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ENERGY SUSTAINABILITY UNITED STATES

How the US clean energy industry can navigate the policy void

As federal government incentives fade rapidly, enhancing revenues and reducing costs is key to many clean technology developers weathering the new political environment

Clean energy technologies likely face a challenging future in the current political environment

Clean energy tax credits to be slashed

Now approved by Congress, the 'One Big, Beautiful Bill' is set to significantly reduce the length, value, and scope of eligibility for many clean energy tax credits under the Inflation Reduction Act (IRA), despite avoiding some of the strictest rule proposals.

This effort is part of Congress's broader initiative to cut any squeezable spending to fund the Trump administration's signature policies, such as tax cuts, and align with the administration's strategy to promote the US's (largely) fossil fuel-based energy dominance. According to the University of Pennsylvania's Wharton School, the energy and climate provisions of the IRA can cost around $1tr over a 10-year period.

Below are some highlights of the changes to the IRA tax credits passed by Congress, as well as

their potential impact.

- **Solar and wind spared from nightmare timeline requirements, but can still face earlier credit sunsets**

The bill is expected to phase out Section 48E investment tax credits (ITCs) and Section 45Y production tax credits (PTCs) for solar and wind projects that are unable to be put in service before 2028.

It escaped what would have been a nightmare clause for the renewables industry; the House bill suggested that to qualify for tax credits, projects must start construction within 60 days of the law's enactment and start operations before 2029. It also scrapped a previously included excise tax that would increase costs across the industry, whether projects claim tax credits or not.

The bill's timeline can still put pressure on planned projects to complete construction faster, but there is an important exemption, where solar and wind projects that start construction with 12 months of the enactment of the law can continue to receive tax credits. This shows a willingness to provide projects under advanced planning with certainty. But the bill should still put developers on alert, prompting them to brace for material changes in the industry in a few years.

- **A win for battery storage and clean firm electricity**

The phaseouts for clean electricity ITCs and PTCs only apply to solar and wind; all other pathways can still enjoy the tax credits until 2032. This would benefit battery projects, including those integrated at renewable plants. On top of the Section 48E ITCs, battery developers are also eligible to claim the Section 45X production tax credits, and together would give US-made batteries an advantage this decade in the domestic market against imports from Asia under tariffs (discussed in more detail below). We expect the preservation of these tax credits to encourage solar and wind projects to adopt storage solutions, thereby reducing the challenge of intermittency for the renewable industry.

In addition, nuclear, geothermal, and hydro can also continue to receive tax credits. This, again, reflects Congress' willingness to support clean and firm electricity that can meet the US's growing power demand.

- **Forthcoming farewell to tax credits for electric vehicles (EVs), charging; delayed goodbye to hydrogen**

As expected, the tax credits for EVs and related infrastructure is set be gone soon, by the end of September. While the elimination of EV tax credits can put a damper on demand, the more profound impact on the US EV industry would come from the retreat of support for the charging infrastructure. Consumers' driving range anxiety is here to stay, and the pace at

which the US EV industry expands is poised to slow down.

In a mild relief to the hydrogen industry, 45V tax credits are phased out in 2028, as opposed to next year in the initial draft. As discussed below, green hydrogen would be hit harder than blue hydrogen, with the latter set to continue cementing its dominance in the US and globally.

- **Tax transfer market saved**

The IRA's transferability clause, which allows project developers to directly sell tax credits to other entities without being involved in a tax equity deal, has helped inject more capital into the clean energy industry and facilitate project development. The implementation of tax credit transfers only started in 2023, but already accounts for half of the total $45-50bn tax credit market today. We continue to see transferability as a key enabler for more capital available for clean technologies.

- **'Foreign entities of concern (FEOC)' still a concern**

The bill, which puts a limit on the percentage of project costs coming from 'material assistance' by an FEOC (primarily referring to China), is less stringent than what the House had proposed. But it can still be an obstacle for many projects seeking tax credits.

