# Policy Brief

## Historical experiences with transitions from fossil-based to renewables-based electricity

04/2023

Axel Michaelowa, Max Schmidt, Isabelle Scheichl and Erin Danford

# Policy Brief

## Historical experiences with transitions from fossil-based to renewables-based electricity

04/2023

Axel Michaelowa, Max Schmidt, Isabelle Scheichl and Erin Danford

Disclaimer

*This Policy Brief is prepared by Perspectives Climate Group (PCG) under the finance support of ETP to meet the request of the Department of Climate Change of Vietnam (DCC) to provide for the background in the early stage of preparing the Outline of the Just Energy Transition Partnership Resource Mobilisation Plan (JETP RMP). The opinions expressed in this publication are those of the authors solely. They do not purport to reflect the opinions or views of the ETP or DCC.*

## Key messages

Historical experiences with transitions from a coal dominated to a renewable dominated electricity system are rich and provide important lessons for Just Energy Transition Partnerships (JETPs). Vietnam should use these to develop a tailored approach that reflects its own context and priorities for realizing a truly 'just' energy transition as follows:

1. **Bringing in key stakeholders**: Put the coal transition high on the political agenda but strictly avoid pure top-down decision-making by closely coordinating with all affected stakeholders from the very beginning of developing Vietnam's Resource Mobilization Plan for its Just Energy Transition Partnership (JETP-RMP). This should include dedicated stakeholder discussions on projected costs and impacts stated in the JETP-RMP as well as how to deal with particularly affected communities;

2. **High-level political framing:** Set up a 'Coal Commission' on the highest-possible political level, which brings together the head of state, responsible ministers, representatives from trade unions, industry, NGOs and affected citizens. Germany used that approach successfully to define a coal phase-out date and agree on the financing for affected communities. Bring in industry that is relevant in the coal mining regions, tailor all policy instruments to local circumstances and combine different policy objectives in an integrative approach. Build on existing policies, including within the social security system and labor system, and expand those;

3. **Mobilizing international public funding:** Develop investment plans bringing in existing multilateral funding programmes, e.g., the Climate Investment Funds (CIFs) approaches tailored to coal-transitions, while recognizing their limitations. Closely align these plans with Vietnam's JETP-RMP. Draw on experiences made with blended finance for GW-scale renewable energy (RE) projects in other emerging economies (e.g., Morocco, Egypt). Make it clear to funders that funding needs to continue for decades and that the funding initially pledged for the JETP will never be sufficient to guarantee a coal phase down in Vietnam;

4. **Mobilizing international private funding:** Include international carbon market funding for renewable electricity as part of the JETP-RMP, ideally through policy crediting applying an approach similar to the recently published Gold Standard methodology on accelerated coal power plant closure. Consider ways how to mobilize further international private financing; e.g. through government guarantees;

5. **Ensure affected social groups are not left behind:** Specifically address historically disadvantaged and discriminated groups when phasing down public funds for domestic coal mining and related value chains, and creating new economic opportunities in other sectors, particularly considering women as facilitators of coal transitions. Target subsidies to key affected areas and proactively train laid off coal mining and power plant workers for new jobs in the renewable electricity-sector.

## Introduction

International experiences in energy transitions away from coal and support of renewable energy expansion offer valuable lessons for Vietnam to learn from in its design of the JETP. Over the last decades, various countries in Europe have phased out domestic coal production and use. Since 2000, various international financing mechanisms for renewable energy financing have been set up. The flagship is the World Bank Climate Investment Funds (CIFs), but international carbon market funding for renewable electricity projects has been even more significant. Moreover, there are large scale renewable energy lighthouse projects in developing countries that have benefitted from a mix of funding.

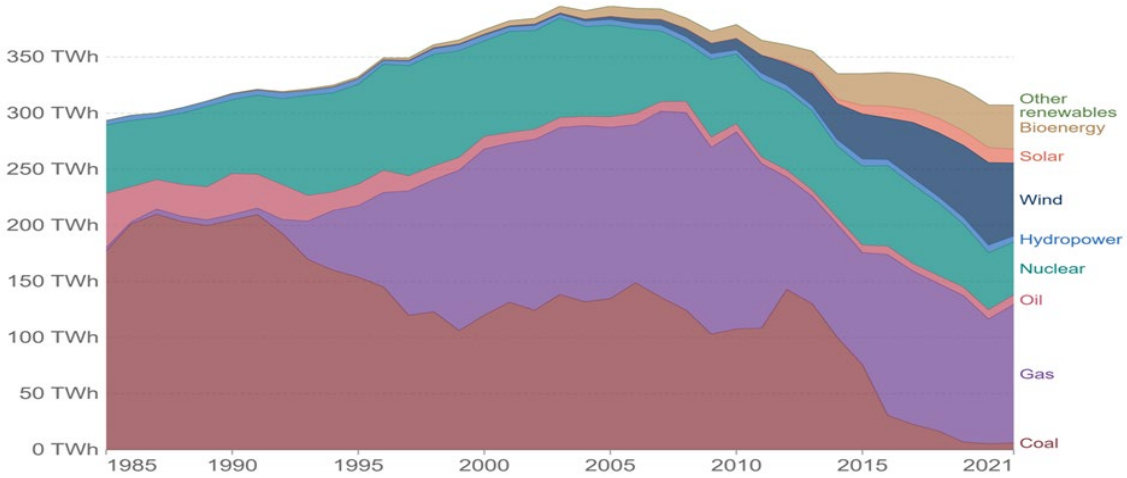
# 1 Coal transitions in Europe

The European industrial revolution which first started in the United Kingdom (UK) in the 18th century and spread to the continent in the 19th century, has been built on coal (Fernihough & Hjortshøj O'Rourke 2021). As in most other parts of the world afterwards, the use of coal in industry and transportation led to significant economic growth, but also to serious pollution and public health problems (Walker Hanlon 2019).

## 1.1 United Kingkom

UK coal production already peaked in 1913, when 1.1 million miners produced almost 300 million tonnes (Mt). The UK's transition away from coal accelerated in the mid-20th century, as the government introduced policies to encourage the use of (then) alternative energy sources such as oil, gas and nuclear (Fothergill 2017). By the beginning of the 1980s coal output was still 130 Mt a year and the mining workforce was still well over 200,000, Ever since the 1980s – accelerated by constant improvement of renewable energy (RE) technologies and policies – the share of coal in the UK’s electricity mix has been dropping sharply (UK Government 2021), as Figure 1 shows.

**Figure 1: Changes in the UK's electricity mix over the last four decades.**




Note: 'Other renewables' includes waste, geothermal, wave and tidal.

Source: Our World in Data (2023).

In 2021 coal production had dropped to 1 Mt with just 500 miners being employed (Statista 2023). However, the UK's coal transition did not (permanently) lead to the loss of employment opportunities. In the same time period, the number of jobs lost was almost fully compensated by new ones in other sectors in the same areas , due to comprehensive economic regeneration measures such as colliery site reclamation and infrastructure investment in new roads, commercial and industrial sites (Fothergill 2017).

