

# **11 Industrial policy for electric vehicle supply chains and the US-EU fight over the**

manufactured in Tennessee. Over the next few months, the US Treasury Department wrote implementing regulations that tweaked key IRA provisions on EVs in ways that accommodated some of the EU's concerns. Doing so through implementing regulation, however, rather than reform of the statute, comes with its own consequences. And some of the trading partners' more fundamental concerns with the IRA could not be fixed through implementing regulations.

This chapter showcases the political-economic complexity of US and EU attempts to cooperate over clean-energy transition policy to address a global externality. EVs are but one example of the challenge facing partners with integrated supply chains, similar levels of economic development and shared worries over climate and other environmental problems, rising inequality, workers, social issues and democracy itself.

The EV conflict laid bare the different ways in which the United States and the European Union prioritise economic efficiency, World Trade Organisation (WTO) rules, the approach to non-market economies and national security vulnerabilities that arise from depending on an authoritarian regime such as China for import sourcing of critical inputs.

The details matter for how the IRA and its implementing regulations affect incentives for international trade in EVs and their key inputs. This chapter explores those details, including the potentially transformative decision that leased vehicles could qualify for consumer tax credits under a separate and independent track of the IRA that did not have those discriminatory local content incentives. It also examines numerous other policies – including the considerable differences in US and EU import tariffs on EVs toward each other and toward third countries, such as China – that are also likely to affect EV trade patterns in ways that offset some effects of the IRA. In the pre-IRA policy landscape, for example, EU imports of EVs were increasingly dominated by sourcing from China, which had largely displaced US exports. Furthermore, the United States continued to import large numbers of EVs from Europe even after implementing the IRA. Whether this trend continues, of course, remains an open question.



instead to regulations mandating certain clean-energy standards.

Given the constrained policy environment in which it operated, the Biden Administration also focused on second-best policies, including subsidies, in the IRA, which was signed into law on 16 August 2022 (Table 1). In general, subsidies for the take-up of clean energy are a second-best solution because they encourage excessive consumption of energy over of cest s4f 1 (ter)5 (g)-3.9 (y o(1)-4t4( (um)4 Nd0pRe90o(1)-4t4( (uus)l

Table 1: Key events affecting US policy on electric vehicles

Date	Event
15 November 2021	President Biden signs into law the Infrastructure Investment and Jobs Act (House: 228–206; Senate 69–30). The bipartisan legislation includes funding of up to \$7.5 billion for EV charging stations.
19 November 2021	The US House of Representatives passes the Build Back Better Act (220–213), which includes tax credits for EVs. The bill never passes the Senate.
27 July 2022	Senator Joe Manchin and Senate Majority Leader Chuck Schumer announce an agreement to allow a vote on the Inflation Reduction Act (IRA) of 2022. It subsequently passes both the Senate (51–50) and House (220–207).
16 August 2022	President Biden signs the IRA into law. The North American assembly requirement in IRA Section 30D goes into effect immediately.
7 September 2022	The Congressional Budget Office releases revised estimates of the budgetary effects of IRA over 2022–31.
1 December 2022	In response to European complaints, during the state visit of French President Emmanuel Macron, Biden says his administration will make 'tweaks' to the IRA.
19 December 2022	The Treasury Department delays proposed regulation on critical minerals and battery components requirements for Section 30D tax credits in the IRA until March 2023.
29 December 2022	Treasury (Internal Revenue Service) clarifies that the IRA's commercial clean vehicle tax credits (Section 45W) are available to consumers who lease vehicles. Treasury also releases a Section 30D White Paper anticipating the direction of proposed guidance on critical mineral and battery component value calculations.
3 February 2023	Treasury reclassifies certain vehicles, making more models eligible for the Section 30D consumer tax credit.
10 March 2023	President Biden and European Commission President Ursula van der Leyen launch negotiations on a targeted critical minerals agreement that would enable relevant critical minerals extracted or processed in the European Union to count toward requirements for clean vehicles in the IRA's Section 30D.
28 March 2023	The United States and Japan sign a Critical Minerals Agreement that qualifies Japan as a 'free trade agreement' partner for the IRA's Section 30D critical minerals content requirements.
31 March 2023	Treasury proposes a rule for content requirements in the IRA's Section 30D, including general criteria for 'free trade agreement' partners that will go into effect 18 April.
12 April 2023	The Environmental Protection Agency proposes new regulations for vehicle emissions to ensure that two-thirds of new passenger cars will be all-electric by 2032.
18 April 2023	The content requirements of IRA Section 30D announced on 31 March 2023, go into effect.

