

One year on: America's Inflation Reduction Act is closer to reshaping the US clean energy industry

The Inflation Reduction Act (IRA) has spurred massive investment announcements in clean energy, with greater tax credit implementation clarity sustaining investor and developer appetite. The US energy industry is set to change profoundly, and the IRA is responsible for much of this – but it is not a one-stop shop



US President Joe Biden speaks at an event celebrating the one year anniversary of the signing of the Inflation Reduction Act at the White House

On 16 August last year, US President Joe Biden signed the landmark [Inflation Reduction Act \(IRA\)](#) into law. With almost \$400bn in direct funding and tax credits allocated to clean energy development, the IRA was set to have a profound impact on America's path to net-zero emissions.

But one year on, we want to examine whether changes are in fact happening and whether they are going far enough. In this article, we take a look at what effects the IRA has already had since its enactment last year, and what the outlook is for America's decarbonisation journey over the next decade.

Heightened enthusiasm reflected in soaring investment announcements

Of the nearly \$400bn dedicated to the energy transition, \$260bn will be in the form of tax credits to support not only relatively more established clean energy technologies such as wind, solar, battery storage, electric vehicles (EVs), and nuclear, but also emerging technologies such as hydrogen, carbon capture and storage (CCS), and advanced biofuels.

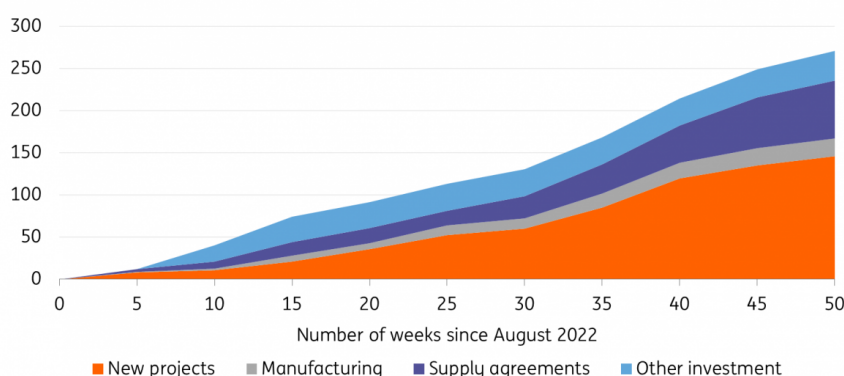
Meanwhile, there is also significant direct funding available through government agencies such as the Department of Energy (DoE) in grants (\$82bn) and loans (\$40bn), which will be crucial in readying the technologies for private investment and widespread adoption across different sectors. For instance, the DoE recently announced roughly \$6bn in grants to fund the decarbonisation of the most energy-intensive manufacturing sectors such as steel, cement, and chemicals.

The generous financial support from the IRA is already attracting soaring investment and project development plans. The DoE's Loan Program Office has been reviewing more than 140 clean energy financing and guarantee requests totalling approximately \$121bn.

In the [power sector](#), \$271bn of investment was announced during the first 50 weeks of the IRA becoming effective to develop utility-scale wind, solar, and storage projects, manufacturing facilities, supply chains, and others in North America. For project development, there was 185 GW of clean power capacity announced during those 50 weeks, which is equal to almost 80% of the current clean power capacity in the US. For manufacturing, 83 clean energy announcements were made during the same period – this would create a total of 76 GW of manufacturing capacity.