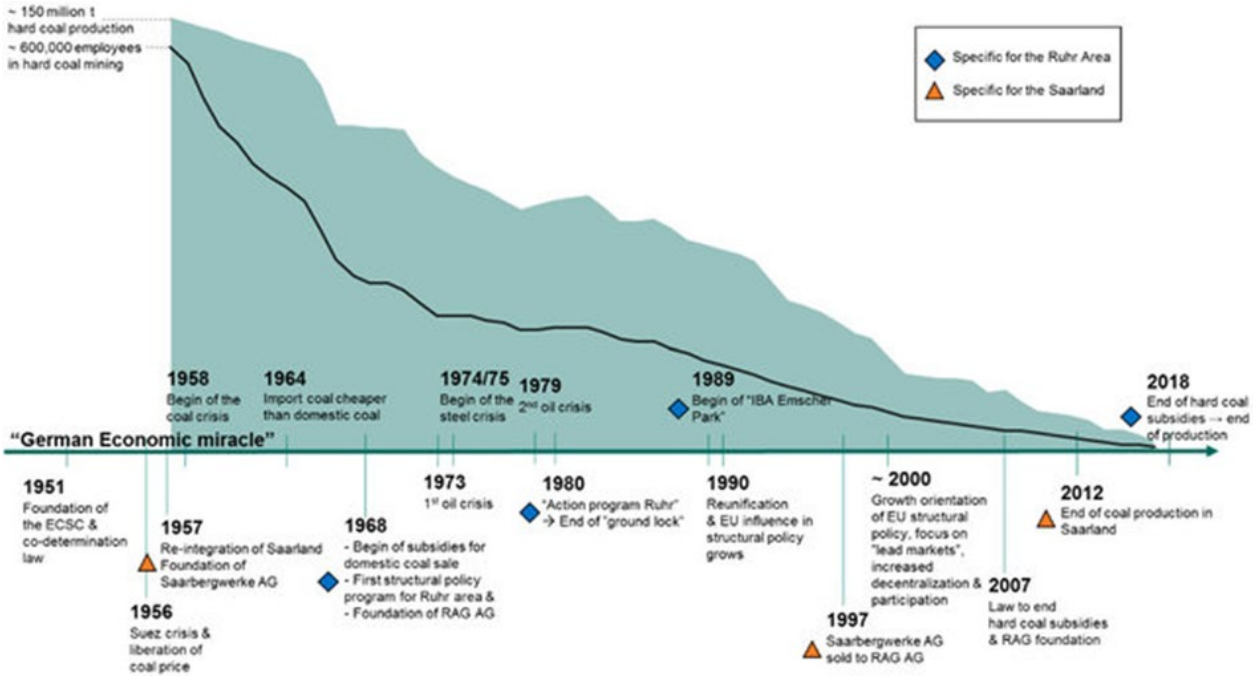
Until as late as November 2015, there was no government commitment to phase out coal in UK electricity generation (Fothergill 2017), as it was driven mostly by economic reasons, supported by a strengthened domestic focus on environmental and climate impacts (Brauers et al. 2020). In fact, the UK's target of a full phase-out by 2024 was announced only in 2021 (UK Government 2021). In retrospective, the coal phase-out was the result of taking the decision not to use public funds to support domestic mining in the 1980s. Consequently, international competition led to a quick decline of domestic coal production and related employment (Brauers et al. 2020).

Moreover, as wholesale electricity prices began to decline, particularly after 2015, the coal industry faced mounting economic pressures on the demand side, leading to the implementation of indirect coal subsidies (Littlecott et al. 2018). In the 2010s, various coal support policies were introduced, from tax benefits to inherited liabilities related to coal mining, the Supplementary Balancing Reserve (2014-2017), and others (ibid.). A cutoff of subsidies for REs in 2015 further slowed coal phase-out (Johnstone et al. 2017). Though not comprising a coherent strategy, over the years various measures have been put in place to ease the transition away from coal production and consumption in the UK (see Table 3 in the annex), and there has never been a significant social movement in the UK to uphold domestic coal production and use.

## 1.2 Germany

Germany has a long history of coal production and use, having large deposits of both hard coal and lignite in various parts of the country. The key population centre, the Ruhr area, developed during the 19th century around such hard coal deposits. After the Second World War, hard coal production reached a peak of 150 Mt, and 600,000 people worked in the mines. In 2018, the last hard coal mine stopped production (see Figure 2 below).

**Figure 2: Hard coal production and related jobs in Germany, 1958-2018**

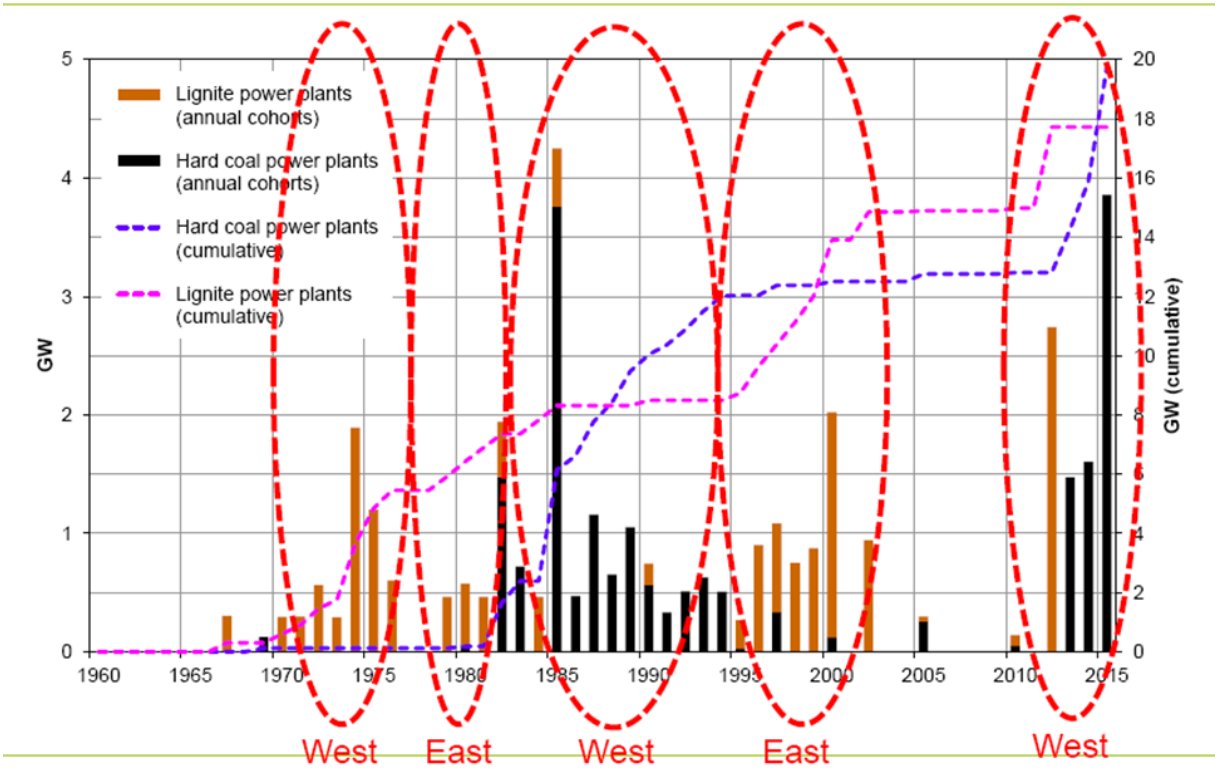



Note: Blue line: coal production, black line: number of jobs.

Source: Oei et al. (2019, p.967).

In contrast to the UK while domestic mining of hard coal has been phased out due to lack of competitiveness, hard coal is still used in German power generation. New hard coal power plants were built massively during the 2010s. Lignite is still being competitively mined in huge opencast mines concentrated in small regions in both Western and Eastern Germany and is used in power generation to a significant extent.

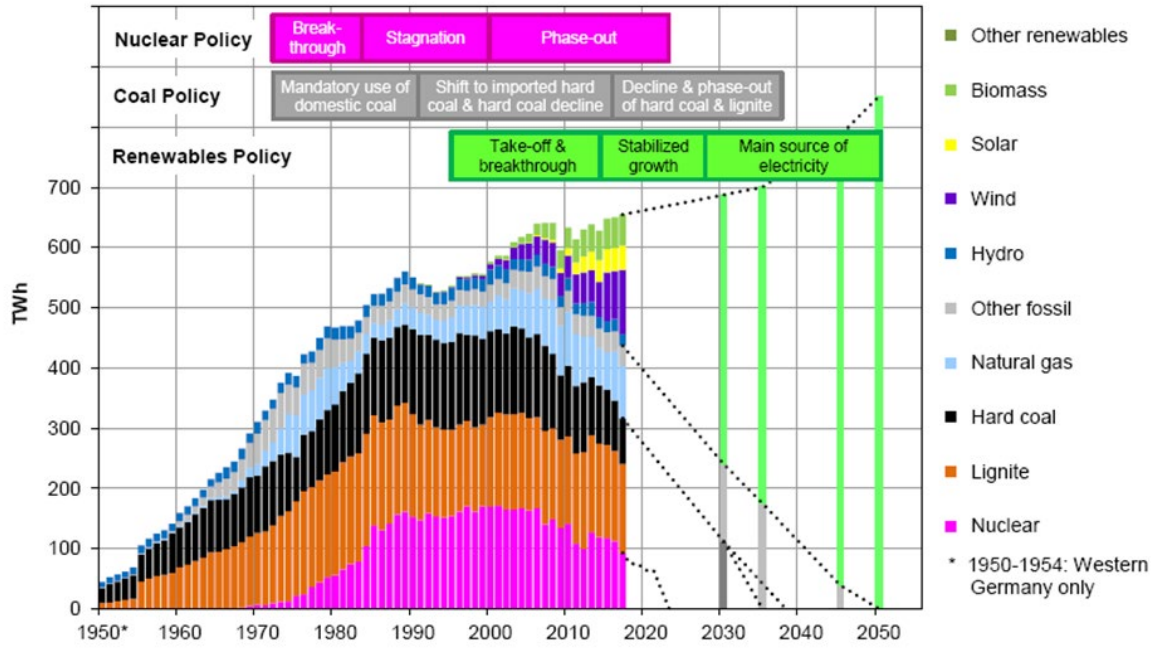
**Figure 3: Vintages of the operating hard coal and lignite power plant fleet in Germany**




Source: Matthes (2019, p.17).

