energy](#) announce a \$37m investment to expand its power transformer factory in South Boston, Virginia for the US power grid.

## Onshore Wind

The US is expected to install over [50GW of onshore wind](#) over 2022-2026, a US\$75bn investment.

## M&A

The IRA, in combination with the continuation of the Investment Tax Credit (ITC) for wind, solar and battery projects, has spurred multi-billion-dollar investments into US renewable energy developers.

[Brookfield Renewables](#): September 2022 saw Brookfield invest up to US\$2bn in US renewables, including US\$1bn to acquire Scout Clean Energy Scout's portfolio includes 1.2GW of operating wind assets, including 400MW managed on behalf of third parties, and a pipeline of 22GW of wind, solar and storage projects across 24 states, including 2.5GW of under construction and advanced-stage projects. Brookfield also announced the acquisition of Standard Solar for consideration of US\$540m, which owns 500MW of operating and under construction contracted assets and a development pipeline of 2.0GW. This builds on the Brookfield acquisition in January 2022 of [Urban Grid](#) for \$650m, a leading solar and battery storage developer with a development pipeline of 13GW of utility-scale solar and 7GW of energy storage projects across key markets in the U.S.

[RWE](#): October 2022 saw RWE of Germany acquire Con Edison Clean Energy Businesses for US\$6.8bn (implying an enterprise value multiple of 11x). Con Edison CEB operates and develops renewable energy plants around the US, with 3GW of operational capacity, with solar projects accounting for 90% of the total. This acquisition nearly doubles RWE's commissioned US renewables infrastructure portfolio to 7GW.

[ENGIE](#): In October 2022 [ENGIE of France](#) acquired 6 GW of solar and battery projects from Belltown Power U.S., significantly strengthening its renewable development pipeline. includes 33 projects comprising 2.7GW of Solar with 0.7GW of paired storage and 2.6GW of stand-alone battery storage. This significantly enhances ENGIE's existing 3.9GW of installed US renewables projects.

## Green Hydrogen

The IRA is a game changer for US green hydrogen manufacturing. [Tax credits of US\\$3/kg](#) for 10 years reduce the cost of manufacturing by up to 75% and make green hydrogen immediately cost competitive against hydrogen produced from fossil fuels, particularly given the renewable energy projects also get a 30% Investment Tax Credit as well. This will make use of green hydrogen in steel manufacturing cost competitive, spurring decarbonisation investments.

## Distributed Energy

The IRA put in place a plan to [electrify everything](#), making [a wide array of distributed energy resources \(DERs\)](#) eligible for new incentives—including renewables, energy efficiency, and other advanced energy systems installed in homes and businesses. Many of these programs specifically address lower income, disadvantaged and tribal households and aim to ease their upfront costs as they transition to clean energy. The IRA gives \$2,000 to homeowners who install efficient heat pumps, heat pump water heaters or biomass stoves, and boilers. It refreshes the tax credit for energy efficient home building, increasing the maximum credit to \$5,000 per home. It creates a \$1bn fund for the Department of Housing and Urban Development for distribution to affordable housing providers for energy efficiency projects, distributed generation, electrification, or other sustainability projects. The IRA directs the DoE to distribute \$4.3bn to states for home energy retrofit rebates, up to \$4,000 or more. It allocates \$200m to the DoE to support states in developing and implementing programs to train and educate contractors on energy efficiency and electrification. It launches a \$27bn

grant program for states, local and tribal governments, and non-profits to enable GHG reduction projects including energy efficiency and distributed generation.

With China leading the world in EVs and renewable energy installs, and the [REPowerEU](#) driving massively accelerated European decarbonisation investment, and [India](#) likewise leading the developing world on investment in renewables, the IRA puts the US back in this key global technology race. With the climate crisis a clear, present and growing danger, global momentum is building.