Powering PastCoal Alliance

# POWERING PAST COAL

## THE STATE OF GLOBAL ACTION TO END EMISSIONS FROM COAL POWER

NOVEMBER 2022

# FOREWORD

**Remarkable progress on coal phase-out has been achieved since the launch of the Powering Past Coal Alliance (PPCA) five years ago.**

Over three-quarters of the coal power capacity in member countries of the Organisation for Economic Co-operation and Development (OECD) has been retired or is scheduled to close by 2030, and the scale of proposed new coal projects has fallen by the same amount globally. With thanks to dedicated partners from the public and private sector, civil society, and close cooperation and leadership from Canada and the UK, the PPCA has become the driving force behind global efforts to phase out coal power, expanding to over 165 members worldwide and representing more than US$17 trillion in private sector assets under management.

The Glasgow Climate Pact agreed at COP26 acknowledged the need to reduce coal power – the first statement of this kind in a UN climate declaration. All 197 Parties agreed to phase down coal and 77 signatories supported further action through the Global Coal to Clean Power Transition Statement. This built on the world's largest public funders of coal power (China, South Korea and the G7) committing in the lead up to COP26 to cease international public finance for coal.

Words on a page will not be enough: national governments must follow through on their COP26 promises. Credible net-zero pledges require a realistic plan to phase out coal emissions – the single most important first step for meeting Paris Agreement climate goals. This means stopping the construction of new coal power plants immediately, scaling up clean power, and retiring existing coal fleets – no later than 2030 for developed countries and 2040 for developing countries – while ensuring a just transition for workers and communities. Subnational governments can accelerate clean energy investments and cooperate with grid operators and utility companies. Private financial institutions must end finance for unabated coal power and increase investments in clean energy to deliver their net-zero commitments.

With thanks to dedicated partners from the public and private sector, civil society, and close cooperation and leadership from Canada and the UK, **the PPCA has become the driving force behind global efforts to phase out coal power,** expanding to over 165 members worldwide and representing more than US$17 trillion in private sector assets under management.

Governments around the world are rising to the challenge. Canada has a legislated net-zero commitment, a price on carbon, and regulations that will see the exit of unabated coal power by 2030. Canada's 2030 Emissions Reductions Plan provides a sector-by-sector roadmap with a suite of new measures and strategies to cut emissions by 40-45% below 2005 levels by 2030, and to achieve net-zero emissions by 2050. The UK is committed to phasing out unabated coal generation by October 2024, building on a swift decline of coal generation from 40% of electricity supply in 2012 to less than 2% in 2020. By 2035, the UK will have decarbonised its electricity system, subject to security of supply.

COP26 also recognised the importance of support for developing countries where energy access needs will require an accelerated deployment of clean alternatives to coal, plus further support to coal-intensive countries as they transition from coal to clean power. Just Energy Transition Partnerships can empower key countries to realise their own ambitions for a clean energy future, with opportunities for green jobs and clean growth. To realise the goals of the PPCA, this support is vital.

Russia's unprovoked, illegal invasion of Ukraine demonstrates the need to increase energy security and reduce the vulnerability caused by a reliance upon fossil fuels and volatile markets. The shift to clean power generation, particularly increased solar and wind alongside greater energy efficiency, offers the most effective route to climate and energy security, and long-term prosperity.

This report showcases the action members of the Alliance are taking across all aspects of the coal-to-clean energy transition through policy, social, economic and technical interventions. Their experience demonstrates this transition is achievable and beneficial, not only for the climate, but also for health, economic development, energy security and affordability of supply.

We are steadfast in our commitment to consign coal to history. The Powering Past Coal Alliance exists to support its members in driving this transition to a clean, sustainable future. We invite all to join us in our efforts over the next five years and beyond.

**GRAHAM STUART MP**

Powering Past Coal Alliance Co-Chair

Minister of State (Minister of Climate), United Kingdom

**THE HONORABLE STEVEN GUILBEAULT, PC, MP**

Powering Past Coal Alliance Co-Chair

Minister of Environment and Climate Change, Canada

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# EXECUTIVE SUMMARY

Coal remains the single biggest contributor to human-created climate change. Deep and rapid reductions in global coal emissions are required this decade to keep on track for no more than 1.5°C global warming. This requires an immediate end to the building of new unabated coal power plants, rapid scaling up of clean power, and the retirement of existing coal fleets in advanced economies by 2030 and globally by 2040.

The good news is that over three-quarters of operating coal capacity in the OECD and EU is on track to close by 2030, while the scale of proposed new coal power plants has collapsed globally by the same amount since 2015. Both dynamics are approaching iconic tipping points that will accelerate the transition away from coal power generation and towards clean electricity.

The Powering Past Coal Alliance was launched by the governments of Canada and the United Kingdom in 2017. The Alliance has since grown into a coalition of more than 165 members leading global efforts to end emissions from coal power and accelerate the coal-to-clean transition. The PPCA now draws on expertise from its global network of governments, industry, finance, labour and civil society groups.

On the fifth anniversary of the Alliance, this report presents new insights into how the global coal-to-clean transition is progressing. It highlights how a future without emissions from coal power is not just achievable, but also cheaper, more reliable and secure, and can help ensure a better future for workers and the communities where they live and work. What's more: the transition is happening now and is irreversibly under way.