At the same time, Germany has been a pioneer in policies supporting renewable electricity generation, consistently over the last three decades. While Germany was a latecomer in wind technology, establishment of wind power technology companies in structurally weak regions around the North Sea and clever alliances with farmers led to a politically winning coalition and perpetuation of lavish feed in tariffs for several decades (Michaelowa 2005). This repeated itself with the solar PV industry establishing itself in Eastern Germany during the 2000s. While both the German solar and wind technology industries crashed during the 2010s when Chinese companies outcompeted them on costs, the political consensus on renewable energy support was so strong by that time the domestic industries vanished, the policy instruments were only made insignificantly less attractive.

**Figure 4 Changes in the German electricity mix since 1950**




Source: Matthes (2019, p.2).

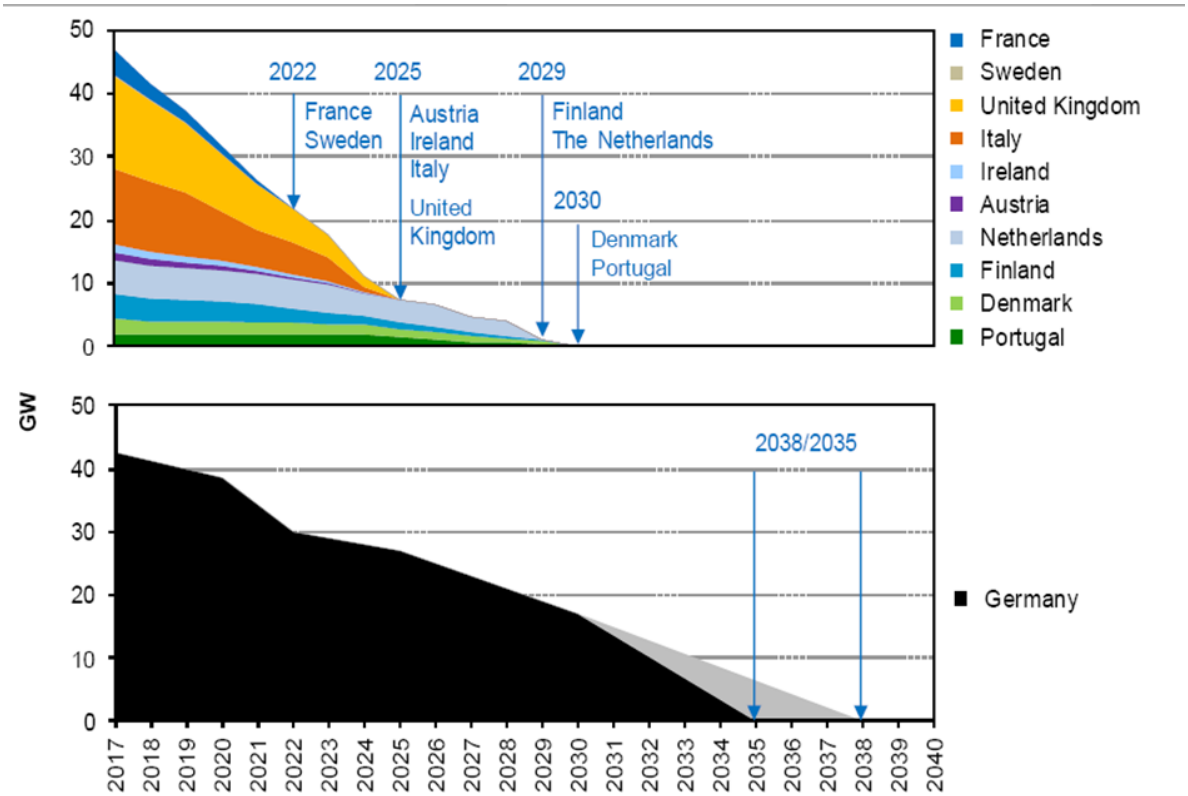
In comparison to the UK, the hard coal phase-out process was slowed down significantly by subsidies for domestic coal from the 1950s on, so that it could stay competitive with cheaper imported hard coal. These subsidies reached their maximum level as late as 1996 (Frondel et al. 2006) and totalled about EUR 300 billion (Oei et al. 2019). Only in 2018 they were stopped completely as being forbidden by European regulation (Brauers et al. 2020). Hard coal phase-out essentially was artificially prolonged for 30 years due to the subsidies.

Fortunately, from the year 2000, the focus of coal policies in Germany shifted from preserving the sector to a just transition, with the aim of promoting economic reorientation and diversification, providing workforce support, enhancing social well-being and quality of life, as well as undertaking environmental remediation and protection measures (see in detail Furnaro et al. 2021). These policies have commonly employed three mechanisms: (1) financial support for public organizations, businesses, and workers; (2) service and assistance for public organizations, businesses, and workers; and (3) direct investments (ibid.). The policies have been very successful to revive the Ruhr and Saar areas; new economic activities could be attracted and jobs for the younger generation be created. While retraining of retrenched miners proved to be difficult, it could be prevented that young people enter the mining sector. So once the last miners have entered retirement, the problem essentially has been resolved. In contrast, unemployment remains high in Eastern German lignite production areas and their diversification so far remains elusive.

In terms of governance structure, from the 1960s through the 1980s, top-down policies predominated which were designed, implemented, and administered by subnational governments with limited participation of local stakeholders. These policies essentially were not very successful, and a lot of money was wasted. Since the end of the 1980s, however, municipal governments have implemented a more regionalized approach with bottom-up

policies, including local participation (ibid.). This strongly contributed to the success of these policies as discussed above. Recently, pressure from both the civil society and coal industry led to setting up the German Coal Commission in 2018, which brings together stakeholders from trade unions, industry, NGOs and citizens (Brauers et al. 2020). This Commission developed a roadmap for the coal phase-out for 2038 – the second-latest planned phase-out date in Europe (Agora Energiewende & Aurora Energy Research 2019; Climate Action Network Europe 2022), which was formally voted into law by the German Federal Parliament in 2020 (Bundestag 2020).

**Figure 5 The German coal power phase-out compared to other European coal power phase-outs.**




Source: Matthes (2019).

Just transition policies and measures in Germany, as a historical social welfare state, are embedded within a plethora of social policies, including the EU's (see further Furnaro et al. 2021). The law on the structural strengthening of affected regions provides a subsidy of up to EUR 40 billion for the affected regions (Bundestag 2020). For example, for alleviating the socio-economic impact of the coal transition, four German coal regions received a total of EUR 2.5 billion from the EU's Just Transition Fund (EU-JTF; European Commission 2022). The EU-JTF supports countries with a domestic coal industry to become climate-neutral economies and provides support to help mobilise around EUR 25 billion for the period 2021-2027 in the most affected regions (Wettengel 2022).

### 1.3 Lessons from two European cases

For the cases of the UK and Germany, the most contentious aspects of a coal phase-out were concerns about energy security and job losses, whether coal is mined domestically, (regional) economic dependence, as well as the relative power of actors with vested interests in coal consumption such as miners' unions (Brauers et al. 2020).

For the case of Vietnam, similar aspects of contestation can be expected, and valuable lessons be learnt from Europe's coal transitions. However, it should be acknowledged that both the UK and Germany were already highly developed countries when they started moving away from domestic coal production, who could spend double digit billion USD on subsidies cushioning the transition process and had a fully developed social security system applicable to people losing their jobs due to the transition. Still, it took decades to accomplish the transition and especially in Germany, the transition was characterized by significant conflicts and inefficiencies. Vietnam's planned coal phase-out starts at a much earlier point, as an emerging economy, with an only partially developed social security system and a much lower public spending power. Thus, particularly learnings from social policies will not be easily replicable in Vietnam. What is clear is that external funding needs to play a much larger role than in the European cases. The various lessons that can be learned from the coal phase-out in the UK and Germany are stated in Table 1 below.