The impact of FEOCs for the battery industry is mixed. Battery producers seeking 45X manufacturing tax credits would not be much affected, as the US only imports a small portion of its lithium from China. Clean energy projects installing batteries to receive 48E tax credits would see a higher impact, as today 70% of the US's lithium-ion battery imports is from China, and the US can satisfy 30% of its demand with domestic manufacturing.

Moreover, the FEOC measures also apply to foreign-influenced entities that have ties with China. This would impact the solar industry. Although nearly zero of US solar equipment imports come directly from China, 60% of solar cell and 80% of module imports are from Cambodia, Malaysia, Thailand, and Vietnam. Certain companies from these countries have been identified as under influence from China and would hence fail to meet the FEOC rule.

This signals an institutionalised, long-term decoupling from the Chinese supply chain—including alternative trade routes. But before then, Chinese products could still find new trade routes as US policy evolves. There is nevertheless an important exception provided to 48E credits, where developers having entered procurement contracts with an FEOC before June 16, 2025 can be exempt from the new rules. This would be a relief to solar projects in advance development.

More changes to the IRA are included in the bill, which we have summarised in the table below.

Highlights of the One Big Beautiful Bill's changes to clean energy tax credits under the IRA

Code	Name	Length and value	Transferability	Foreign entities of concern
45Z	Clean fuel production credit	• Value of credit = %domestic feedstock + (%foreign feedstock x 80%) • %Foreign feedstock = total foreign feedstock/total feedstock • %Domestic feedstock = 100% - %foreign feedstock • Lifecycle greenhouse gas emissions adjusted to exclude emissions from indirect land use change • Emissions rates for transportation fuel from animal manure calculated on specific feedstocks used to produce each fuel • Sustainable aviation fuel credits applicable to any fuel sold in 2025 until termination September 30	• No changes	The following restrictions apply to sections **45Z, 45Q, 45X, 45U, 48E, and 45Y**: • No tax credits allowed if the taxpayer is a specified or influenced foreign entity after enactment The following restrictions apply to sections **45Z and 45U**: • No tax credits allowed if the taxpayer is a specified foreign entity after enactment; no tax credits allowed if the taxpayer is a foreign-influenced entity after 2 years of enactment Specific applications: • **45X**: After enactment, a taxpayer cannot receive a certain percentage of material assistance from a specified or influenced foreign entity; components cannot be manufactured through effective control by a specified foreign entity • **48E & 45Y**: Starting 2026, construction of 'qualified facilities', cannot receive a certain percentage of material assistance from a specified or influenced foreign entity • **45Z**: Starting 2026, clean fuel cannot be produced using foreign feedstock
45Q	Carbon oxide sequestration credit	• Matches the value tax credits for sequestration with that for permanent storage		
45X	Advanced manufacturing production credit	• Phaseout timeline: 75% of tax credit value beginning 2031, 50% beginning 2032, 25% beginning 2033, phased out starting 2034 • No tax credits for wind components sold after 2027		
45U	Zero-emission nuclear power production tax credit	• Cannot be produced in a 'covered nation' or 'covered entity' • Value of tax credits decreases by 20% each year starting in 2029; in 2032, value of tax credits decreases from 40% to 0%		
48E	Clean electricity investment credit	• Phaseout ***for solar and wind only*** if projects are put in service starting 2028, with an exception that projects starting constriction within 12 months of law enactment can continue to receive credits • Additional domestic content restriction to qualify for **48E**: for construction starting June 16, 2025: at least 40% domestic content, until Jan. 1, 2026: at least 45%, starting 2026: at least 50%, starting 2027: at least 55% • For offshore wind: starting June 16, 2025: at least 20% domestic content, until Jan. 1: 27.5%, starting 2026: 35%, starting 2027: 55%		
45Y	Clean electricity production credit			
30D	Clean vehicle credit			
45V	Clean hydrogen production tax credit			
25E	Previously-owned clean vehicle credit			
45W	Qualified commercial clean vehicles credit	Termination timeline: • **30D, 45W, 25E**: Termination after September 30, 2025 • **25C, 25D**: Termination in 2026 • **45V**: Termination in 2028 • **30C, 45L**: Termination after June 30, 2026		
45L	New energy efficient home credit			
25D	Residential clean energy credit			
30C	Alternative fuel vehicle refueling property credit			
25C	Energy efficient home improvement credit			

ING Research based on US Congress

Rethinking the economic viability of clean technologies

Since its signing, the IRA has enabled tremendous investment in clean energy, largely by improving project economics with tax credits. Now, with the credits on the chopping block, businesses and investors must take a fresh look at the viability of these technologies and rethink what is needed to keep up the development of the clean energy industry.

