

Deloitte.



Sustainability & Climate
**IRA and the net-zero race –
How EU industrial policy
should respond**





Stiftung
KlimaWirtschaft

Stiftung KlimaWirtschaft — German CEO Alliance for Climate and Economy is a nonprofit foundation whose sole mission is to promote climate protection and the sustainable use of natural resources. As a CEO alliance of more than 30 companies from all sectors of business and industry, we work with government, think tanks and civil society to develop constructive solutions for the transition to a climate-neutral economy. As Foundation 2° we have been arguing for ambitious climate targets and ambitious climate policies at the national, European and international level since 2007. We renamed our foundation "Stiftung KlimaWirtschaft" in 2021 to better reflect who we are and how we work.

This study was commissioned by Stiftung KlimaWirtschaft. The here presented views do not necessarily represent the views of Stiftung KlimaWirtschaft or its supporting companies.

Foreword	4
Executive Summary	6
Challenges for EU industrial and transformation policy	8
The US-IRA changes the landscape of transformation policy	10
EU response to the IRA	14
Development of green value chains in the EU	19
Evaluating the EU Green Deal Industrial Plan	24
Conclusion: Considerations for EU industrial policy	28
Authors	30

Foreword

Dear reader,

The race to net-zero is in full swing. Building a climate neutral European economy by mid-century is not just crucial to limit temperature rises to 1.5 degree Celsius. It is also now the strategic goal for smart, future-oriented economic policy making. Europe has built a strong foundation with a well-functioning emission trading system and a comprehensive, ambitious regulatory framework. Businesses in Europe want to do their part in keeping Europe on a path to climate neutrality. They have understood the change of tides (or “Zeitenwende”).

2022 has painfully reminded us that overly dependency of a single trading partner implies a massive geostrategic risk. As with Russian gas, we can see similar dependencies in the space of renewable energy equipment. We urgently need to strengthen the manufacturing of all key technologies that are needed for the greatest economic transformation in 100 years. At the same time, the US’ Inflation Reduction Act, though not without risks, strikes European businesses and policy makers alike with its great simplicity and the pragmatism of forceful net-zero industrial policy. The IRA shows the EU that to really unleash the transformation of the European economy, an ambitious net-zero industrial policy is needed. The EU’s Green Deal Industrial Plan with the Net-Zero Industry Act at its core has been a big step forward to complement the existing Green Deal policy framework. The ambitious proposals must now be shaped in a pragmatic, fast and courageous way without further delay. Perfect is the enemy of the good!

With this study commissioned by Stiftung KlimaWirtschaft (German CEO Alliance for Climate and Economy), we want to contribute to the on-going debate for a smart, future-oriented European industrial policy. We urgently need to strengthen European net-zero value chains.

Now is the time for civil society, businesses and politics to close ranks and jointly push project net-zero 2050. The transition may be a long and winding road, but every step takes us closer to a clean, sustainable and prosperous future.

I hope you enjoy the analysis!

Thank you,



A handwritten signature in black ink that reads "Sabine Nallinger".

Sabine Nallinger

Managing Director
Stiftung KlimaWirtschaft – German CEO
Alliance for Climate and Economy

Dear reader,

The need to transform economies to reach net zero emissions is urgent and critical. The climate crisis poses a grave threat to our ecosystems, our civilization and our economy. Consequently, it is imperative that we rapidly reduce our greenhouse gas emissions to limit the increase in global temperature to as close as possible to 1.5°C compared to pre-industrial levels in the coming decades. Though industrialization has played a significant role in exacerbating the climate crisis in the past, we now have the opportunity to make a new kind of industrialization a key driver for bringing about solutions for climate change mitigation, resilience and adaptation - a process we call zerograding or upgrade to net zero.

Policy needs to reconcile the need for short-term economic growth with environmental sustainability to pave the way towards a net zero world. This includes the massive deployment of clean and renewable energy sources such as wind, solar, and hydrogen, the accelerated development of sustainable manufacturing and production practices as well as revamping economic activity to align with net zero goals. Several governments have presented plans to facilitate and accelerate this transition.

In particular, the United States have made remarkable progress in encouraging and supporting climate change mitigation. A notable milestone was the

decision to rejoin the Paris Agreement on climate change in 2021. Most importantly, in 2022, the Inflation Reduction Act (IRA) was signed into law. It is a massive program to transform the US economy and build green energy supply chains that is also likely to lead to considerable emission reductions. Built around generous subsidies with a simple structure in the form of tax credits, the IRA already attracts substantial investments into green and sustainable value chains in the USA and is expected to do so in the foreseeable future.

At the same time, the IRA also challenges the EU's approach to net zero transformation policy. Without a strong policy response, the EU may lose its edge in attracting and expanding green value chains which are crucial in order to replace existing fossil-based value chains as a pillar of the EU's long-term economic prosperity. The IRA has been a wake-up call for the EU to complement its climate policy instruments with an industrial policy that meets the requirements of a net zero world. This approach also addresses other objectives in an increasingly challenging geo-political economic environment, such as reducing supply chain dependency on China in strategic industries.

It is crucial that stakeholders and experts contribute to further improving the EU industrial policy with their knowledge and analysis. Deloitte is committed

to facilitating the transformation of economies and companies to net zero around the world. This study is a contribution towards this goal.

I wish you an exciting read.



Prof. Dr. Bernhard Lorentz

Managing Partner
Global Consulting Sustainability & Climate
Strategy Leader

Executive summary

For a long time, European Union (EU) has been the global benchmark for pursuing ambitious climate action and setting policies aimed at reducing greenhouse gas emissions. Amid geopolitical rifts around the role of free trade and the security of supply chains, more and more countries embrace the net-zero transition as an opportunity to transform their economies and secure their prosperity. In recent months, various geographies worldwide have put forward national plans to enhance their net-zero capabilities through different industrial policy measures.



The US Inflation Reduction Act (IRA), whilst a very positive step for climate protection, poses a challenge to the EU by providing substantial subsidies for the development of green value chains in the form of transparent and easy-to-understand tax credits. It thus has the potential to attract considerable investment in clean technologies from other countries to the US, thereby building up the green-energy and electric-vehicle (EV) value chains that are likely to be the basis for future economic prosperity. This could be further reinforced by IRA-related activity reinforcing the US advantage of low energy prices through substantial increases of renewable power generation capacities.

While the EU's policy transformation approach has focused on carbon pricing, regulation, and incentivizing innovation, it so far lacks the policy instruments to adequately respond to an approach based on subsidizing carbon-free products. With the Green Deal Industrial Plan (GDIP), the EU has responded to the IRA and other industrial policy challenges. The GDIP is a highly complex policy approach with the main aim of developing green value chains in the EU in order to both strengthen the industrial base of the EU's prosperity and to increase the resilience of the EU against global trade disruptions. The plan emphasizes simplifying regulation (e.g. by speeding up approval procedures) and financing for green value chains (e.g. by relaxing state-aid rules at the national level and using existing EU funds at the EU-level).

Analyzing the development of key elements of green value chains shows that in most cases, significantly faster growth is required:

- At the present speed of adding generation capacities, REPowerEU targets for solar power capacity in 2030 would be missed by 258 GW, that of wind power capacity by 231 GW.
- The annual manufacturing output for photovoltaics would have to increase sixfold compared to current levels. Annual domestic manufacturing of wind turbines needs to increase by 25% to meet REPowerEU targets in 2030. Especially for photovoltaics, this will be challenging in a market dominated by Chinese manufactures.
- For both hydrogen and battery production, considerable additions of capacity will be needed, the better part of which still have to be developed. Related value chains are only in the process of being established.
- Announcements of manufacturing projects for electrolyzer and batteries in the EU would be sufficient to cover good parts of or even exceed expected demand. At the same time, there is considerable uncertainty and risk that announced projects will be deprioritized or withdrawn due to IRA subsidies and lack of corresponding incentives in the EU.

Overall, an ambitious EU industrial policy appears justified in the face of current challenges. An evaluation of the current EU proposals on industrial policies, informed by a consultation of leading

companies in green value chains, reveals that while the general approach to focus on green value chains is much welcome, several issues should be addressed. Especially striking is that the GDIP's complexity fails to provide the required direction and simplification required from an EU response to the IRA.

Conclusions on how the GDIP could be improved:

- More focus on EU-level instruments would further promote simplicity and efficiency of the GDIP. This would ideally be achieved by giving a much larger role to the Innovation Fund than currently foreseen. Also, IPCEIs could be reformed for more simplicity of use and be given a larger role as a harmonized instrument at national level with a transnational component.
- Smart subsidies such as auctions and Contracts for Difference (CfDs) should be preferred over nominally fixed benefits such as tax credits but will only be successful if designed in a lean way.
- Rather than proposing new instruments, existing ones should be streamlined and simplified. Too many conditionalities, compliance requirements and reporting rules make the system hard to use.
- The EU should continue to work towards reducing energy costs. The price-lowering effect of renewable energy should be key to the effort. Certainty about the new electricity market design and improved permitting processes will be required to accelerate the buildup of renewable power.