**Table 1: Lessons learned from the coal transitions in Germany and the UK.**

| Lessons learned from… | |
|---|---|
| **Germany** | Adopt an anticipatory approach based on policy responses that try to prevent the expected negative social consequences of declining coal production (rather than start responding to impacts only once they can be felt) |
| | Focus on regions with a concentration of coal mining industry / power plants, tailor all policy instruments to local circumstances and combine different policy objectives in an integrative approach |
| | Build on existing policies, the social security system and labour market/training system. Ensure that no young people enter the mining/thermal power plant sector |
| | Set up a Coal Commission on the highest-possible political level, which brings together ministers, stakeholders from trade unions, industry, NGOs and affected citizens |
| **United Kingdom** | Gradually (not abruptly) phase-out public funds to support domestic coal mining, in close coordination with trade unions and other stakeholders |
| | Create future economic opportunities as well as industries particularly in affected coal-dependent regions |
| **Both countries** | Avoid uncoordinated top-down decision-making, but coordinate closely both with subnational bodies and regional associations that the country is part of |
| | Meaningfully engage with affected stakeholders from all regions, particularly coal-dependent regions, from early in the process in consulting on financing plans, including discussions of projected costs and impacts |

More specifically, Table 4 in the annex summarises a selection of just transition-related policies in Germany since the 1960s.

# 2 The Climate Investment Funds – the largest multilateral financing scheme for renewable electricity

The World Bank's Climate Investment Funds (CIF) were established in 2008 to mobilize finance for large scale electricity sector interventions in emerging economies. CIF has become one of the largest multilateral climate funds in the world, with 14 contributor countries having pledged over USD 10 billion to it (CIF 2022). So far, CIF (2023a) claim to have leveraged more than USD 62 billion in additional financing – particularly from the private sector – in 72 countries by committing public finance through its energy transition-related programs such as the USD 7.1 billion Clean Technology Fund (CTF).

Indeed, on a per-country level, CIF has not been reporting data on USD invested per gigawatt (GW) of installed RE or amount of fossil fuels avoided in any systematic or transparent way, e.g., in its annual reports (see Table 5 in the annex). For the CTF programme, since 2009 CIF investments are claimed to result in a cumulative reduction of 132 Mt carbon dioxide (CO2), with annual GHG emission reductions at 28.9 Mt CO2 in 2022, comparable to the annual GHG emissions of the Philippines, or the combined emissions of 25 million cars in one year (CTF Trust Fund Committee 2022). However, in-depth case studies and assessments of the effectiveness of CIF funding are lacking. What is clear is that overall, RE power expansion does not exceed 3 GW. Costs per MW of installed RE capacity seem to be on the high side. Table 5 in the annex provides an overview of a recent evaluation of CIF's RE-related programmes.

The CIF has set up three dedicated programmes, relevant to JETP: the Accelerating Coal Transition (ACT) Investment Program (USD 2 billion) under the CTF, the Scaling-Up Renewable Energy Program in Low Income Countries (SREP), and the Industry Decarbonization Program (CIF n.d.A).

ACT offers to both public and private sector entities a holistic toolkit to tackle three critical challenges associated with coal phase-outs: (1) governance, including policy and institutional reforms; (2) people, (ensuring a just transition for those affected by the transition) and (3) infrastructure, including the decommissioning and repurposing of existing coal assets (CIF n.d.A). CIF-ACT has committed USD 500 million for South Africa and Indonesia each (Government of Indonesia 2022; Government of South Africa 2022; Jessop 2022). Here, we would highlight the Women-Led Coal Transitions (WOLCOT) Grant Mechanism which supports fostering women's climate leadership and effective participation in the design and implementation of its energy transition plans (CIF n.d.B).

## 2.1 Lessons from the CIF

Despite significant amounts of funding available, the CIFs have not been able to trigger a coal phase-out in any of the countries where they have been active. They may have accelerated RE project implementation somewhat in some countries, but the real success story is missing (see Table 5 in the annex). This also holds true for Vietnam. As of mid-2022, four CTF-projects – three of which in the transport sector – have been in the implementation phase (CTF Trust Fund Committee 2022), but their real impact has not been proven yet, not least because of insufficient target setting and reporting (see Table 6 in the annex). As of 2023, six CIF projects worth a total of USD 135 million have been approved (all CTF), but the latest available

investment plan from CIF's website dates back to 2009 (CIF 2023b). So, Vietnam should be careful regarding big announcements from multilateral, CIF-style programmes.

For Vietnam it would be promising to apply for a well-targeted CIF-ACT funding in the same order of magnitude as South Africa and Indonesia, and proactively push a WOLCOT style grant component funding activities enhancing engagement of vulnerable groups in the JETP process, which would be unlikely to be funded by other funders if one looks at the South African JETP experience. In that way, the CIFs can play an appropriate role in the Vietnamese JETP addressing a clearly focused intervention area that does not suffer from the very broad remit of previous CIF interventions.

# 3 International carbon market funding for electricity from renewable energy sources

Vietnam has great potential for REs, particularly solar and wind power, due to its favorable geographical location with high solar radiation levels and strong coastal winds (e.g., World Bank 2021). International carbon markets, either supporting compliance with national emission targets under the international climate policy regime, or being of a voluntary nature, allow actors to receive emissions credits for RE projects that can then be sold on the market. They have been operational for the last 20 years and particularly the Clean Development Mechanism (CDM) under the Kyoto Protocol has been highly successful, mobilizing thousands of projects in over hundred countries (Michaelowa et al. 2019a).

Emission credits represent the reduction or removal of one metric tonne of carbon dioxide equivalent (CO2e) compared to an emissions baseline. The currently valid compliance carbon market operates under Article 6 of the Paris Agreement. Article 6.2 enables bi- and multilateral cooperation involving internationally transferred mitigation outcomes (ITMOs – the Paris Agreement term for carbon credits authorized by the host country for international trade), while Article 6.4 establishes an international mechanism (the Article 6.4 Mechanism, A6.4M) for trade of carbon credits overseen by an international supervisory body. Though not yet operational, the A6.4M is seen as the successor to the CDM. ITMOs under Article 6 can be used by countries to meet their Nationally Determined Contributions (NDCs) or by international airlines to comply with the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). They can also be used for voluntary offsetting and carbon neutrality claims.

Voluntary markets, on the other hand, generate emission credits that can be used to make claims regarding offsetting of private sector emissions, or results-based climate finance, etc. Over the years, various private standards have emerged to specify methodologies for emission credit generation, issue voluntary emission credits and manage emission credit registries. The market is dominated by Verra's Verified Carbon Standard, followed by the Gold Standard and various US based standards. We would like to note that in the recent past many niche standards have emerged, particularly in the field of removals.

As per the summary reports of the World Bank (2023) and Refinitiv (2023), the cumulative credit transactions by end 2022 on the primary CDM market had reached 3.36 billion, under Joint Implementation, the second Kyoto Mechanism, 1.08 billion and under the voluntary carbon market 2.12 billion (Ecosystem Marketplace reports until 2021, Allied Offsets for 2022).

The 2022 transactions reached 199 Mt for the voluntary market and 42 Mt for the CDM market. ITMO transactions have not yet taken place.

Renewable energy was critical under the CDM, with total capacity installed exceeding 9.5 GW. Vietnamese RE CDM projects, mostly hydropower, reached close to 500 MW. RE is also the leading category of credit issuances among voluntary carbon market transactions, totalling 99 Mt in 2022 (Climate Focus 2023), with RE credit prices as per the Platts standardized Platts 'Renewable Energy Current Year' reaching a high of USD 7.65 in 2021, and USD 2.45 on March 31, 2023 (Platts 2023). Among the RE credits three most-credited activities in 2022 were: (1) large-scale wind power projects (39%), (2) large-scale hydropower projects (29%), and (3) large-scale solar power projects (22%) (Climate Focus 2023).

However, it is important to note that there has been a strong debate surrounding the additionality of RE projects. The concept of additionality refers to whether or not the projects would have been implemented in the absence of funding from carbon crediting. In general, demonstration of additionality is an integrity cornerstone of carbon market activities and is required for registration under major standards. In theory, demonstrating additionality ensures that funding supports mitigation actions that would not otherwise be feasible, often referred to as 'high-hanging fruit', to ensure that carbon crediting is genuinely contributing to global climate change mitigation. If a technology has reached the point of being cost-competitive with other alternatives, it does not require additional support through carbon crediting, and funding does not ensure additional mitigation outcomes.

