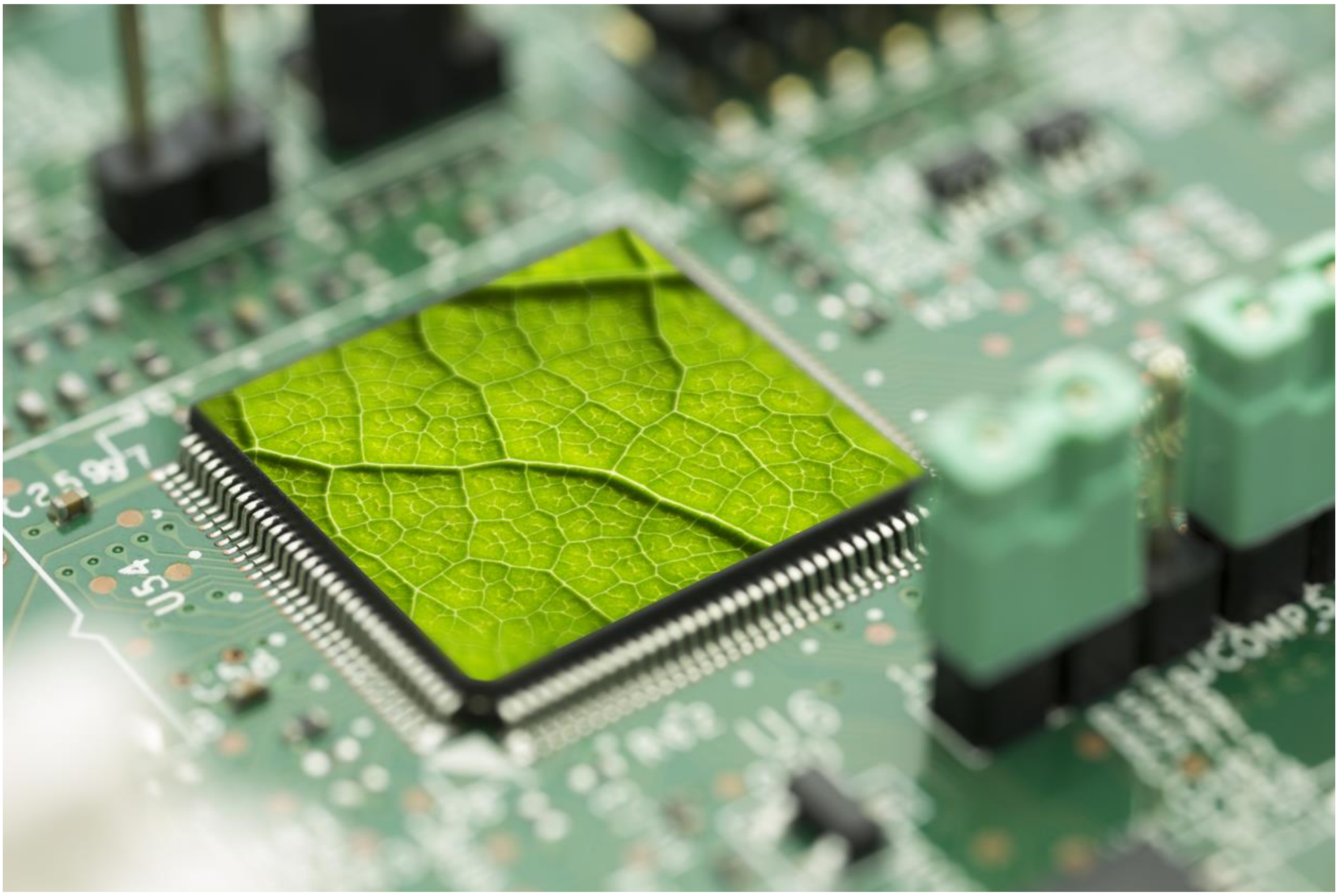
MENON ECONOMICS

REPORT

GREEN TECH SUBSIDIES IN THE EU, NORWAY, AND THE US



MENON PUBLICATION NO. 56/2023

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Foreword

Menon Economics, commissioned by NHO, has conducted an analysis of the state of public support programmes for green technologies in Europe and the USA, in light of recent changes to the respective subsidy regimes. This report summarises the findings of three industry-specific reports that Menon Economics prepared during Spring 2023, which focused on the battery, hydrogen, and offshore wind industries respectively.

The Inflation Reduction Act has been hailed as a single largest subsidy scheme for climate and energy in American history, having significantly improved investment profitability for a broad range of green tech industries in the USA. This public support programme prompted the EU to respond quickly, relaxing existing state aid rules and allowing Member States more flexibility to provide state aid. The analysis provides a detailed examination of the public support programmes in both regions, examining their effects on investment profitability.

The analysis was led by Jonas Erraia. The analytical team consisted of Piotr Śpiewanowski, Einar S. Wahl, Henrik Foseid. Erik W. Jakobsen provided quality assurance.

Menon Economics is a research-based analysis and advisory company at the intersection of business economics, economics, and industrial policy. We offer analysis and advisory services to companies, organisations, municipalities, counties, and ministries. Our main focus is on empirical analysis of economic policy, and our employees have economic expertise at a high scientific level.

We thank NHO for an interesting project. We also thank all interviewees for their valuable input during the process. The authors are responsible for all content in the report.

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May 2023

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Table of Contents

Executive summary

This decade is expected to be crucial for limiting global temperature rise and taking necessary measures towards achieving net-zero emissions. The transition towards a net-zero emissions world offers an investment opportunity worth around USD 7 trillion per year, which is estimated to reach approximately USD 200 trillion by 2050. This investment target is significantly higher than the current level of investment. Therefore, achieving these objectives will require extensive public support programs worldwide. Decision-makers aim to design these programs in a manner that not only maximizes support for the green transition but also promotes the development of domestic net-zero industries.

The global landscape of subsidies and support programs for green technology is evolving rapidly, with many countries increasing their efforts in recent years. The United States is a notable example, where the Inflation Reduction Act (IRA) is anticipated to mobilize over USD 360 billion by 2032. This represents the largest initiative taken by Congress to combat climate change. However, some studies suggest that the actual program budget could be three to four times higher, exceeding USD 1 trillion. The incentives provided by the IRA cover the entire energy sector, from raw material producers to end-use consumers, and significantly enhance the appeal of investing in supported industries.

The vast scale of the US subsidy program has prompted the European Union to respond quickly by significantly relaxing state aid rules for the widespread deployment of green technology. Previously, support for European green technology manufacturers had been fragmented, primarily focusing on research, development, innovation, and pilot projects. However, under new or modified programs such as the Temporary Crisis and Transition Framework or the European Hydrogen Bank, EU green tech manufacturers can now expect investment subsidies on a level that is often comparable to what is offered in the US. Nevertheless, there are still numerous differences between EU and US subsidy schemes in terms of their scope and design, which we discuss in this report. The report concentrates on three sectors: batteries, hydrogen, and offshore wind.

The IRA has significantly altered the landscape of battery subsidies, giving a distinct advantage to US-based manufacturers. The regulation allows producers in the US to receive USD 35 for every kWh of battery cell capacity produced and USD 45 per kWh for producing battery packs, covering around 30 percent of marginal production costs. The level of support provided is significantly higher than in the EU and Norway, despite the EU relaxing state aid rules in response to the Inflation Reduction Act. The discrepancy in the level of subsidy is likely to contribute to faster growth of the industry in the US compared to Europe, although we still expect a significant increase in production capacity in Europe as well.