2.1

Transportation accounted for 38 percent of US carbon emissions in 2021, the largest single contributor to emissions (CBO, 2022a). Of this figure, 83 percent came from personal vehicles (58 percent) and com-

infrastructure in the geographically expansive United States<sup>72</sup>. This constraint on consumer EV take-up is often referred to as 'range anxiety'.

At the federal level, the United States provided consumer tax credits for EVs of up to \$7,500 dating back to the American Recovery and Reinvestment Act (ARRA) of 2009. They were phased out once a manufacturer's US sales reached 200,000 units. By the summer of 2022, Nissan and Ford were getting close to reaching the cap, and Tesla, General Motors (GM) and Toyota had exceeded it and were no longer receiving subsidies<sup>73</sup>.

To incentivise buyers to switch from ICE vehicles to EVs, the IRA modified existing federal consumer tax credits. It removed the 200,000 unit cap, making the tax credits available again to Tesla, GM and Toyota. The uncapped credits would be available for 10 years.

In an attempt to encourage automakers to build out a fleet of EV models for the mass market, the IRA initially limited the tax credit to lower-priced EVs and to individuals or households with lower earnings. These provisions were added out of concern that most of the limited EV take-up – and subsidies paid out by US policy under earlier tax credits – had gone to higher-income consumers who purchased expensive models, such as early Teslas. To the extent that these purchases would have been made without the tax credits, they were both costly to taxpayers and had insufficient impact on achieving US climate policy objectives<sup>74</sup>.

## 2.2

The IRA includes more than just consumer tax credits, as it also attempts to achieve other objectives. Understanding these requires

<sup>72</sup> The bipartisan Infrastructure Investment and Jobs Act that was signed into law in November 2021 provided \$7.5 billion of funding to address part of this challenge.

<sup>73</sup> Jon Linkov, 'Toyota Becomes 3rd Automaker to Reach Electric Vehicle Tax Credit Limit', *Consumer Reports*, 7 July 2002, <https://www.consumerreports.org/hybrids-evs/toyota-reaches-electric-vehicle-tax-credit-limit-a9709089660/>.

<sup>74</sup> For a review of the literature, see Sheldon (2022).

getting to grips with what the US government perceived as the initial, pre-IRA economic and policy equilibrium, as well as the domestic political-economic forces that would make the green energy transition policy sustainable and not subject to a political reversal of the sort that took place in 2017, when President Donald Trump pulled the United States out of the Paris Agreement.

The United States has a large, legacy ICE automobile industry. As ICE vehicles and EVs involve some different corporate players, as well as different inputs in their supply chains, a transition from one to the other puts hundreds of thousands of jobs at risk (Klier and Rubenstein, 2022; Hanson, 2023). Many of these at-risk jobs are in politically important swing states, such as Michigan and Ohio, where they affect communities that have suffered disproportionately large economic losses since 2001 – a period that coincides with the “*rust belt*” (Autor et al., 2021). Whatever the source of the shock, the failure of workers and communities to adjust continues to play an outsized role in policy discussions – unsurprisingly, given the effectiveness with which Donald Trump weaponised it during the 2016 presidential campaign and while in office.

The US perception of the pre-IRA equilibrium was that it was dominated by China, which subsidised EVs. Beijing had prioritised the sector as part of its highly controversial ‘Made in China 2025’ industrial policy programme announced in 2015. China’s supply-side policies for batteries were also alleged to discriminate in favour of indigenous firms<sup>75</sup>. Finally, its import tariffs were high, providing firms that produced locally protection from foreign competition (in game-theoretic terms, if the rivalry were modelled as a prisoner’s dilemma, China was

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.” With US-China geopolitical tensions worsening, the United States was unwilling to expose itself to the same sort of long-run energy dependencies that resulted in the OPEC-led supply shocks of the 1970s, which triggered backups at gas pumps, rationing and ultimately inflation, recession and political upheaval at home. Russia’s weaponisation of energy supplies to the detriment of the European Union provided even more ammunition to policymakers worried that in a military conflict, China would do something similar in the future to restrict the supply of EVs or the ability to manufacture them domestically.