As the cost of RE continues to fall in many countries, there has been significant speculation regarding the additionality of such projects, with researchers stating that the renewable resource needs to be more and more marginal for the project to qualify as additional (Spalding-Fecher et al. 2012; Cames et al. 2016; Michaelowa et al. 2019b). As a result, both Verra and Gold Standard have placed restrictions on crediting of RE projects. Though there are some exceptions, crediting of RE projects can only continue in least developed countries (LDCs), as defined by the UN, and low income and low middle-income countries where the penetration level of the proposed renewable energy technology type is less than 5% of the total grid installed capacity (GS 2021; Verra 2023). These restrictions are however "throwing out the child with the bath water" as they do not assess the actual RE resource a project can access. For example, a wind power project with a 5 metres per second (m/s) average windspeed may still be nicely additional, while a project with an 8 m/s will not. The following activities are still eligible for registration under Verra and Gold Standard in Vietnam (Table 2):

**Table 2: RE projects eligible in Vietnam under Verra or Gold Standard**

| Standard | RE activity remaining eligible |
|---|---|
| Verra (Verified Carbon Standard) | • Activities replacing electric lighting with more energy-efficient electric lighting.<br>• Activities installing and/or replacing electricity transmission lines and/or energy-efficient transformers. |

| Standard | RE activity remaining eligible |
|---|---|
| | Note: For both activity types, only small-scale activities are eligible, i.e., energy efficiency improvements with savings less than 60 gigawatt hours (GWh) per year or emission reduction less than 60 kilotonnes $CO_2e$ per year. |
| Gold Standard | • Grid connected offshore wind projects.<br>• Waste to energy projects that involve utilization of landfill gas/biogas to electricity generation with or without thermal energy production.<br>• Grid connected projectsat involve distributed installation of renewable technology, where individual unit size is up to a maximum 500 kilowatt (kW) of installed capacity.<br>• Project types that still comprise less than 5% of Vietnam's total installed grid capacity, including: photovoltaic, tidal/wave, wind, geothermal, waste to energy and renewable biomass.<br>Note: There may be exceptions for projects supplying energy to mini-grids, in which case the Gold Standard Community Services Activity Requirements must be consulted on a case-by-case basis. |

Note: All other activity types are excluded, as Vietnam is not a least developed country and is classified as a lower middle-income country. This table represents general project type eligibility in Vietnam, as of 2023. However, other exceptions may apply in certain cases, and project developers should consult the standard requirements thoroughly when considering a potential project.

Sources: GS (2019; 2021), Verra (2023).

For Vietnam, international carbon market funding for large-scale renewable electricity should be part of its JETP-RMP. To address the additionality challenge, a policy-crediting based approach should be applied. An approach to harness carbon market revenues directly for the closure of coal power plants could be to use the Gold Standard methodology "Early Phase-out of coal fired thermal power plants and their replacement with green-field renewable energy generation plants" (GS 2023). Generally, the methodology which has just been published for public comments seems to be tailored for use in JETP contexts. Its peculiarity is that the RE plant does not need to prove that it is additional, which may generate a backlash from carbon market critics. Thus, we would recommend Vietnam to rework the methodology to make its additionality determination highly credible in order to reduce the probability of criticism, and use it in the context of Article 6.2 collaborations. Once the Article 6.4 mechanism takes methodology submissions, the methodology could be submitted there in order to show Vietnamese leadership.

## 4 Lighthouse renewable energy projects in developing countries

For harnessing the full potential of solar energy, Vietnam can learn from many international experiences such as those from two lighthouse solar projects on the African continent. These projects are relevant for the Vietnamese JETP because they have been developed at scales much larger than previous solar power projects in the countries and feature innovative financing structures that blend domestic and international sources of financing. Moreover,

both Morocco and Egypt are at a level of development comparable to Vietnam and feature similar investment barriers as Vietnam.

### 4.1 Ouarzazate Solar Power Station in Morocco

In 2016, Morocco inaugurated the first phase of the Ouarzazate Solar Power Station, the world's largest (concentrated) solar power plant at the time, as part of Morocco's Solar Energy Programme to develop 2 GW by 2020 and ambitious plan to generate over 50% of its domestic electricity from REs by 2030 (NS Energy n.d.A). The USD 9 billion project (originally USD 2.5 billion) was expanded over four phases and finalised in 2019 by a consortium led by the Saudi Arabian power and water project developer ACWA Power. For the construction phase, approximately 1,000 jobs were created and 60 permanent jobs during the operation and maintenance phase (Power Technology 2020).

The 0.58 GW project was initially developed by the Moroccan Agency for Sustainable Energy (MASEN) and the state-owned power utility, the Office National de l'Electricité of Morocco (ONEE), with the co-owned Solar Power Company (SPC) acting as a special purpose vehicle (ibid.). Under the first of two 25-year power purchase agreements (PPAs), MASEN purchases power from the SPC at the cost of the power generated. Under the second PPA, ONEE will buy all power from MASEN, at the grid price, and dispatch it from the plant (NS Energy n.d.A.).

MASEN led organising the invitations to tender for the plants at each of the five sites and acted as a consolidator of concessional loans. Overall, the funding for the project was obtained through a combination of government borrowing from multilateral agencies and banks, as well as concessional loans. The consortium for the first project phase consisted of the following funders, listed in descending order: Germany's KfW bank with EUR 324 million, European Investment Bank (EIB) EUR 217.5 million, the AFD with EUR 150 million, the African Development Bank (AfDB) with USD 128 million, the CTF with USD 119 million, the Neighbourhood Investment Facility (NIF) of the European Union with EUR 106.5 million, the CIFs and World Bank with USD 100 million each, so overall well over USD 1.2 billion (International Climate Initiative 2016; EU Neighbours South 2019; AFD n.d.; World Bank 2018). The financing model used in the project, which saw MASEN lend government-borrowed funds to the project company, has been widely hailed as a template for other RE projects (see in detail Climate Policy Initiative 2012a, 2012b), which Vietnam could draw on for developing its RMP.

### 4.2 Benban Solar Park in Egypt

The largest solar PV project on the African continent, the Benban Solar Park in Egypt, was commissioned in early 2018 and fully constructed by the end of 2019 already (British International Investment 2022). The 1.8 GW project was part of Egypt's Nubian Suns Renewable Energy Feed-in Tariff (FiT) program and aligned with the Egyptian government's Sustainable Energy Strategy 2035, which aimed to generate 20% of electricity from REs by 2022. The New and Renewable Energy Authority (NREA), a state-owned institution, led the USD 4 billion project, with funding from various international donors exceeding USD 1 billion, including the European Bank for Reconstruction and Development (EBRD) with USD 500 million and a consortium of nine international banks around the International Finance Corporation (IFC) with USD 653 million (Mercom 2017; NS Energy n.d.B). The Multilateral Investment and Guarantee Agency (MIGA), another institution of the World Bank Group provided USD 210 million worth of political risk insurance to private lenders and investors involved in the solar park (IFC 2017).

A second consortium consisted of the Green Climate Fund (GCF), the Dutch Development Bank FMO, the Islamic Development Bank (IsDB) and the Islamic Corporation for the Development of the Private Sector (ICD) (EBRD 2019).

For the construction alone, more than 10,000 people worked at the site, and 4,000 permanent jobs are created afterwards (ibid.). The solar plants themselves were produced by leading local and international solar energy developers, bringing more of the private sector into the Egyptian electricity market that has traditionally been dominated by the public sector (EBRD 2022). Overall, Benban added the equivalent of 2.7% of total installed capacity in Egypt. Following Benban, Egypt began to move away from the FiT framework and concentrate its efforts on developing competitive solar auctions to attract investors and promote trust in the regulatory framework (ibid.).

### 4.3 Lessons for Vietnam

Both the Ouarzazate Solar Power Station and the Benban Solar Park project demonstrate that GW-scale RE investments can be mobilized rapidly by bringing together large consortia from both national and international public and private sector sources. Key ingredients are high level of trust into the governance of the project, and catalytic institutions.