Regarding low-carbon hydrogen production, IRA has established favourable conditions in the US. US-based hydrogen producers can benefit from a fixed subsidy whose value varies according to the CO_2 emissions generated during the hydrogen production process. Green hydrogen producers can receive a subsidy of USD 3 per kilogram produced, whereas blue hydrogen producers can receive USD 1 per kilogram. In Europe, the subsidies for green hydrogen will be determined by the European Hydrogen Bank through an auction process, and Norwegian green hydrogen producers are eligible to participate. We expect the level of support for green hydrogen to be similar to that in the US during the first rounds of the auction. However, there is a significant level of uncertainty regarding the actual level of support and the programme's total budget. Additionally, the European programme does not provide any support for blue hydrogen.

The IRA has also raised the level of support for the offshore wind industry, which means that offshore wind projects are now eligible for investment subsidies that can cover up to 40% of the investment costs. However, the value of these subsidies is taken into account when determining the price the operator pays for the land leases, as they are allocated through a competitive auction. Similarly, in Europe, the level of subsidies is decided through competitive auctions, resulting in varying levels of support for different projects. Since the differences in the level of support are relatively small, and the electricity markets are separated between regions, it is unlikely that the Inflation Reduction Act will have a significant impact on offshore wind investments in Europe. However, the Act is expected to speed up the deployment of offshore wind technology in the US, which could create opportunities for offshore wind technology manufacturers from Europe and Norway.

The Inflation Reduction Act (IRA) has also raised the level of support for various other green technology sectors, such as energy storage, solar energy, carbon capture and storage, and critical minerals.

In general, due to IRA the US public support system offers a higher level of subsidies than the EU and Norway for most green technology industries, although the extent of the gap varies between the different sectors. The battery industry is expected to have the largest disparity in subsidy levels. Additionally, the US program provides investors with more certainty about the available aid, while in Europe, obtaining aid requires a lengthy administrative process with an uncertain outcome. The simplicity and predictability of the aid rules have increased the appeal of investing in the US.

However, the level of available state aid is not the sole factor influencing investment decisions. Other factors, such as general business conditions, also play a crucial role in shaping investment decisions, especially in emerging green technology sectors. Green technology investments can involve significant risks and uncertainties, including high upfront costs, long development periods, and a complex regulatory environment. Therefore, investors must weigh various factors, including the regulatory environment, tax policies, policy uncertainty, and energy prices, to make informed decisions and manage risks effectively. However, our analysis does not reveal any systematic differences between the US, Europe, and Norway for these factors.

Introduction

This decade will likely prove critical in terms of the world's ability to limit the rise in global temperatures and take the necessary measures towards net-zero emissions. The shift towards a net-zero emissions world presents an investment opportunity worth nearly USD 7 trillion annually, or approximately USD 200 trillion by 2050, according to Bloomberg.[1,2] This figure is substantially higher than the current investment level,[3] and so achieving these investment objectives necessitates substantial public support programs worldwide. Decision-makers aim to design these programs in a way that not only maximises support for green transition but also contributes to the establishment of domestic net-zero industries.

China has historically led the way in green-tech industrial policy, with subsidies that have long been greater than anywhere else. According to the European Commission, Chinese subsidies as a share of GDP have been twice as high as those in the EU. China in its Five-years plan has announced investments worth over USD 280 billion in clean technologies, while the net-zero ecosystem in Europe was worth over EUR 100 billion in 2021.[4]

The global subsidy landscape for green tech is evolving rapidly, with several countries increasing their subsidy and support programs in recent years. The United States, for instance, is set to mobilise more than USD 360 billion by 2032 through the Inflation Reduction Act (IRA), which represents the largest single step taken by Congress to address climate change.[5,6] Some studies suggest, however, that actual amount programme budget could be three to four times higher exceeding USD 1 trillion.[7] The incentives offered by IRA cover the entire energy sector, from raw material producers to end-use consumers.

In recent months, the European Union has also shifted its public support programs to focus more on the mass deployment of green technology in response to IRA. Until recently, support for European green tech manufactures has been fragmented, focused mainly on research, development, innovation, and pilot projects. However now under new or newly modified programmes such as the *Temporary Crisis and Transition Framework* or the *European Hydrogen Bank* EU green tech manufacturers can expect investment subsidies on a level that is in many cases comparable to what is offered in the US. There remain, however, many differences both in scope and design of subsidy schemes between EU and US.

Several other countries have also presented their investment plans for clean tech technologies. Japan's green transformation plans involve issuing 'green transition' bonds to raise up to USD 140 billion. India has introduced the *Production Linked Incentive Scheme* to improve competitiveness in sectors such as solar photovoltaics and

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[1] *https://about.bnef.com/blog/the-7-trillion-a-year-needed-to-hit-net-zero-goal/*

[2] *McKinsey set the figure even higher at USD 540 trillion by 2050, see https://www.mckinsey.com/capabilities/sustainability/our-insights/delivering-the-climate-technologies-needed-for-net-zero*

[3] *European Commission (2023), A Green Deal Industrial Plan for the Net-Zero Age, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, COM (2023) 62*

[4] *Ibid.*

[5] *https://www.wri.org/update/brief-summary-climate-and-energy-provisions-inflation-reduction-act-2022*

[6] *Rhodium Group modelling suggests that with the passage of the IRA, GHG reductions are expected to reach 31 percent to 44 percent by 2030. This is much higher reduction that under a business-as-usual scenario (without the IRA) under which the U.S. would be expected to reduce greenhouse gas (GHG) emissions by between 24 percent and 35 percent by 2030 compared to 2005 levels.*

[7] *Bistline J., Mehrotra N. and Wolfram C., (2023), Economic Implications of the Climate Provisions of the Inflation Reduction Act, Brookings Papers on Economic Activity.*

batteries.[8] Canada has announced an USD 80 billion program for investments in clean energy and sustainable infrastructure, as part of its 2023 budget.[9]

Incentives offered through IRA and other regional green technology subsidy programs are predicted to substantially influence the economics of decarbonisation. This is anticipated to encourage the implementation of clean energy technologies and reduce emissions. Widespread adoption of green technology will result in beneficial spillover effects. Since most of the emerging green technology sectors have steep learning curves, there is an expectation of considerable cost reductions in production on a global scale for a range of important technologies.

The regional incentive schemes also have a competitive dimension, as they aim to attract significant investments in strategic net-zero emission sectors within their respective jurisdictions. Supply-side subsidies enhance the return on investment, making regions that offer higher subsidies more attractive to investors. Demand-side subsidies increase the market size, thereby encouraging the establishment of production facilities in the region, especially in sectors with high transportation costs.

Given the short time since the announcement, the overall impact of those programmes is not yet known. However, data collected for one of the earliest discussed programs, IRA, indicate that it has been successful in attracting substantial investments in green technology. According to an analysis by the Financial Times, as of April 2023, over USD 70 billion in investments in green tech have been pledged in the US in just six months after the IRAs enactment. Around two-thirds of these investments are from foreign sources, with South Korea being the largest investor, particularly in the battery sector. Only slightly more than 10 percent of all green technology investments in the US came from Europe, suggesting a limited amount of capital flight from Europe as a consequence of the differential in subsidy levels between the US and Europe.

In this report, we examine the different support landscapes for green tech in the US, Norway, and the EU, summarising our findings from three separate reports on battery manufacturing (Menon Publication 46/2023), hydrogen production (Menon Publication 48/2023) and offshore wind (Menon Publication 51/2023).

The remainder of this document is structured as follows. The next section offers a brief introduction to public support schemes for green technology in both the US and Europe. Following that, we will delve into greater detail regarding the discrepancies in support between those regions for three particular industries: battery manufacturing, hydrogen production, and offshore wind, as well as their ramifications on global markets and pricing. Lastly, we will contextualize the subsidy regimes within a broader framework of other conditions that impact investment decisions.

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[8] *European Commission (2023), A Green Deal Industrial Plan for the Net-Zero Age, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2023) 62*

[9] *https://www.budget.canada.ca/2023/report-rapport/chap3-en.html*

A brief introduction to public support for green technologies

Public support programs play a crucial role in promoting emerging technologies or industries that offer public benefits but are faced with market barriers. Manufacturing of green technology, for instance, requires public subsidies to offset the cost differential between these alternatives and fossil-based technologies. As technology matures, the amount and size of the subsidies needed to bridge the gap decreases. Historically, the US and Europe have taken different approaches in setting the value of subsidies for most industries and those differences affect project profitability and hence investment decisions.

