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Mobilizing Finance for Korea's Coal Phase-Out: What International Experience Shows

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Solutions for Our Climate (SFOC) is an independent nonprofit organization that works to accelerate global greenhouse gas emissions reduction and energy transition. SFOC leverages research, litigation, community organizing, and strategic communications to deliver practical climate solutions and build movements for change.

Mobilizing Finance for Korea's Coal Phase-Out: What International Experience Shows

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Executive Summary

South Korea's financial flows remain misaligned with its climate commitments. Despite global clean energy investment surpassing fossil fuels in 2023, Korea continues to channel USD 130 billion (KRW 173.7 trillion) into fossil fuels, including USD 57.8 billion into coal, while renewable investment reached only USD 18.4 billion. Coal still supplies over 30% of electricity, among the highest shares in the OECD. Such an imbalance exposes the economy to stranded assets, lost competitiveness, and missed growth opportunities.

Key lessons from international experience:

- The **UK** de-risked offshore wind through public finance and stable revenue guarantees, becoming a world leader.
- **Germany** scaled renewables and supported former coal regions with legal certainty and targeted public finance.
- **Spain** mobilized capital and secured social support through sovereign green bonds and just transition agreements.

Korea faces major gaps, such as weak ETS carbon pricing, untapped potential in the offshore wind sector (>600 GW), and the need to support coal-dependent regions such as Chungnam and Gangwon in the transition.

To align finance with an early coal phase-out, Korea could implement binding fossil fuel exclusions and redirect KDB and KEXIM lending toward clean energy, particularly offshore wind, or consider establishing a dedicated coal transition facility to finance just transition and regional redevelopment in coal-dependent areas. Korea could also reform the K-Taxonomy and ETS for net-zero alignment and meaningful carbon pricing and track progress via an Energy Supply Investment Ratio to enhance accountability and guide capital toward renewables, competitiveness, and fair community transition.

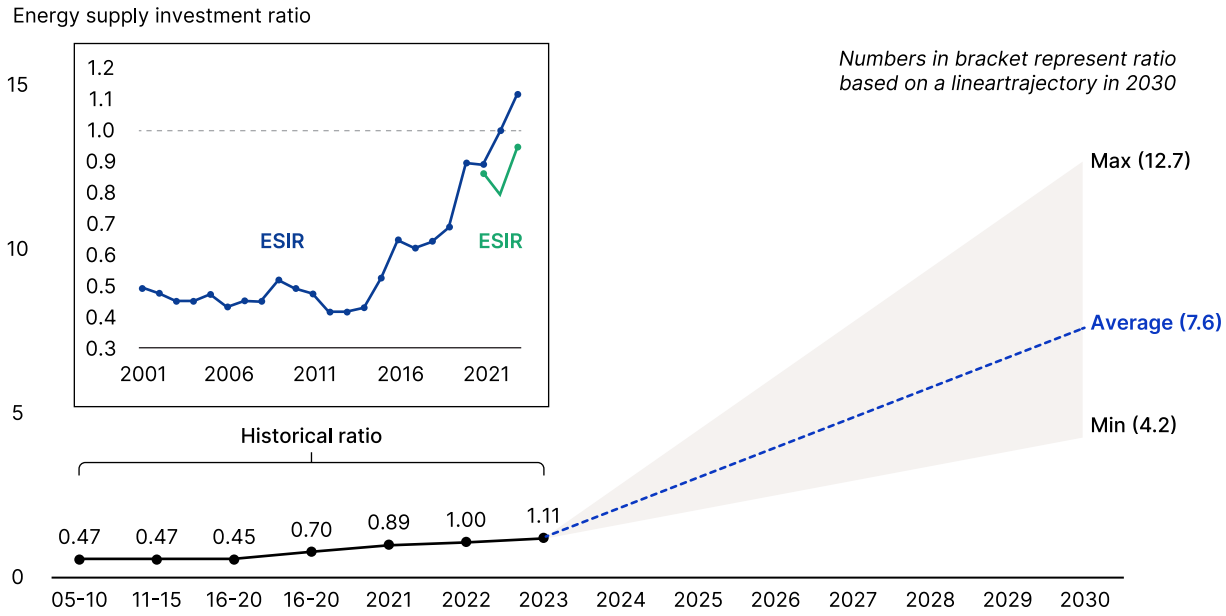
1. Public Finance as a Lever for the Energy Shift

The Global Shift – Climate Urgency and Financial Trends

A global shift from fossil fuels toward clean energy is underway, driven not only by growing climate urgency but also by stronger policies and changing economics.[1] Particularly coal, the most carbon-intensive fuel, is increasingly seen as incompatible with climate goals. The International Energy Agency (IEA) emphasizes that unabated coal power must be phased out by 2040, and governments are committing to exit coal.[2]

As a response, financial flows are shifting: governments and institutions are redirecting capital toward clean energy, resulting in global investments in low-carbon energy surpassing those in fossil fuels for the first time in 2023. Some banks, including JPMorgan Chase and BNP Paribas, have begun reporting their Energy Supply Investment Ratio (ESIR), a benchmark to assess alignment of financial flows with transition goals (Figure 1).[3]

Figure 1: Range of Energy Supply Investment Ratios to 2030 implied by commonly referenced climate scenarios consistent with 1.5C warming



Source: BloombergNEF (2025). Third annual energy supply investment and banking ratios.