The Ouarzazate case shows that the creation of MASEN as a special purpose vehicle was crucial to generate trust that the project would not be bogged down in the bureaucracy that characterizes other Moroccan institutions such as ONEE. In the Egyptian case, the FiT programme was crucial to encourage investment in the large Benban project.

Vietnam should recognize that credible new public institutions like MASEN can be critical to lead the development of RE projects and secure international funding. The successful implementation of public-private partnerships (PPP) and the involvement of private sector developers in Benban's engineering, procurement, and construction has also played a key role in the project's success. The use of PPPs in the Benban Solar Park has helped to mitigate risks and increase investment in the project, making it a model for other countries (EBRD 2022). Vietnam could explore more PPP-opportunities in its own RE sector to leverage the private finance needed for its RMP.

## 5 Conclusion

Historical experiences with coal transitions in Europe, the large CIF programmes for RE, international carbon market projects, and two GW scale solar power projects in Northern Africa provide important lessons for the Vietnamese JETP.

Even in rich industrialized countries, phasing out coal in the electricity sector has taken decades. Costs for covering subsidies for retrenched coal mining workers and their retraining, as well as restructuring the economy of affected regions reached double digit USD billion figures. Decentralized application of policy instruments is better than top-down approaches that may delay the transition. Vietnam will have to count on external financing for many decades, the current JETP can only be a beginning.

Despite a lofty aim, the CIFs have not been able to harness a coal phase-out in any of the countries where they have been active; they have provided some incremental improvements of RE power plant expansion. So, a JETP should not build on a CIF style approach alone.

The CDM has shown how international carbon markets can accelerate RE, globally reaching close to 10 GW installed capacity, and 0.5 GW in Vietnam alone. Therefore, Article 6 approaches should become a significant component of the Vietnamese JETP, ideally through a policy crediting approach applying a concept which could be informed by the Gold Standard methodology “Early Phase-out of coal fired thermal power plants and their replacement with green-field renewable energy generation plants”.

The 2 GW scale solar projects Ouarzazate and Benban in Morocco and Egypt show the relevance of dedicated, efficient public institutions for large-scale RE expansion. Credible institutions can harness a blending of financing from multiple sources. It is crucial to get a catalytic effect with a financial institution that is willing to take that role. Large scale offshore wind investment in Vietnam could aim to replicate such structures.

# 6 References


AFD n.d.: Le plus grand compleye solaire thermodynamique des pays du sud à Ourzazate, Agence Française de Développement (accessed March 30, 2023)

Agora Energiewende, Aurora Energy Research (2019): The German coal commission - A roadmap for a just transition from coal to renewables, https://www.agora-energiewende.de/fileadmin/Projekte/2019/Kohlekommission_Ergebnisse/168_Kohlekommission_EN.pdf (accessed March 27, 2023)

Brauers, Hanna; Oei, Pao-Yu; Walk, Paula (2020): Comparing coal phase-out pathways - The United Kindom's and Germany's diverging transitions, In: Environmental Innovation and Societal Transitions, 37, 238-253

British International Investment (2022): Welcome to the largest solar park in Africa, https://www.bii.co.uk/en/news-insight/news/welcome-to-the-largest-solar-park-in-africa/#:~:text=Welcome%20to%20Benban%2C%20Egypt%2C%20home,hundreds%20of%20thousands%20of%20homes (accessed March 24, 2023)

Bundestag (2020): Bundestag beschließt das Kohleausstiegsgesetz, Press Release, July 3, 2020 03.07.2020, https://www.bundestag.de/dokumente/textarchiv/2020/kw27-de-kohleausstieg-701804https://www.bundestag.de/dokumente/textarchiv/2020/kw27-de-kohleausstieg-701804 (accessed March 7, 2023)

Cames, Martin; Harthan, Ralph; Füssler, Jürg; Lazarus, Michael; Lee, Carrie; Erickson, Pete; Spalding-Fecher, Randall (2016): How additional is the Clean Development Mechanism?, Öko-Insitut e.V., Infras, Stockholm Environment Institute, Berlin

CIF (2022): Primer - CTF, ACT and JETP, https://d2qx68gt0006nn.cloudfront.net/sites/cif_enc/files/knowledge-documents/JETP_Primer.pdf (accessed March 23, 2023)

CIF (2023a): Climate Investment Funds, https://www.cif.org/ (accessed March 30, 2023)

CIF (2023b): Investing in Vietnam, https://www.cif.org/country/vietnam (accessed April 27, 2023)

CIF (n.d.A): Climate Investment Funds' Programs, https://www.cif.org/cif-programs (accessed March 30, 2023)

CIF (n.d.B): Women-led coal transitions (WOLCOT) - grant mechanism under accelerated coal transitions program (ACT), https://www.cif.org/sites/cif_enc/files/knowledge-documents/Gender_WOLCOT_brief.pdf (accessed March 23, 2023)

Climate Action Network Europe (2022): Europe's coal exit – overview of national coal phase out commitments, https://beyond-coal.eu/europes-coal-exit/#:~:text=To%20be%20in%20line%20with%20the%20UN%20Paris%20Climate%20Agreement,by%202030%20at%20the%20latest (accessed March 24, 2023)

Climate Focus (2023): Voluntary carbon market - overview, https://climatefocus.com/wp-content/uploads/2023/01/VCM-Dashboard-2022-Overview-1.pdf (accessed March 24, 2023)

Climate Policy Initiative (2012a): San Giorgio Group case study: Ouarzazate – CSP, https://climatepolicyinitiative.org/wp-content/uploads/2012/08/Ouarzazate-I-CSP.pdf (accessed March 24, 2023)

Climate Policy Initiative (2012b): Ouarzazate – Concentrated solar power, Morocco, https://www.cif.org/sites/cif_enc/files/knowledge-documents/ouarzazate-i-csp-morocco-case-study-summary-poster_0.pdf (accessed March 24, 2023)

CTF Trust Fund Committee (2022): Meeting of the CTF Trust Fund Committee – CTF Results Report (Summary), https://www.cif.org/sites/cif_enc/files/meeting-documents/ctf_tfc_28_3.1_rev.1_ctf_results_report_summary.pdf (accessed March 30, 2023)

EBRD (2019): First EBRD funded Egyptian solar plan begins generation, https://www.ebrd.com/news/2019/first-ebrd-funded-egyptian-solar-plant-begins-generation-.html (accessed March 24, 2023)

EBRD (2022): How the EBRD became Egypt's leading partner for renewable energy, https://www.ebrd.com/news/2022/how-the-ebrd-became-egypts-leading-partner-for-renewable-energy-.html (accessed March 24, 2023)

European Commission (2022): EU Cohesion Policy – €2.5 billion for a just climate transition in Germany, Press release, October 21, 2022, https://ec.europa.eu/regional_policy/en/newsroom/news/2022/10/21-10-2022-eu-cohesion-policy-eur2-5-billion-for-a-just-climate-transition-in-germanyhttps://ec.europa.eu/regional_policy/en/newsroom/news/2022/10/21-10-2022-eu-cohesion-policy-eur2-5-billion-for-a-just-climate-transition-in-germany (accessed March 7, 2023)

EU Neighbours South (2019): Morocco: European Investment Bank funds one of the biggest solar power complexes in the world, August 8, 2019, https://south.euneighbours.eu/news/morocco-european-investment-bank-funds-one-biggest-solar-power-complexes/ (accessed March 30, 2023)

Fernihough, Alan; Hjortshøj O'Rourke, Kevin (2021): Coal and the European Industrial Revolution, NBER Working Paper 19802, Cambridge, United States

Fothergill, Steve (2017): Coal Transition in the United Kingdom, IDDRI and Climate Strategies, Sheffield

Frondel, Manuel; Kambeck, Rainer; Schmidt, Christoph M, (2006): Hard Coal Subsidies: A Never-Ending Story?, in RWI Discussion Papers, 53, Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI), Essen

Furnaro, Andrea; Herpich, Philipp; Brauers, Hanna; Oei, Pao-Yu, Kemfert, Claudia; Look, Wesley (2021): German Just Transition – A Review of public policies to assist german coal communities in transition, Resources for the future (RFF) and Environmental Defense Fund (EDF), Washington

Government of Indonesia (2022): CIF Accelerating coal transition (ACT): Indonesia country investment plan (IP) – Draft for public consultation,

https://fiskal.kemenkeu.go.id/docs/CIF-INDONESIA_ACT_IP-Proposal.pdf (accessed March 23, 2023)