In the **United States**, federal support programs such as the Inflation Reduction Act (IRA) offer fixed levels of subsidy for net-zero technologies. These subsidies can take the form of direct payments per unit produced for production subsidies or a fixed percentage of investment costs for investment subsidies. Although the level of subsidies may differ among technologies and change over time, they are pre-determined and do not account for potential changes or factors that could affect regional differences in project profitability. While this approach has the benefit of low administrative burden, it carries a high risk of over- or under-compensation.

Public support programs for green technology in **Europe** are generally more complex and fragmented than in the US. While the IRA subsidies primarily focus on mass deployment of green technologies, the main objective of EU programs has traditionally been research and innovation. This distinction is in part due to the European Union's strict state aid rules, which aim to prevent unfair competition between Member States. These regulations require that state aid must not unduly distort competition in the single market and must be necessary and proportionate.

Furthermore, state aid rules in the EU allow Member States to allocate funds proportionally to the funding gap, or the difference between the total costs of a project or investment and the amount of private funding available to finance it. To determine the existence of a funding gap, the European Commission requires a thorough analysis of the investment or project, including a detailed assessment of the costs, potential revenues, and the availability of other sources of funding. The analysis should demonstrate that the investment or project would not be viable without the aid, and that the aid is necessary to fill a genuine funding gap. The approach focused on closing the funding gap guarantees the required profitability for the supported projects. However, it often results in lengthy administrative processes and relatively limited funding for mass production of mature technologies thus not enabling speeding up mass deployment of strategic technologies.

Identifying the funding gap is far easier in the case of commodities such as electricity or hydrogen. In such instances, the quantity of state aid required to bridge the funding gap can be established through a competitive auction. Such auctions, often designed as technology-specific, have been widely used across EU Member States, where competitors vie to offer the lowest subsidy required to initiate the project. The auction mechanism guarantees the required profitability for the supported projects, thus minimising the amount of public funding required to achieve the national goals of renewable energy deployment.

Investment and production subsidies for manufacturing green technology and renewable energy are just part of the toolbox that influences investment profitability. Green technologies can also be encouraged through other policies. A good example are various forms of carbon taxation, which, like subsidies, reduce the relative cost of clean energy compared to fossil fuel-based technologies. Carbon policies in Europe are much more extensive, and carbon prices are significantly higher than in the US. This policy has a particularly significant impact on the generation of green electricity, favouring zero-emission energy sources in Europe, but it also indirectly affects other industries.

In this report we focus on differences between subsidy regimes and especially on the amount of subsidy available to green technology manufacturers and green energy producers. However, when comparing subsidy schemes across different regions, it is important to understand that the objective of industrial policy is not solely to maximise the value of public support. There are various reasons for this. Firstly, subsidies can differ significantly in their design, making some easier to obtain or more extended than others. Secondly, investment decisions are influenced by multiple factors beyond just subsidies, such as local production costs, resource, and labour availability, and expected demand. Thirdly, if subsidies surpass the necessary level to incentivise the desired production, they become inefficient, and taxpayers bear the additional cost. However, the relative size of subsidies still plays a role since, all else being equal, companies aim to maximise their profits and may select regions with higher subsidies to locate their production facilities. Therefore, while subsidies should not be the sole factor considered, they can significantly impact a company's decision-making process.

Subsidies for battery manufacturing

The Inflation Reduction Act has significantly changed the landscape of battery subsidies in favour of US-based manufacturers. The regulation allows producers in the US to receive USD 35 for every kWh of battery cell capacity produced and USD 45 per kWh for producing battery packs, covering around 30 percent of marginal production costs. The level of support provided is significantly higher than in the EU and Norway, despite the EU relaxing state aid rules in response to the Inflation Reduction Act. The discrepancy in the level of subsidy is likely to contribute to faster growth of the industry in the US compared to Europe, although we still expect a significant increase in production capacity in Europe as well. For a comprehensive analysis of the impact of subsidies on the battery industry in Europe and the US, including their implications for the industry in Europe and Norway, please refer to Menon Publication 46/2023 where the full results of our comparative analysis are presented.

The Inflation Reduction Act has dramatically changed the battery subsidy landscape in favour of the US based battery manufacturers. We estimate that battery manufacturers in the USA will receive a substantial subsidy of approximately USD 150 billion over the next decade through the Act. The majority of this subsidy will be provided as a production subsidy, with manufacturers receiving USD 35 for every kWh of battery cell capacity produced, and USD 45 per kWh for producing battery packs, covering approximately 30 percent of production costs. The subsidy will be available until 2032. Furthermore, battery manufacturers can benefit from investment subsidies through local support programmes provided by individual states and from public support for both upstream and downstream industries, including electric vehicle subsidies that require locally produced batteries. This clause, however, has been heavily contested by US trade partners. Based on our analysis, battery producers are likely to receive subsidies equivalent to more than 200 percent of their initial investment costs throughout the subsidy period.

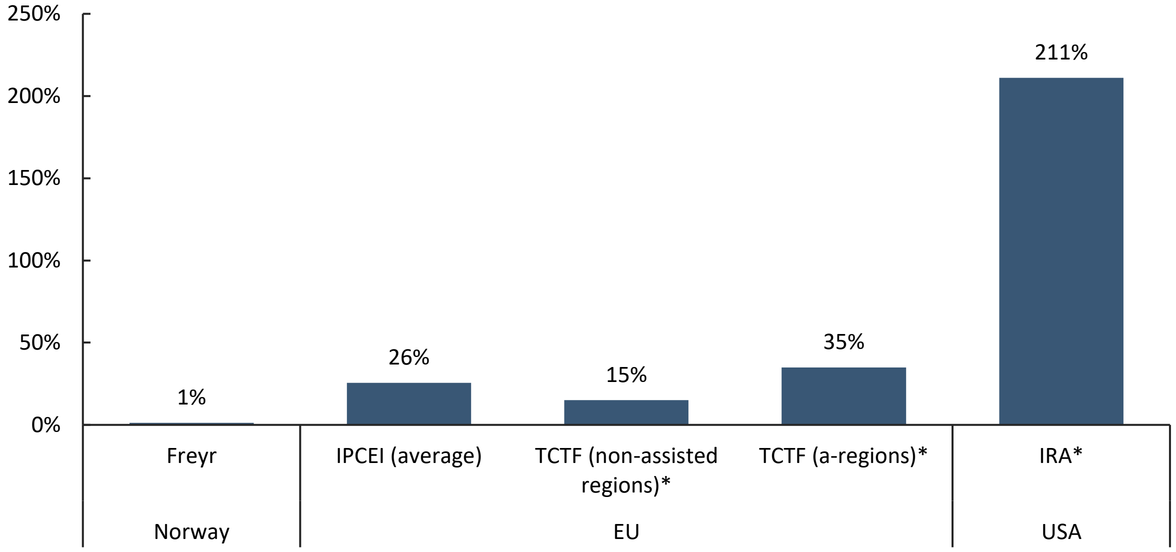
The substantial subsidy package implemented in the US has triggered a swift response from the European Union, in the form of a significant relaxation of the strict state aid regulations. Prior to this, public support for European battery producers was mainly offered through fragmented programs focused on research, development, and innovation, along with pilot projects. However, with the introduction of IPCEI, a EUR 6 billion public support framework for the battery supply chain, certain battery producers have received state aid amounting to over 25 percent of their total investment costs. The support can be even greater with the newly modified Temporary Crisis and Transition Framework (TCTF), which enables EEA states, including Norway, to offer higher levels of state aid and in exceptional cases, match the state aid provided in other countries. In contrast to the US, the application procedure remains complicated and is assessed on a project-by-project basis. Some governments have already made initial announcements about providing higher levels of subsidies to battery producers through this mechanism.

