

Electric Power & Natural Gas

The Iberian green industrial opportunity: Seizing the moment

Possessing natural endowments and mature industrial infrastructure, Spain and Portugal have an unprecedented opportunity to lead the energy transition and create significant value for the region.

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For a number of decades, Europe has been on a steady deindustrialization trajectory following the emergence of new, low-cost manufacturing centers, predominantly in Asia. Both Spain and Portugal have borne the cost of a marked decline in their industrial output. Since 2004, European industry has lost 6 percent of its gross value added (GVA), while Spain's industry GVA has decreased 20 percent during that time.¹

In parallel, the world is increasingly feeling the effects of climate change. There is now a broad and growing global consensus on the need for urgent, concerted action to mitigate the negative effects of economic activity on the planet. Governments and companies have committed to ambitious climate goals, including the landmark Paris Agreement, which aims to limit warming to 1.5°C above preindustrial levels. A crucial step in meeting these goals is the transition away from fossil fuels toward a net-zero energy system.

This urgent imperative for decarbonization could be a significant opportunity for the Iberian region. Spain and Portugal's unique geographic endowments—including ample opportunities for cost-effective renewable energy production and significant raw materials—as well as their mature industrial base, mean they are well placed to capture the “green growth” that the energy transition can deliver.

However, the window for action is closing in the fast-moving global energy landscape. Iberia is at an inflection point and currently has the chance to become a strong industrial player through the energy transition, and also to emerge as a key energy exporter in Europe. Spain and Portugal may need to take swift action to seize this opportunity (see sidebar “The Iberian Industry and Energy Transition Initiative”).

Bringing net-zero ambitions back on track

Across Europe, the European Union has put several policy initiatives in place to move toward net zero, including the European Green Deal and the Fit for 55 plan, which aim to more than halve CO₂ emissions by 2030 and achieve net-zero emissions by 2050.² However, to meet these goals, the energy transition needs to accelerate—without further action, Europe is currently not on track to meet its climate goals as outlined in the Paris Agreement.³

On the Iberian Peninsula, the energy transition is particularly important for ensuring sustainability and competitiveness into the future. The region is vulnerable to the effects of climate change, with certain areas already seeing an increase in the frequency of extreme weather events, including severe heat waves and low rainfall.⁴ In May 2023, 90 percent of the Portuguese mainland and 60 percent of the Spanish countryside experienced drought.⁵ These climate impacts could adversely affect key sectors of the region's economy, including agriculture and tourism.⁶

Although strong decarbonization targets are in place in both countries, significant acceleration in the rate of decarbonization will be required to meet these climate goals. And make no mistake: achieving this acceleration and reindustrializing local economies will require concerted action across sectors—as well as significant mobilization of capital. But if Spain and Portugal can achieve this through a set of targeted unlocks, they could play a leading role in the energy transition and support Europe's net-zero goals while capturing the economic benefits of green industrial growth.

In this article—the first in our series looking at Iberia's green industrial opportunity—we explore

¹“Gross value added and income by A*10 industry breakdowns,” Eurostat, accessed April 2024; “Gross value added,” Spanish National Statistics Institute (INE España), accessed April 2024.

²“Fit for 55,” European Council, April 12, 2024; “The European Green Deal,” European Commission, accessed July 2024.

³“2023 NDC synthesis report,” UNFCCC, November 14, 2023.

⁴“Consequences of climate change,” Directorate-General for Climate Action, European Commission, accessed February 2024.

⁵“Severe drought spreads in Portugal, officials seek EU help,” Reuters, May 10, 2023; Fred Pleitgen, Claudia Otto, and Laura Paddison,

“Disappearing lakes, dead crops and trucked-in water: Drought-stricken Spain is running dry,” CNN, May 2, 2023.

⁶“Net-zero Spain: Europe's decarbonization Hub,” McKinsey, September 23, 2022.

The Iberian Industry and Energy Transition Initiative

Spain and Portugal's decarbonization targets to achieve net zero by 2050 will require participation from all sectors and industries. McKinsey set up the Iberian Industry and Energy Transition Initiative to act as a leading think tank and a demand and investment accelerator on the Iberian Peninsula. The main goal of the Initiative is to help Spain and Portugal realize their decarbonization goals while capturing the opportunity to develop new industries and scale existing ones.