The central policy objective – and the one creating the biggest negative reaction from Europe – was to ease the US labour market transition from ICE vehicles to EVs. The IRA seeks to do so in several ways. First, consumption subsidies appeared initially limited to EVs assembled in North America. This feature of the law transformed the consumption subsidy into a subsidy to production, as it is paid only as long as the EV is both manufactured and sold domestically<sup>78</sup>. Second, the law includes a separate production tax credit for batteries and their inputs (as well as other sources of clean energy), which also affects the competitiveness of the EV supply chain in the United States.

Advocates for the local assembly provisions argued that the green transition would be sustainable in a democracy like the United States only if a political constituency of workers and domestic firms were created to support it. Consumer interests would never mobilise politically

<sup>78</sup> The main competitiveness spillover was that the subsidy might impede the ability of foreign exporters to sell to the US market; that subsidy did not affect the direct cost of producing an EV for export. The IRA also does not ‘pick winners’ in terms of subsidising production. Because the subsidy flows through to producers through a consumer tax credit, consumers are still the ones choosing which EV models they want to purchase. This mechanism is different from the subsidies available in the 2022 CHIPS and Science Act, for example, which charges the Commerce Department with disbursing subsidies across semiconductor manufacturing investment projects.

in large enough numbers to support the lower prices that might arise through import competition.

A related argument is that political support for the United States remaining open at all remains tenuous (the national psyche remains scarred by the ‘China shock,’ which President Trump so masterfully exploited politically). Policies like the IRA – even if discriminatory and inefficient – are needed to maintain a broader policy of trade openness elsewhere across the economy.

Numerous concerns with the IRA’s objectives have emerged. An overarching worry is that using a single policy instrument to target multiple objectives reduces the chance that any one objective will be met.

One set of concerns is domestic. The IRA is a poorly targeted labour-market and community-adjustment policy. Although the geography of the North American EV supply chain may end up driven by the same forces as the ICE supply chain that emerged by the late twentieth century (Klier and Rubenstein, 2023), the plants and jobs are unlikely to end up in exactly the same communities as the ICE plants and where jobs are being wound down. Although there may be a political constituency of workers in the EV supply chain years from now to support a cleaner automobile sector, workers and communities that lose out as ICE supply chain plants are no longer needed may be nearly as unhappy about their jobs being replaced by EV jobs two or three states away as EV jobs overseas<sup>79</sup>.

A second important domestic concern with the IRA is its fiscal implications. Targeting the climate externality with subsidies requires raising taxes elsewhere, which will generate additional inefficiencies (a carbon tax does not).

79 Other parts of the IRA unrelated to EVs do include place-based policies designed to facilitate new investment in the exact locations where economic activity driven by dirty energy would decline. The IRA also includes Low-Income Communities Bonus Credits for clean energy projects rooted in underserved communities, and the Davis-Bacon Act provides additional tax benefits if wages are high enough (under) and the work involves registered apprentices.

Even without those inefficiencies, the IRA is expensive for taxpayers, especially if take-up far exceeds initial estimates by the Congressional Budget Office (CBO, 2022b; Bistline et al., 2023; Goldman Sachs, 2023). If taxpayers end up unwilling to support the IRA fiscally over the long term, Congress could terminate the programme early, reducing the chance of achieving its most important objective of reducing carbon dioxide emissions.

An additional concern (discussed below) is whether the IRA approach will incentivise creation of an EV supply chain for the world outside of China. Two other worries involve how trading partners might respond to the international spillovers created by the US policy approach.

First, to the extent that the IRA displaces the legitimate market access expectations of trading partners exporting to the United States, there may be retaliation, which would impose other costs on the US economy. If the IRA leads to excessive US exports, trading partners may respond directly with tariffs (countervailing duties) to limit those exports. Rather than a cooperative equilibrium, in which governments agree to restrain their subsidies to socially efficient levels (and combine them with carbon taxes), the noncooperative equilibrium may end up with the same level of economic activity on EVs and carbon dioxide reductions but with excessive subsidies (which requires tax-raising elsewhere) and retaliation (which increases other costs).

Second, US subsidies may lead other countries to change their climate policies, especially out of concern over reduced industrial competitiveness.

2021 but failed to pass the Senate<sup>80</sup>. One was a tax credit of \$4,500 for vehicles assembled at unionised plants in the United States. The European Union lobbied heavily against this provision, in part because it would have discriminated against the US manufacturing facilities of European-headquartered car companies, many of which are located in right-to-work states where workforces are not unionised<sup>81</sup>. Canada complained vociferously as well, including in a letter sent by Deputy Prime Minister Chrystia Freeland and Trade Minister Mary Ng to a host of US senators that included explicit tariff threats if they passed the legislation<sup>82</sup>.