Investment announcement in clean power in the US

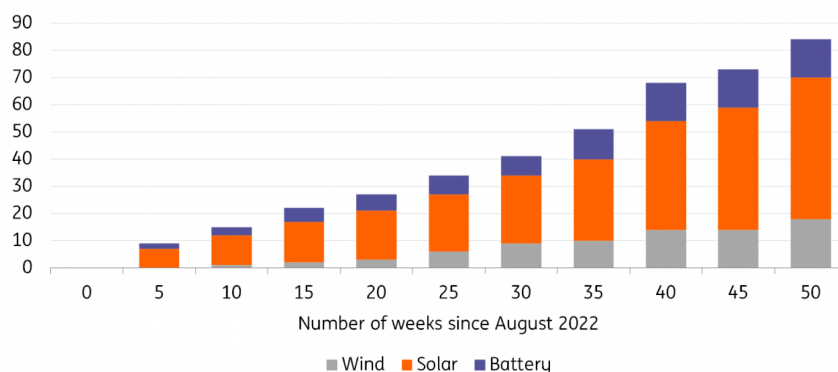
\$bn



Source: American Clean Power

Note: American Clean Power estimates investment numbers when certain information is missing for all the sub-categories except manufacturing. Of the 83 manufacturing announcements, only 48 have investment information. Thus, the total manufacturing investment number is underestimated.

Number of clean power manufacturing announcements in the US

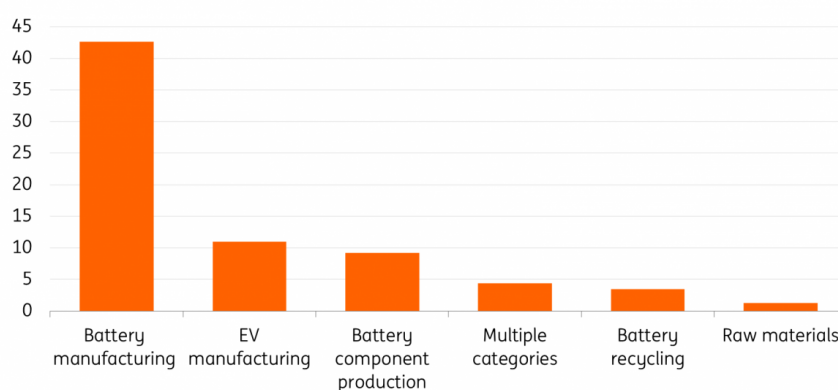


Source: American Clean Power

The [US EV industry](#) is also seeing huge investment announcements. By the end of July, the IRA had attracted \$72bn in private-sector investment announcements. Notably, investment plans happen not just in EV manufacturing, but along the entire value chain, including battery manufacturing, recycling, and raw minerals. Several car manufacturers have also updated business strategies to ramp up EV production in the next few years.

EV investment announcement since the passage of the IRA

\$bn



Source: Bloomberg New Energy Finance, ING Research

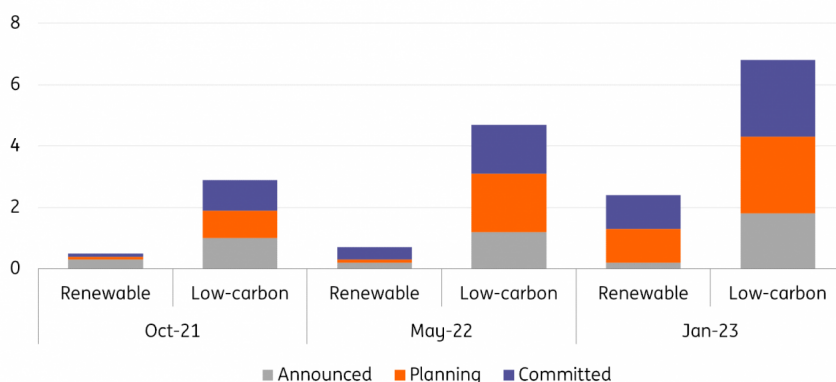
Note: Announced investment in North America through July 2023

In the [hydrogen industry](#), 6.5 million tonnes per annum (Mtpa) of low-carbon hydrogen (blue hydrogen with CCS) capacity and 2.4 Mtpa of renewable (green) hydrogen had been announced as of January 2023 to come online in North America by 2030. This is a rise of 30% and a 3.5-fold growth compared to their respective capacities announced as of May 2022 before the IRA. And the total announced capacity of 8.9 Mtpa of blue and green hydrogen is almost the level of today's 10 Mtpa of (mostly grey, non-clean) hydrogen production in the US. To note, the 6.5 Mtpa of blue hydrogen project announcement accounted for more than 70% of the world's total. This is partly

because of the stronger policy support and consequently a stronger growth momentum in CCS in the US, which is a key technology in producing low-carbon blue hydrogen.