Challenges for EU industrial and transformation policy

The transition to a net-zero economy is the foremost economic challenge of our time. Unless swift action is taken to reduce greenhouse gas (GHG) emissions, the world is likely to pass the critical threshold of 1.5°C of temperature increase in the 2030s.¹ In order to decarbonize and reach net zero CO₂ emissions by mid-century, huge investment is needed. The International Energy Agency (IEA) estimates that clean energy investment must increase from USD 1.2 trillion in 2020 to USD 4.4 trillion by 2030, and maintain a similar level until 2050.² By signing the IRA into law in August 2022, the US introduced their most ambitious climate protection program yet. For climate protection efforts, this is a major step forward as the bill implies an estimated \$200 billion to \$611 billion³ funding for the green transformation.



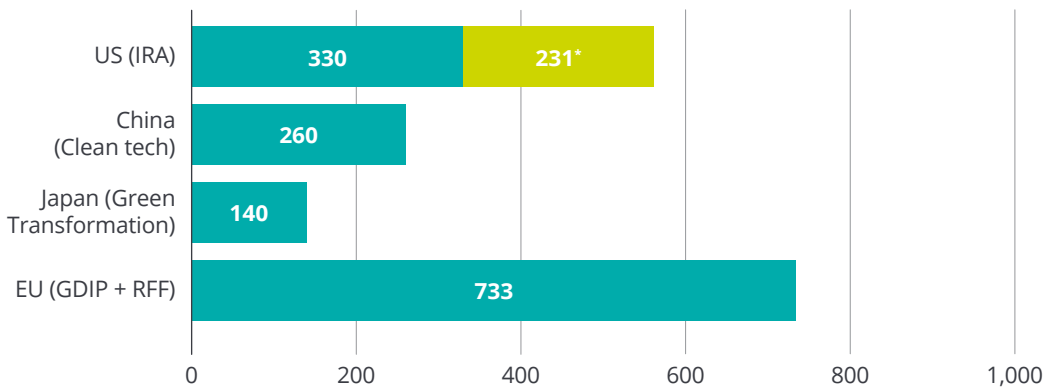
Global activity to reduce emissions is increasing, but protectionism is on the rise

The European Union (EU) has been a frontrunner in combating climate change and reducing carbon emissions, dating back to the introduction of the EU Emissions Trading System (EU ETS) in 2005. With the goal of making Europe the first climate-neutral continent by 2050, the European Commission launched the Green Deal in 2020. In 2021, the “fit for 55” package was presented, consisting of measures to reach the goal of reducing GHG emissions by 55% in 2030, compared to 1990. Extensive funds are being made available at both European and member-state level to support the transition to net-zero.

¹ Intergovernmental Panel on Climate Change (2021), Sixth Assessment Report, IPCC, Geneva.

² International Energy Agency (2021), Net Zero by 2050, IEA, Paris.

³ As the main instrument, tax credits, are uncapped in volume, costs are dependent on uptake of the tax credits. We expect that final costs will be in the range between the more conservative cost estimate of the Congressional Budget Office and the much higher cost estimate of Credit Suisse. (Credit Suisse, 2022, US inflation reduction act – a tipping point in climate action).

Fig. 1 – Policy efforts towards net zero economies from countries

Source: EU Commission (2023), A Green Deal Industrial Plan for the Net-Zero Age, Credit Suisse. All values in Euro. *Credit Suisse estimates the volume of the uncapped tax credits significantly higher than the EUR 330 billion with a total volume of EUR 561 billion.

Other economic blocs are now joining the policy effort towards net zero economies, which is vital for the fight against climate change. But different approaches to net-zero transition policy create economic challenges by reinforcing the role of industrial policy. For the European Union, this creates a need to complement successful policies such as the ETS with a targeted, strategic industrial policy to strengthen net-zero value chains.

New developments challenge the EU's role as a frontrunner in setting policy for decarbonization

Governments play a key role in driving decarbonization by providing a framework and orientation to market actors. At the same time, we are currently seeing several developments around the globe that shift the world away from a global economic model based on free trade and towards nationalized approaches. The COVID-19 pandemic has highlighted the vulnerability of global supply chains. Russia's war in Ukraine and China's nationalization of its economic policies expose the dangers of dependency on individual countries for critical resources such as raw materials and energy. The Inflation Reduction Act is a very welcome policy to increase the ambition of climate action in the United States. However, it poses

a challenge for the European Union as it offers large production subsidies in green value chains, attracting investment in such technologies from other countries to the USA.

For the EU, this creates the risk that the buildup of green value chains could be taking place elsewhere, jeopardizing the technological foundations that have been laid in recent years. In particular, this poses two dangers: First, such value chains are a potential source of future economic prosperity as they replace existing fossil-based value chains. And second, import dependencies in investment goods critical to the transformation could put the EU at a disadvantage if production capacities are not sufficiently scaled up globally.

An opportunity to overhaul EU policy approach and framework

The US IRA has been perceived as a wake-up call by the EU to refocus its net-zero related policies, address existing deficiencies, and create an industrial policy fit for the present age. The European Commission recently published a communication on the "Green Deal Industrial Plan" (GDIP) as a new industrial policy for the EU. Drafts of pieces of legislation foreseen under the GDIP are circulat-

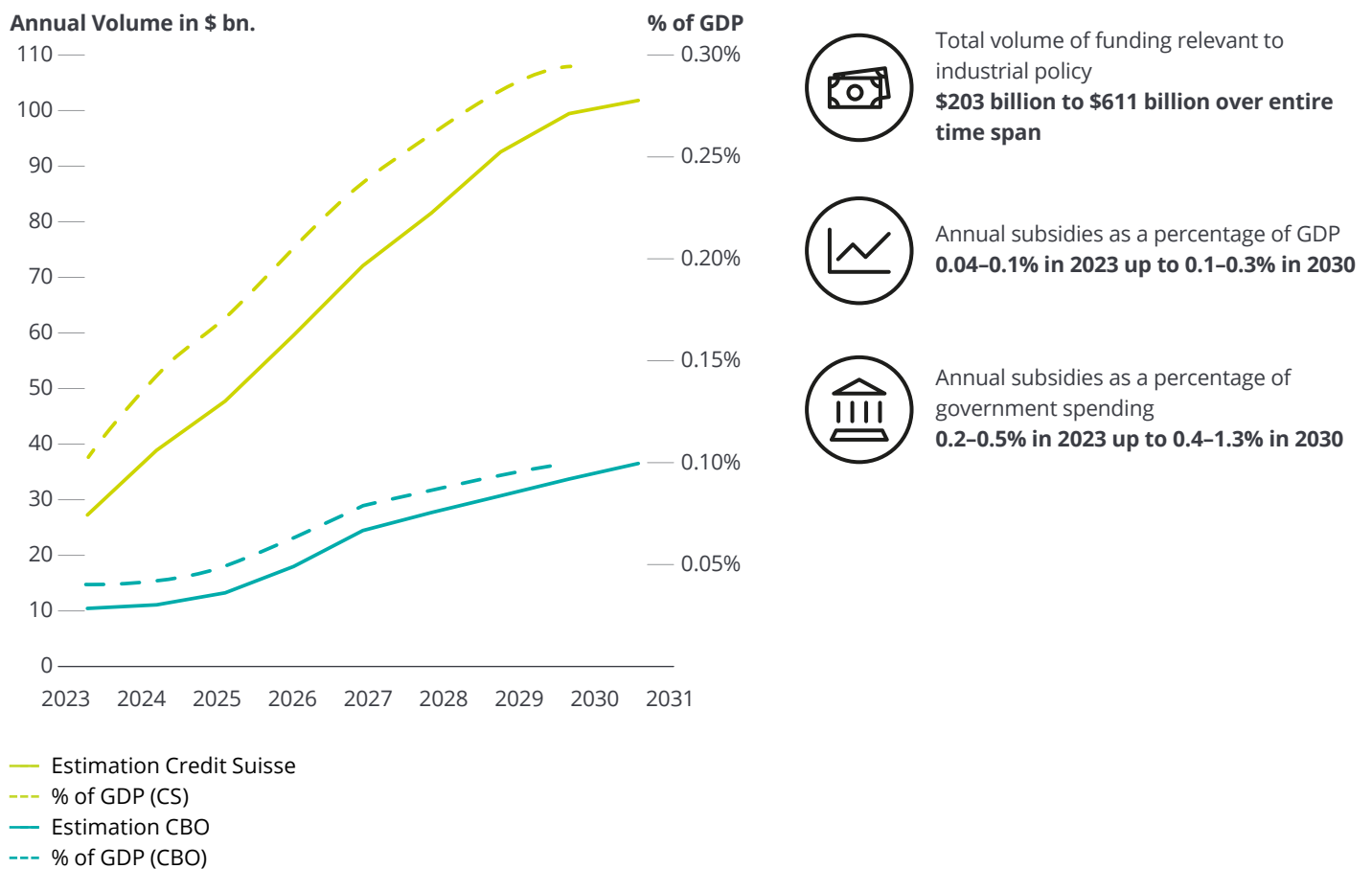
ing ahead of the March 2023 European Council Summit, where they will be on the agenda.