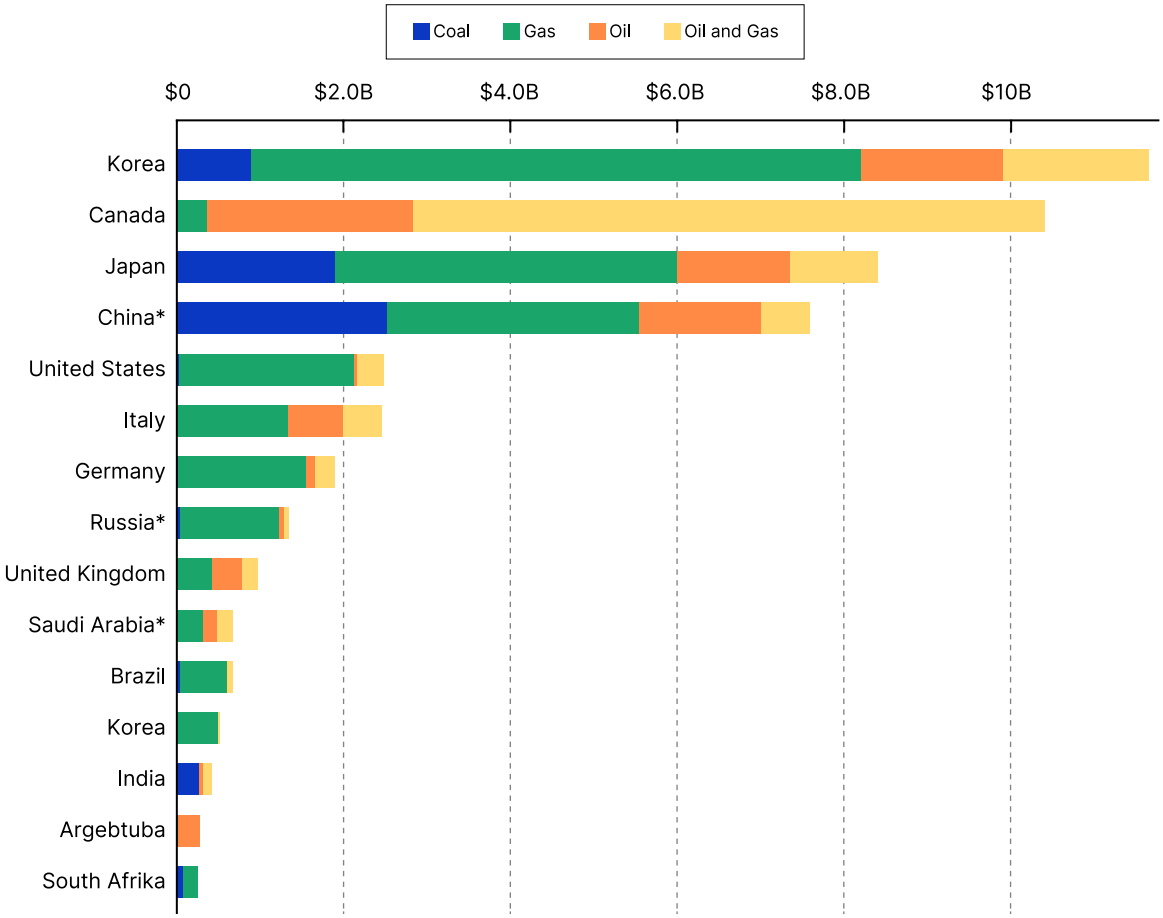
1 UN (2025). Renewable energy – powering a safer and prosperous future.
2 IEA (2022). Coal in net zero transitions: strategies for rapid, secure and people-centred change; PPCA (2024). 25 Countries and the EU launch call to action for no new coal in national climate plans.
3 BloombergNEF (2025). Third annual energy supply investment and banking ratios.

While still voluntary, the ESIR highlights the scale of change required and could also serve as a benchmark for public finance institutions such as development banks, sovereign wealth funds, and infrastructure banks.

Korea's Coal Dependence and Finance Gap

Despite global trends, financial shifts are not yet happening at the scale needed to meet Paris targets, including in South Korea, where coal remains central to the energy system and economic policy. In 2023, it accounted for 33.6% of power generation, while renewables represented one of the lowest shares among OECD countries.[4] Similarly, its financing patterns show that in 2023, Korea was the largest provider of international public finance for fossil fuels among the G20 (Figure 2), while its renewable energy support lagged far behind peers such as Germany, Japan, and Italy (Figure 3).[5]