The IRA stripped out the unionisation criterion and changed the requirement for US assembly to a requirement for North American assembly, making Canadian and Mexican plants eligible (Mexico also has plants for several European-headquartered automakers).

### 3 The effects of the IRA on electric vehicle supply chains

Multiple provisions of the IRA affect EVs. They include consumer tax credits for new clean consumer (Section 30D) and commercial (Section 45W) vehicles, and producer tax credits for other parts of the EV supply chain (Section 45X), which have received much less public attention<sup>83</sup>.

80 House Committee on Rules, H.R. 5376: Build Back Better Act, 3 November 2021, <https://rules.house.gov/sites/republicans.rules118.house.gov/files/BILLS-117HR5376RH-RCP117-18.pdf>.

81 See Margaret Spiegelman, 'Mexico, EU, Japan, Others Voice Concern about Proposed US EV Tax Credit', *Inside, US Trade*, 1 November 2021, <https://insidetrade.com/daily-news/mexico-eu-japan-others-voice-concern-about-proposed-us-ev-tax-credit>; Joe Miller, 'German carmakers condemn Biden's electric-vehicle subsidy plans', *Financial Times*, 11 December 2021, <https://www.ft.com/content/8b432548-9a7d-4669-b479-27fa6eb70bd9>.

82 See David Ljunggren, 'Angry Canada threatens to Impose Tariffs on US Goods over EV Tax Credit Plan', *Reuters*, 10 December 2021, <https://www.reuters.com/world/america/canada-threatens-impose-tariffs-us-goods-over-ev-tax-credit-plan-2021-12-10/>.

83 Section 25 also includes a provision for previously owned clean vehicles.

### 3.1

Consumer vehicles are defined as vehicles that weigh less than 14,000 pounds (6,350 kilograms). They include cars, pickup trucks and sport utility vehicles (SUVs). Even relatively heavy vehicles with batteries fall under the threshold with room to spare. Examples include the Audi RS e-tron (5,200 pounds/2,358kg) for cars, the Ford F-450 Crew Cab (8,600 pounds/3,900kg) for pickups and the GMC Hummer EV (9,000 pounds/4,082kg) for SUVs<sup>84</sup>.

The consumer tax credit is restricted to vehicles for which final assembly takes place in North America. This requirement went into effect immediately on implementation of the law (16 August 2022).

The sudden change left consumers who had placed orders but had not legally contracted for vehicle delivery in the lurch.

The consumer tax credit is up to \$7,500, with eligibility determined by the inputs going into the batteries of the EV. Half of the tax credit eligibility (\$3,750) is available for vehicles that include a battery recycled in North America or a battery that meets a critical minerals sourcing

where to draw the line in the battery supply chain between what was a critical mineral and what was a component – could matter substantially). The minimal battery components threshold was 50 percent in 2023 (once Treasury issued guidance), increasing by 10 percentage points a year until reaching 100 percent in 2029-32.

Also excluded under the law is sourcing from a “  
 ,” a designation that covers China, Iran, North Korea and Russia<sup>85</sup>. Beginning in 2024, a vehicle may not contain any battery components manufactured or assembled by a foreign entity of concern. Beginning in 2025, a vehicle’s battery may not contain any critical minerals sourced from a foreign entity of concern.

Section 30D includes at least two other criteria that affect eligibility for a tax credit. The first is the limit on adjusted gross income (AGI), which cannot exceed \$300,000 for married couples and \$150,000 for individuals. The second is a price cap. Beginning in 2023, tax credit eligibility requires that the manufacturer’s suggested retail price (MSRP) be









ese tax credits could result in another \$4,500 in tax credits per vehicle. For EVs eligible for the tax credit under Sections 30D or 45W, the additional \$4,500 from Section 45X means that a single EV could potentially qualify for \$12,000 in total subsidies (whether the consumer, the EV company, the battery company or the company making critical minerals or components will enjoy these subsidies needs to be determined empirically, but the combined benefit to consumers and firms in these markets clearly comes at the expense of the government and taxpayer). At the upper end of take-up, the cost to the US government for the production tax credit could total six times more than the Congressional Budget Office (CBO, 2022b) estimate<sup>89</sup>.