This study will scrutinize the IRA challenge, assess the EU's progress towards various targets in key value chains, and reflect on the EU's envisaged policy response and need for further action. A key part of the study has been a consultation of companies in and around green value chains.

The US-IRA changes the landscape of transformation policy

The IRA will likely decrease US emissions by an additional 7–10% by 2030 in comparison to a baseline scenario.⁴ Annual costs of the net-zero-transformation-related aspects of the IRA will rise to between 0.1% and 0.3% of US GDP by 2030, the final year of most IRA components.

Fig. 2 – Expected costs of the ira’s transformation-related components



Total volume of funding relevant to industrial policy
\$203 billion to \$611 billion over entire time span



Annual subsidies as a percentage of GDP
0.04–0.1% in 2023 up to 0.1–0.3% in 2030



Annual subsidies as a percentage of government spending
0.2–0.5% in 2023 up to 0.4–1.3% in 2030

Source: Congressional Budget Office and Credit Suisse

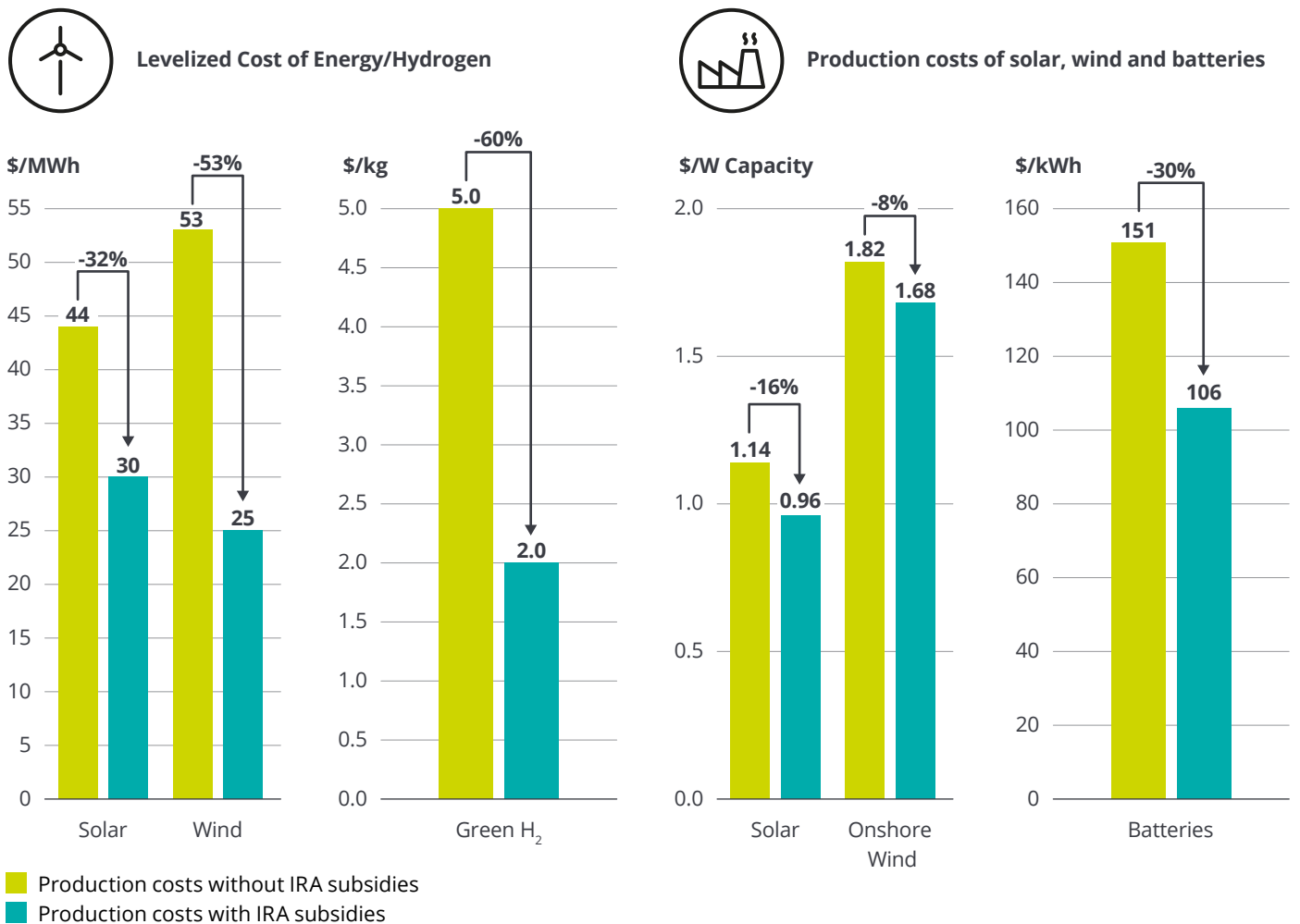
⁴ Rhodium Group (2022), A Turning Point for US Climate Progress: Assessing the Climate and Clean Energy Provisions in the Inflation Reduction Act, <https://rhg.com/research/climate-clean-energy-inflation-reduction-act/>.

Simplicity through focus on tax credits and clear eligibility criteria

One defining characteristic of the IRA is its simplicity. This originates primarily in its focus on one key instrument: tax credits, which support operational expenditures (OPEX) or capital expenditures (CAPEX) of companies. Funding

under these programs is transparent and easy to understand for companies. This implies that companies can easily calculate business cases for potential investment in products supported by the IRA.

Fig. 3 – Effect of subsidies on production costs of supported products



Source: Credit Suisse (2022), Deloitte, Bloomberg NEF; Fraunhofer ISE. Displayed: Effects of the Production Tax Credits. Alternative: Funding of up to 70% of the investment costs.

The main aim of the IRA is to ramp-up value chains for green energy and batteries/BEVs

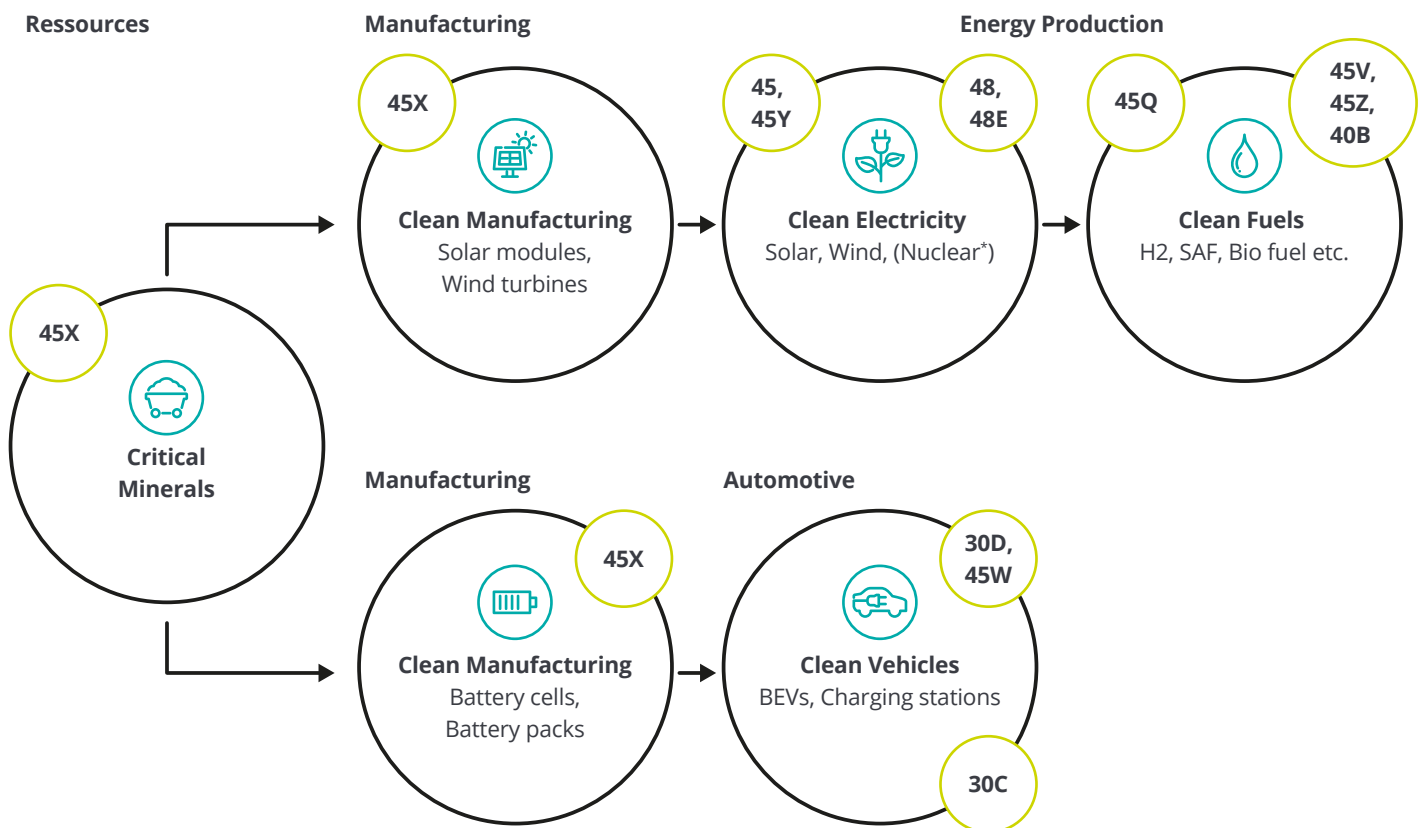
The second key aspect of the IRA's design is its clear focus on supporting the ramp-up of green value chains at scale. Eligible products can receive substantial OPEX or CAPEX support without limita-

tion of total funding volumes. The significant support is made possible by restricting the IRA mainly to two value chains: Green energy and EVs.