The Iberian Industry and Energy Transition Initiative currently comprises more than ten founding members, including leading energy, industrial, and financial organizations. Initiative members attend periodic meetings to discuss key thematic missions around the way forward for energy and industry in Spain and Portugal.

In the first quarter of 2024, over 20 roundtables were held to discuss the topics of electrification and renewables, as well as renewable molecules (including green hydrogen, sustainable fuels, and biomethane). The insights from these roundtables helped to inform this article series, which focuses on Spain, though many of the insights can be applied to Portugal as well. A variety of stakeholders will be involved in the effort; public-private collaboration will be essential to materialize the Initiative's vision.

Spain and Portugal's natural endowments and the challenges they would need to overcome to seize this once-in-a-generation opportunity.

Significant action is needed across sectors, alongside capital mobilization

Spain and Portugal have set ambitious national targets to cut greenhouse gas (GHG) emissions by 32 and 55 percent, respectively, by 2030.⁷ However, to meet these targets, the rate of decarbonization would need to speed up—to meet its 2030 decarbonization targets, Spain would need to increase this rate fourfold and, subsequently, by more than fivefold to achieve net zero by 2050. Portugal would need to accelerate its decarbonization by 20 percent to achieve net zero by 2050.⁸

Achieving these decarbonization targets would require a strong agenda, including targeted energy transition initiatives across sectors. Spain and Portugal aim to add ~90 gigawatts (GW) and ~25 GW of renewable power capacity by 2030 (vs. 2023), respectively, based on their national plans. Compared to past commissioning trends, this would imply a reduction in annual solar deployment from 4.3 to 3.5 GW per year, but an increase in wind deployment from 1 to 2.8 GW per year. These renewable energy sources could support increased power demand from sectors such as industry, buildings, and transportation as the electrification of industry and household assets partially replaces fossil fuels.⁹

Other renewable energy sources are needed too. Green hydrogen, for example, can enable decarbonization in industries such as refining and chemicals (where it can replace grey hydrogen),

⁷ Gross values, excluding land use, land use change, and forestry (LULUCF); "National Integrated Energy and Climate Plan (PNIEC) 2023–2030," Ministerio para la Transición Ecológica y el Reto Demográfico, Gobierno de España, June 2023; "National Energy and Climate Plan 2030 (PNEC 2030)," Presidência do Conselho de Ministros Diário da República, June 2023.

⁸ "Net-zero Spain," September 23, 2022.

⁹ "National Integrated Energy and Climate Plan (PNIEC) 2023–2030," June 2023; "National Energy and Climate Plan 2030 (PNEC 2030)," June 2023; Occo Roelofsen, Ken Somers, Eveline Speelman, and Maaik Witteveen, "Plugging in: What electrification can do for industry," McKinsey, May 28, 2020.

or be used in new applications, for example, in steel, synthetic fuel, and ammonia production. Spain is aiming for 11 GW and Portugal for 5.5 GW of electrolysis capacity for green hydrogen production by 2030.¹⁰

In the transportation sector, the transition to electric vehicles (EVs), as well as the increased role of sustainable fuels, will be crucial for decarbonization in certain modes of transport. Spain is aiming for more than 20 terawatt hours (TWh) of biogas production per year by 2030, providing other alternatives for fossil fuels in the industrial sector.¹¹

Delivering this growth would require a substantial mobilization of capital. This is estimated at around €2.5 trillion in investments for Spain (more than €85 billion per year until 2050), representing around 6 percent of Spanish GDP. Portugal would require approximately €500 billion (more than €15 billion a year until 2050, around 7 percent of GDP).¹² Until 2030, much of the investment needed would go to scaling electrification and renewables capacity; our analysis suggests that €120 billion is expected to be invested in Iberia to support the development of more than 1,000 renewable farms.

Iberia's potential: Leveraging the region's assets

Given that global economies need to undergo significant transformation to reach net zero, those countries that decarbonize quickly and strategically could gain a competitive edge—especially those that want to maintain energy-intensive tradable industries. In the same way that geographies with historical access to cheap fossil fuels have an economic advantage today, access to affordable and secure renewable energy—and

the ability to capitalize on it—could represent a significant advantage into the future.