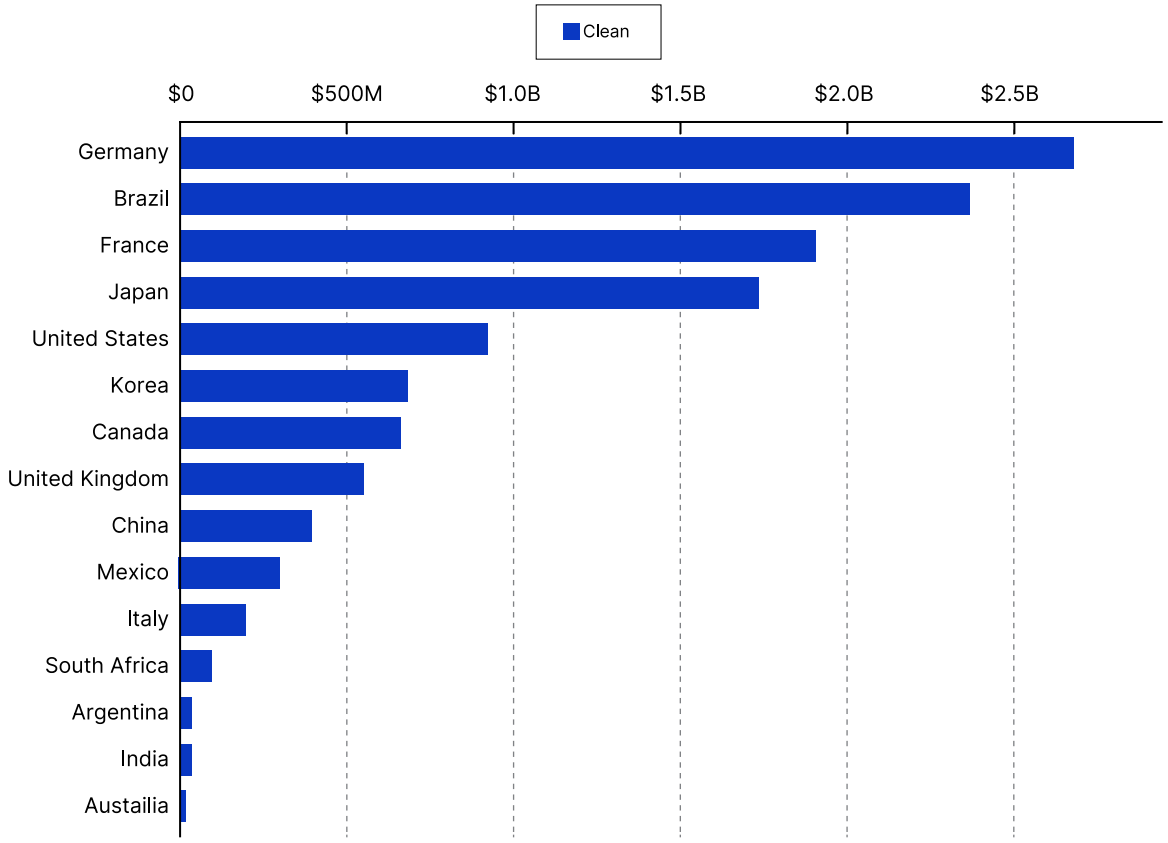
Figure 2: The top 15 G20 countries with the largest flows of international public finance for fossil fuel energy resources.



Source: OCI (2023). Public finance for energy database: data dashboard.

4 IEA (2025). Korea: Electricity; OECD (2025). Environment at a glance: Korea
5 OCI (2023). Public finance for energy database: data dashboard.

Figure 3: The 15 G20 countries with the largest flows of international public finance for renewable energy resources.



Source: OCI (2023). Public finance for energy database: data dashboard.

This misalignment poses risks for both climate and domestic economy. Without financial reforms, Korea risks stranded assets, weaker competitiveness, and missed opportunities for clean energy jobs and security.[6]

International Lessons for Korea

Experiences from the UK, Germany, and Spain demonstrate that redirecting finance from coal to clean energy is feasible and effective. Each country combined policy mandates, fossil fuel exclusions, and public finance leadership to drive structural change.[7] The UK phased out coal by 2024 despite coal supplying 40% of its power in 2012.[8] Germany committed to a 2038 coal exit while investing heavily in renewables and just transition funds.[9] Spain closed nearly all coal plants, pledged a 2025 exit, and already

6 IEEFA (2024). South Korea's economy risks missing out on global transition to renewables.
7 TFMR (2024). Scaling transition finance: findings of the transition finance market review; The Federal Government Germany (2025b). Ending coal-generated power; World Resources Institute (2021b). Spain's national strategy to transition coal-dependent communities.
8 BBC (2024). UK to finish with coal power after 142 years.
9 Library of Congress (2020). Germany: Law on phasing-out coal-powered energy by 2028 enters into force.

reached over 50% renewable electricity in 2023.[10]

Korea has a similar opportunity. In September 2025, the government announced a major reorganization to improve climate governance: energy affairs from the Ministry of Trade, Industry and Energy will be transferred to the newly established Ministry of Climate, Energy and Environment, centralizing oversight of carbon neutrality and climate policy. With rising public concern, a new administration, and existing green finance frameworks, Korea can adopt international best practices to align capital with climate goals.[11] This report examines how finance has shaped coal-to-clean transitions abroad, identifies gaps in Korea's current framework, and explores how financial policy reform could accelerate Korea's transition while safeguarding competitiveness, energy security, and a just transition for communities.