By subsidizing actors along the entire value chain, the IRA aims to create an ecosystem of green energy that is com-

petitive with traditional energy sources. "Linking" of subsidies (e.g. extraction of minerals, production of solar panels, generation of electricity, clean hydrogen) can create even more substantial cost reductions than those shown in Figure 3.

Fig. 4 - "Linking" of tax credits along key value chains



Source: Deloitte.

*The IRA also covers nuclear energy generation under tax credit 45U, but uptake is expected to be smaller than of the tax credits 45/45Y and 48/48E.

Company-friendly approach with high fiscal risks for the state

The IRA's approach is clearly geared to being attractive for companies. Simple rules and safe and fixed funding imply that it is easy to base investment decisions on IRA support. From a fiscal perspective, however, the IRA appears highly risky. Nominally fixed PTC subsidies can be greatly wasteful if companies would already engage in the respective activities with less support. Coupled with the uncapped nature of tax credits, if subsidies per unit are set too high, the government would be using taxpayer money to fund vast excess subsidies to companies.

The subsidies-based approach creates a structural challenge for the EU

With the IRA, the EU's policy approach to decarbonization is, for the first time confronted with a systematic alternative approach. The US, also for political reasons, is fully focusing on an "all carrots, no sticks" approach based on industry subsidies for decarbonization. This creates a structural challenge for the EU and its main emphasis on carbon pricing, regulation, and incentivizing innovation. Whereas the EU essentially aims to make fossil-based production more expensive, the USA is making carbon-neutral production cheaper.

Companies thus have an immediate incentive to invest in the USA for products that are eligible for subsidies under the IRA. Especially investment in emerging new value chains such as green hydrogen and battery production may be drawn towards the USA. Potential first-mover advantages could translate to the creation of future industrial ecosystems.

EU lacks instruments for market ramp-up and OPEX support

Despite significant financial volumes in funding programs, the EU at present does not possess instruments to substantially support the ramp-up of markets and value chains. The EU traditionally aims to provide a level playing field for the emergence of green technologies so that the most efficient solutions will prevail and market failures are eliminated. Existing funding instruments are therefore focused on promoting research and development of technologies in their early development stages. They focus primarily on CAPEX support, whereas some of the technologies supported by the IRA (e.g. manufacturing of wind turbines, solar modules, and production of green hydrogen) are more OPEX-heavy and can receive such support under the IRA.



EU response to the IRA

Released as a communication of the European Commission on 1 February 2023, the Green Deal Industrial Plan (GDIP) outlines the EU response to the challenges for industrial policy posed both by the IRA and other global developments. Its key goals are “to massively increase the technological development, manufacturing production and installation of net-zero products and energy supply in the next decade”.⁵ This is to secure high-quality jobs and ensure the competitiveness of European industry. It also aims to increase resilience and reduce dependencies in critical, especially energy-related, supply chains. Overall, the GDIP’s scope

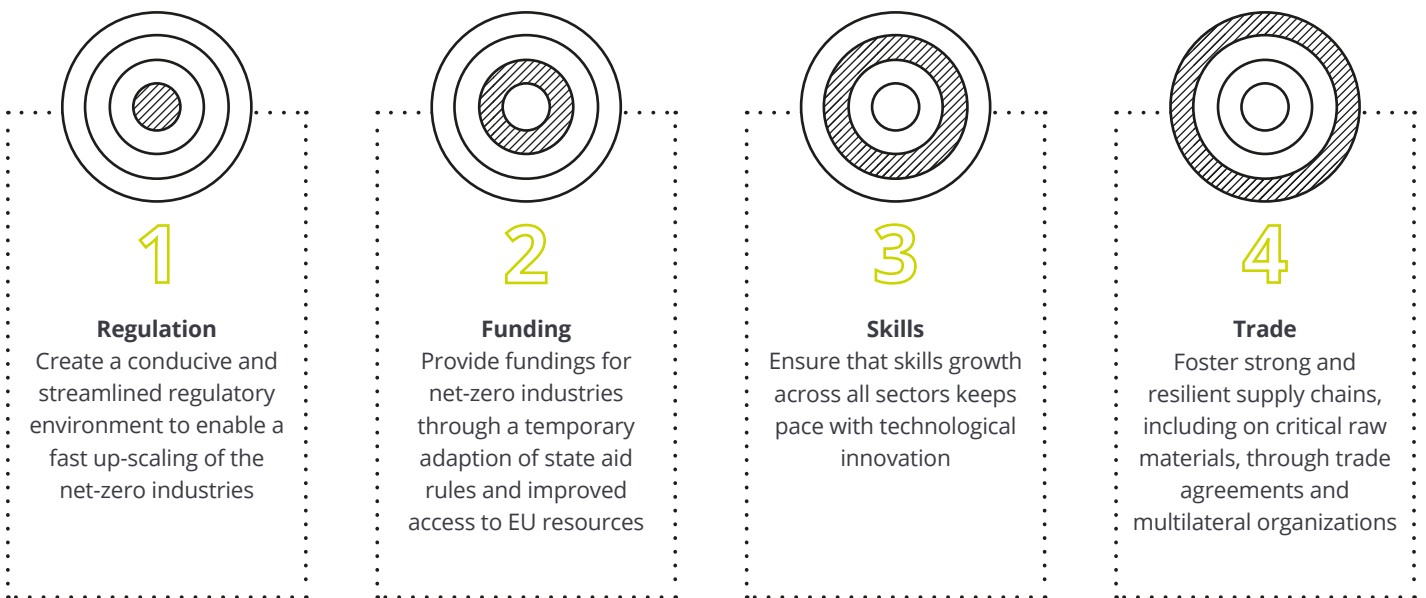
is much broader than the IRA’s focus on green supply chains and can be understood as a comprehensive industrial strategy for the net-zero age.

The GDIP is a broad-based industrial strategy for the net-zero age

The GDIP complements ongoing activity under the European Green Deal and REPowerEU and rests on four pillars. The first pillar aims at a predictable and simplified regulatory environment, the second pillar at speeding up access to financing for the clean tech sector, the third pillar at enhancing the skills of the workforce, and the fourth pillar at pro-

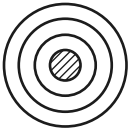
moting open trade for resilient supply chains. Given the focus on increasing manufacturing production and installing net-zero products, we focus below on the key Pillars 1 and 2. Due to the complexity of the GDIP, only the most relevant proposals are referred to.

Fig. 5 – The four pillars of green deal industrial plan



„A Green Deal Industrial Plan for the Net-Zero Age (GDIP)“

Source: European Commission



Pillar 1

Create a predictable and simplified regulatory environment

The goal of the first pillar of the GDIP is to create a reliable and simplified regulatory environment, i.e., to speed up approval procedures and enable faster expansion of the net-zero industry. Drafts of the most important Acts announced under Pillar 1, especially the Net-Zero Industry Act (NZIA), the Critical Raw Materials Act (CRMA) and the electricity market reform proposals, have already been in unofficial circulation during the development of this study. The Net-Zero Industry Act proposal, published on Thursday March 16th, sets out the political target to man-

ufacture at least 40% of required net-zero technologies in Europe by 2030. To achieve this target the Net-Zero Industry Act mainly focuses on accelerating permitting processes for strategic net-zero technologies.

Fig. 6 – GDIP pillar one: regulation

Pillar 1: a predictable and simplified regulatory environment



Net-Zero Industry Act

- Targets for industrial capacity by 2030 in green value chains
- Shorten permitting processes (national 'one-stop-shop'), creation of European standards and regulatory sandboxes



Critical Raw Materials Act

- Foster extraction, processing and recycling of critical raw materials in the EU
- Diversification of sourcing through renewed international engagement with trade partners



Energy

- Adoption of an EU regulatory framework for batteries
- Adoption of the Ecodesign for Sustainable Products Regulation
- Reform of the electricity market design

Source: European Commission



Pillar 2

Ensure faster access to funding/ financing

The GDIP contains proposals to promote investment in clean technologies in Europe by member states, the EU, and private actors. At a national level, the main aim is to simplify and relax EU state aid rules. The challenge will be to ensure a level playing field in the internal market while making it easier for member states to grant the necessary aid to relevant industries or even match funding conditions offered in other international jurisdictions. In order to speed up the granting of such aid, the Temporary State Aid Crisis and Transition Framework (TCTF) and the General Block Exemption Regulation (GBER) have been revised for the Green Deal. Further regulation is expected to help simplify the approval of measures related to IPCEI (Important Projects of Common European Interest) projects.