However, as the window narrows with increased global competition, countries may need to act fast to seize this opportunity and establish themselves as leaders in the energy transition. Spain and Portugal, with their unique geographical position and mature industrial base, possess natural endowments that could position them as frontrunners in clean energy production and allow them to capitalize on green opportunities.

By continuing to grow green industries where they already have strong positions, such as renewable energy and automotive production, and boosting new ones where they have the ingredients to foster growth, such as green hydrogen, biofuels, and battery production, both countries could enable economic growth and help Europe meet its sustainability goals.

The region's major advantages include the potential to produce cost-effective renewable energy, a well-established industrial base, well-developed infrastructure, and significant sources of raw materials (Exhibit 1). Each of these are detailed below.

Cost-effective renewable energy: Spain and Portugal have a strong renewable energy profile, with some of the lowest costs to produce renewable energy and green hydrogen in Europe. With approximately 300 sunny days a year, solar energy is 20 to 25 percent more economical than in Central Europe.¹³ The region's wind resources exceed the EU average by 5 to 10 percent, and it also has significant pumped-hydro storage capacity, with Spain ranking third in Europe.¹⁴ This strong renewable energy potential also means the region enjoys a 15 to 20 percent cost advantage

¹⁰"National Integrated Energy and Climate Plan (PNIEC) 2021–2030," June 2023; "National Energy and Climate Plan 2030 (PNEC 2030)," June 2023.

¹¹"National Integrated Energy and Climate Plan (PNIEC) 2021–2030," Ministerio para la Transición Ecológica y el Reto Demográfico, Gobierno de España, March 2020; "Electrification," International Energy Agency, July 11, 2023.

¹²One trillion = 1 million million (10¹²); 1 billion = 1,000 million (10⁹); "Net-zero Spain," September 23, 2022; "Paths for Portugal for decarbonization," McKinsey, May 2021.

¹³"Statistics of meteorological variables," Ministry for the Ecological Transition and the Demographic Challenge.

¹⁴"Wind power numbers daily," Wind Europe, June 2024; "Cumulative installed pumped hydropower storage capacity in Europe in 2022, by country," Statista, 2022.

Exhibit 1

Spain and Portugal have a structural advantage in Europe for the energy transition across several relevant dimensions.

Illustrative example of cost competitiveness across five European countries¹

Competitiveness dimension	Indicator					
		Spain and Portugal	Country A	Country B	Country C	Country D
Energy opex	Renewables share					
	Solar LCOE ²					
	Onshore wind LCOE					
	Cost of green hydrogen					
Input materials opex	Lithium mining capacity					
	Biogenic CO ₂ supply					
Industrial base capex	Steel production					
	Vehicles produced					
	Refining capacity					
Existing infrastructure capex	Annual container port traffic					
	Pipeline export capacity ³					
	LNG ⁴ terminals capacity					

■ Above average
■ Average
■ Below average

¹Spain and Portugal are compared against a group of peer European countries that are either major economies or established leaders in some dimensions of energy transition competitiveness. Countries that are average are on track to meet their energy transition targets.

²Considering current levelized cost of energy (LCOE) for the best locations within the countries.

³Considering the maximum of exports' and imports' pipeline capacity.

⁴LNG = liquefied natural gas; only considering large-scale LNG terminals.

Source: Ember; Enerdata; entsog; EUROFER; FCHO; Fischer Data; Greenea; GLE; IHSM DCP; IHS Markit; IRENA; MineSpans; S&P Platts; WorldBank; McKinsey LCOE model; McKinsey refining capacity database

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for green hydrogen production compared to Central Europe.¹⁵

While reducing GHG emissions is the core component of the energy transition, there are also other considerations. In particular, if the transition is poorly executed, it could compromise three other important objectives: affordability, reliability, and industrial competitiveness.¹⁶ For example, in 2023, Spain experienced a significant reduction in household electricity prices compared to 2022, improving affordability.¹⁷ These reduced costs can

be attributed to several factors that have lowered wholesale prices across Europe: lower gas prices, a reduction in energy demand, and an increased capacity of cost-effective renewables. According to our analysis, industrial electricity prices in 2023 in Spain (including taxes) were more than 20 percent lower than the EU average.¹⁸

For Spain to keep its advantaged lower energy costs by 2030, all system costs need to be added and evaluated. Even though wind and solar generate electricity more cheaply than fossil

¹⁵Global energy perspective 2023, November 21, 2023.