While these tax credits may induce additional battery manufacturing investments into the United States, some of the subsidies may be transfers that do not have a marginal effect on investment facility decisions. EV companies had announced considerable new investment projects before July 2022 – when passage of the IRA seemed unlikely – and thus may subsequently receive subsidies for investments they had already committed to. As of January 2022, for example, plans were already afoot to build 13 large-scale EV battery plants in the United States<sup>90</sup>.

#### 4 The European response to the Inflation Reduction Act

The IRA was signed into law in August 2022. The European Union's political reaction was relatively slow to materialise. In contrast, in early September 2022, the trade minister from South Korea was already in Washington demanding action on behalf of Korean auto companies. He objected vociferously to the unexpected cutting off of consumer tax credits of Hyundai's popular Ioniq models, which were being

89 Christine McDaniel, 'The Cost of Battery Production Tax Credits Provided in the IRA', *Forbes*, 1 February 2023, <https://www.forbes.com/sites/christinemcdaniel/2023/02/01/the-cost-of-battery-production-tax-credits-provided-in-the-ira/>.

90 Dasl Yoon, 'EV Battery Maker's Sales Pitch to the West: We're Not Chinese', *Wall Street Journal*, 26 January 2022, <https://www.wsj.com/articles/ev-battery-makers-sales-pitch-to-the-west-were-not-chinese-11643198401>.



semi-annual US-EU Trade and Technology Council (TTC) meetings held in early December 2022 in Maryland. Biden's US Trade Representative Katherine Tai also suggested that Europe consider subsidies of its own<sup>95</sup>.

Finally, during the state visit of French President Macron in December, President Biden indicated there would be *exibility*<sup>96</sup>. The administration ultimately showed considerable and unexpected *exibility* when the Treasury Department, the US government agency in charge of implementing key discretionary elements of the IRA, issued regulations on 29 December 2022 and 31 March 2023 (as discussed below).

Domestic political constraints meant that the administration could do relatively little to ease the pain of the IRA on its allies. The IRA was not a bipartisan piece of legislation. After the November 2022 mid-term elections, when with Republicans took control of the House of Representatives, prospects for legislative reform became even less likely than they were before the election.

#### 4.1 *Exemption*

The IRA provoked a tremendous reaction in Europe for a number of reasons. For EVs, the problems were obvious. Under the new law, as of 16 August 2022, an EV manufactured in Europe would no longer be eligible for the consumer tax credit offered on EVs manufactured in North America. The difference created incentives for multinational companies to locate their production facilities in North America instead.

95 Andy Bounds and Aime Williams, 'Top US trade official urges EU to join forces on subsidies amid Green Deal tensions,' *Financial Times*, 2 November 2022, <https://www.ft.com/content/0e52d609-5cfe-453c-9baf-b33b66e941e9>.

96 "For example, there's a provision in it that says that there is the exception for anyone who has a free trade agreement with us. Well, that was added by a member of the United States Congress who acknowledges that he just meant allies; he didn't mean, literally, free trade agreement. So, there's a lot we can work out." White House, 'Remarks by President Biden and President Macron of France in Joint Press Conference,' 1 December 2022, <https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/12/01/remarks-by-president-biden-and-president-macron-of-france-in-joint-press-conference/>.

ere was also much more. The EU was caught off guard when the details of the new legislation were abruptly revealed in late July 2022. It had hoped that its efforts to work with the Biden Administration and establish the TTC in 2021 would prevent these sorts of policies from emerging with little notice. Failing to include Congress in the TTC proved to have been a mistake, as industrial policy often takes the form of legislation (given Treasury's rule-writing function under the IRA and the fact that industrial policy is being implemented through the US tax code, it would also be helpful if the Treasury Department, not only the US Trade Representative, the Commerce Department, and the State Department, were part of the TTC).

In terms of the EU's own policies, the IRA was problematic for reasons that went well beyond the EV sector. The European Green Deal and Fit for 55 involved first-best carbon taxes, phasing out free allowances, a carbon border adjustment mechanism and other potentially WTO-consistent policies as part of its clean energy transition (the IRA suddenly made apparent the fact that the United States was not interested in solutions consistent with traditional WTO rules). For Europe, an extremely important policy question was how much of its own original clean energy transition plan would remain feasible. Would the EU remain politically able to implement a sizable carbon tax, phase out free allowances and impose other policies that make dirty energy consumption in the bloc more expensive for industry?

The IRA's tax credits for batteries and other sources of clean energy make consumption of US energy cheaper, jeopardising the EU's industrial competitiveness. This fear was the major concern facing the EU that even the taxes to the EV tax credits (discussed below) would not be able to address.