At EU level, existing EU funds and pan-European financing options are intended to facilitate the funding of innovations and the production and use of clean technologies. The focus here is on the REPowerEU, InvestEU and European Innovation Fund programs.

Several proposals for funding through the Innovation Fund are for areas also supported by the IRA. By mid-2023, an auction for EUR 800 million to support hydrogen production is anticipated by the Innovation Fund, supporting producers with a fixed premium per kg of renewable hydrogen produced. Further extension of

such auction mechanisms to support the production of components for solar and wind energy, electrolyzers, and batteries are envisaged.

For the review of the Multiannual Fiscal Framework (MFF) by summer 2023, the Commission proposes a new European Sovereignty Fund to support advanced technologies and ensure all member states have access to projects in such technologies.

Yet as to private funding, the GDIP remains vague on how to increase private capital flow into clean technologies. This is to be primarily achieved by establishing a fully developed Capital Market Union that, along with the EU sustainable finance disclosure framework, is expected to provide the necessary impetus to drive investment.



Fig. 7 – GDIP pillar two: funding

	Temporary Crisis and Transition Framework (TCTF) until: 2025				Green Deal General Block Exemption Regulation
National Funding	Simplification of aid for renewable <ul style="list-style-type: none"> Extend provisions to all renewable technologies (under RED II) and to renewable hydrogen and bio-fuel storage. Eliminate the need for open tenders for less mature tech and extend deadlines for projects. 	Simplification of aid for decarbonising <ul style="list-style-type: none"> Allow aid by reference to standard percentages of investment costs – for hydrogen use, energy efficiency and electrification. More flexible aid ceilings per beneficiary in schemes fulfilling specific conditions. 	Enhanced investment support schemes <ul style="list-style-type: none"> Strengthen investment support schemes for strategic net-zero technologies, including the possibility of granting higher aid to match the aid received for similar projects by competitors located outside of the EU. 	Targeted aid for major production projects <ul style="list-style-type: none"> Enhanced targeted aid for major new production projects in strategic net-zero value chains, taking into account global funding gaps. 	Increase notification thresholds for state aid <ul style="list-style-type: none"> Increasing thresholds triggering notification to the Commission. Simplify and accelerate the IPCEI program.
EU Funding	Repower EU* <p>Reduce energy use, increase clean energy production and diversify energy supplies. The plan also increases the funds of the RRF with additional 20 billion.</p> <p>The EC encourages Member States to:</p> <ul style="list-style-type: none"> Accelerate the permitting processes Increase tax breaks Invest in skills for the workforce 	Invest EU Programme* <p>Catalysing private investments in EU priority areas, such as the net-zero tech and industrial innovation.</p> <p>The EC proposes to:</p> <ul style="list-style-type: none"> Simplify procedures to responds current needs Increase the overall funding, in particular for 2024–2027 	Innovation Fund* <p>Supports the development of new technological solutions that decarbonise energy intensive industry.</p> <p>The EC proposes to:</p> <ul style="list-style-type: none"> Launch in autumn a first auction for supporting the production of renewable hydrogen Consider extending the mechanism for scaling up manufacturing of components for clean tech 	Sovereignty Found** <p>EC proposes new joint EU funding in the context of the review of the MFF, to be presented before summer 2023.</p>	

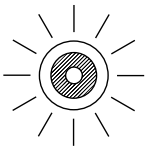
Source: European Commission. *Modification of existing fund **Planned fund



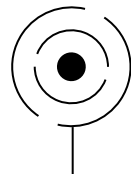
Development of green value chains in the EU

The goals of the GDIP and its NZIA are to ensure substantial production within the EU from green value chains. This merits an analysis of the current state and development in the EU of the main value chains referred to in the EU proposals. The Net-Zero Industry Act, published on March 16th, 2023, sets out the political target to manufacture at least 40% of required net-zero technologies in Europe

by 2030. In reference to this target, the following chapter sheds light on the gap between current production capacities and the ambition outlined in the net-zero industry act. It also analyses the required capacity additions to meet the EU targets for wind and solar power capacity and EU hydrogen production.⁶ Progress to the following EU targets for 2030 is analyzed:



592 GW
solar power
capacity



510 GW
wind power
capacity



10 Mt
of EU hydrogen
production



40 percent
EU manufacturing capacity of
annual deployment needs in
strategic net-zero technologies

⁶ The benchmarks for EU demand are the REPowerEU and EU Green Deal objectives.

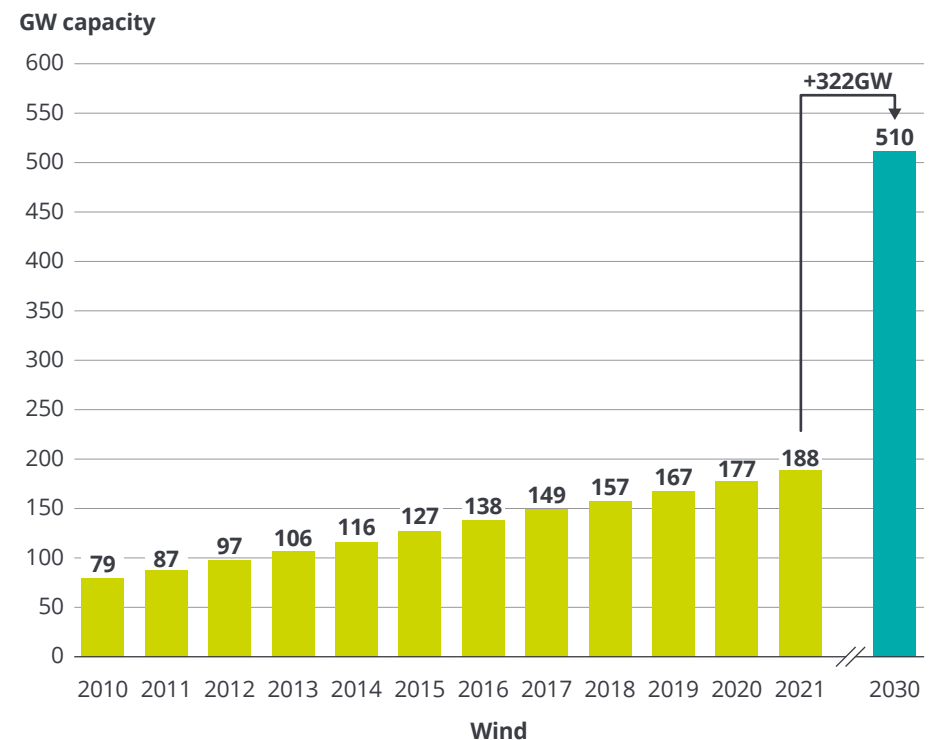
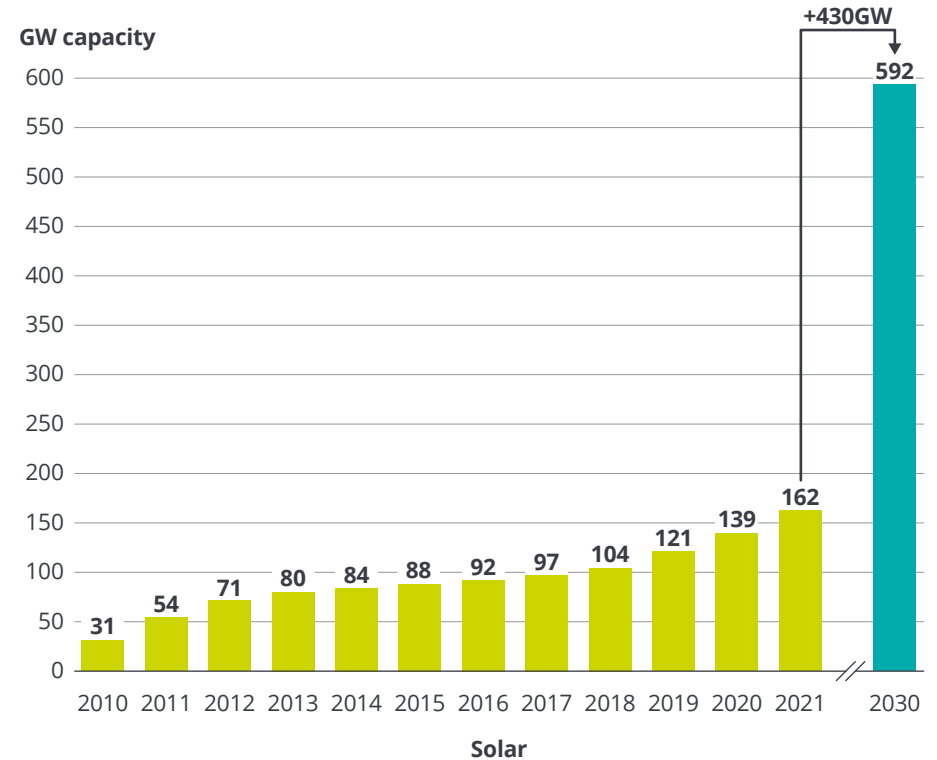
In summary, the gaps present themselves as follows:

- At the present speed of adding generation capacities, REPowerEU targets for solar power capacity in 2030 would be missed by 258 GW, that of wind power capacity by 231 GW.
- The annual manufacturing output for photovoltaics would have to increase sixfold compared to current levels. Annual domestic manufacturing of wind turbines needs to increase by 25% to meet REPowerEU targets in 2030. Especially for photovoltaics, this will be challenging in a market dominated by Chinese manufactures.
- For both hydrogen and battery production, considerable additions of capacity will be needed, the better part of which still have to be developed. Related value chains are only in the process of being established.
- Announcements of manufacturing projects for electrolyzer and batteries in the EU would be sufficient to cover good parts of or even exceed expected demand. At the same time, there is considerable uncertainty and risk that announced projects will be deprioritized or withdrawn due to IRA subsidies and lack of corresponding incentives in the EU.