2. Korea's Green Finance Landscape

2.1 Status Quo: Progress without Impact

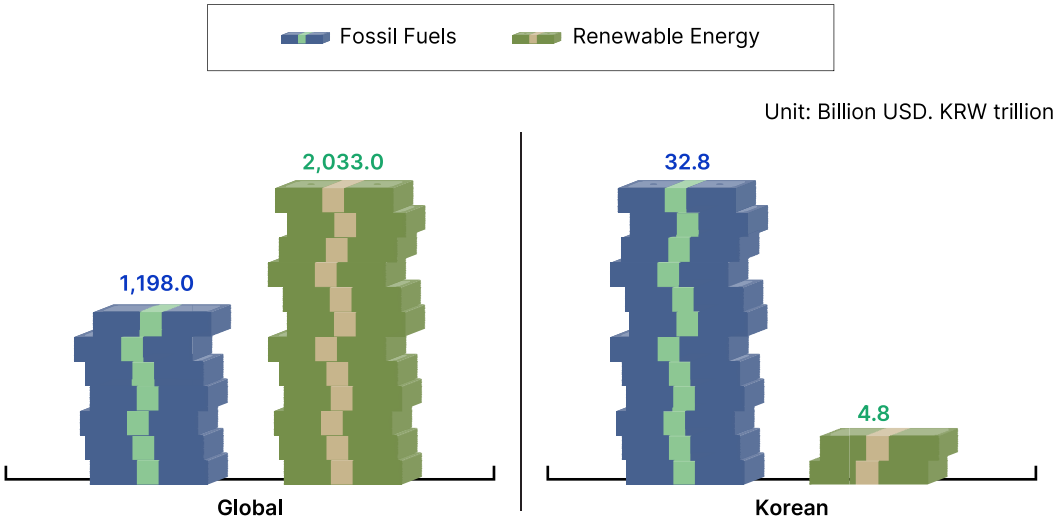
South Korea stands at a critical turning point in its energy transition. In recent years, it has introduced a range of green finance initiatives, including the K-Taxonomy, the Emissions Trading Scheme (ETS), and public green loan and guarantee programs.[12] Additionally, the country's central bank, the Bank of Korea, has begun assessing climate-related financial risks and exploring ways to support the green transition.[13] These developments reflect a growing awareness of the role of finance in meeting climate goals.

However, these measures have not yet accelerated a structural shift in capital flows. As illustrated in Figure 4, Korean financial institutions continue to channel significantly more capital to fossil fuels than to clean energy. According to a report by KoSIF,[14] as of June 2024, total fossil fuel investments reached USD 130 billion (KRW 173.7 trillion), with 58% concentrated in the power generation sector. 61.2% of this financing came from public institutions. Furthermore, coal alone accounted for USD 57.8 billion (KRW 77.1 trillion), representing 44.4% of all fossil fuel financing. In contrast, renewable

10 Beyond Fossil Fuels (2023). Closure of Spain's biggest coal plant makes way for massive wind power development.
11 NaverNews (2025). 정부 목소리와 반대로 가는 공적금융의 에너지 투자 (Translation: Public finance's energy investment goes against the government's voice).
12 ESG News (2024). South Korea unveils $313 billion green financing plan to combat climate change; FSC (2024). Authorities introduce administrative guidelines on green finance for application on K-taxonomy.
13 BoK (2025). Climate change and the Bank of Korea.
14 KoSIF (2025). 2024 Fossil fuel finance white paper.

energy received only USD 18.4 billion (KRW 24.5 trillion), roughly one-fifth of fossil finance.[15]

Figure 4: Comparison of New Investments for Global and Korean Energy Finance as of 2024.



Source: KoSIF (2025). 2024 Fossil fuel finance white paper.

This imbalance is reflected in the country's ESIR, which as of June 2024, is approximately 1:7. Thus, for every KRW invested in fossil fuels, only KRW 0.14 went to renewable energy. BloombergNEF estimates the ratio required to align with climate goals is roughly 4:1 in favor of low-carbon energy. This significant contrast underscores the urgent need for financial reforms and targeted investment in clean energy.

Most green finance policies in Korea remain fragmented, largely voluntary, and lacking in enforceable rules that are able to drive capital reallocation. Key instruments such as fossil fuel exclusion policies, public investment mandates for clean energy, or frameworks to redirect capital meaningfully are still missing.[16] In addition, Korea's ETS only has a limited impact on coal investments due to low carbon prices and weak incentives for utilities to diversify their portfolios.[17]

15 KoSIF (2025). 2024 Fossil fuel finance white paper.
16 The Guardian (2025). 'A structural dependance on heavy industry:' can South Korea wean itself off fossil fuels? https://www.theguardian.com/environment/2025/aug/16/a-structural-dependence-on-heavy-industry-can-south-korea-wean-itself-off-fossil-fuels
17 Statista (2025). Carbon pricing in South Korea – Statistics & facts.

2.2 Gaps, Risks, and Missed Opportunities

This misalignment carries significant risks. According to Carbon Tracker,[18] South Korea faced some of the highest potential stranded-asset exposure globally, with around $106 billion tied to coal investments, primarily through KEPCO and the broader coal fleet. Without credible phase-out signals, utilities and banks are likely to continue investing in assets that could lose value as global decarbonization accelerates. The financial sector also risks falling behind international investor expectations, reducing competitiveness.[19] At the same time, Korea is missing out on significant opportunities. Continued capital support for coal slows progress toward the 2050 net-zero target and delays the economic benefits of a clean energy transition, including job creation, industrial competitiveness, and a thriving renewable energy sector.[20]

These gaps are especially visible in offshore wind, where Korea's strong potential remains underdeveloped. Investors are holding back due to policy uncertainty and lagging technological competitiveness, resulting in weak financial support.[21] To turn the energy transition into an opportunity and accelerate an early coal phase-out, Korea will have to adopt financial frameworks that directly reorient capital from coal to clean energy. Experiences from other countries are offering useful lessons for Korea's next step.