Battery producers in Norway have so far received significantly lower levels of state support, with the total aid received amounting to approximately one percent of their total investment cost, as demonstrated in the figure below. However, Norwegian producers have benefited from significant state loan guarantees. However, it is unlikely that the historical data accurately reflects the level of state aid that battery manufacturers can anticipate receiving in the future. This is due to recent extensions of the TCTF and the Norwegian government's announcement that Norway may join the battery IPCEI enlargement process. Figure 1 presents the expected and historical levels of state aid for battery cell manufacturing.

Our analysis of public support regimes reveals that the level of subsidies available to US battery producers significantly exceeds those accessible to their counterparts in the EU and Norway. The net present value of total subsidies received by battery manufacturer in the US under IRA amounts to over twice the initial investment costs. At the same time, the European producers can, depending on the region, receive aid up to 35 percent of total investment cost under standard state aid rules, as shown in Figure 1.

This disparity is likely to influence EU investment decisions negatively. As the profitability of producing batteries in the US is considerably higher than in Europe, we anticipate a decrease in expected production capacity in Europe, resulting in slightly higher battery prices to compensate for investors' elevated required rate of return compared to the scenario without IRA. On a separate note, the level of subsidies offered in the US may be above the socially optimal level, thus imposing excessive costs on the taxpayer. We estimate that the per-job-cost of the US subsidy will equal roughly USD 1 million annually.

Figure 1: Actual and estimated state-aid intensity for battery manufacturers under various regimes in Norway, EU, and USA. Source: Menon Economics



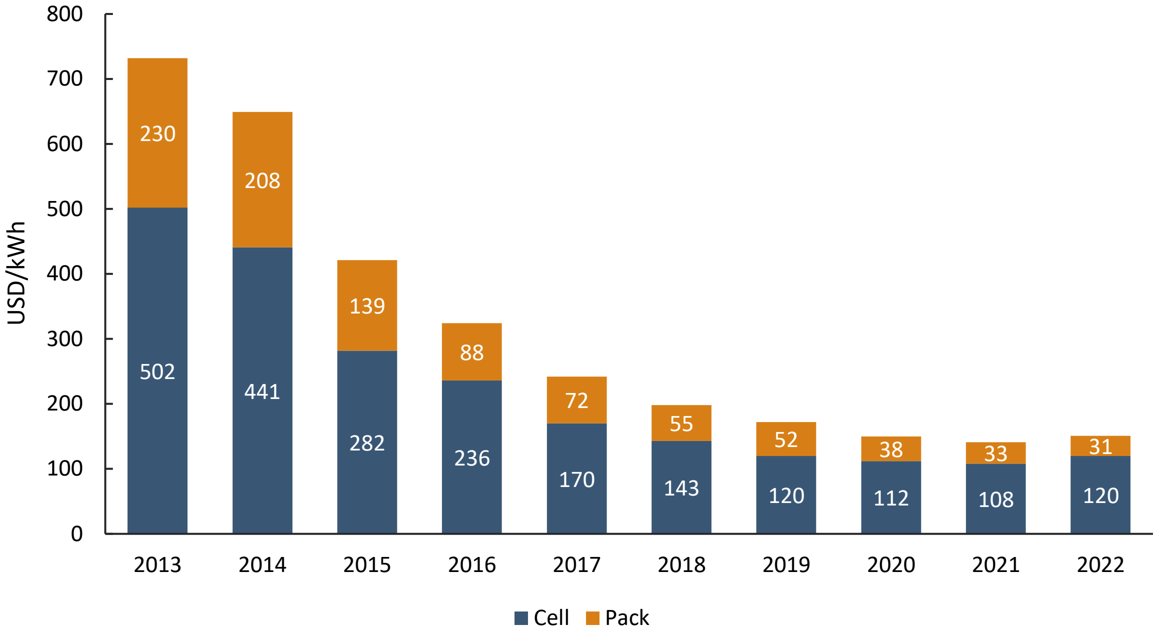
*Estimated values of state aid intensity

Despite the US offering a higher level of public support, there are compelling reasons to anticipate an increase in battery production in Europe. One of the primary factors is the regionalisation of the battery and car market. Furthermore, Europe enjoys a more secure demand growth for electric vehicles due to the impending ban on fossil fuel vehicles starting in 2035. Several other factors come into play when deciding on investment location, including tax regimes, political stability, access to infrastructure, a skilled workforce, and more, many of which make European countries attractive. Regarding Norway, Norwegian battery producers highlight their local roots, connections to Norway, and access to relatively cheap renewable energy, providing a significant strategic competitive advantage and making it more pertinent to keep certain aspects of production in Norway.

Impact of subsidies on battery prices

Over the last decade, the price of lithium-ion batteries has fallen dramatically. Pack prices per kWh were above USD 1 200 in 2010. With the most recent price being reported by BloombergNEF[10] at around USD 151 per kWh, this constitutes a fall of more than 80 percent.[11]

Figure 2. Price development of lithium-ion battery cells and packs. Source: BloombergNEF



For the first time in many years, price rose slightly in 2022. Though the industry experienced high demand and pressure in the supply chains, the increased costs were mostly driven by higher prices of raw materials and components. Especially important was the high prices of lithium, which rose more than fourfold compared to its average over the past three years. Though not as dramatic, many other key raw materials for batteries saw significant price increases, helping to drive up prices, even as economies of scale drove learning effects in the industry. As of April of 2023, prices for most key materials have come down significantly, and it is expected that price decreases for lithium-ion batteries will return in 2023 and 2024.

There is significant uncertainty related to the effect of the IRA of the future price of battery cells. On the one hand, the IRA will create significant pressure on the already strained global supply chain for raw materials such as lithium and cobalt, whose prices are expected to remain high. Furthermore, the low unemployment rate in the US means that wages are high in both the construction and operations phase. The factors will contribute to higher costs for battery manufacturers. Some of these worries, however, will be abated by the fact that the factories announced over the last year will not come online before 2026 or after.

However, in the longer term, the IRA package is expected to push down battery prices. The increased demand for batteries and EVs will drive investments in the industry, leading to increased supply, competition, and

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[10] *https://about.bnef.com/blog/battery-pack-prices-fall-to-an-average-of-132-kwh-but-rising-commodity-prices-start-to-bite/#_ftn1*

[11] *Many point to a pack price of around USD 100 per kWh as the price level where EVs become cost-competitive with internal combustion car engines.*

economies of scale. As more companies enter the market and technologies improve, battery prices are expected to decrease.

The net effect on prices in the long-term is hard to quantify. However, one way to get an estimate it, is by using the so-called learning rate. The historic learning rate for lithium-ion batteries is estimated to be in the 20-24 percent range.[12] That is, the price of battery cells per kWh of capacity has decreased by between 20 and 24 percent with every doubling of the cumulative global production capacity. Modelling by McKinsey[13] suggests that total global demand for lithium-ion batteries will increase from 700 GWh in 2022 to 4 700 GWh in 2030. Of this, it is expected that US production will account for one sixth, or just below 800 GWh. Even if we assume that half of this capacity is a net positive global effect which can be attributed to the IRA, the effect on global prices is 3.5 percent relative to the baseline scenario. The low effect of the IRA on battery prices remains robust to other estimates of learning rate and expected global capacity. This is no doubt a very crude way to calculate the expected price effect of the IRA, but it goes to illustrate the final most likely is fairly small.

Today there are substantial price differences of lithium-ion batteries between regions. While the costs of batteries produced in China came in at USD 127/kWh, prices were 24 and 33 percent more expensive in the US and Europe respectively. With the high subsidies from the IRA, it is expected that the price differential between the EU and US will grow as more US capacity come online.