The speed of solar- and wind-power capacity buildup must increase

In REPowerEU, targets for the total installed capacity in electricity generation from solar and wind power in 2030 are set at 592 GW (solar) and 510 GW (wind). Despite a clear increase of installed capacity over the past year, the current pace of new installations will have to increase substantially to meet the targets. If the average pace of annual installations over the last three years continued, solar power by 2030 would only reach 334 GW (missing the target by 258 GW) and wind power capacity would amount to 279 GW (missing the target by 231 GW).

Fig. 8 – Development of solar and wind capacity and REPowerEU target 2030



■ Total EU capacity
 ■ REPowerEU target

Source: IRENA, REPowerEU

Apart from any further financial support (the necessity of which is unclear as at present wind and solar capacity investment can be profitable), the streamlining of permit procedures and finalizing the reform of electricity market design to give investors more certainty about market development will be vital to increasing capacity.

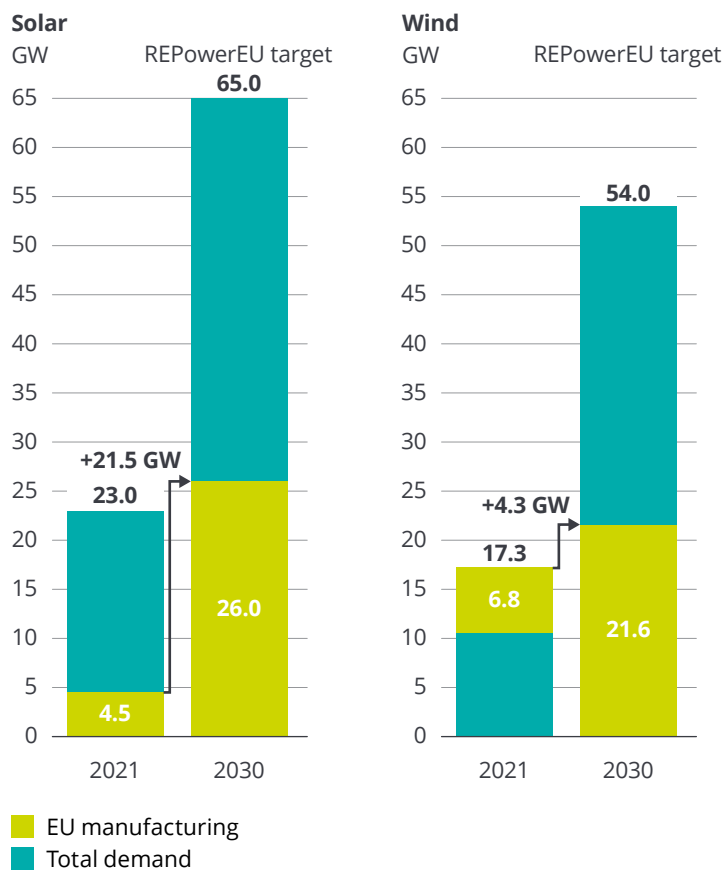
Photovoltaics manufacturing would need to increase much more than wind turbine manufacturing

The draft of the NZIA foresees that EU manufacturing should account for at least 40% of the 2030 demand for strategic net-zero technologies, which include inter alia the manufacturing of photovoltaics and wind turbines. Compared to present manufacturing quantities in the EU photovoltaics manufacturing volumes in the EU need to increase by 21.5 GW. This would be an almost sixfold increase in a market globally dominated by China. For wind turbines, the required increase towards the 40% target is rather moderate, requiring an increase by 4.3 GW, corresponding to an increase of roughly 25% compared to the present output by 2030.

According to the IEA, global photovoltaics production capacity must triple to at least 750 – 800 GW by 2030 in the global net-zero scenario. Industry actors also emphasized that, due to structurally high energy costs, ramp-up of production in the EU would require significant OPEX support. In contrast, substantial IRA support in the US is around nine times higher than what is available under the EU Innovation Fund and might make American photovoltaics modules the cheapest in the world.^{7,8}

Wind-turbine manufacturers in the EU currently face a difficult situation. Many producers have reported negative profits, with companies citing lethargic wind-energy deployment in the EU as a key reason, along with cost pressures related to inflation and supply chain issues. For wind-turbine manufacturing, support under the IRA is estimated to be 8-14 times higher than that available in the EU.⁹

Fig. 9 – Manufacturing of photovoltaics and wind turbines



Source: Deloitte calculations based on IRENA, SolarPower Europe, REPowerEU, Vestas, Nordex, Siemens Gamesa, Enercon, GE Wind Energy Note: For wind turbines, 2021 EU production included net exports and exceeded installations in the EU.

⁷ VDMA (2023), EU-Reaktion auf den Inflation Reduction Act im Bereich der Klima-Transformationstechnologien.

⁸ Credit Suisse (2022), US Inflation Reduction Act: A Tipping Point in Climate Action.

⁹ VDMA (2023), EU-Reaktion auf den Inflation Reduction Act im Bereich der Klima-Transformationstechnologien.

Ramping up hydrogen production from zero is volatile

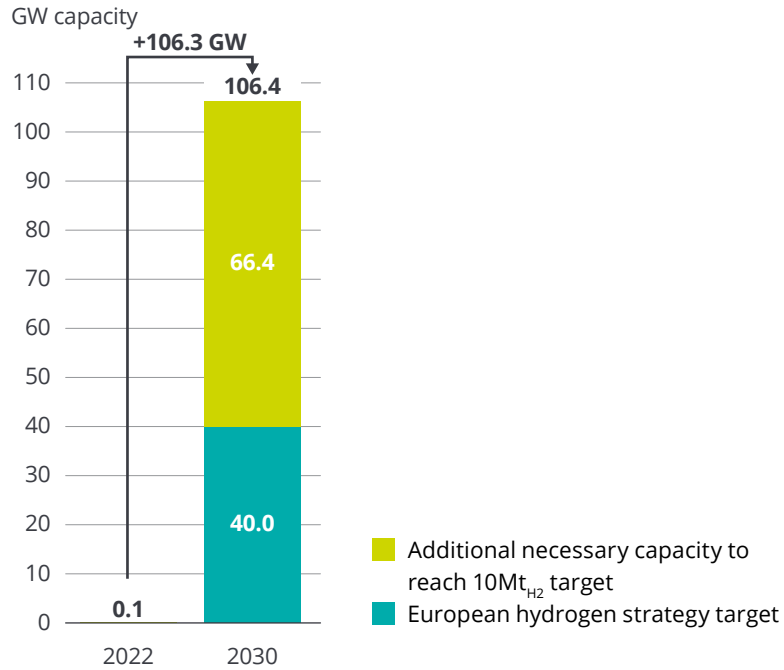
In REPowerEU, a target of 20 Mt of annual renewable hydrogen demand by the EU was set for 2030, of which 10 Mt should be produced domestically. According to our calculations and accounting for average utilization rates of electrolyzers to satisfy criteria for renewable hydrogen, this would require an installed electrolyzer capacity of 106.4 GW, substantially more than the 40 GW foreseen in the European Hydrogen Strategy.

Since electrolyzers are just starting to be installed in the EU, the need to ramp them up is of course massive. All required capacity by 2030 will need to be newly installed by then. According to a study by Monitor Deloitte in 2022¹⁰, proposals for hydrogen projects in the EU by 2030 amounted to 36 GW. This must be taken with a grain of salt since new projects will still be formulated until 2030 and not all announced projects will be realized. In fact, industry representatives emphasized that for hydrogen production, IRA subsidies are deemed highly attractive. While subsidies would not lead to an overall canceling of plans for investment in the EU, they may well lead to prioritizing investment in the USA over the EU.