18 Carbon Tracker (2019). South Korea could waste over US $100 billion on outdated coal technology, crippling KEPCO.
19 The Korea Times (2025). Delayed climate change responses to pose financial risks for banks, insurers: BOK, FSS.
20 IEEFA (2024). South Korea's economy risks missing out on global transition to renewables; UN (2025). Renewable energy – powering a safer and prosperous future.
21 BloombergNEF source

3. Lessons from International Best Practices

3.1. United Kingdom – De-risking Offshore Wind

Climate-Integrated Finance and Investor Signals

The United Kingdom's coal phase-out clearly highlights the enabling role of the financial sector in driving the transition from coal to clean energy. The Bank of England was one of the leading actors in this transition by being among the first central banks to integrate climate risk into financial supervision. Through climate-related stress tests and support for the Task Force on Climate-related Financial Disclosures (TCFD), the Bank signaled that coal and other high-emission assets pose systemic financial risks.[22] Through the Prudential Regulation Authority's framework, over 1,500 financial institutions were required to treat transition risks as material, influencing lending and investment decisions.[23] The 2021 Climate Biennial Exploratory Scenario (CBES) further highlighted vulnerabilities in fossil fuel assets under different decarbonization pathways, reinforcing investor awareness of regulatory shifts, carbon pricing, and declining renewable technology costs. These actions contributed to the reallocation of capital toward low-carbon assets and set new market expectations.[24]

Public Finance and Policy to De-Risk Clean Investment

Complementing financial signals, the UK also created dedicated public finance institutions to drive clean energy investment. The Green Investment Bank (GIB, 2012–2017) was strictly mandated to fund low-carbon infrastructure while excluding coal and gas, attracting private capital to early-stage clean technologies.[25] Its successor, the UK Infrastructure Bank (UKIB, 2021–), maintains a formal exclusion on fossil fuels and continues to support renewable energy, clean transport, and grid upgrades.[26] A key success story is the UK's offshore wind sector: combining public financing with the 'Contracts for Difference' (CfD) scheme, which offers 15-year fixed-price contracts, reduced both capital costs and perceived market risk, making the UK the world's largest offshore wind market.[27]

22 Bank of England (2025a). Climate change.
23 Bank of England (2025b). PRA Climate change adaptation report 2025.
24 Bank of England (2022). Results of the 2021 Climate Biennale Exploratory Scenario (CBES).
25 Parliament UK (2010). Green Investment Bank.
26 Bank of England (2025a). Climate change; Gov UK (2021). Policy design of the UK Infrastructure Bank.
27 Gov UK (2023). Boost for offshore wind as government raises maximum prices in renewable energy auction; Reuters (2025). UK presents plans for subsidy reform to speed up green energy projects.

Figure 5: UK – Total $million commitments for 'direct' investments in different types of energy infrastructure

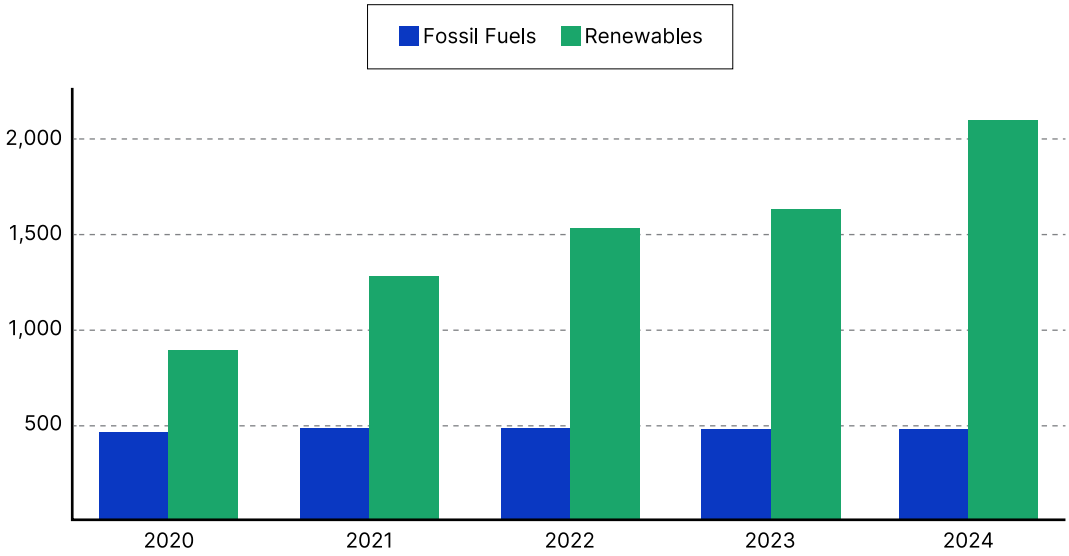


Figure 5: Carbon Brief (2024). Q&A: How the UK became the first G7 country to phase out coal power.