Not only did the IRA put economic pressure on the European Union to move away from the first-best policy (taxing carbon at its high social cost), the new pressure to subsidise posed separate threats to the internal structure of the EU itself. The Treaty on the Functioning of the European Union (TFEU) has rules prohibiting member states from

providing subsidies to companies; these rules are part of the fabric that maintains harmony within the union (Kleimann, 2023). The IRA may thus create a wedge between EU countries that can subsidise and those that lack fiscal resources and cannot. If EU countries now feel political-economic pressure to subsidise, their response to the IRA may be to not only discriminate against the United States and other countries; they may also end up discriminating against each other.

The timing of the IRA was also problematic, given the macroeconomic environment in Europe in 2022. Russia's war on Ukraine, its weaponisation of gas supplies flowing through the Nord Stream 1 pipeline and the European policy decision to wean itself off Russian energy, created political problems across the continent by straining European economies, creating high inflation and recessionary risk. Heavy industries in Europe – many concentrated in Germany – were already being forced to rethink their business models, given the loss of access to relatively inexpensive Russian natural gas. Adding early fuel to the fire was a September 2022 report that Tesla was putting on hold its plans to produce battery cells in Germany, potentially shifting more EV production to the United States. The European economies (d S)10 pipEtercaWataeecoctr. Md (e)1 ore EV product



The EU was also concerned about the implications of the US policy actions for the WTO (the nondiscriminatory, rules-based trading system also formed the legal backbone of the European Union). Following four years of the Trump Administration's policies eroding rules-based trade, the hope had been that the Biden Administration might not only be different but that it might be a partner in rebooting efforts at multilateralism.

The IRA was perhaps the final nail in the coffin. By aggressively choosing subsidies – and a particularly discriminatory form of them

pandemic. As of April 2023, no new subsidy policy decision had been announced, however<sup>101</sup>.

Most EU countries provide consumer tax credits for EVs, which average €6,000 (roughly \$6,400) per vehicle (Kleimann, 2023; ACEA, 2022). The main difference is that the EU credits are nondiscriminatory (they do not include local content requirements or other

Table 3: Tariffs on electric vehicles imposed by the US, EU and China in 2023



market because of the EU's free trade agreements (FTAs) with Korea and Japan – two other major EV manufacturers – as well as Mexico and Canada. The EU's FTAs with South Korea, Mexico and Canada already have a 0 percent duty on EVs in effect; the phase-in period for Japan's FTA means that the tariff will fall from its current level of 3.8 percent to 0 in 2026. The implication is that EU imports from these countries enjoy (or will enjoy) a 10 percentage point tariff preference into the EU market relative to the United States. Under the United States' FTAs, the tariff preference offered to South Korea, Mexico and Canada (2.5 percentage points) and Japan (none) is much smaller (or nonexistent).

The United States and the EU could negotiate a trade agreement to reciprocally lower those bilateral tariffs to zero, but such a move is not currently on the policy agenda.

Indeed, the EU and US treat China, the other major exporter of EVs to the world, quite differently. In the EU market, imports from China face the same tariffs as imports from the United States. In the United States, because of the trade war tariffs in effect since July 2018, EU exporters benefit from a 25 percentage point tariff preference into the US market relative to EVs manufactured in China.

These tariffs are likely to affect trade flows (Figure 3)<sup>104</sup>. The value of EU imports of EVs from China, for example, is nearly three times as high as EV imports from South Korea and 16 times as high as imports from the United States. Onshored production by Tesla, Volkswagen and MG – major US and European brands – dominates Chinese EV exports to the European Union<sup>105</sup>. Imports of EVs from Japan remain small; major exporters like Toyota have been relatively slow to move

104 In Figure 3, almost 90 percent of EU EV imports from rest of world were sourced from Mexico in 2022.

105 See Selina Cheng, 'Tesla Rival BYD Leads Push to Sell Chinese EV Brands Around the World'; *Wall Street Journal*, 3 March 2023, <https://www.wsj.com/articles/tesla-rival-byd-leads-push-to-sell-chinese-ev-brands-around-the-world-4e0b6d06>; Peter Sigal, 'Europe Forecast to Import 800,000 Chinese-Built Cars by 2025', *Automotive News Europe*, 7 November 2022, <https://europe.autonews.com/automakers/chinese-electric-car-exports-europe-soar>.



the Chinese and European markets, the only sizable recent US export growth for EVs has been to Canada<sup>108</sup>.