Electrolyzer production in the EU appears to be on track but also subject to high uncertainty

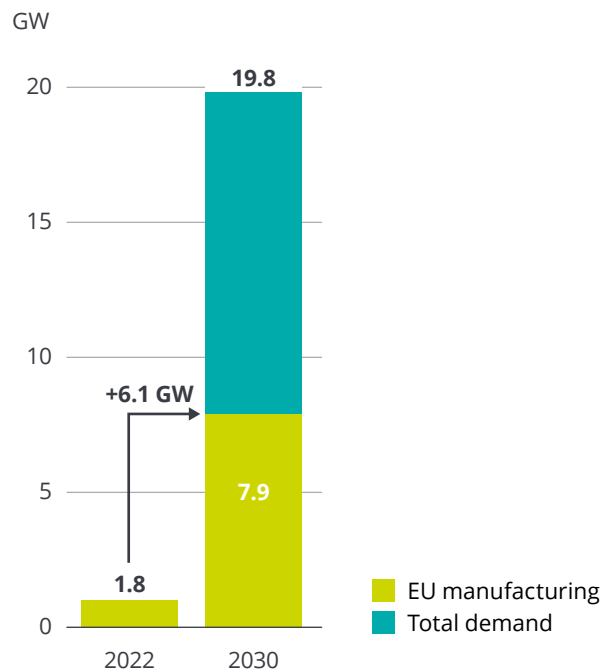
To reach installed electrolyzer capacity of 106 GW in the EU by 2030, we estimate a rising path of annual installation reaching 19.8 GW, installed by 2030. Producing at least 40% of them in the EU as foreseen by the NZIA targets would require annual production of electrolyzers in the EU to increase by 6.1 GW, from the present 1.8 GW per year to 7.9 GW by 2030.

Fig. 10 – Hydrogen production: electrolyzer capacity and 2030 target



Source: Deloitte 2022, EU Commission 2020, A hydrogen strategy for a climate-neutral Europe

Fig. 11 – Manufacturing of electrolyzes: Present output and 2030 target



Source: Deloitte 2022, Hydrogen Europe 2022

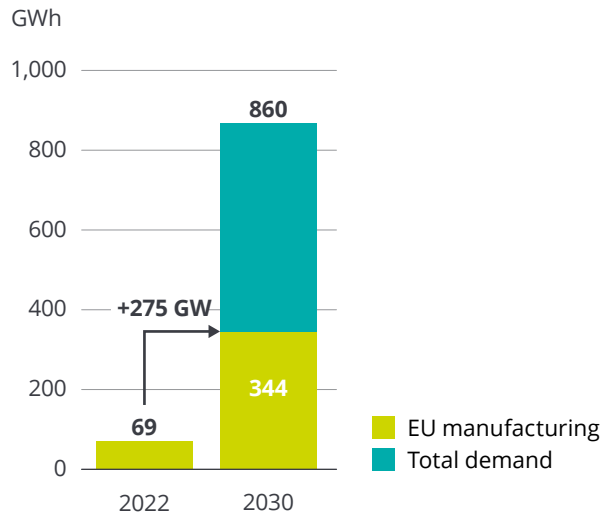
According to Hydrogen Europe, announcements of investment in annual electrolyzer manufacturing by 2030 in Europe (incl. Great Britain and the EFTA countries) amounts to 53 GW. That would be substantially more than the NZIA target but, of course, announcements should be taken with care. Europe is currently a strong player in this industry and has the largest global manufacturing capacity in electrolyzer manufacturing. However, China accounts for more exports and can reportedly produce standard alkaline electrolyzers for USD 300/kilowatt – 75% cheaper than Western-made machines of the same type.¹¹ The main danger for electrolyzer manufacturing, in the opinion of industry representatives, would be a sluggish hydrogen-production ramp-up in Europe.

Battery production could be influenced significantly by IRA subsidies

Battery production is another highly dynamic industry in which the lion's share of capacity must still be built up. An authoritative target for battery production in gigawatt hours was not available at the time of writing but a scenario by Transport & Environment estimated total demand of 860 GWh for battery capacity production in 2030¹². The NZIA target of 40% EU production would require production of at least 344 GWh, around five times the 2022 production of 69 GWh.

EU project announcements by 2030 amounted to 1527 GWh, far more than the demand scenario or target. However, and especially in the battery industry, IRA subsidies are highly attractive and have led to a few prominent cases of investors backtracking on investment announcements for the EU.

Fig. 12 – Manufacturing of batteries: Present output and 2030 target



Source: Fraunhofer ISE, Transport&Environment (2023) A European response to US IRA.

¹¹ BloombergNEF (2021), 2H 2021 Hydrogen Market Outlook: China Drives a Gigawatt, Bloomberg New Energy Finance, London.

¹² Transport&Environment (2023), A European response to US IRA.

Evaluating the EU Green Deal Industrial Plan

Are the proposals put forward by the European Commission up to tackling the challenges facing the EU? Deloitte's own analysis of the draft documents circulating ahead of the EU Council Summit in March 2023 has been combined with a consultation of major companies in green value chains.



It is positive that the EU is reacting to the IRA challenge by looking into green value chains

With the GDIP and its related regulations, the EU is reacting to the IRA and other geopolitical challenges, especially the dangers of import dependencies on individual countries. Under the current global circumstances, an industrial policy as foreseen by the GDIP is justified. It should aim to ensure the future economic prosperity of the EU by ensuring that the strengthening of existing and emergence of new green value chains is not prevented by subsidies in other countries. It should also increase the resilience of the net-zero transformation in the EU by working to reduce volatile dependencies on imports of critical goods.

Many of the proposed regulatory improvements (e.g., allocation of net-zero valleys, time limits for permits) have been evaluated as useful on the practical level. Indeed, complex regulation and slow administrative processes with high transaction costs hinder investment in net-zero technology. These regulatory measures could be helpful to at least reduce these brakes on net-zero investment.

The GDIP's complexity is a drawback compared to the IRA's simplicity

While the intention of the GDIP and its ancillary documents are highly welcome, a negative aspect of the GDIP and its ancillary documents is their enormous complexity. The GDIP framework equally addresses the structural challenge posed by the IRA, the need for more resilience in supply chains of critical goods, the existing drawbacks of EU transformation policy, and innovation policy objectives. This alone foments a degree of complexity that creates substantial difficulties for market actors to understand the policy and logic of its measures. It becomes even more complex when combined with the inevitable duality of measures at EU

level and guidance for member states (e.g. through modifications of state aid rules). This is problematic as the challenge posed by the IRA is not only one of subsidies along value chains – which the GDIP seeks to address – but also one of simplicity and ease of use.

To respond to the IRA, the GDIP should focus on core incentive instruments to support ramp-up of green value chains

One way to reduce complexity would be to focus on a set of core instruments to financially support the ramp-up of green value chains where necessary. Given the ambitious renewable energy generation and industrial capacity targets under discussion, financial support for critical elements of value chains and to bring down energy costs will be required both to counter incentives in other countries and to overcome initial obstacles. But the GDIP and the NZIA still lack an explicit definition of a concise and limited set of coherent and easy-to-apply incentive instruments.

Instead, modifications to and the use of multiple financial instruments, both at EU and member state level, have been discussed. This further increases the already high complexity of the financial incentive landscape in the EU. An EU response to the IRA would need to contain a clearly identifiable approach to supporting a substantial ramp-up of green value chains, as well as the possibility of OPEX support across the EU.

Current support programs are administratively too demanding

Both at EU and at national level, funding programs in the EU are overly heavy on administration and application procedures. The objective of preventing excess subsidies can lead to exceedingly zealous restrictions, and put a damper on the incentives and success of subsidy-receiving companies. Frustrated with expen-

sive and lengthy application processes for EU funding instruments such as the Innovation Fund and IPCEIs with limited total funding volumes, several companies interviewed called on the EU to copy the American approach and deploy tax credits as large-scale support instruments.

This should be understood more as a wake-up call for a mindset shift towards pragmatism in simplification and streamlining of existing funding instruments than as a prompter to deploy fiscally wasteful tax credits in the EU. Market-based instruments such as auctions or Contracts for Difference are preferable from an economic point of view. But if programs based on such instruments continue to be designed with too many conditionalities and administrative costs, the call for tax credits will become stronger.



Too much fine print in state aid rules

National funding instruments play a major role in the GDIP in terms of providing incentives to relevant industries. As restrictions on state aid are loosened under the newly published TCTF and GBER, member states receive more leeway to financially support green value chains. This is generally a positive development since state aid rules must reflect competition for investment from outside the EU while preserving the integrity of the Internal Market.

Some issues however arise in the state-aid measures. For one, the limit of the TCTF of 2025 appears too soon for sound financial planning and many companies wonder why the deadline was not set for 2030 to align it both with the IRA and targets in the Fit for 55 context. What's more, restrictions and conditions in the fine print of individual measures curtail and complicate the suggested measures, for example the highly complicated process for subsidy matching under enhanced investment support. And even though member states now will have more flexibility in planning individual funding instruments to aid the emergence of green value chains, concrete measures must first be designed and implemented before industries can reliably take them into account for business planning. This will lead to further delay and add to the competitive disadvantage of building or maintaining green business in the EU.