Policy measures reinforced these financial incentives. The legally binding Climate Change Act, a carbon price floor, and stricter air pollution standards rendered coal economically uncompetitive, while targeted financial instruments and market reforms actively de-risked investment in clean alternatives.[28] Together, these actions illustrate the interplay of finance and policy in accelerating decarbonization and provide practical lessons for other countries seeking to phase out coal while scaling renewable energy.

3.2. Germany – Legal Frameworks and Regional Transition Support

Legal Frameworks and Financial Innovation for Market Certainty

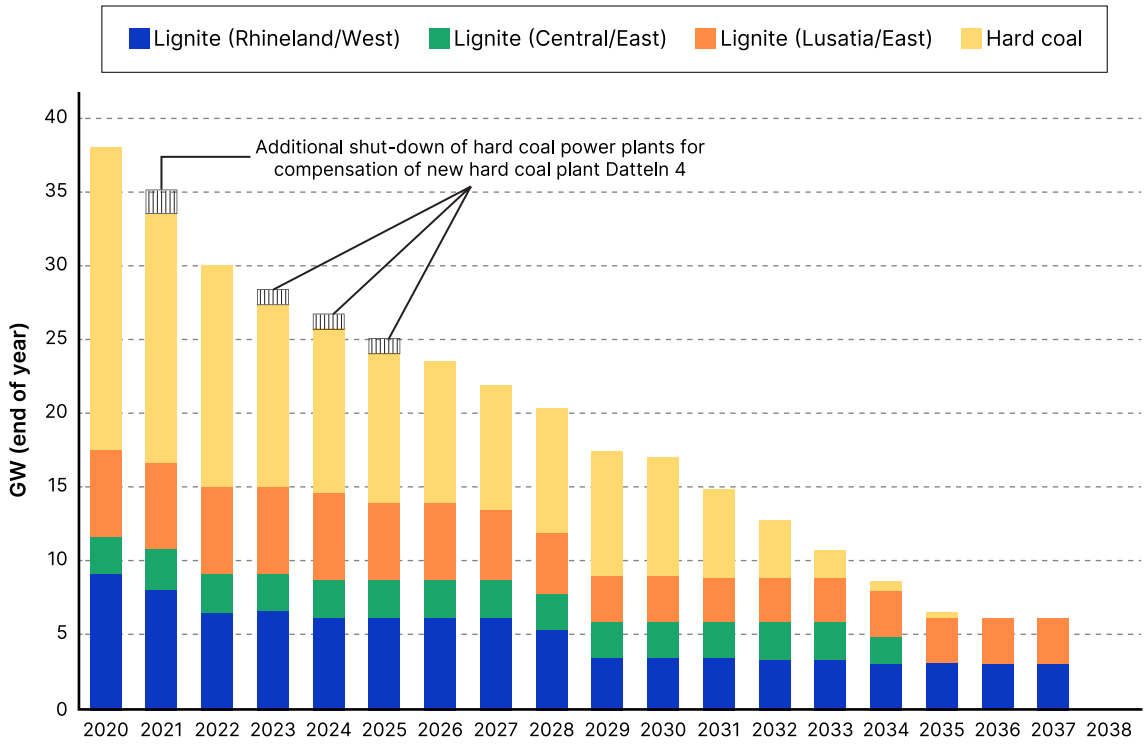
Germany's coal-to-clean transition has been clearly shaped by strong legal and regulatory frameworks. The country's 2020 Coal Exit Law ('Kohleausstiegsgesetz') set a legally binding coal phase-out by 2038, with a 2030 review that could bring the exit date forward, and includes compensation mechanisms for utilities, while providing support for workers and coal-dependent regions such as the Rhineland (Figure 6).[29] Thus, it provides policy certainty for both investors and financial institutions. This legal frame-

28 Carbon Brief (2024). Q&A: How the UK became the first G7 country to phase out coal power; TFMR (2024). Scaling transition finance: findings of the transition finance market review.

29 The Federal Government Germany (2025b). Ending coal-generated power; World Resources Institute (2021a). Germany's "Coal Commission": Guiding an inclusive coal phase-out.

work reduces investor uncertainty and aligns financial institutions with the transition.[30]

Figure 6: Coal Phase-Out Timeline and Capacity Reduction by Region in Germany



Source: Clean Energy Wire (2020). German govt adopts coal exit, fixes hard coal compensation.

Complementing this, the Renewable Energy Sources Act (EEG) provided stable investment conditions for wind and solar, first through feed-in tariffs and later auctions to increase cost-efficiency while minimizing market risks.[31] Germany has also introduced new financial tools for industry decarbonization, such as Carbon Contracts for Difference (CCfDs), established in 2024. CCfDs provide long-term price certainty for low-carbon technologies by covering the cost gap with carbon-intensive alternatives, incentivizing cleaner production while protecting firms from carbon price volatility.[32]

Public Finance as an Enabler of the Transition

The financial shift was significantly backed by Germany's public financial institutions, particularly the national development bank KfW. Since 2019, KfW has excluded coal from its financing portfolio and aligned lending activities with Paris goals through sector-specific guidelines, prioritizing clean energy, energy efficiency, and sustainable

30 Tiedemann, S., & Müller-Hansen, F. (2022). Auctions to phase out coal power: Lessons learned from Germany.
31 IEA (2023). Germany's renewables energy act.
32 Energiewende BMW (2024). Starting signal for carbon contracts for difference.

infrastructure. Using concessional loans, guarantees, and blended finance, KfW helps de-risk new technologies and attracts private investment.[33]

Additionally, KfW takes a critical implementation role in major public funding instruments, such as the Climate and Transformation Fund (KTF) and the proposed EUR 500 billion Infrastructure and Climate Fund, channeling public capital to operationalize national and EU climate goals.[34] In addition, these efforts support former coal regions in developing new economic identities and employment opportunities, linking industrial decarbonization with regional redevelopment.[35] These mechanisms translate policy commitments into bankable projects, and in combination with law and innovation, they make finance a central driver of Germany's coal phase-out.