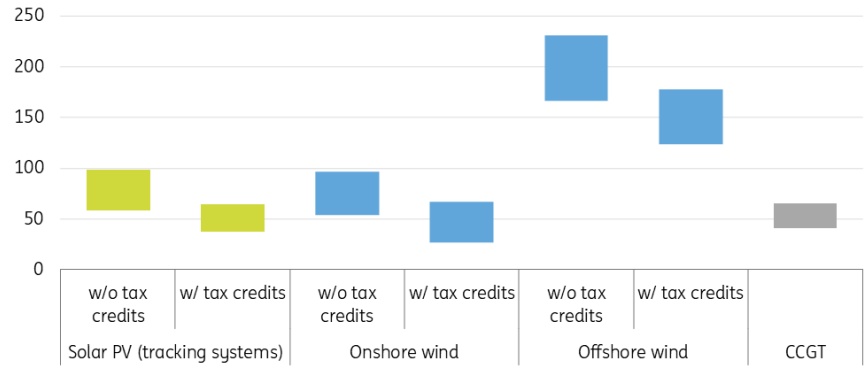
Solar and wind

There is still optimism for the solar and onshore wind industries from a cost perspective. An analysis from Bloomberg New Energy Finance (BNEF) shows that without government incentives, only best-in-class solar and wind projects can be cost-competitive with those of combined cycle gas turbines (CCGTs). But another study from Lazard, with which we agree based on our own evaluation, suggests lower levelised cost of electricity (LCOE) ranges for unsubsidised and subsidised solar and onshore wind projects. We also think that the LCOE of CCGT projects can trend higher, in or above the range shown below, in cases where a higher capital cost or lower capacity factor is considered.

This means that more wind and solar projects could be in cost parity with CCGT than shown below.

Levelised cost of electricity in the US

$/MWh



Source: Bloomberg New Energy Finance

Note: subsidies only include those at the federal level. Offshore wind LCOE calculations include transmission costs and lease costs based on the latest auction results.

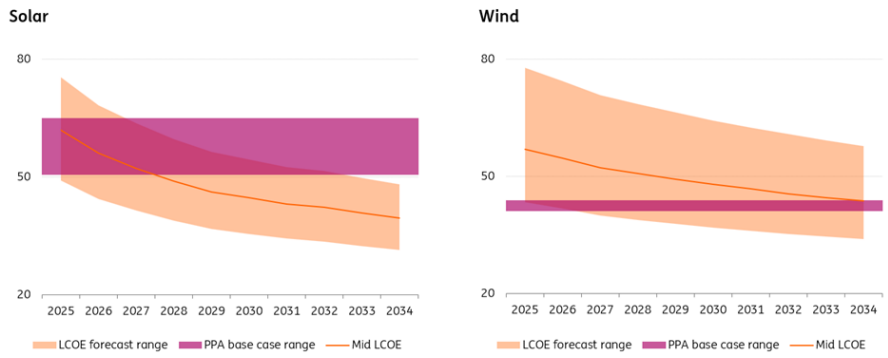
However, the LCOE metric does have its limitations. For example, it does not reflect the renewables' intermittent nature. When costs to 'firm' intermittency – where energy storage, backup power, etc., are considered – renewables can lose their cost competitiveness in certain cases, even with the tax credits. Nevertheless, we do expect those costs to come down as energy storage systems, forecasting models and grid modernisation advance.