¹⁶An affordable, reliable, competitive path to net zero, McKinsey, November 30, 2023.

¹⁷"Electricity price statistics," Eurostat, April 2024.

¹⁸Ibid.

fuels, they will require additional spending as their share in the overall generation mix rises for storage, other “firming capacity” (electricity that can be used at times when solar and wind do not provide enough energy), and grid infrastructure. If the costs of technologies, such as batteries, do not decline as expected, or if grids are not designed thoughtfully, the delivered cost of electricity could rise.¹⁹

Established industrial base: As Europe’s second-largest car manufacturer, and home to the continent’s third-largest steel production and primary refining capacity, Spain has a strong foundation on which to scale up green industry opportunities.²⁰ Both Spain and Portugal have a large potential workforce, too, with more than 1.8 million qualified engineers and scientists.²¹

Developed infrastructure: The Iberian Peninsula’s well-established export infrastructure includes 18 deep-sea ports. These ports collectively manage around 20 percent of the EU’s container traffic, underscoring the region’s pivotal role in international trade.²² Further, Spain and Portugal account for the largest single share (approximately 30 percent) of the EU’s liquefied natural gas (LNG) import capacity.²³

Availability of raw materials: Portugal is projected to contribute around 30 percent of the EU’s lithium production capacity by 2030.²⁴ Iberia also has significant potential in biomass supply—the region accounts for the third-largest feedstock for biobased gases and fuels in Europe (approximately 10 percent of the total).²⁵ These two factors could foster green opportunities that require such raw materials, for example in the battery ecosystem and biomethane production.

Cross-cutting challenges: Overcoming the hurdles

Despite this strong position, Spain and Portugal face several potential obstacles to their net-zero goals and green growth potential. We have identified challenges in the following areas.

Cost-competitiveness: Certain green technologies and solutions are not yet as competitive as their fossil fuel alternatives, slowing adoption and uptake. For example, our research shows that green hydrogen use cases are still between two and five times more costly than conventional fossil options, and biofuels are still more than two times more expensive than their fossil alternatives.

Licensing and permitting: Renewable energy projects often involve long and complex permitting processes (taking up to four years for a standard biomethane project, for example).²⁶ This high burden of bureaucracy lengthens projects and increases their costs.

Regulatory uncertainty: Regulations can be unclear and cumbersome, potentially hampering the development of green projects. Uncertainty regarding demand outlooks or the application of certain regulatory frameworks could create hurdles when deciding to move forward with green investments.

Societal conviction and mobilization: Public support is needed to drive decision making toward renewable energy-friendly regulation and increased spending on these projects. This calls for educational campaigns and effective communication of the socioeconomic and environmental benefits of renewable technologies, as well as the large multiplier effect that investing in these technologies could have.

¹⁹“An affordable, reliable, competitive path to net zero, November 30, 2023.

²⁰“The automotive industry in Spain,” Sernauto, 2018; *European steel in figures 2022*, Eurofer, 2022.

²¹“State of European tech 2019,” Atomico, 2019.

²²“Container port traffic by country and year,” World Bank Data, 2021.

²³“System capacity map 2021,” ENTSOG, 2021.

²⁴“Mineral commodity summaries,” US Geological Survey, January 2022.

²⁵“Geographical analysis of biomethane potential and costs in Europe in 2050,” ENGIE, 2021.

²⁶“An example of this is the Life Landfill Biofuel project, developed by a consortium of seven companies from Spain and Portugal; “The European Life Landfill Biofuel project will generate biomethane as fuel for vehicles from landfill biogas,” Gasnam, September 19, 2019.

System stability: As renewable energy sources scale up, grid integration and flexibility may become more challenging. Ensuring the reliable integration of intermittent renewables into the grid poses a complex problem worldwide, and Spain and Portugal would need to invest in grid infrastructure upgrades, energy storage solutions, and demand-response mechanisms to enhance grid flexibility and stability.²⁷

Financing hurdles: Funding schemes, incentives, and private investments all play a crucial role in the energy transition. In the current context, high upfront costs and the long lifetime of existing equipment may be delaying the transition of industries and households toward greener alternatives. On larger projects, uncertainty regarding long-term demand, feedstock availability, or technology maturity can also undermine the financial attractiveness of such projects.