Fourth, sales to the United States and Norway have dominated EU exports of EVs (Figure 5). EU exports to the United Kingdom resumed after a brief decline in the aftermath of Brexit. EU exports of EVs to China are modest.

Figure 5: Major EU electric vehicle export destinations include the US, UK, and Norway

Source: Eurostat. Notes: The CN codes are 87038010 and 87038090 in 2017-2023, 87039010 in 2016. Trade values are converted to US dollars from euros using end-of-month usd/euro spot exchange rates from FRED (DEXUSEU).

## 5 The US policy response to European pleas and other announcements

On 29 December 2022, the Biden Administration quietly announced what



United States had eliminated the North American assembly requirement in Section 30D by Congress amending the law.

The Section 45W leasing option will also dull the battery supply chain sourcing incentives, which are also found only in Section 30D. If consumers choose to take up the tax credit primarily via leasing under Section 45W, automakers will not face financial pressure to use battery components sourced from the United States, use recycled batteries or source critical minerals from the United States or free trade agreement partners. Section 45W thus reduces the incentive to create a separate redundant EV battery input supply chain outside of China.

In a second set of announcements in early 2023, the Biden Administration made additional decisions affecting implementation of the consumer tax credits. On 31 March, Treasury released its proposed rule regarding which countries would be considered ‘free trade agreement’ partners to satisfy the critical minerals sourcing criterion in Section 30D. It highlighted countries with which the United States “  
 “ .” In addition to the 20 countries with which the United States had a Congressionally ratified FTA<sup>109</sup>, the criterion for a critical minerals agreement would be one in which each side

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Federal Register 23370, 17 April 2023).

**the Biden Administration had foreshadowed these details on 28**

implementing regulations of 29 December and 31 March, and its negotiations of such cr Epa(n Doe3e-1)11 (als a)4 (gr)15 (e)-3 (emen)7 (ts)17 (. I)9 (n M)21 (a

the full impact of these critical minerals agreements and the Treasury announcement of 31 March 2023 remains unknown. At one extreme, they could turn out to be meaningless. For example, if all consumers and automakers switch to transacting via lease instead of purchases, there would be no additional tax credit benefit from sourcing critical minerals from such a partner country. Or, if the executive agreement nature of the critical minerals deals does not create enough certainty about future access to the US tax credits, firms may not invest. At the other extreme, if consumers seek the tax credit under Section 30D instead, the ability to source inputs from such countries might create additional incentives to develop alternative supply chains outside of China.

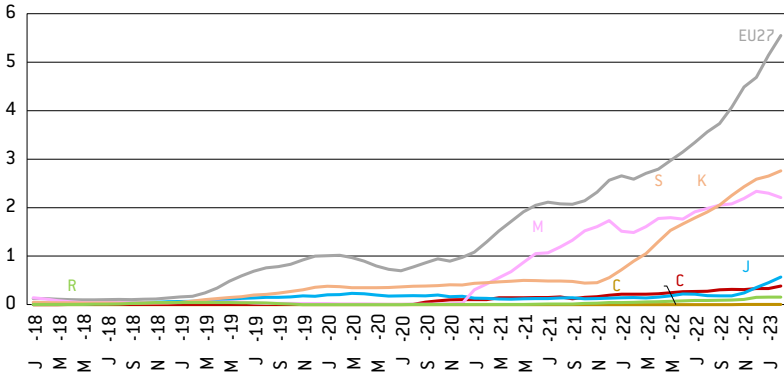
Finally, on 12 April 2023, the Biden Administration proposed another policy to increase the take-up of EVs<sup>117</sup>. The Environmental Protection Agency announced new regulations that require two-thirds of new passenger cars to be all-electric by 2032. If implemented, the regulations would tend to increase consumption of all EVs, domestic or imported, relative to ICE vehicles.

## 6 Eligibility for US tax credits, US imports of electric vehicles, and leasing

It is too soon to look for the impact of these emerging regulations on the EV supply chain, but it is worth examining the US import market to provide context (Figure 6). The concern expressed by South Korean and European officials over the North American assembly provisions in the IRA is understandable. In the lead-up to the sudden announcement of its details (in July 2022), US imports of EVs from both the EU and South Korea had been growing. In the 12 months ending in July 2022, US imports were \$3.3 billion from the EU and \$1.8 billion from South Korea. Cutting off those exports would obviously hurt both economies.