Government of South Africa (2022): Accelerating coal transition (ACT) investment plan for South Africa, https://www.dffe.gov.za/sites/default/files/docs/accelleratedcoaltransition.invstmentplan.pdf, (accessed March 23, 2023)

GS (2019): Community services activity requirements, Version 1.2, https://globalgoals.goldstandard.org/201-ar-community-services-activity-requirements/ (accessed March 24, 2023)

GS (2021): Renewable energy activity requirements, Version 1.3, https://globalgoals.goldstandard.org/standards/202_V1.3_AR-Renewable-Energy-Acivity-Requierments.pdf (accessed March 24, 2023)

GS (2023): Gold Standard for the Global Goals – Methodology Concept: Early Phase-out of coal fired thermal power plants and their replacement with green-field renewable energy generation plants, https://www.goldstandard.org/sites/default/files/documents/methodology_concept_early_phase_out_of_coal_fired_thermal_power_plant.pdf (accessed March 30, 2023)

IFC (2017): A new solar park shines a light on Egypt's energy potential, https://www.ifc.org/wps/wcm/connect/news_ext_content/ifc_external_corporate_site/news+and+events/news/cm-stories/benban-solar-park-egypt (accessed March 24, 2023)

Industrial Economics (2023): Evaluation of the Development Impacts from CIF's Investments, https://d2qx68gt0006nn.cloudfront.net/sites/cif_enc/files/knowledge-documents/development_impacts_eval_report.pdf (accessed March 30, 2023)

International Climate Initiative (2016): Feierliche Zeremonie zur Eröffnung des Solarkomplexes NOOR I in Marokko, February 15, 2016, https://www.international-climate-initiative.com/iki-medien/artikel/feierliche-zeremonie-zur-eroeffnung-des-solarkomplexes-noor-i-in-marokko/ (accessed March 30, 2023)

Jessop, Simon (2022): CIF earmarks $1 bln for clean power move in SAfrica, Indonesia, Reuters, October 27, 2022, https://www.reuters.com/business/sustainable-business/cif-earmarks-1-bln-clean-power-move-safrica-indonesia-2022-10-27/ (accessed March 22, 2023)

Johnstone, Phil; Stirling, Andy; Sovacool, Benjamin (2017): Policy mixes for incumbency: exploring the destructive recreation of renewable energy, shale gas "fracking," and nuclear power in the United Kingdom, in: Energy Resources and Social Sciences, 33, p.147–162

Littlecott, Chris; Burrows, Louise; Skillings, Simon (2018): Insights from the UK Coal Phase out Experience: Report to Chile Decarbonization Roundtable, E3G, https://www.e3g.org/wp-content/uploads/E3G_Insights_from_the_UK_coal_phase_out_experience_2018.pdf (accessed March 23, 2023)

Matthes, Felix (2019): Germany's Coal Phase-Out. Insights from the German Commission on Growth, Structural Change and Employment ("The Coal Commission"), Öko-Institut, https://foroalc2030.cepal.org/2019/sites/foro2019/files/presentations/felix_matthes_alemania.pdf (accessed March 30, 2023)

Mercom (2017): IFC-Led consortium invests $653 million to develop 13 solar projects in Egypt, https://www.mercomindia.com/ifc-led-consortium-invests-653-million-to-develop-13-solar-projects-in-egypt (accessed March 24, 2023)

Michaelowa, Axel (2005): The German wind energy lobby: how to promote costly technological change successfully, in: Environmental Policy and Governance, 15, p. 192-199

Michaelowa, Axel; Shishlov, Igor; Brescia, Dario (2019): Evolution of international carbon markets: lessons for the Paris Agreement, in: WIREs Climate Change, 10, doi: https://doi.org/10.1002/wcc.613

Michaelowa, Axel; Hermwille, Lukas; Obergassel, Wolfgang; Butzengeiger, Sonja (2019): Additionality revisited: guarding the integrity of market mechanisms under the Paris Agreement, in: Climate Policy, 19, p. 1211-1224

NS Energy (n.d.A): Ouarzazate Solar Power Plant, Draa-Tafilalet, https://www.nsenergybusiness.com/projects/ouarzazate-solar-power-plant-draa-tafilalet/ (accessed March 24, 2023)

NS Energy (n.d.B): Benban Solar Park, https://www.nsenergybusiness.com/projects/benban-solar-park/ (accessed March 27, 2023)

Oei, Pao-Yu; Brauers, Hanna; Herpich, Philipp (2019); Lessons from Germany's hard coal mining phase-out: policies and transition from 1950 to 2018, in: Climate Policy, 20, p. 963-979

Our World in Data (2023): United Kingdom: Energy Country Profile, Our World in Data, https://ourworldindata.org/energy/country/united-kingdom#what-sources-does-the-country-get-its-electricity-from (accessed March 31, 2023)

Platts (2023): Reckoning with renewables as carbon certifiers tighten rules. Renewable energy may re-evaluate options , S&P Global Commodity Insights, https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/energy-transition/022122-reckoning-with-renewables-as-carbon-certifiers-tighten-rules-renewable-energy-may-re-evaluate-options (accessed March 30, 2023)

Power Technology (2020): Noor Ouarzazate Solar Complex, https://www.power-technology.com/projects/noor-ouarzazate-solar-complex/:~:text=Noor%20Ouarzazate%20Solar%20Complex%20benefits&text=The%20Noor%20I%20CSP%20plant,the%20operation%20and%20maintenance%20phase(accessed March 24, 2023)

Refinitiv (2023): Refinitiv carbon research, https://www.refinitiv.com/en/trading-solutions/commodities-trading/carbon-trading (accessed March 30, 2023)

Spalding-Fecher, Randall; Narayan Achanta, Amrita; Erickson, Peter; Haltes, Erik; Lazarus, Michael; Pahuja, Neha; Pandey, Nimisha; Seres, Stephen; Tewari, Ritika (2012): Assessing the impact of the Clean Development Mechanism, CDM Policy Dialogue,

https://www.cdmpolicydialogue.org/research/1030_impact.pdf (accessed March 24, 2023)

Statista (2023): Number of people employed in the coal mining industry in the United Kingdom (UK) from 1920 to 2021, https://www.statista.com/statistics/371069/employment-in-coal-mining-industry-in-the-united-kingdom-uk/ (accessed March 30, 2023)

Trove Research (2023): Reports & Commentary, https://trove-research.com/reports-and-commentary/ (accessed March 30, 2023)

UK Government (2021): End to coal power brought forward to October 2024, March 30, 2021, https://www.gov.uk/government/news/end-to-coal-power-brought-forward-to-october-2024 (accessed March 24, 2023)

Verra (2023): Verified Carbon Standard (VCS), https://verra.org/wp-content/uploads/2022/12/VCS-Standard-v4.4-FINAL.pdf (accessed March 24, 2023)

Walker Hanlon, William (2019): Coal smoke, city growth, and the costs of the industrial revolution, in: The Economic Journal, 130, p. 462-488

Wettengel, Julian (2022): German coal states to receive €2.5 billion EU funds for just transition, Clean Energy Wire, October 21, 2022, https://www.cleanenergywire.org/news/german-coal-states-receive-eu25-billion-eu-funds-just-transition (accessed March 23, 2023)

World Bank (2018): A proposed additional loan in the amount of US$ 100 million and a proposed Clean Technology Fund Loan in the amount of US$ 25 million to the Moroccan Agency for Sustainable Energy (MASEN), https://documents1.worldbank.org/curated/en/138481528687821561/pdf/Morocco-Noor-AF-project-paper-P164288-May17-clean-05212018.pdf (accessed March 30, 2023)

World Bank (2021): Offshore wind development program - offshore wind roadmap for Vietnam, World Bank, Washington

World Bank (2023): Carbon pricing dashboard, https://carbonpricingdashboard.worldbank.org/ (accessed March 22, 2023)

## Annex

### Table 3: Measures to socially buffer the transition away from coal in the UK.

| Compensation or grandfathering (backward-looking) | Structural adjustment assistance (forward-looking, narrow) | Adaptive support (forward-looking, broad) |
|---|---|---|
| **Consumers/households** | | |
| Energy intensive industries first compensated for, then exempted from selected green charges on electricity prices | Subsidy, now much reduced, for installation of solar panels on domestic and commercial properties | Advice on energy efficiency |
| **Workers** | | |
| Lump-sum redundancy payments for miners, varying in value through time but typically worth 6-12 months' wages | | |
| State unemployment benefits and (in many other cases) incapacity benefits | Employment and training advice for ex-miners in the first 6-12 months following redundancy | On-going but declining government funding for the Coal Industry Social Welfare Organisation |
| Other welfare benefits | | |
| **Communities** | | |
| Revenue Support Grant system compensates local authorities for loss of property tax revenue following closure of mines and power stations | Government-funded colliery site reclamation programme | Government financial support for community projects from Coalfields Regeneration Trust |
| | EU Structural Funds target mining areas | |
| | Assisted Ares status for coalmining areas under UK regional policy | Lottery funding for heritage and community projects |
| | Infrastructure investment in former mining areas | Funding for national mining museum |
| **Corporations** | | |
| Coal industry state-owned up to 1994 and financial losses absorbed by Exchequer | | |
| Limited subsidy under EU rules to private coal producers in late 1990s | Market economy allows corporate diversification (e.g., coal power generators move into gas, mining companies into property development) | Low tax, low regulation environment |
| Inherited liabilities on miner's health compensation and on environment met by Exchequer | | |

Source: Own illustration, adapted from Fothergill (2017, p.7).