Fiscal burden: Companies engaged in energy transition projects frequently contend with fiscal pressures beyond initial capital outlays, including ongoing taxation and the financial unpredictability that comes with pioneering new technologies. Supportive fiscal measures can help mitigate these challenges. These may include tax reliefs, grants, and subsidies designed specifically to offset the immediate financial burden and foster a more attractive investment climate, thereby encouraging more consistent and sustained investment.

Capitalizing on endowments to unlock new value pools

Spain and Portugal have a unique advantage in the energy transition. The countries could capitalize on their natural endowments to produce cost-competitive renewable energy vectors—including electricity generation from renewable sources and alternative energy sources, such as biofuels, biomethane, and green hydrogen. And, as energy-intensive industries evolve toward a greener energy mix and transition away from fossil fuels, Spain and Portugal's current industry could

gain a competitive edge simply through the cost abatement enabled by this new energy paradigm.

In this context, Spain and Portugal could adopt two strategies that leverage the region's position as the lowest-cost producer of decarbonized energy in Europe: the "Energy play" and the "Industry play" (Exhibit 2).

First, the "Energy play" is an anchor move where both countries generate and capture more wealth by directly producing, consuming, or exporting raw energy or energy products to nearby countries. This involves leveraging their competitive energy profile to play a leading role in the production of key energy vectors: renewable electricity and renewable molecules (such as green hydrogen, biofuels, or biomethane). This could also have a positive impact on the energy independence of the region, helping it to navigate through major disruptions across global energy supply chains.

Second, Spain and Portugal's mature industrial base presents an opportunity for an "Industry play"—a scale-up strategy that entails establishing local green value chains by scaling existing ones (for example, leveraging the mature automotive industry to become a leading EV producer, or increasing the competitiveness of existing industry through lower energy costs), or developing entirely new ones (such as building a battery ecosystem).

Together, these two strategies could allow Spain and Portugal to excel in five identified value pools, unlocking major prospects for green growth in both countries.

Electrification and renewables: Given the region's potential to produce cost-competitive renewable energy, boosting green power consumption could be a key lever for domestic decarbonization. By 2030, increasing power demand through electrification in mobility and buildings, as well as green industry development, could present a significant opportunity for both countries. However, meeting this demand would require expanding the installed renewable energy capacity, while

²⁷ Manuel Moncada, "The energy transition involves investing 53,000 million euros in networks," Renewable Energy, October 19, 2023.

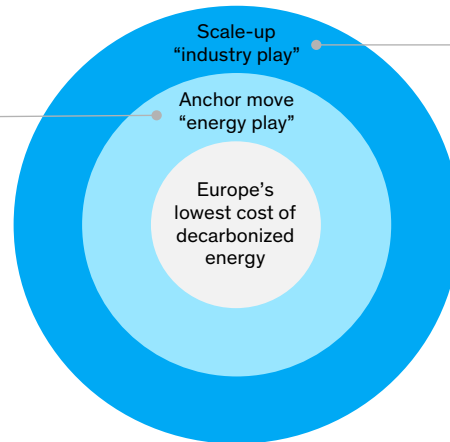
Exhibit 2

Spain and Portugal could leverage their positions as Europe's lowest-cost decarbonized energy producers to unlock significant value pools.

The Iberian Peninsula's untapped potential (illustrative)

Energy play: Become Europe's lowest-cost energy provider

1. Scale electrification and renewables' capacity
2. Become a leader of renewable molecules
 - Green hydrogen and derivatives
 - Sustainable fuels
 - Biogases



Industry play: Scale and localize high added value industries

3. Scale localized current and new green industries
4. Become one of the largest electric vehicle producers in Europe
5. Build up the battery value chain of Europe

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also ensuring the profitability of investments into renewable energy systems, the competitiveness of dependent industries, and system reliability through 24/7 green capacity. Supporting infrastructure would need to be developed to accommodate this uptake in capacity and generation.