117 See EPA press release of 12 April 2023, <https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards-cars-and>.

Figure 6: US imports of electric vehicles from the EU and South Korea have continued growing despite the IRA



Source: US International Trade Commission Dataweb. Notes: The Harmonised Tariff Schedule code is 8703800000. The code was created in 2017 and did not exist prior to 2017.

There is no discernible impact of the IRA on the US electric vehicle import data at time of writing. The North American assembly provision went into effect on 16 August 2022 and has remained in place for purchased vehicles since. Adoption of the August provision was not followed by a reduction in US imports of EVs from either the EU or South Korea in the fourth quarter of 2022. The lack of decline suggests that US demand for EVs in this period was high, as US consumers continued to purchase imported EVs even though the Section 30D consumer tax credits discriminated against most foreign-assembled vehicles. It was only on 29 December that Treasury announced that leased vehicles were eligible for the consumer tax credit, even if assembled outside of North America. Thus, any positive impact from that announcement would only be expected to arise in the 2023 data.

However, at least three other interesting trends are apparent in the US import data. First, US imports of EVs from Mexico are increasing, thanks in part to sales of the Mustang Mach-E assembled at



considerably in the immediate aftermath of the Treasury announcement of 29 December 2022 (Figure 7). EV leasing rates increased from only 9.7 percent of new EVs entering the market in December 2022 to 34.3 percent by March 2023. The steady increase from January to March is consistent with dealers and consumers learning about and responding to the tax credit differential available under the leasing option. While the leasing rate of all US vehicles increased between December 2022 and March 2023, the uptick was much larger for EVs (in 2022, ICE vehicles still made up more than 90 percent of all new vehicles in the US market – see again Figure 1).

Figure 7: US electric vehicle leases have increased since the eligibility for IRA tax credits was expanded

Source: Edmunds. Notes: On 29 December 2022, Treasury announced that EVs leased to consumers would be eligible for tax credits under Section 45W of the Inflation Reduction Act.





a few models were eligible for the full tax credit as of April 2023, when the input sourcing regulations first went into effect. More models may become eligible over time if automakers choose to assemble in North America and if their supply chains for inputs adjust. However, that outcome may also be influenced by the restrictiveness of other Treasury and Department of Energy Section 30D decisions that are still under consideration, as well as whether countries negotiate critical minerals agreements with the US Trade Representative.

However, even if consumers opt to buy instead of lease EVs, so that the battery input sourcing criterion binds, several questions remain. To address concerns over dependency on imports from an authoritarian regime with a history of restricting exports, how will the United States coordinate with trading partners to establish an additional EV battery input supply chain outside of China? In June 2022, the United States, the EU, Japan, South Korea, the United Kingdom and Australia established the Minerals Security Partnership<sup>120</sup>. How it will be used remains unclear. Where will the mining and the environmentally challenging refining take place? Incentivising industry to invest in an additional supply chain outside of China is resource intensive and requires

affected will ultimately depend, in part, on whether consumers switch to leasing.

Another issue that could not be resolved is the IRA's producer tax credits for batteries and their inputs arising under Section 45X.

Furthermore, none of the tweaks arising from Treasury regulations tackled the larger and more fundamental European worry about the

Second, understanding the potential impacts of these other parts of the IRA on competitiveness will require more complex assessments than simply counting up the total amount of subsidies disbursed.

From the US perspective, the IRA also remains imperfect. As already described, the implementing regulations may impact economic outcomes in ways that diverge from the law's initial intentions.

Even putting that aside, additional domestic policy is needed to assist workers and communities adversely affected by the transition from ICE vehicles to EVs. Displaced workers need help reaching opportunities, both within the automobile and clean energy sectors and in other important and growing areas of the US economy (Hanson, 2023).

The IRA also raises longer-run fiscal concerns. Because its tax credits are uncapped, if consumer and producer take-up of incentives exceeds expectations, the federal government may need additional sources of tax revenue. One potential solution – included in the Build Back Better Act, which passed the House in 2021 but failed to pass the Senate, but was not included in the IRA – was a global minimum corporate tax that is consistent with that of the OECD (Clausing, 2022, 2023; the EU adopted a directive implementing the minimum tax at the end of 2022, Directive (EU) 2022/2523).

The US and EU may have resolved the most pressing bilateral frictions associated with their EV industries. But the European concerns associated with the IRA overall have not been fixed, and the considerable political-economic challenges associated with coordinating the US and EU green transitions are far from over.

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