Announced North American clean hydrogen production capacity by 2030

\$bn



Source: Hydrogen Council

Note: Renewable hydrogen refers to green hydrogen generated from electrolysis processes using renewable electricity. Low-carbon hydrogen refers to blue hydrogen produced from natural gas with CCS technologies.

Considerable progress has also been made in [CCS](#) and advanced [biofuels](#) (particularly [sustainable aviation fuels](#), or SAFs). The US is traditionally leading in CCS development as Section 45Q tax credits for the technology had been in existence pre-IRA, and then it got another bump under the IRA. The DoE has also awarded \$23.4bn to 16 projects in 14 states with locally tailored technical assistance to develop CCS technologies.

The US has also recently ramped up efforts to advance direct air capture (DAC). The DoE announced in August that two DAC projects in Texas and Louisiana would receive as much as \$1.2bn in support. As for SAFs, the US is also in the lead. The IRA's \$1.25-1.75 per gallon of bioSAF tax credits is stimulating supply, putting the US in a position to drive SAF production capacity growth over the next few years.

Implementation guidelines continue to arrive, though uncertainties remain

The key to the smooth implementation of the IRA is clear rules on who is eligible to get what amount of tax credits or other types of funding. To address uncertainties, the Internal Revenue Service (IRS) and the Treasury Department have been working to publish detailed guidance throughout the past year. Some of the guidelines include:

IRA guidance examples

Guidance examples	Potential impact examples
Income, sales price, and critical mineral and battery component requirements for the highest level of EV tax credits	Strengthen US domestic critical mineral supply chain; reshape trade partnerships; encourage vertical collaboration along the value chain
Guidance on clean energy tax credit transferability and direct pay	Introduce flexibility and increase access to tax credits; enhance credit bankability
Guidance to provide enhanced support for low-income and other disadvantaged communities	Ensure a more just energy transition
Notice of Intent a potential proposal to offer bonus renewable energy production and investment tax credits to applicable projects that meet certain domestic content requirements	Spur renewable energy manufacturing in the US; strengthen domestic renewable energy equipment supply chain; reshape trade partnerships

Source: US Treasury Department, US Internal Revenue Service, ING Research

These rules – despite the need for more refining – are useful for project developers and investors to determine tax credit eligibility, estimate revenue streams, evaluate project outlook, and advance investment decisions and project development. They are also reshaping the structure and components of the US clean energy supply chain, which will be discussed further below.

Nevertheless, the guideline setting remains a work in progress, and market players in certain clean energy areas are still waiting tentatively for new guidelines. For instance, the IRS and Treasury have not yet released guidance on hydrogen tax credits. For now, [two major uncertainties remain](#): how renewable electricity (used to produce green hydrogen) is measured and how the carbon intensity of hydrogen delivery is calculated. This determines how clean a hydrogen project is and consequently how many tax credits the project can get. The more quickly guidance rules are out, the faster the projects will be expected to move to their next stages.

Clean energy supply chain set for drastic changes

With decade-long tax credits and funding, the IRA is set to have a profound, long-term impact on the US. This means more clean energy will be produced, and supply chains will look significantly different than they do now.

Through strict eligibility rules for the highest levels of tax credits, the IRA aims to strengthen the US domestic [supply chain](#) of raw materials used for low-carbon technologies, with EV and renewable energy tax credit guidelines incentivising at least parts of the supply chain to reside in North America (originated, manufactured, assembled, or recycled). This move is to counter China's dominance in the clean energy industry, as the country now accounts for 77% of the global battery cell manufacturing capacity, 88% of solar PV manufacturing capacity, and an average of 50% of wind and electrolyser manufacturing capacity.