Renewable molecules:²⁸ Iberia could become a leader in the production of key sustainable energy vectors such as green hydrogen, sustainable fuels, or biogases. The region already has a competitive edge in producing biofuels and biogases due to its feedstock availability and the fact that the region is the fourth-largest biomass producer in Europe.²⁹ The region also has well-developed existing refining and cracking capacity and logistics infrastructure. Alongside hydrogen, biofuels and biomethane (a substitute for natural gas) are important inputs for the decarbonization of industrial and transportation processes. The

production of green hydrogen hinges on the availability and cost-competitiveness of renewable electricity, since electricity accounts for around 60 percent of green hydrogen's production costs.³⁰ Green hydrogen can be used as a raw material for hydrogen-dependent industrial processes, and as an energy vector in emerging use cases such as transport, power generation, or heating. However, transporting hydrogen across long distances is generally not cost-competitive, so the demand for green hydrogen may remain local in the shorter term.³¹ Demand for green hydrogen in Spain and Portugal could grow significantly by 2030, driven by decarbonization in industries that are well established in Iberia, such as refining, chemicals, and steel. In the transportation sector, the demand for hydrogen would come from segments where direct electrification is not feasible, such as heavy-duty vehicles, maritime, and aviation. Significant funds have already been allocated for hydrogen

²⁸In this article, renewable molecules are defined as chemical compounds with a sustainable manufacturing process that can drive decarbonization in several nonelectrical end uses, such as transportation or industrial uses.

²⁹ACRE by McKinsey.

³⁰*Global hydrogen review 2023*, IEA, September 2023.

³¹"Assessment of hydrogen delivery options," European Commission, 2021.

Green steel and green ammonia

Despite collectively being the third-largest producer of steel in Europe, Spain and Portugal's opportunity in green steel lies in producing a green steel intermediate, direct reduced iron (DRI), through the hydrogen-consuming H₂-DRI-EAF method.¹ DRI can be an attractive alternative for producing decarbonized steel, given that green hydrogen is not currently cost-competitive. The first announcements for greenfield DRI production in the region have already been made.

Our analysis shows that ammonia currently accounts for upwards of 25 percent of the end-use of hydrogen in Spain. As in the case of green steel, Iberia can leverage its hydrogen production capacity to become a leading green ammonia producer. This would help to meet domestic demand (as Spain and Portugal are net importers) and also potentially allow exports to countries that have high ammonia demand but lack a cost advantage in production. Further, in the medium term, additional uses of green ammonia (such as maritime fuel or as a hydrogen carrier) are expected to gain momentum, further increasing its demand.

¹ *European steel in figures 2022*, Eurofer, 2022.

production in Spain and Portugal, with over 70 announced projects to date.³²

Green heavy industry: The advancement of green technologies, such as electrification; green hydrogen; carbon capture, utilization, and storage (CCUS); and biofuels, has paved the way for heavy industries to decarbonize. Green steel and green ammonia are two examples of industries that rely on green hydrogen in their processes, making them potential targets where Spain and Portugal could leverage their access to lower-cost green hydrogen and their mature industry base (see sidebar “Green steel and ammonia”). Other energy-intensive sectors, such as green cement, ceramics, and data centers, could also represent potential opportunities for both countries.

EV production: The automotive industry plays a significant role in Spain and Portugal's economies, accounting for 8.1 percent and 5.6 percent of Spanish and Portuguese GDP, respectively.³³ The

industry is undergoing a major shift toward EVs in the EU; however, as of 2022, only 7 percent of vehicles produced in Spain and less than 1 percent in Portugal, were BEVs. Given the strong existing industrial base and qualified workforce, Spain and Portugal could convert this sector toward EV production and attract other European and non-European OEMs to develop new production capacity.

Batteries: With lithium reserves and access to low-cost renewable energy, Spain and Portugal have an opportunity to become major contributors to Europe's nascent battery ecosystem, from lithium mining and refining to battery cell production and assembly. This could be leveraged to meet growing demand (driven by the adoption of EVs) both locally and across Europe, providing a robust alternative to a global supply chain that is often affected by external shocks.³⁴

³² “Hydrogen production and infrastructure projects database,” Industrial Energy Agency, October 2023.

³³ Annual report, Asociación Española de Fabricantes de Automóviles y Camiones (ANFAC), 2022; “Portugal—country commercial guide: Automotive and automotive parts,” International Trade Administration, 2024.