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[12] *https://pubs.rsc.org/en/content/articlelanding/2021/ee/d0ee02681f*
[13] *https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/battery-2030-resilient-sustainable-and-circular*

Subsidies for hydrogen manufacturing

Our analysis of the various public support schemes reveals that the US currently provides more generous subsidies than those proposed in Europe. Under the Inflation Reduction Act, US-based hydrogen producers can receive a fixed subsidy of varying value, depending on their production's lifecycle CO_2 emissions. Green hydrogen producers can expect a subsidy of USD 3 per kilogram produced, while blue hydrogen producers receive USD 1 per kilogram. In Europe, the level of subsidies for green hydrogen will be determined by the European Hydrogen Bank through an auction process. We anticipate levels of support for green hydrogen similar to that in the US in the first rounds of the auction. However, the support in Europe is expected to decrease as technology matures. Furthermore, the programme does not offer any support for blue hydrogen.

While there is currently considerable uncertainty about the precise level of support for green hydrogen in Europe, we believe that if the European Hydrogen Bank functions as planned, there will not be a significant shift towards investments in green hydrogen. However, in the case of blue hydrogen, the level of support in the US that is much higher than in Europe makes blue hydrogen competitive even with unablated grey hydrogen attracting investments in the sectors. This, however, offers an investment opportunity for Norwegian industry players that specialize in blue hydrogen.

For a more detailed analysis of the impact of subsidies on the hydrogen industry in Europe and the US, including their implications for the industry in Europe and Norway, please refer to Menon Publication 48/2023, which presents the full results of our comparative analysis.

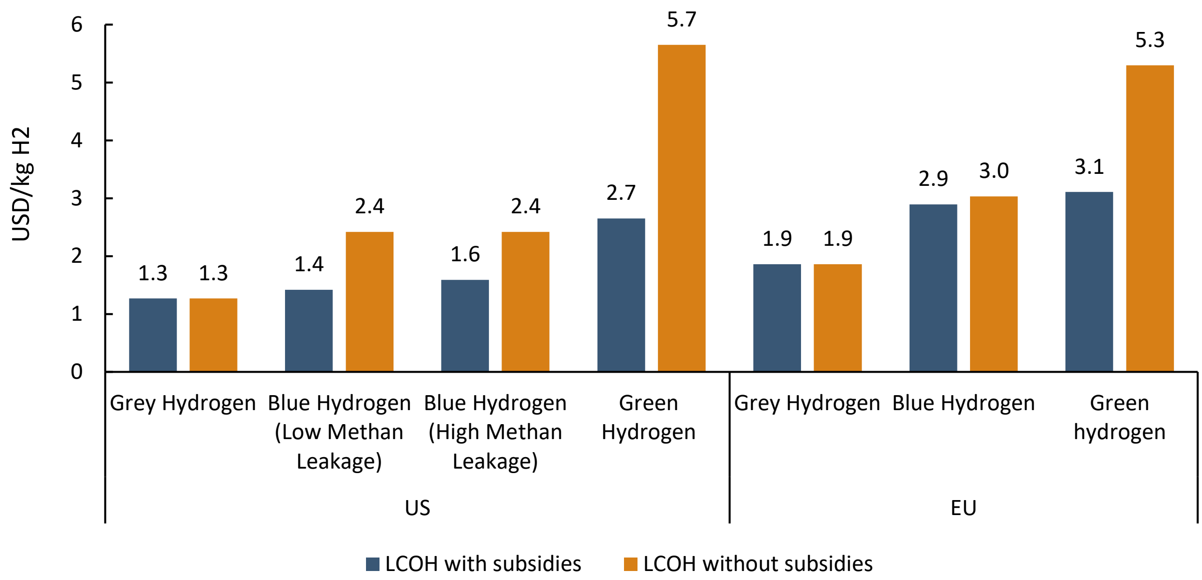
Low-carbon hydrogen is expected to play a significant role in decarbonising critical sectors like transportation, industry, power generation, and heating, serving as a reliable dispatchable and backup power supply. However, its widespread adoption faces significant investment challenges. Currently, production costs of low-carbon hydrogen are two to three times higher than fossil fuels, making it crucial to scale up production and reduce costs to enable widespread adoption of low-carbon hydrogen. This requires developing dedicated hydrogen infrastructure and opening new demand sectors for renewable and low-carbon hydrogen.

To overcome these challenges, authorities in the US and EU have proposed various strategies and initiatives. In the next decade, hydrogen producers in the USA are set to receive a significant subsidy of roughly USD 100 billion under the IRA. This subsidy will be primarily provided through a production subsidy, with a subsidy level depending on life cycle emission intensity. Producers of renewable hydrogen can receive up to USD 3 for every kilogram of renewable hydrogen for 10 years after production start. Blue hydrogen, due to its higher emission levels, qualifies for lower subsidy levels of up to USD 1 per kilogram hydrogen. The production subsidy is disbursed to all producers and is best regarded as a simple cash transfer through the tax system, as it is not depending on having sufficient tax liabilities to be offset with. A key feature of the subsidy structure under the IRA is that it does not involve lengthy, burdensome, and uncertain application processes.

In Europe, the European Commission has proposed the European Hydrogen Bank which will offer subsidies to renewable hydrogen producers in the form of a fixed premium per unit of hydrogen produced. Norway is also eligible to participate in the scheme. The value of the premium will be determined through a competitive auction process. This process will help to identify and cover the funding gap necessary to scale up hydrogen production, while also minimising the costs needed to achieve the EU's hydrogen production targets. It is expected that the subsidy at the initial auctions will result in a fixed premium of between EUR 1.7 and EUR 2.5 per kg H_2 produced for 10 years after production start. The proposed budget of the programme, however, is not sufficient to support large scale green hydrogen production. The value of subsidies awarded in subsequent auction is expected to be lower as the hydrogen production technology matures potentially allowing to support larger volumes in the future. Finally, as per proposal, the European Hydrogen Bank will support only green hydrogen projects.

Our analysis of the various public support schemes reveals that the US currently provides more generous subsidies than those proposed in Europe. While the difference in proposed public support for green hydrogen is expected to be relatively small in the first rounds of the auction, it is expected to increase as technology matures. Moreover, the levels of support in the US are significantly higher for blue hydrogen, which is eligible for production subsidies only in the US. In addition, it is important to note that US LCOH of blue hydrogen after subsidies is competitive with grey hydrogen in our calculations. The LCOH for various production technologies in the EU and US respectively is shown in the figure below.

Figure 3: Levelised cost of hydrogen production with and without subsidies in the US and EU. Source: Menon Economics



It is important to note, however, that there are several factors which make the support for green hydrogen in the EU considerably more uncertain than in the US. Firstly, the support levels will remain unknown until after the auctions. Secondly, the limited budget of the programme in Europe creates uncertainty regarding the actual availability of the support mechanism for projects seeking public support. In addition, and as already mentioned, the support for hydrogen through the Hydrogen Bank still has not been confirmed by the EU.[14]

If the anticipated European Hydrogen Bank provides the expected level of support, it is unlikely that there will be a significant shift in investment from the EU to the US for green hydrogen. However, for blue hydrogen, the significant gap in production costs may attract more investment in the US, despite transportation costs that could hinder export potential. This presents an investment opportunity for Norwegian industry players who focus on blue hydrogen to expand production in the US. It is important to note that primary cost drivers, such as energy prices, demand growth, and technological advancements, are uncertain and could potentially lower market prices in the future.

Within electrolyser manufacturing, it is also unlikely that the difference in support regimes between the United States, Europe, and Norway will result in significant capital outflow to the US. Additionally, high transportation

[14] *Similar uncertainties exist for the support for electrolysers through IPCEI and TCTF. See below.*

costs play a role in mitigating the potential impact of these differences. This view is confirmed by the European Commission which in its staff working paper from March 2023[15] indicates that shipping complete electrolyser systems is not expected to be economically viable due to their weight. Typically, electrolyser manufacturing is located in close proximity to deployment sites as large electrolyser installations need to be customised for specific projects. European Commission have also not found any evidence of a shift in manufacturing investments from Europe to the US.