3.3. Spain – Green Bonds and Just Transition Agreements

Financial Sector Shift and Market Signals

Spain's transition away from coal has been strongly shaped by financial sector involvement as capital flows were redirected from fossil fuels to clean energy. The Spanish Treasury, for instance, issued its first sovereign green bond in 2021, raising €5 billion to proactively support clean energy, climate resilience, and social equity objectives. Following this example, financial institutions and corporates issued over €24 billion in sustainable bonds by 2024, primarily for renewables, clean transport, and green infrastructure.[36] Major electricity utilities such as Iberdrola and Endesa secured large-scale green loans, including a €550 million European Investment Bank (EIB) loan for wind and solar projects. These developments reflect growing investor confidence and illustrate how financial markets can accelerate the clean energy transition.[37]

Public Finance and Policy De-Risking Investment

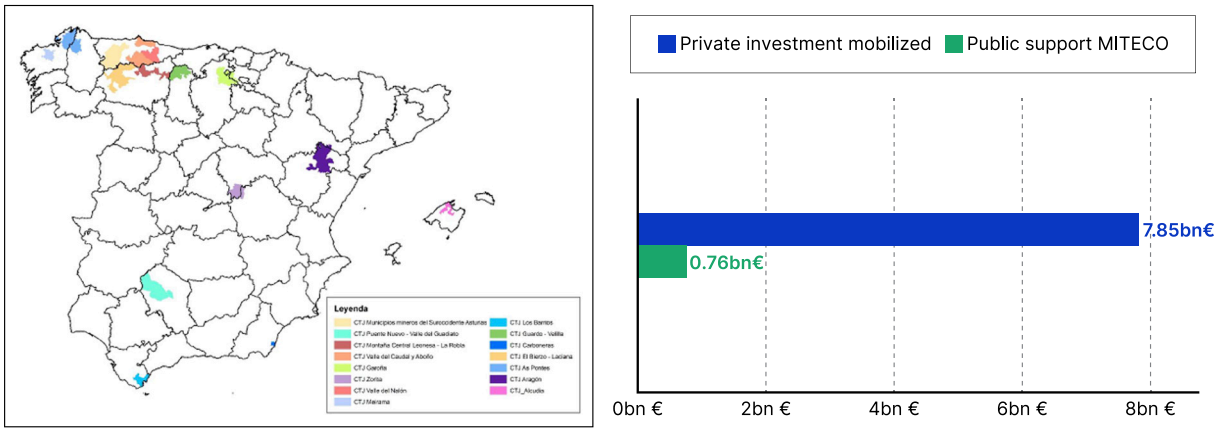
Public finance institutions have played a catalytic role in unlocking private investment. The Instituto de Crédito Official (ICO), Spain's largest development bank, partnered with the EIB to deliver concessional finance, including co-financing Endesa's rollout of

33 KfW (2023). KfW: Sectoral guidelines for oil and natural gas come into force; KfW (2025). KfW's 2025 start-of-year press conference: KfW CEO Wintels: In 2025, the focus will be on Germany as a business location.
34 Bundesregierung (2022). 170 billion euros for energy supplies and climate protection; Clean Energy Wire (2025). German parliament adopts reform to allow €500 bln new debt for infrastructure and climate.
35 The Federal Government Germany (2025a). Billions for structural improvements.
36 ESG today (2021). Spain joins growing list of sovereign green bond issuers with €5 billion inaugural offering; IESE (2025). The growth of sustainable bond issuances in Spain: A beacon of ESG resilience.
37 EIB (2023). Spain: Endesa, ICO and EIB sign €500 million in sustainability-linked financing.

2.9 GW of new wind and solar capacity in 2023. Competitive auction schemes, modeled after Contracts for Difference (e.g., Renewable Energy Economic Regime (REER)), provided revenue certainty to renewable developers, lowering financial risk and attracting diverse public and private capital.[38]

Complementing these financial mechanisms, besides regulatory certainty, Spain's policy frameworks ensured a socially inclusive transition. A legally binding 2025 coal phase-out, together with the Just Transition Strategy, supported worker retraining, community redevelopment, and employment alternatives in former coal regions, marking Spain as one of the few countries to integrate financial policy, energy transition, and social equity into a well-balanced strategy.[39]

Figure 7: Geographical location of the areas covered by the Just Transition Agreements and investments % public support in just transition areas.



Source: Just Transition Institute Spain (2023). Spain, 4 years towards a just energy transition.

38 European Commission (2020). Tenders/Auctions: Economic regime for renewable energies.
39 Beyond Fossil Fuels (2023). Closure of Spain's biggest coal plant makes way for massive wind power development; Just Transition Institute Spain (2023). Spain, 4 years towards a just energy transition.