³⁴ Timur Gül and Leonardo Paoli, “Electric cars fend off supply challenges to more than double global sales,” International Energy Agency, January 30, 2022.

Capturing economic and societal benefits

Based on existing infrastructure, announced projects, and additional capital expenditures, we estimate these five value pools could contribute around 10 percent of the region's GDP by 2030 in a base case scenario, with an average annual growth of 1 percent over the next seven years (Exhibit 3). In more ambitious scenarios, this could rise up to 20 percent of GDP, with an average annual growth rate of 2 percent.

Tax revenues could see a significant boost from added industrial output, too: by 2030, Spain could see a 1.9 percent rise in VAT collections and a 0.6 percent increase in corporate taxes, while Portugal could see a 1.3 percent increase in VAT and a 0.6 percent increase in corporate taxes collected, compared to 2022.

Spain and Portugal's potential to become end-product manufacturers means exports also have

the potential to grow accordingly. The automotive sector will likely play a pivotal role, while green steel and green ammonia (which may target nearby markets with unmet demand) would probably contribute to a lesser extent. The overall effort could fuel an increase of between 15 and 25 percent in industry exports for Spain and Portugal.

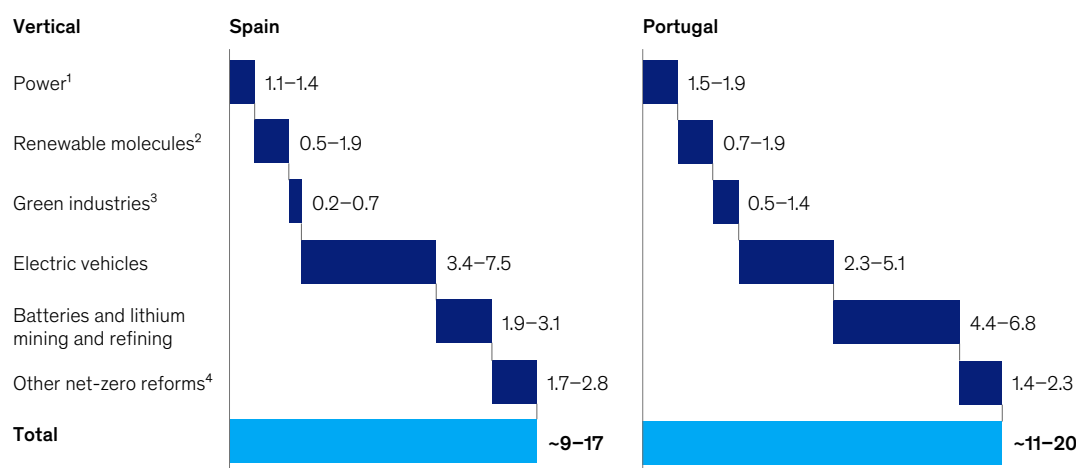
As green industries penetrate the market, both qualified and nonqualified job positions would be needed to fulfill production demands, creating over 1.5 million net direct and indirect jobs for Spain and Portugal combined (Exhibit 4). The EV industry is expected to be a major driver of this expansion and could simultaneously foster the development of the new battery value chain. This would create numerous job openings, and could also add value to traditionally less-affluent rural areas, such as those rich in lithium reserves.

Green industries bring the prospect of more jobs and potentially an improved quality of work.

Exhibit 3

The opportunities afforded by the energy transition could contribute significantly to Spain and Portugal's GDP.

GDP impact, % of 2022 GDP



Note: Figures may not sum to listed totals, because of rounding.

¹Renewable energy sources (RES) deployment, mainly from solar PV, onshore and offshore wind, and battery storage.

²Including biomethane, biofuels, synthetic fuels, and hydrogen.

³Composed of green ammonia and green steel production as well as carbon capture, utilization, and storage (CCUS) as enabler.

⁴Including reforms on buildings, transport infrastructure, industry electrification, and machinery updating.

Source: Fundación BBVA; *Global Energy Perspective 2023*, McKinsey, October 2023; INE; Oxford Economics; PORTADA; PWC; US Bureau of Labor Statistics; McKinsey analysis

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Exhibit 4

The energy transition could lead to the creation of over 1.5 million jobs in Iberia.