Differences in support level between the two regions are also likely to have implications on the hydrogen downstream industries such as ammonia production. Nonetheless, examining these markets falls outside the scope of this report.

Impact of subsidies on hydrogen prices

As of today, green, and low-carbon hydrogen market is much less mature than the market for batteries discussed in the previous section as there exist no large-scale production.[16] The measures taken in both US and Europe will scale up hydrogen production in both regions and contribute to establishing such a market which will give clear price signals. While the US programme is fully concentrated on the domestic production, the European Hydrogen Bank will allocate a budget also to support of production in other regions as well as the necessary transportation infrastructure.

Subsidies for hydrogen production in the US and Europe will significantly reduce production costs of green hydrogen in both regions and production costs of blue hydrogen in the US as shown in Figure 3 above. The exact impact of subsidies on prices is more difficult to predict as it depends on the already mentioned multiple factors determining global prices. However, since the two regions are expected to be large producers and buyers of green and low-carbon hydrogen it is likely, that prices in the medium to long term will be set by production costs in the same way as they have for decades set the costs of grey hydrogen-based products such as ammonia.[17] Our analysis shows that subsidised blue hydrogen in the US is likely to be price competitive with grey hydrogen, while costs of green hydrogen after taking into account he subsidies are likely to be in the range USD 2.5 – USD 3 per kilogram of hydrogen both in Europe and the US.

There is an additional layer of uncertainty surrounding the interchangeability of green hydrogen and low-carbon hydrogen, which have low but still positive carbon emissions. Blue hydrogen, produced from natural gas combined with carbon capture and sequestration, is expected to be less expensive to produce than green hydrogen in the coming years. Nevertheless, the variation in regulations defining emissions across different jurisdictions will be the primary factor determining the difference in market prices between these two products, as demand for them will be driven by these regulations.

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[15] *https://single-market-economy.ec.europa.eu/system/files/2023-03/SWD_2023_68_F1_STAFF_WORKING_PAPER_EN_V4_P1_2629849.PDF*

[16] *There is also reverse causality as lack of well-functioning markets and uncertainty about demand hinders investment decisions.*

[17] *https://www.bankofcanada.ca/2023/03/staff-working-paper-2023-16/*

Subsidies for offshore wind

Following the Inflation Reduction Act, the US and Europe offer a similar level of public support for the offshore wind industry. In the US, offshore wind projects are eligible for investment subsidies that can cover up to 40 percent of investment costs. However, since land leases are allocated through a competitive auction, the value of subsidies is factored in when determining the price for the lease. In Europe, the level of subsidies is also determined through a competitive auction, which results in varying levels of support for different projects.

The relatively small difference in the level of support, combined with the separation of electricity markets between the regions, suggests that the Inflation Reduction Act is unlikely to have a significant impact on offshore wind investments in Europe. However, it is expected to accelerate the deployment of offshore wind technology in the US, creating opportunities for European and Norwegian offshore wind technology manufacturers. For a comprehensive analysis of the impact of subsidies on the offshore wind industry in Europe and the US, including their implications for the industry in Europe and Norway, please refer to Menon Publication 51/2023 where the full results of our comparative analysis are presented

Deployment of offshore wind energy is experiencing rapid growth, with an annual increase of 20 percent. Its role in national energy mixes is becoming increasingly significant. In fact, the importance of offshore wind is poised to rise even further in the future as access to suitable land for renewable energy production becomes more limited.

Currently, China holds the leading position in the offshore wind industry, accounting for 44 percent of the world's installed capacity, which is equivalent to 25.6 GW. The United Kingdom is the second-largest market, contributing a 23 percent share in the global capacity, followed by several EU countries, which collectively represent 28 percent of the global capacity. As of April 2023, offshore wind projects in the United States and Norway remain largely limited to small-scale initiatives. However, there are expected to be significant increases in the deployment of offshore wind technology worldwide. The EU has announced plans to achieve around 110 GW of offshore renewable generation capacity by the end of the decade, while the US administration has set a target of 30 GW.

Europe's offshore wind growth can be attributed to a wide range of subsidies, with the European Union utilising twelve different instruments. These instruments vary in scope, from supporting research and development to innovation, infrastructure, and wind farm construction. The most crucial support instrument for offshore wind has been the various forms of feed-in-tariffs offered through a competitive process to the lowest bidder. However, as offshore technology costs have decreased, some favourable offshore wind projects in Europe are being built without subsidies.

Looking to the future, the EU is proposing to subsidise all energy projects through two-way contracts for differences, a financial tool that provides revenue stability for electricity generators. This approach aims to support the deployment of renewable energy projects while maintaining cost-effectiveness.

Offshore wind development in the US has been slower compared to Europe, but this could change with the implementation of the IRA for offshore wind projects. This important policy instrument offers additional financial support, with developers having the option of choosing between a production subsidy or an investment subsidy. The IRA builds on an existing mechanism but increases the level of support and extends the period for which support is offered. The production subsidy under the IRA provides a bonus payment of up to 2.9 cents per kWh of electricity generated. However, the preferred subsidy mechanism will likely be the investment subsidy, which has been increased to up to 40 percent of the investment costs under the IRA. This option offers the highest net present value of subsidies of the two choices. The highest level of subsidy will be available only to projects that meet specific criteria, such as the use of domestically produced equipment.[18]

The impact of subsidies on profitability is, however, mitigated by the mechanism used in allocation of land leases. Offshore land leases are assigned through competitive auctions and the net present value of subsidies is taken into account when bidders make their offers.

IRA has also instituted production and investment tax credits for offshore wind equipment manufacturers. This may lead to an increase in equipment production capacity and result in lower costs for operators.

Renewable energy is also supported indirectly through carbon pricing mechanisms that increase the costs of fossil-based electricity and in consequence higher electricity market prices. Such a mechanism (EU ETS) is in place in the EEA which with the prevailing prices of emission allowances contributes to EUR 30 to EUR 75 per MWh higher electricity prices than they would be in the absence of the mechanism. In contrast, carbon pricing mechanisms in the US exist only in some states, and the current levels of carbon prices are significantly lower than in the EU.

Apart from financial support, a transparent and efficient permitting process is essential for the rapid deployment of offshore wind projects. Recently, the EU has taken steps to ensure that renewable energy projects are granted permits in a timely and efficient manner. The EU has agreed to designate one or more "renewables go-to areas" and ensure that the permit-granting processes for renewable energy projects in those areas do not exceed two years. This streamlined process aims to support the deployment of renewable energy projects while maintaining environmental safeguards. In contrast, similar provisions do not exist in the US, where historically permitting processes have been lengthy.

Overall, the effect of the IRA on the Norwegian offshore wind industry is expected to be limited for several reasons. Firstly, the electricity markets in Europe and the US are not interconnected, which means that offshore wind farms in these two regions do not directly compete with each other in the electricity market. Secondly, the difference in subsidy regimes between the US and Europe is relatively small. Thirdly, the offshore wind ambitions in the US are modest compared to the planned growth in other regions.

The implementation of the IRA is expected to have a positive impact on the deployment of offshore wind projects in the US, which will in turn benefit European and Norwegian manufacturers of offshore wind equipment. However, the effect of the policy may be dampened by local content requirements that favour US-based manufacturers. Eligibility for higher levels of subsidies will require a gradually increasing share of local content, reaching 55 percent by 2028. Nonetheless, this provision still allows for 45 percent of the market to be supplied by EU and Norwegian manufacturers. Without the IRA, the market for these manufacturers would have been much smaller in a counterfactual scenario.