3.4. Comparative Overview of International Green Finance Measures

To illustrate the key lessons, the table below compares the financial policy tools and transition mechanisms across the UK, Germany, Spain, and Korea, highlighting both common elements and Korea's remaining gaps.

Country	Approx. ESIR	Carbon Pricing & Regulation	Public Finance Institutions	De-risking Instruments	Just Transition Measures	Highlight
UK	>1:1	Climate Change Act, Carbon Price Floor, Air pollution standards	Green Investment Bank /UK Infra-structure Bank	Contracts for Difference for offshore wind	Limited direct just transition tools	World leader in offshore wind finance
Germany	~1:2.5	Coal Exit Law, Renewable Energy Sources Act (EEG)	KfW development bank; Climate & Transformation Fund	Carbon Contracts for Difference; concessional loans, guarantees	Compensation, regional development funds, worker support	Linking finance with regional identity (e.g. Rhineland)
Spain	~1:3-4	Coal phase-out by 2025; Climate Law	Instituto de Crédito Oficial (ICO) with EIB	REER auction scheme; green bond	Just Transition Strategy, retraining, community redevelopment	Integrated social equity + finance strategy
Korea	1:7	ETS (weak price, free allowances); K-Taxonomy (loopholes)	KDB, KEXIM (no fossil exclusion, limited green mandate), BoK climate risk work	Few de-risking tools; slow permitting	No comprehensive just transition finance; small regional programs	Offshore wind opportunity + coal-dependent regions

4. Lessons for Korea: Building a Finance-Driven Coal-to-Clean Transition

Overall, it becomes clear that South Korea's financial landscape remains misaligned with its climate commitments. Despite introducing various green finance initiatives, capital continues to flow toward coal, exposing the economy to stranded assets, rising capital costs, and declining competitiveness in global markets that are rapidly shifting to clean energy.[40]

Lessons from the UK, Germany, and Spain demonstrate that finance can play a decisive role in accelerating coal phase-out when supported by three pillars: effective carbon pricing, targeted public finance to de-risk clean investments, and just transition mechanisms that link climate goals with social equity.[41]

Korea's Emissions Trading System has yet to deliver a meaningful carbon price signal.

40 IEEFA (2024). South Korea's economy risks missing out on global transition to renewables; KoSIF (2025). 2024 Fossil fuel finance white paper.

41 CTC (2024). Accelerating coal-to-clean energy transitions: First report and recommendations of the coal transition commission.

Unlike Germany, which leveraged carbon revenues to fund regional transition programs, Korea's weak carbon pricing leaves investors without clear signals to shift capital away from coal.[42]

The gaps are especially visible in offshore wind. Korea has an estimated technical potential of over 600 GW, yet less than 0.2 GW is currently operational. Investors remain hesitant due to policy uncertainty, regulatory hurdles, and limited financial de-risking. Instead of attracting capital, current policies risk slowing growth in a sector that could otherwise deliver competitiveness and hundreds of thousands of jobs. By contrast, the UK mobilized offshore wind finance through stable revenue guarantees, concessional finance, and clear long-term roadmaps.[43]

Similarly, Korea could benefit from ensuring that finance supports communities in coal-dependent regions such as Chungnam and Gangwon. Germany's Rhineland region shows how targeted financial mechanisms can create new economic identities beyond coal, while Spain's just transition agreements demonstrate the importance of social investment tools, retraining, local business support, and regional development funds in building political and investor confidence.[44]

For Korea, aligning finance with an early coal phase-out could involve a comprehensive strategy that integrates industrial opportunity with social equity. Four potential priorities stand out:

1. Introduce binding fossil fuel exclusion rules for public finance institutions.
2. Redirect lending mandates at KDB and KEXIM toward clean energy, particularly offshore wind, or consider establishing a dedicated coal transition facility to finance just transition and regional redevelopment in coal-dependent areas.
3. Reform the K-Taxonomy and ETS to reflect international net-zero pathways, close coal/gas loopholes, and provide a meaningful carbon price signal.

By implementing such measures and tracking progress through an Energy Supply Investment Ratio (ESIR), Korea can transform its financial system into a proactive driver of a just, competitive, and resilient coal-to-clean transition, signaling its commitment to climate-aligned finance.

42 Carbon Trust (2023) Unlocking the potential: Challenges and opportunities for South Korean offshore wind supply chain.
43 InfluenceMap (2025). New briefing: South Korea's emissions trading scheme weakened by pressure from major industries.
44 Coal Transition (2024). Coal-exit and beyond: Structural change and a just transition in Korea and Germany; Just Transition Institute Spain (2023). Spain, 4 years towards a just energy transition.

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- EIB (2023). Spain: Endesa, ICO and EIB sign €500 million in sustainability-linked financing. https://www.eib.org/en/press/all/2023-251-spain-endesa-ico-and-eib-sign-eur500-million-in-sustainability-linked-financing.

- Energiewende BMW (2024). Starting signal for carbon contracts for difference. https://energiewende.bundeswirtschaftsministerium.de/EWD/Redaktion/EN/Newsletter/2024/03/Meldung/topthema.html.
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Solutions for Our Climate (SFOC) is a nonprofit organization established in 2016 for more effective climate action and energy transition. SFOC is led by legal, economic, financial, and environmental experts with experience in energy and climate policy and works closely with domestic and international partners.