Share of qualified and non-qualified jobs, %

Vertical	Nonqualified	Qualified	Spain, thousand jobs	Portugal, thousand job
Power	66	34	50	20
Renewable molecules	70	30	50	10
Green industries	85	15	20	30
Electric vehicles	85	15	720	150
Batteries and lithium mining and refining	79	21	310	300
Total:			1,140	510

Source: Fundación BBVA; *Global Energy Perspective 2023*, McKinsey, October 2023; INE; Oxford Economics; PORTADA; PWC; US Bureau of Labor Statistics
McKinsey analysis

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Research across 15 European regions, including Spain and Portugal, shows that high-quality employment and higher wages are associated with green jobs, and that these jobs are particularly beneficial for middle- and low-skilled workers.³⁵ Research from the United States shows that employees in the clean energy sector enjoy significantly higher and fairer wages compared to the national average.³⁶ These jobs also face lower automation risks than their non-green counterparts.

Importantly, this range of economic benefits would not be limited to national economies but could also strengthen regional economies close to natural resources, such as Andalusia, Castilla y León, and Extremadura in Spain, and Boticas and Montalegre in Portugal (where lithium reserves are found). This could help reduce the effect of population concentration in large cities, potentially alleviating housing price inflation and promoting homogeneous development in the region.

Charting the path forward

Spain and Portugal sit on the cusp of an exciting new green industrial era, but the path ahead contains obstacles that need to be addressed for these two countries to fully capture their unique opportunity.

While each economic sector and industry will face its own set of challenges, further detailed in our white papers, the plays could be hampered by the aforementioned cross-sectoral challenges of cost-competitiveness, regulatory uncertainty, system stability, and financing hurdles.

To overcome these challenges and chart the course ahead, five overarching unlocks could make the difference. These would involve all stakeholders in the economy—private, public, and social sectors.

1. **Effective incentive schemes.** Public-private collaboration is essential for the successful development of renewable energy projects.

³⁵ Anna Valero et al., "Are 'green' jobs good jobs? How lessons from the experience to-date can inform labour market transitions of the future," Grantham Research Institute on Climate Change and the Environment and Centre for Economic Performance, London School of Economics and Political Science, October 2021.

³⁶ Joseph Kane, Mark Muro, Ranjitha Shivaram, and Adie Tomer, "Advancing inclusion through clean energy jobs," Metropolitan Policy Program at Brookings, Brookings Institute, April 2019.

Incentivization measures could help to build enough scale to develop the cost-competitiveness of green solutions compared to fossil-based alternatives. Such measures would involve increasing the availability of soft loans and guarantees from public institutions (such as Export Credit Agencies [ECAs] guarantees) to stimulate private lenders.³⁷

2. **Clear and stable regulation.** Regulatory frameworks that are simple and flexible with long-term certainty could support better visibility of regulation implementation timings, targets, and penalties. This would have a positive impact on project predictability and support robust project planning. This is especially the case for electricity markets, where transparent regulation is critical for accelerating the deployment and integration of more renewable energy sources in the energy system³⁸.
3. **Faster and smoother permitting.** Administrative permitting processes could be optimized to minimize long permitting periods, with initiatives such as “one stop shops” or homogenization and centralization of permitting processes at a national level.
4. **Strengthened project bankability.** Strong project business cases can help to ensure robust and stable financing schemes and

attract investments. Technology providers should not only improve the technological robustness of their project plans but also create alliances with equity investors that could help identify revenue streams and scale attractive projects across renewable energy vectors.

5. **Substantial grid deployment.** Coordinated uptake between projects and electrification increases through efficient grid deployment that includes planning grid capacity enhancements in line with announced demand. This plan would need to be delivered alongside clarification on the remuneration framework for future grid investment.

The shift toward green energy and the resulting impact on industry present a major opportunity for Spain and Portugal. The Iberian Peninsula is positioned positively to leverage its natural endowments and become a central player in the energy transition—but the opportunity is timebound.

Spain and Portugal now have a choice: stay the course and see their competitive advantage eroded—or seize this opportunity to become prominent shapers of green industrial growth in Europe.

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³⁷“How can public and private sector collaboration accelerate the energy transition? Industry experts explain,” World Economic Forum, April 28, 2024.

³⁸“Electricity market design,” European Commission, May 2024.