These requirements are already leading EV manufacturers to explore vertically along the EV value chain. In January this year, General Motors (GM) announced a joint venture with mining company Lithium Americas to gain exclusive access to lithium from a mining site in Nevada, US. Ford will receive a \$9.2bn loan from the DoE, the largest single loan in the DoE Loan Programs Office history, to develop battery plants in Tennessee and Kentucky in collaboration with battery company SK Innovations. Tesla, BMW, VW, Hyundai, Honda, and others are also investing in battery manufacturing.

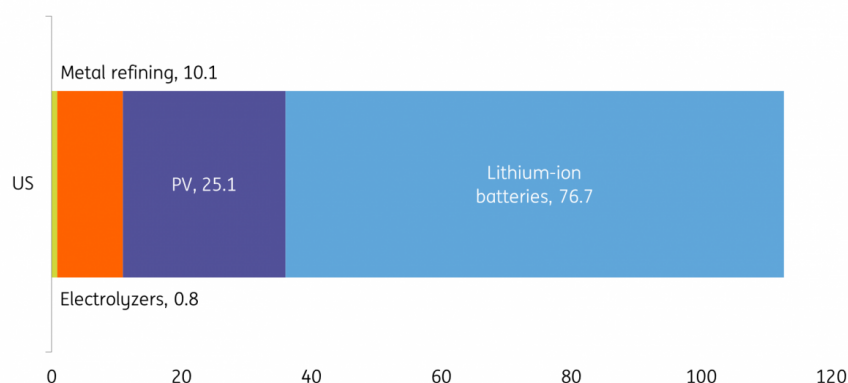
The renewable power industry is not yet officially affected by the domestic component Notice of Intent, but partnerships are nevertheless emerging to build assembly capacity in the US. In May,

US solar company Invenergy and Chinese solar panel manufacturer Longi collectively announced the plan to build the US's largest solar factory in Ohio, at a capacity of 5 GW. Similar moves are also being made by other international companies like Hanwha Q Cells, Vikram Solar, Jinko Solar, etc. One risk to note is the additional cost of geopolitical complexities. The US has restrictive tariffs in place against Chinese solar cells and might impose tariffs on Southeast Asian countries to discourage China from rerouting exports.

In the long term, these provisions will create a more mature domestic clean energy supply chain. However, it would take time and be expensive. It is estimated that the US will need to invest almost \$120bn in lithium-ion, solar PV, electrolyzers, and metal refining to meet domestic demand by 2030.

Upfront investment needed in the US to meet domestic clean energy manufacturing demand in 2030

\$bn



Source: Bloomberg New Energy Finance, ING Research

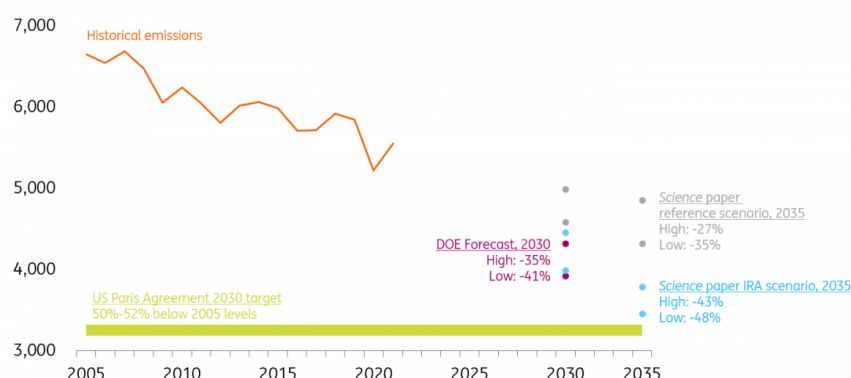
US will be closer to climate targets but still falls short

Eventually, when a robust low-carbon energy supply chain is established, when emerging technologies become largely competitive with carbon-intensive options, and when infrastructure hubs scale up the adoption of clean technologies, the US will be making significant progress toward decarbonisation. A recent research paper published by Science suggests that the US will likely slash emissions by 43-48% by 2035 under the effects of the IRA.