Furthermore, these provisions may also incentivise Norwegian equipment manufacturers to establish production facilities in the US, allowing them to benefit from production subsidies while complying with local content requirements. Despite the potential negative impact of local content requirements for some European

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[18] *In theory, the level of support for offshore wind projects can be further increased by an additional 10 percent for production subsidies and 10 percentage points for investment subsidies, if the projects are located in "energy communities" - areas that are dependent on fossil fuel production and processing. However, in practice, such areas are generally not found in close proximity to areas that are favourable for offshore wind development.*

equipment manufacturers, the overall positive effects of IRA due to faster market growth are likely to outweigh these consequences for the majority of European equipment manufacturers.

Finally, the widespread adoption of zero-marginal cost energy sources, such as offshore wind electricity, is expected to impact electricity prices. However, the impact of the IRA public subsidies for offshore wind and other renewable energy on average electricity prices is likely to be modest. Studies show that the total effect would amount to 5 percent lower electricity prices across US states by 2040.[19]

Impact of subsidies on electricity prices

The adoption of zero-marginal cost energy sources, such as offshore wind electricity, is poised to have a notable impact on electricity prices. However, the extent of this impact varies depending on the scale of deployment relative to the size of the energy system which differs significantly between Europe and the United States. For instance, in the EU, the target generation capacity of 110 GW by 2030 would cover roughly 20 percent of the current electricity consumption in the region. In the US offshore wind deployment in the United States is expected to have a smaller share in energy mix at around 4 percent.[20] It's worth noting, however, that the impact of offshore wind on electricity prices in individual countries and regions may differ due to transmission system bottlenecks between them.

In addition to offshore wind electricity, public support programs in Europe and the US also promote other renewable energy sources. According to an analysis by the EU, renewable sources as a whole are projected to supply over two-thirds of the EU's electricity by 2030. Nevertheless, fossil fuels are anticipated to continue influencing electricity prices during a significant number of hours, thereby diminishing the impact of renewable deployment on electricity prices.

To accurately evaluate the impact of these policies on electricity prices, a complex modelling exercise is necessary, taking into account the expected rise in electricity demand in the coming years despite improvements in energy efficiency. A comprehensive modelling study by Blistine et al. (2023)[21] for the US electricity system suggests that the effect of the IRA public subsidies for renewable energy on average electricity prices is likely to be modest. The study indicates that due to the subsidies in the IRA, retail electricity prices will be lower than they would have been otherwise, with the difference increasing over time as more renewable energy is integrated into the grid. However, the impact is predicted to remain relatively modest, with an average increase of around 5 percent. The widespread implementation of intermittent energy sources is likely to cause greater price variability, resulting in periods of near-zero or even negative prices during peaks of renewable energy production, and higher prices during times with less favourable conditions for renewable energy production. However, this effect can be lessened by the implementation of energy storage and flexible energy consumption.

[19] Bistline J., Mehrotra N. and Wolfram C., (2023), Economic Implications of the Climate Provisions of the Inflation Reduction Act, Brookings Papers on Economic Activity.

[20] This is due to the fact that the 2030 deployment target in the US is less than one-third of that in the EU. Furthermore, electricity generation in the US is about 60 percent larger than in the EU.

[21] Ibid.

Subsidy differences in other green tech sectors

Subsidy programs in both the EU and US support a wide range of green technologies beyond the sectors previously discussed. The IRA outlines specific provisions for each technology. The support mechanisms include investment, production, or consumer subsidies as well as local content requirements. It is beyond the scope of this report to go through the details of all sector- specific provisions, but in this brief chapter, we will provide a brief description of support for selected sectors that are most relevant from Norwegian perspective.

Energy storage and **solar energy** are both covered by the same section of IRA, Investment Tax Credit for Energy Property, which determines investment subsidies also for offshore wind. Thus, both sectors are eligible for subsidies of up to 50 percent if they meet certain criteria on project location and domestic content. As with offshore wind, solar energy projects in the US can also choose production subsidies instead. Both investment and production subsidies give similar level of support thus the decision on the choice of the subsidy mechanism is likely to be project specific depending on projects' capital costs and the expected capacity factor.[22]

As explained in the chapter on hydrogen subsidies, the IRA also offers subsidies for **carbon capture and storage**, with varying levels based on the technology used and how the captured carbon is utilised. Carbon capture facilities can expect USD 85 per tonne of CO_2 capture and sequestration or USD 60 per tonne if captured carbon injected for enhanced oil recovery or utilised. Amounts for direct air capture are even higher and amount to USD 180 and USD 130 per tonne for sequestrated and utilised CO_2, respectively.

The IRA provides support for **critical minerals**, which do not fall under the category of eligible green technologies in the EU. While subsidies for critical minerals production are lower than for other sectors outlined in the report, they still cover 10 percent of production costs. Furthermore, the domestic industry receives indirect support through regulations requiring locally sourced or processed critical minerals for electric vehicles to qualify for subsidies.

In the EU, apart from renewable electricity and hydrogen, most green tech manufacturing is not targeted by technology-specific public support programs. Instead, sectors that are considered strategic net-zero technologies, which include solar photovoltaic and solar thermal technologies, onshore and offshore wind, battery and storage technologies, heat pumps and geothermal energy technologies, electrolysers and fuel cells, sustainable biogas/biomethane technologies, carbon capture and storage (CCS) technologies, grid technologies are eligible for the same subsidy programs available to the battery industry discussed earlier. Those subsidy programmes include the already mentioned TCTF and IPCEI or the Innovation Fund. Innovation Fund with a budget of around EUR 10 billion will support up to 60 percent of innovation costs for sectors covered under the EU Emissions Trading System. Moreover, the EU has set a target to achieve a production capacity that covers at least 40 percent of regional demand for those technologies through the implementation of the Net Zero-Industry Act.

[22] *https://www.icf.com/insights/energy/solar-economics-ptc-vs-itc*

Significance of other regulation and business conditions

When considering state aid for green tech investments, particularly the IRA, there is often a strong focus on the level of subsidies provided. However, subsidies should not be seen as the sole determinant of investment decisions. Other factors, such as general factors for doing business, also play a critical role in shaping investment decisions, especially in emerging green tech sectors. Green tech investments can involve significant risks and uncertainties due to high upfront costs, long development periods, and a complex regulatory environment. Therefore, investors need to consider various factors, including the regulatory environment, tax policies, policy uncertainty, and energy prices, to make informed decisions and manage risks effectively. In the following sections, we explore these factors in more detail.

Regulatory environment and regulatory burdens

The regulatory environment plays a vital role in shaping investment decisions related to green technology. There are two perspectives to consider: The first pertains to the regulations specific for climate policy and green tech investments, and the second to the general regulatory framework.

Governments around the world have implemented a range of **policies and regulations to promote the development and adoption of green technologies**. These policies include targets for renewable energy, incentives for investment such as feed-in tariffs and tax credits, carbon pricing, and emissions regulations. The EU, as well as Norway, has been on the forefront of this development integrating climate considerations into the broader regulatory framework. This can be seen in the EU ETS, Carbon Border Adjustment Mechanism, requirements for uptake of EV. The presence of both supportive policies as well as regulations can encourage investment in both green tech and renewables, as it reduces risks and increases the likelihood of a return on investment.

Another critical regulatory aspect is the administrative burden that comes with the timeline and decision-making process for green investments. Lengthy processes and high uncertainty remain a challenge in both Europe and the United States. To tackle this issue, Europe has made considerable progress in simplifying permitting rules and shortening decision times in recent months. However, despite these improvements, administrative burden and uncertainty still remain significant factors that investors need to consider when evaluating investment decisions in both regions.

The **regulatory framework** is another important factor that can impact decisions on green tech investment. This framework refers to the rules, laws, and policies that regulate industrial activities, including environmental regulations, labour laws, tax policies, and permit requirements. A well-designed regulatory framework can help establish a level playing field for businesses, promote fair competition, safeguard the environment and workers' rights, and ensure public safety. Moreover, it can provide investors with greater certainty and predictability, which can encourage long-term investment and support economic growth.