## Table 4: Measures to socially buffer the transition away from coal in Germany.

| Policy name | Administrator | Target | Policy types* | | | | Design | Public Participation | Funding sources | Total Funding |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Historical policies*** | | | A | B | C | D | | | | |
| Development Program Ruhr (DPR), *1968–1971* | Subnational (NRW) | Workers in the Ruhr region | x | x | x | x | Top-down design by the advisory group and *Länder* chancellery and offices. | Limited — top-down programme. | National government NRW European Community | EUR 8.7 billion |
| Action Program Ruhr (APR), *1980–1984* | Subnational (NRW) | Workers and communities in the Ruhr region | x | x | x | x | Top-down design by advisory group and *Länder* chancellery and offices, drawing on recommendations from local multistakeholder conferences | Consultation with local stakeholders and experts via a two-day conference prior to the design of the programme. | National government NRW European Community | EUR 3.5 billion |
| Future Initiative for Coal and Steel Regions (FICSR), *1987–1991* | Subnational (NRW and municipal governments) | Workers and communities in the Ruhr region | x | x | x | x | Design according to the recommendations of a multistakeholder commission. | Consultation with local stakeholders and experts for the design of the policy. Participation of stakeholders via a multistage assessment process prior to the implementation phase. | National government NRW European Community | Approx. EUR 1 billion |
| BA Emscher Park (IBAEP), *1989-1999* | IBA Association | Communities in the Ruhr region | x | | x | x | Public–private planning company. Details of the program developed via projects selected by the multistakeholder grant committee. | Participation of local stakeholders via their own projects during the implementation phase. Consultations with selected local stakeholders. | National government NRW European Community / European Union Private sector/banks | EUR 2.5 billion |
| Act on Financing the Termination of Subsidized Coal Mining (AFTSC), *2007–2018* | National government and subnational governments (NRW, Saarland) | Hard coal workers and regions in Germany | | x | | x | Top-down decision by national and *Länder* governments. | Hearings of selected (regional) stakeholders in the design process of the law. | National government Länder European Union | EUR 14.8 billion, |

Note: *: Policy types: A. Economic reorientation and diversification. B. Workforce support. C. Social well-being and quality of life. D. Environmental remediation and protection.

(continues on the next page)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Present Policies*** | | | | | | | | | | |
| Regional development policy framework<br>*1991 – 2020* | National government and *Länder* | Regional development of structurally weak regions (not restricted to mining regions) | x | x | x | | Top-down decision on criteria for the funding of the programs. Projects developed by individuals, municipalities, companies, etc. | No participation of local stakeholders in the design. Depending on the specific program within the regional development framework, participation via own projects was possible (private, companies, municipalities, institutions, etc.). | National government Länder European Union | Approx. EUR 72 billion, 1991–2017<br>EUR 1.2 billion in 2020 (grants)<br>EUR 1.2 billion in 2020 (loan warranties) |
| EU support for Germany<br>*2014 - 2020* | European Union, national government, and *Länder* | Regional development of structurally weak regions (not restricted to mining regions) | x | | x | x | Multilevel coordination (EU–national, national–*Länder*). | No participation of local stakeholders in the design of the programs. The European Union and member states decide on the criteria for distribution of funds. The Länder decide on the funds granted to individual projects. | European Union | Structural and Investment Funds (EUR 27.9 billion, 2014–2020)<br>European Agricultural Fund for Rural Development (approx. EUR 5 billion annually)<br>"Horizon 2020 (EUR 80 billion until 2020, EU wide) |
| Commission on Growth, Structural Change and Employment (also called the Coal Commission) and Coal Exit Laws (CCCL)<br>*2022 - 2042* | National government and multistakeholder organization | Lignite regions and workers; coal power plant workers | x | x | x | x | Multistakeholder commission recommendations implemented on the national level. | Participation via representatives of relevant stakeholders in the Coal Commission. Hearings of experts and assessment of the region via field trips. | National government European Union | EUR 2 billion per year for 20 years (2022–2042) for structural development |
| | | | | | | | | | | **Total**: EUR 214.8 billion**<br>*Historical:* EUR 30.5 billion<br>*Present:* EUR 184.3 billion |

Notes: **: Sum excludes the indirect support provided by the European Agricultural Fund for Rural Development.

Source: Own illustration, adapted from Furnaro et al. (2021, p.5).

## Table 5: Country cases for CIF's RE activities.

| Country | Evaluated Programme | CIF financing (USD million | Co-financing (USD million | Total costs (USD million) | MW installed | Total costs (USD/ kW) | GHG red. p.a. (Mt) |
|---|---|---|---|---|---|---|---|
| **Bangladesh** | Scaling Up Renewable Energy **(Solar)** | 29.25 | 383.79 | 413.04 | 80 | 5,160 | n/a |
| **India** | CTF Investment Plan for India (7 **Solar** projects) | 725 | 6816 | 7539 | n/a (11.787 GWh p.a.) | n/a | 10.4 |
| **Indonesia** | **Geothermal** projects* | 483.25 | 3,971.35 | 4,454.6 | 1,815 | 2,450 | n/a |
| **Morocco** | Noor Ouarzazate I Concentrated **Solar** Power (CSP) | 97 | 657.5 | 854.5 | 160 | 5,340 | 0.25 |
| **Nepal**** | Extended **Biogas** Project | 4.2 | 3.6 | 7.75 | n/a | n/a | 0.09 |
| **Thailand** | CTF Private Sector RE Program and RE Accelerator Program **(wind)** | 34 | 129.59 | 163.59 | 88.5 | 1,850 | n/a |
| **Türkiye** | Private Sector Renewable Energy & Energy Efficiency Project | 100 | 2,048.9 | 3,099.56 | n/a | n/a | n/a |

Sources: Own compilation, based on Industrial Economics (2023) and the respective country pages of the CIF (for total energy funding only).

## Table 6: CTF activities in Vietnam.

| | | | | | Emissions reductions (t $CO_2$) | | | Co-financing (USD million) | | | Installed capacity (MW) | | | Passengers per day (number of people) | | Energy savings (GWh) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Project | Public/ Private | MDB | CTF USD M | RY2022 | Cumulative | Annual Target | RY2022 | Cumulative | Target | RY2022 | Cumulative | Target | RY2022 | Target | RY2022 | Target |
| Vietnam | Ha Noi Sustainable Urban Transport Program - Project 1: Ha Noi Metro Rail System Project (Line 3: Nhon-Ha Noi Station Section) | Public | ADB | 50 | | | 8,400 | 107 | 722 | 1,326 | | | | | 157,000 | | |
| Vietnam | Ha Noi Sustainable Urban Transport Program - Project 2: Strengthening Sustainable Urban Transport for Ha Noi Metro Line 3 Project | Public | ADB | 50 | | | | 0 | 0 | 10 | | | | | | | |
| Vietnam | Sustainable Urban Transport for HCMC MRT Line 2 | Public | ADB | 50 | 0 | 0 | 4,025 | | 53 | 1,391 | | | | | 128,960 | | |
| Vietnam | Vietnam Distribution Efficiency Project | Public | World Bank | 30 | 365,707 | 1,607,885 | 269,148 | | 600 | 770 | | | | | | 449 | 414 |

Source: CTF Trust Fund Committee (2022, p.43).