However, this forecast means the US will be well behind its commitment under the Paris Agreement to cut emissions by 50-52% by 2030 – and a delay in meeting this interim target could mean that the US risks missing its goal to become net zero by 2050.

Impact of the IRA on US emissions

Net million tonnes of CO₂e



Source: Science, US Department of Energy, Climate Action Tracker, ING Research

Note: The paper “Emissions and energy impacts of the Inflation Reduction Act” published on Science is authored by a team from institutions such as National Renewable Energy Laboratory, Resources for the Future, US Environmental Protection Agency, Princeton University, Rhodium Group, Dartmouth College, Sanford University, and MIT Joint Program on the Science and Policy of Global Change.

What is the IRA not addressing?

The IRA is not a one-stop shop for a faster clean energy transition in the US – in any jurisdiction, one single policy hardly does it all. What are some of the issues the IRA is not touching upon?

The first is infrastructure. Take the power sector as an example, there were [over 2 Terawatts \(TW\)](#) of renewable and storage capacity waiting to be connected to the grid by the end of 2022, a 40% increase from 2021. The renewable capacity from projects waiting in line exceeded the total existing renewable capacity of 1.25 TW in 2022. This grid congestion issue is caused partly by the design of interconnection evaluation processes and has resulted in delays in renewable project development. Seeing the problem, the Federal Energy Regulatory Commission has approved reforms to speed up the permitting process, and the Infrastructure Investment and Jobs Act assists to build more transmission lines. These efforts will help with the situation, but their effect is looking to only be modest in the medium term.

The second issue that has fallen out of the IRA's scope is offtaker demand management for certain clean energies. In the hydrogen industry, for instance, being able to secure long-term offtake agreements is crucial for projects to come to a final investment decision (FID). Although North America is leading in bringing projects to FID, as of January 2023, only 8% and 26% of the renewable (green) hydrogen and low-carbon (blue) hydrogen projects announced by 2030 had reached FID or were under construction, commissioned, or operational. To facilitate hydrogen demand growth, offtakers need assurance that there will be continuously available and reasonably priced hydrogen. Government agencies can help with the situation by providing financial support for offtakers, and/or creating a platform for more transparent pricing.

Lastly, as we have repeatedly pointed out, the IRA is more heavily focused on carrots than sticks, as is the US energy and climate policy in general. There are recent efforts made on the regulatory front, such as proposed stricter regulation standards on automotive pollution to disincentivise high-emissions economic activities. But some of the more complex policy designs, like a nationwide carbon pricing and trading scheme, will be without the country's reach for now.

That said, the US will be needing a much more comprehensive – and possibly more aggressive – collection of incentives, regulations, standards, enforcement, and labour capacity-building programmes to realise its climate goals on time. These can help consistently bring down the costs of clean technologies such as hydrogen and EVs so that they become competitive with high-carbon alternatives when the IRA's financial support expires in a decade.

Clean energy tax credits are likely to survive long-term turbulence

Corporates and investors are watching whether the IRA will survive in the long term. If Republicans take control of Congress, and a Republican president is elected in 2024, the IRA could be at risk of being repealed, as signalled by some current criticism of the law. But even then, bipartisan support for certain cleaner technologies, especially carbon capture and storage (CCS) and blue hydrogen, is unlikely to go away. Since the IRA entered into force, [more than 80%](#) of the pledged investment in clean energy and semiconductor manufacturing announced is specifically toward Republican congressional districts. With significant potential for revenue generation and job creation, this should give IRA clean energy tax credits enough stability through the elections.

The IRA, with its lucrative incentives to attract project developers and investors worldwide, has drawn concerns and action from other economies. As a response, the EU has proposed the Net-Zero Industry Act and the European Critical Raw Materials Act, but since it is unclear how much funding there will be and where it will come from, these policies might not be able to provide incentives as high as those of the IRA. On a positive note, countering policies can level the playing field for faster clean energy adoption worldwide, but the risk is that domestic requirements under these policies could lead to a certain extent of clean energy supply chain deglobalisation.

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