Conversely, a poorly designed or overly complicated regulatory framework can create unnecessary costs and entry barriers, potentially deterring investors and limiting economic growth. Moreover, it can create compliance challenges for businesses and increase the risk of non-compliance, leading to penalties and reputational harm. However, regulations that are overly burdensome or complex can also discourage green tech investment, especially for small and medium-sized enterprises (SMEs).

The regulatory environment varies widely between countries and is challenging to compare directly. However, the World Bank's Ease of Doing Business Index[23] provides an indication of the regulatory burden in different countries. This ranking considers various factors, including the ease of "Starting a business", "Dealing with construction permits", "Connecting to the electricity grid" and "Registering property". In the table below, we show the global rank of the relevant countries discussed in this report.

Table 1. Global rank according to Ease of Doing Business Index. A dark colour indicates a high rank (low score), a light the opposite. Source: World Bank

Rank by country	Starting a business	Dealing with construction permits	Getting electricity	Registering property	Enforcing contracts
United States	55	24	64	39	17
Denmark	45	4	21	11	14
Norway	25	22	44	15	3
Sweden	39	31	10	9	39
Germany	125	30	5	76	13
France	37	52	17	99	16

As we see from the table, there does not seem to be large differences in terms of average rank between the EU and the US. Yet, it might seem that the Scandinavian countries score slightly higher (lower rank) than the US, while France and Germany fare slightly worse.

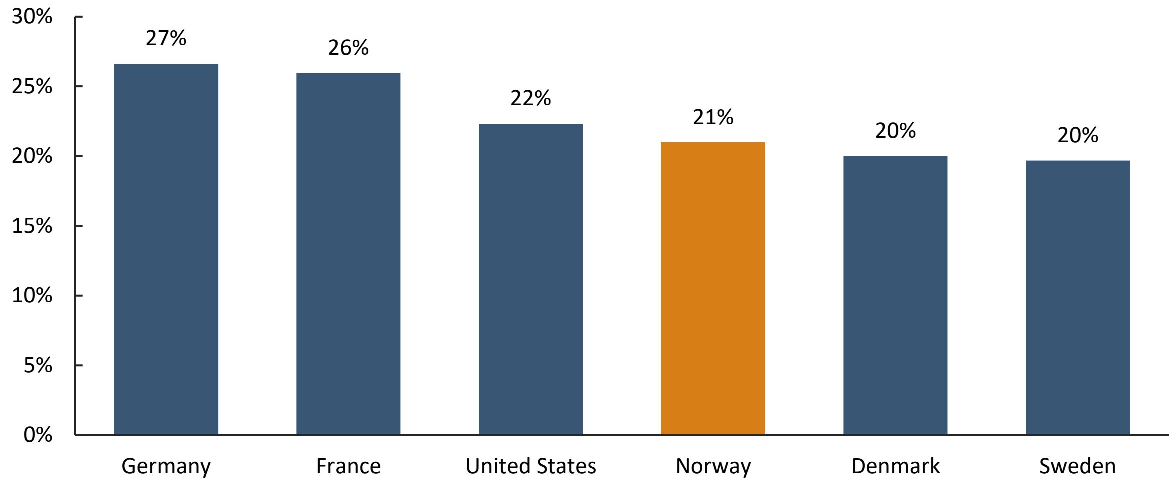
Taxation

Taxes are another institutional factor that can have a significant impact on investment decisions, including those related to green technologies. Firstly, taxes can be directly used to encourage investment in green tech, such as through taxes on high carbon emissions or tax incentives for green investments. This report has already discussed this aspect. Secondly, the overall tax burden for companies is also an essential consideration in investment decisions. The higher the effective tax rate, the greater the required return (before taxes) for investments to be worthwhile.

When comparing tax rates, it is important to consider effective tax rates, as there can be significant differences between stated corporate tax rates and the actual taxes paid by companies. To measure this, we used the OECD's Composite Effective Average Tax Rate (EATR).[24] The EATR is a synthetic tax policy indicator that reflects the average tax contribution a company makes on an investment project earning above-zero economic profits. It is used to analyse discrete investment decisions between two or more alternative projects. Figure 4 shows the EATR for selected countries.

[23] *https://archive.doingbusiness.org/en/rankings*
[24] *https://stats.oecd.org/index.aspx?DataSetCode=CTS_ETR*

Figure 4. Composite Effective Average Tax Rate. Source: OECD



As shown in the figure, the average tax rate in the US is higher than in the Scandinavian countries, but still somewhat lower than in France and Germany.

Policy uncertainty

Political uncertainty can have a negative impact on investment decisions in green technology, as instability and uncertainty increase the required rate of return on investments. While overall economic and political instability in the United States is low, the country's policies relating to climate change have been uncertain in the past. During the Trump administration, there was a significant rollback of environmental regulations and support for renewable energy, which created uncertainty for investors in the sector. In addition, the administration withdrew from the Paris Agreement, which the US had played a vital role in negotiating. Although the Biden administration's emphasis on climate change and commitment to clean energy have contributed to renewed optimism for green technology investment in the US, the risk of a sudden political shift is markedly higher than in the EU. While we do not believe that the IRA will be rolled back in the case of a Republican presidential candidate, it is noteworthy that all Senate and House Republicans voted against the bill.

In the European Union, there is generally more stability and predictability in terms of political support for climate policies. The EU has set ambitious targets for reducing greenhouse gas emissions and increasing the use of renewable energy and has implemented policies and regulations to support these goals. Additionally, there is mostly a broad political consensus on the need to support green tech and renewable investment in Member States. As a result, investors in green technology in the EU may have greater confidence in the long-term prospects of their investments.

Production costs

An important way to maximise profits is to minimise production costs. While many input factors are tradeable and thus have similar prices across regions, there are others for which price differences persist. Investors may thus be inclined to favour location offerings that lower production costs. The key production factors with costs varying across the regions are labour and electricity.

Labour costs are comparable between EU and US, however direct comparison is difficult due to exchange rate fluctuations and more importantly differences in markets for specific skills. On average, hourly labour costs in the EU were EUR 30 per hour in 2022 ranging between EUR 8 in Bulgaria to almost EUR 51 in Luxembourg. In

Norway labour costs are even higher at EUR 55 per hour.[25] Labour costs in the US are on comparable level. Compensation costs among private industry employers in the United States averaged USD 40 per hour worked in December 2022 also varying between regions from USD 32 in East South Central region to 47 USD on the east and west coast.[26]

The cost of electricity and the availability of green energy are also important factors that can impact investment decisions. However, the importance of these factors depends on the sector's electricity intensity, which can vary significantly between sectors. For example, in the case of green hydrogen, electricity prices make up most operating costs. Other energy-intensive green tech products include solar panels and battery production, while the energy costs are less important for the production of wind turbines. On the other hand, higher electricity prices incentivise investments in renewable electricity generation, and increase demand for certain green tech products that improve energy efficiency, such as heat pumps.

In the last decade wholesale electricity prices have been higher in Europe than in the US. The difference in electricity prices was predominantly due to higher CO_2 allowance and natural gas prices in Europe. However, with the growing share of renewables in the grid, the pass-through of CO_2 and natural gas prices to average electricity prices will go down. This makes it difficult to assess which region will be at a cost advantage in 2030. Electricity prices in Norway have historically been significantly lower than in the rest of the continent. However, the gap has recently significantly with the increase of transmission capacity to other countries.

Concludingly, broader regulatory framework and business conditions, such as taxes, policy uncertainty, regulation, and the price of electricity, can significantly influence future green tech investment decisions.

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[25] *https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Hourly_labour_costs#Hourly_labour_costs_ranged_between_.E2.82.AC8.2_and_.E2.82.AC50.7_in_2022*
[26] *https://www.bls.gov/regions/southwest/news-release/employercostsforemployeecompensation_regions.htm*

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