A potential earlier sunset of the tax credits for solar and wind, as well as the upward cost pressure from tariffs, points to the increased importance of extracting greater value from other current revenue streams.

The **first** is through **power purchase agreements (PPAs)** signed with off-takers. Today, for utility-scale solar projects, the average LCOE based on the BNEF analysis is only slightly higher than average PPA prices in the US today and is forecast to drop below the average PPA price from 2026 onwards. This puts utility-scale solar projects in a good position to maintain profitability without IRA tax credits, while the case for wind projects is more challenging.

Forecast LCOE and PPA prices for solar and wind projects

$/MWh



Source: Bloomberg New Energy Finance

We see several factors that can improve PPA prices for clean energy projects in the wake of waning tax credits. The first is the premium that corporate off-takers are willing to pay for clean energy that can partially or fully offset their emissions from conventional power sources. Despite changing policy dynamics in the US, many corporates remain committed to sustainability targets, and PPAs continue to be a popular way to manage net-zero targets. In addition, the power demand surge from the rapid development of artificial intelligence will require data centre companies to sign up more PPAs to offset any corresponding increase in GHG emissions.

This means that solar and wind projects can enhance their revenues by finding the customers who are willing to up-pay and, preferably in the long run, to lower emissions from electricity usage.

Second, wind and solar projects can benefit from optimising their production profile through pairing with **storage solutions**, especially given that the bill preserves the tax credits for batteries until the next decade (discussed below). This can firm the power they generate, reduce expenses from grid connection and project development, and broaden their product offerings to areas such as ancillary services and capacity markets. Although the rising costs of power generation and energy storage as a result of tariffs and IRA FEOC requirements can discourage solar and wind developers from installing batteries, we still see it as a net positive strategy.

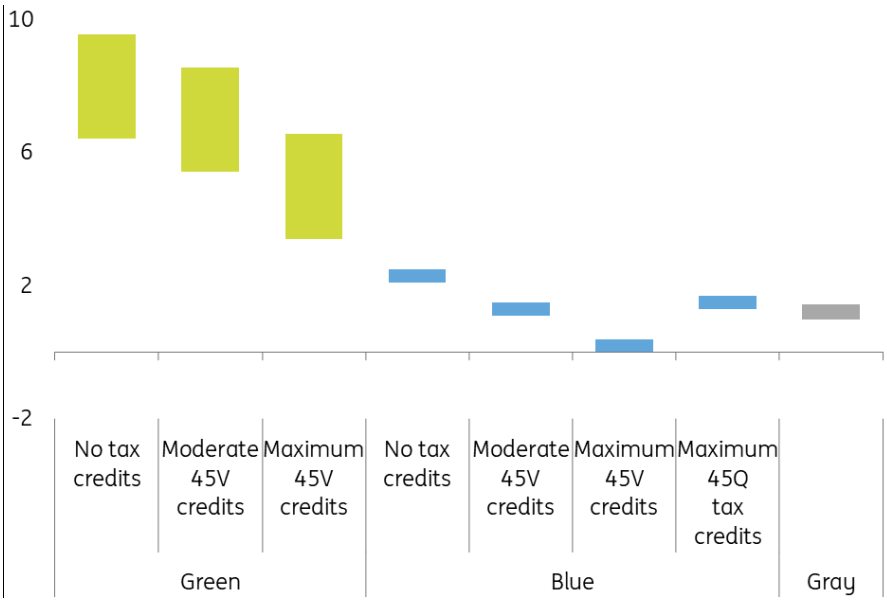
In addition, the economies of scale and manufacturing efficiencies are expected to continue to drive down the cost of renewables, especially for batteries. This, however, may be entirely offset by tariffs and higher costs from procuring domestic content to comply with potential changes to the IRA that are directed against certain foreign countries, the US administration deems adversarial.