EU instruments suffer from lack of available funds

Although several planned EU-level funding instruments are mentioned in the GDIP, they are likely to play a subordinated role in the immediate response to the IRA due to lack of funds and slow decision making. The large financial capacity of REPowerEU will only become effective at member-state level. The

proposed EUR 800 million for hydrogen capacity auctions under the Innovation Fund are a large share of the fund's annual resources but small in comparison to the two-digit EUR billion figure that Germany is to commit to its Carbon Contracts for Difference.¹³

The proposed Sovereignty Fund's mandate remains unclear, and it is unlikely to become available in the short run (before the review of the Multiannual Fiscal Framework), and is subject to significant risk of political obstruction by member states. It is also questionable whether yet another fund should be added to the already complicated landscape of funds, rather than strengthening, for instance, the existing Innovation Fund.

More EU-level measures would increase consistency and efficiency

Ideally, more measures at EU level would increase the consistency and transparency of EU industrial policy by reducing the heterogeneity of multiple incentive systems at EU and national level and safeguarding the integrity of the EU Internal Market. Also, EU-level measures could overcome problems posed by tight budget situations in some member states and ensure that support is equally available throughout the Union. This could also increase the efficiency of support as investment would ideally be made in the most favorable locations in the EU.

However, one should remain realistic about the difficulties of increasing funds for EU measures and the time that initializing new programs at EU level would take. National measures will continue to play a key role and many companies have reported excellent working relations with the corresponding authorities. To combine the advantages of EU-level consistency and speed of implementation, an overhaul of IPCEI support towards more simplicity and more large-scale funding

could be a viable compromise. IPCEIs have often been criticized by companies due to their long lead times, frequent reviews, and question loops by the EC with uncertain outcomes. Large up-front costs for applications are coupled with relatively low success probability. To better use this – in theory – strong instrument, which also has the potential to bring consistency thanks to its transnational nature, the application and approval procedure for IPCEI projects would need to be highly simplified, funding volumes increased substantially, and OPEX support made possible.

¹³ Handelsblatt (2023), Habeck krepelt Subventionsregeln zur klimagerechten Transformation der Industrie um, <https://www.handelsblatt.com/politik/deutschland/foerderrichtlinie-habeck-krepelt-subventionsregeln-zur-klimagerechten-transformation-der-industrie-um/29022234.html>.

Conclusion: Considerations for EU industrial policy

Global developments warrant an ambitious industrial policy of the EU

While the development of key green-value chains in the EU already needed to pick up speed due to the need to reduce excessive import dependencies, especially on China, the IRA has sharply increased pressure to support the buildup of these value chains. Thanks to easily calculated and high subsidies, many companies are reviewing investment decisions with a view towards benefiting from IRA support, especially in emerging industries like batteries and hydrogen production, with their equally new value chains. An EU industrial policy appears justified to face this challenge and the wider context.

The green transformation implies a moment of potential rupture in industrial continuity: As fossil-based value chains are replaced by new, green value chains, locational decisions for investment with long-lasting impact will be made. New comparative advantages will come into play. Energy prices will no longer depend on the availability of fossil fuels but rather on relative proximity or connection to regions with plentiful wind, solar and land availability. Although the many advantages of established industrial clusters – like qualified workers, proximity of services, etc., will continue to be important, crucial elements of green value chains may be built in new locations. Ensuring that green value chains will be located in the EU is of great importance to secure the industrial base for EU economic prosperity and resilience.

Moreover, a successful green transformation, meeting EU goals for full decarbonization of its economy by 2050, and a 55 percent reduction of emissions by 2030 compared to 1990, requires that critical investment goods for the greening of value chains be available to EU industry. It is possible that such goods become scarce on the world market in the course of global decarbonization efforts or due to geopolitical issues.

A European industrial policy should not support industries that would forever remain dependent on subsidies. The comparative advantages of countries and world regions should be seized and facilitated. Financial support is justified if it is temporary and supports nascent value chains that will become efficient once a certain scale has been reached or if it counters subsidies offered in other countries that would attract away value chains otherwise located in the EU.

Green value chains in manufacturing are likely to become part of the foundation of the EU's future prosperity. The risks of not having such value chains develop in the EU seems to outweigh the fiscal costs of industrial policy support.

Possible considerations for improving the GDIP

Focus on net-zero value chains is sensible

- Funding will be required along value chains but should be managed and limited by using market mechanisms and efficiently structured instruments.
- It must be identified where in value chains financial support is required and where obstructions can be solved by simplifying regulation or other measures.

More emphasis should be put on measures at EU level

- More focus on measures at EU level would increase transparency in the complex system of incentives and ensure that investment support is available consistently across the EU.
- The Innovation Fund could for example be given a much stronger role as a simplified core incentive instrument with an OPEX support capability to achieve GDIP objectives.
- Also IPCEIs could be comprehensively reformed to become much simpler to use and then given a larger role.

Preserving responsible use of funds through smart subsidies

- Smart subsidies such as auctions and Contracts for Difference (CfDs) should be preferred over nominally fixed benefits such as tax credits but will only be successful if designed in a lean way.
- Instruments must be designed carefully to prevent conflict with other incentives and carbon pricing.

Simplification through fewer instruments and more pragmatic instrument design

- Time and timing is key! Rather than compiling and establishing a new comprehensive set of tools, regulations, and measures that aim at solving competition, independence, and resource and environmental targets, existing instruments and measures should be streamlined and simplified.
- The EU should strive for more simplicity and pragmatism in designing measures. Too many conditionalities, compliance requirements, reporting rules and fine print make the system hard to use for businesses and deters companies from using the incentives offered.
- Regional and cohesion policy objectives and instruments should be kept as separate as possible from the industrial policy toolkit. Sufficient investment support should not be prevented because of cohesion policy objectives if the danger is that the investment may otherwise be made outside of the EU.

Substantial increase in renewables capacity necessary to combat energy price disadvantage

- In order to work on a key disadvantage compared to say, the USA, the EU should continue to work towards reducing energy costs. Accelerating the buildup of renewable power will contribute to this target and should be supported with a suitable new electricity market design and improved permitting procedures. The potential of energy imports from sun- and wind-rich neighbouring countries and regions should be utilized.



Authors



Prof. Dr. Bernhard Lorentz

Managing Partner
Global Consulting
Sustainability & Climate Strategy Leader
Tel: +49 30 25468 3214
blorentz@deloitte.de



Dr. Sebastian Lange

Partner
Global Investment &
Innovation Incentives GI³
Tel: +49 30 25468 5173
seblange@deloitte.de



David Saha

Director
Valuation, Modelling & Economics
Tel: +49 30 25468 5188
dasaha@deloitte.de



Tobias Hausotter

Senior Manager
Sustainability & Climate
Tel: +49 30 25468 5472
thausotter@deloitte.de

The authors would like to thank Johannes Trüby (Partner, Economic Advisory, Deloitte France) for insightful comments, Olivia-Julia Lamml (Professional, Global Investment & Innovation Incentive), Sebastian Pyper (Consultant, Valuation, Modelling & Economics) and Benno Schoel (Consultant, Valuation, Modelling & Economics) for their valuable support and contributions to this study.

Deloitte.

Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited (“DTTL”), its global network of member firms, and their related entities (collectively, the “Deloitte organization”). DTTL (also referred to as “Deloitte Global”) and each of its member firms and related entities are legally separate and independent entities, which cannot obligate or bind each other in respect of third parties. DTTL and each DTTL member firm and related entity is liable only for its own acts and omissions, and not those of each other. DTTL does not provide services to clients. Please see www.deloitte.com/de/UeberUns to learn more.

Deloitte provides industry-leading audit and assurance, tax and legal, consulting, financial advisory, and risk advisory services to nearly 90% of the Fortune Global 500[®] and thousands of private companies. Legal advisory services in Germany are provided by Deloitte Legal. Our professionals deliver measurable and lasting results that help reinforce public trust in capital markets, enable clients to transform and thrive, and lead the way toward a stronger economy, a more equitable society and a sustainable world. Building on its 175-plus year history, Deloitte spans more than 150 countries and territories. Learn how Deloitte’s approximately 415,000 people worldwide make an impact that matters at www.deloitte.com/de.

This communication contains general information only, and none of Deloitte GmbH Wirtschaftsprüfungsgesellschaft or Deloitte Touche Tohmatsu Limited (“DTTL”), its global network of member firms or their related entities (collectively, the “Deloitte organization”) is, by means of this communication, rendering professional advice or services. Before making any decision or taking any action that may affect your finances or your business, you should consult a qualified professional adviser.

No representations, warranties or undertakings (express or implied) are given as to the accuracy or completeness of the information in this communication, and none of DTTL, its member firms, related entities, employees or agents shall be liable or responsible for any loss or damage whatsoever arising directly or indirectly in connection with any person relying on this communication. DTTL and each of its member firms, and their related entities, are legally separate and independent entities.