Hydrogen

The project economics outlook for blue hydrogen (produced from natural gas with carbon capture and storage, or CCS) is more promising than for green hydrogen (produced from electrolysing water using renewable power). Green hydrogen is the most expensive form of hydrogen, even with the full 45V tax credits, which offer ≤$3/kg of hydrogen produced, depending on the carbon intensity. Blue hydrogen, on the other hand, has a lower baseline production cost of $2.1-$2.5/kg. Moderate tax credits can already make blue hydrogen cost-competitive with grey hydrogen (produced from natural gas without CCS). And although it might not be easy to get, full-scale 45V tax credits can bring the cost down to below zero. Even if 45V tax credits are phased out early, blue hydrogen producers can still receive 45Q carbon capture tax credits through 2032, albeit possibly at a lower level.

Levelised cost of hydrogen in the US

$/kg



Source: Bloomberg New Energy Finance, Center for Strategic and International Studies, ING Research

Note: Subsidies only include those at the federal level. Maximum 45V tax credits = $3/kg; moderate 45V tax credits = $1/kg; maximum 45Q tax credits = $0.8/kg based on estimates from CO2 capturing rates.

This means that the development of blue hydrogen in the US, which has already trumped that of green hydrogen, will continue to be in a more advantageous position and make up most of the clean hydrogen capacity growth in the country. Green hydrogen producers in the US, in order to secure offtake agreements, are increasingly exporting to European customers because of the higher sustainability standards and a preference for green hydrogen across the Atlantic. For both colour shades of hydrogen, securing buyers, preferably for the long term, is

crucial to attracting investors and moving projects forward.

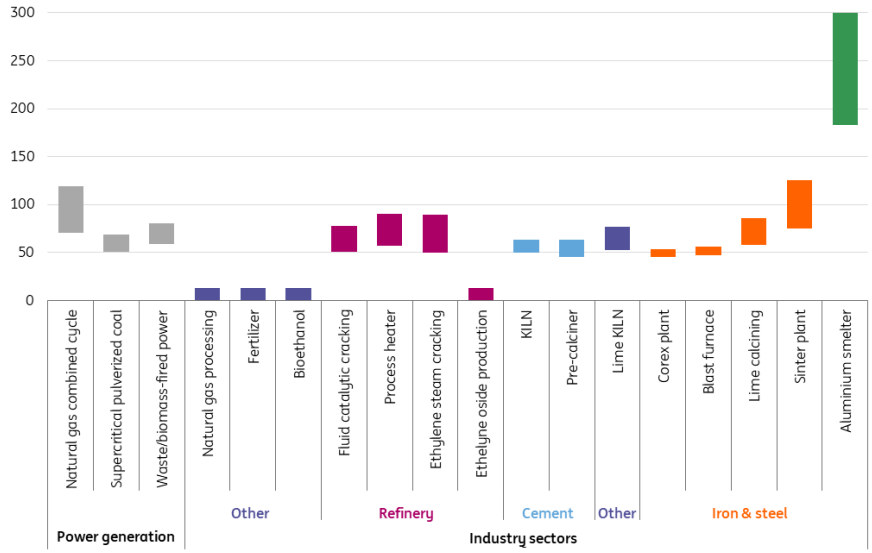
Carbon capture and storage (CCS)

CCS is least impacted by policy disruptions. Not only have no changes been made to cut the length of the 45Q tax credits, but the credits for reusing captured CO2 in cases like enhanced oil recovery are now increased to match the level for permanent carbon storage.

The $85/tCO2 tax credits for point source CCS can offset the cost of carbon capturing in several applications, such as with point source capture for coal power generation, oil refining, and cement/steel production. Costs in other cases remain high even with tax credits, such as with aluminium smelters and direct air capture, where the low CO2 partial pressure at the source of emissions or capture results in much higher capturing costs.

Cost of carbon capture in various types of power and industrial processes

$/tonne of CO2



Source: ING Research estimates based on Global CCS Institute

Note: The analysis excludes the cost of downstream CO2 compression or storage.

And although CCS tax credits are largely safe, the Department of Energy has recently terminated $3.7bn of grants already contracted to clean energy demonstration projects, many of which are CCS projects. These CCS demonstration projects tend to be for less mature use cases, such as natural gas power plants, as they need policy uplifting due to a lack of established revenue streams, infrastructure, or environmental regulations.

One way to enhance revenue streams is to resell the captured CO2. It has been a key business model for CCS projects in natural gas processing, where CO2 is sold for enhanced oil recovery. Now, with the advancing energy transition, CO2 can also be sold to companies as an input along with clean hydrogen to produce synthetic fuels. While the synthetic fuels market is also nascent, doing so can, in the long term, create a more vibrant green energy supply chain.

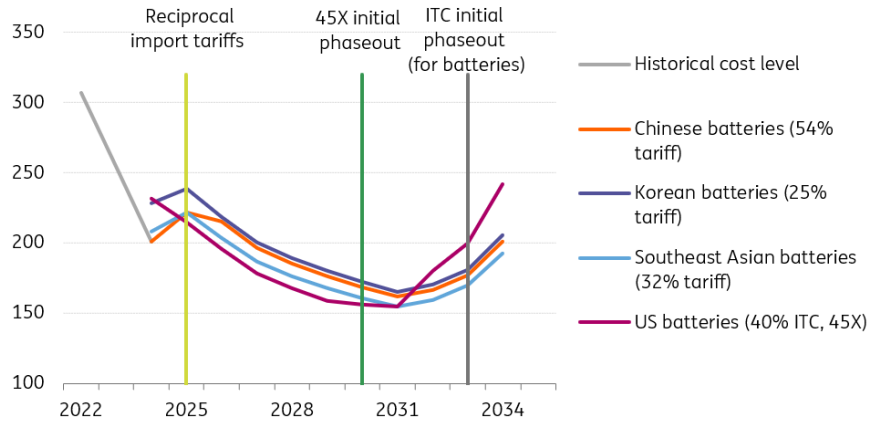
It is worth keeping in mind that reselling CO2 only 'recycles' the carbon already released to the atmosphere, whereas meaningful emissions reduction needs permanent carbon storage and removal. Nevertheless, carbon reselling can be an intermediate solution to expanding the CCS market.

Battery storage

Similarly, the battery industry would continue to receive most of the IRA tax benefits going until 2032, giving US-made batteries a cost advantage against those imported from China and other Asian countries under tariffs this decade. Conversely, a full termination of all tax credits available to batteries – 45X and 48E if a battery is connected to the grid – would have completely wiped out any cost reduction potential this decade from technological advancements in the US.

Cost of four-hour fully installed energy storage systems, by battery origins

$ per kilowatt-hour (based on usable capacity)



Source: Bloomberg New Energy Finance, ING Research

Note: The analysis applies a 40% ITC to energy storage projects with domestic batteries and 30% ITC to others; tariff assumptions are based on recent developments. Provisions regarding foreign entities of concern are not considered. Fully installed battery systems include costs for turnkey storage systems, engineering, procurement & construction (EPC), and grid connection.

Nevertheless, this cost outlook still highlights the importance of US battery producers investing in technology innovation and upscaling today to bring the cost curve down even more. Otherwise, starting early next decade, once the tax credits start to fade, US producers' battery systems can lose their cost advantage.

For the US clean energy industry as a whole, policy uncertainty should prompt developers to focus on their projects' fundamental economics to prepare for scenarios without federal subsidies. They can do this by expanding revenue streams, as well as furthering their support of the critical infrastructure that enables their technologies. A developer might also need to rethink financing strategies as a result. While the government's role in facilitating the clean energy development is crucial, especially in de-risking and upscaling novel technology projects, private sector activity will be increasingly important in its absence.

Conclusion

The clean energy industry in the US is experiencing drastic policy changes, where the 'carrots' nurtured under the former Biden administration are rapidly fading. So are the 'sticks', with little to no environmental regulations at play to meaningfully limit emissions and spur sustainability activities. These new dynamics will create new headwinds for certain clean energy players, but will not stifle the industry as the US continues its path along a structural energy transition. More so than anything else, new market conditions require refreshed ways of thinking and doing business – and this is what can sustain the development of clean energy in the US.

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