This does not mean the coal-to-clean energy transition is or will be easy. There are barriers standing between people and the clean energy systems they want, including a lack of information, insufficient capital and finance, institutional resistance to doing things differently or questioning the status quo, and vested interests. But these barriers are not impassable; they can be removed. Today, it is only inaction that stands between humanity and a clean energy future.

This report shares case studies and viewpoints from PPCA members and partners, showing how positive progress is already being made in the transition from coal power generation to clean electricity. National and subnational governments are consulting stakeholders and creating policy frameworks that support workers and communities while driving economic diversification in pursuit of a just transition. Utility companies, grid operators, and regulators are planning for a new era of flexible grids delivering low-carbon electricity. Financial institutions are providing catalytic support to accelerate the retirement of existing coal power plants.

Now more than ever, humanity must urgently work together to accelerate the shift from coal to clean power generation. The cascading impacts from Russia's invasion of Ukraine on global energy markets demonstrate the integral link between climate change, energy security, and the vulnerabilities caused by dependence on fossil fuels. This report presents a range of real-world solutions being implemented by governments at all levels, industry, financial institutions and other organisations. So, whether you are a policy maker, a grid operator, an investor, a coal worker or a concerned citizen – read on and become a part of the movement that is accelerating the transition from coal to clean energy.

# INTRODUCTION

**Phasing out coal power is the single most important first step the world must take to meet the Paris Agreement's climate goals.**

The Powering Past Coal Alliance (PPCA) is a coalition of national and subnational governments, businesses and organisations working to advance the transition from unabated coal power generation to clean energy. Launched by the Canadian and UK governments in 2017, what started as a small network of 27 national, provincial, state and city governments endorsing the Alliance's declaration, has grown to more than 165 members at the forefront of global efforts to deliver the Paris Agreement.

To mark the fifth anniversary of the Alliance, PPCA members have come together in this report to capture the positive state of play on global coal phase-out and bring to light the voices of innovation, experimentation and progress rising around the world to end emissions from coal power for good.

**Section 1 of this report describes the global coal power landscape**, including progress, challenges, and the way forward. While coal power is increasingly uneconomic in most countries, experience among PPCA members has shown that there are a variety of approaches to coal phase-out. There is no one-size-fits-all answer.

**Section 2 provides case studies** that highlight how members of the Alliance are overcoming common roadblocks across areas of policy, social engagement, economics and technical solutions. Many of the case studies come from jurisdictions whose economies relied previously on coal for jobs and power. While they faced major hurdles in the transition, they also serve as an inspiration to those who have yet to embark on this journey.

Hopefully, this report engenders optimism and determination. Although the road ahead is long, there are willing partners that can provide the necessary expertise and support along the way. The examples in this report show that the initial steps are challenging but can produce additional benefits and tangible progress.

Whether you are committed to the cause but do not know where to begin, or sceptical that ending emissions from coal power could ever be possible, this report is for you.

SECTION 1

# THE GLOBAL COAL POWER LANDSCAPE

## PROGRESS, CHALLENGES, AND THE WAY FORWARD

- ENDING COAL-FIRED POWER IS CENTRAL TO KEEPING GLOBAL WARMING BELOW 1.5°C
- STATE OF PLAY: THE GLOBAL COAL POWER LANDSCAPE
- THE WAY FORWARD: A GLOBAL COAL-TO-CLEAN TRANSITION

# Ending coal-fired power is central to keeping global warming below 1.5°C

Coal power is the single largest contributor to climate change, accounting for around one-third of total $CO_2$ emissions. This makes a global exit from unabated coal power a fundamental precondition for keeping global warming below dangerous levels.

The dates by which the world must stop burning coal are now irrefutable. The latest analyses by the Intergovernmental Panel on Climate Change (IPCC) and International Energy Agency (IEA) agree on the necessity of a rapid decline in coal use. They find that coal power plants that are not fitted with mitigation technologies to reduce $CO_2$ emissions must be phased out by 2030 in developed economies and by 2040 everywhere else. The degree of urgency is also now clear: coal emissions need to fall four-fifths by 2030, requiring the closure of the world's dirtiest coal-fired power plants.

This clear climate imperative is not the only reason to end emissions from coal power. Shifting power systems from coal to low- or zero-carbon power sources, such as renewables, would significantly reduce the cost of externalities for governments and people around the world. The significant local pollution and health impacts of coal power create social and financial costs that are rarely factored into economic assessments and planning decisions. An early phase out of coal plants around the world could help avoid over 14.5 million premature deaths from air pollution over the next three decades, delivering an economic benefit of US$16.3 trillion.

The global energy crisis triggered by Russia's invasion of Ukraine in early 2022 has dramatically highlighted the importance of energy security and affordable electricity for all. While much attention has been paid to the rising price of gas, the global benchmark for coal prices had already hit record heights as global demand increased following the COVID-19 pandemic. The price of coal has further jumped by a factor of three since early 2022, contributing to fuel price volatility and driving inflation. Beyond temporary measures required in some countries to keep the lights on in the short term, the goals of secure and affordable energy are fully aligned with climate change goals and a rapid transition from coal to clean energy.

In 2015, when the Paris Agreement signalled the necessity for the world to move away from all fossil fuels, the global coal power fleet was heading towards a two-thirds increase in size. The following section analyses progress towards a global coal exit since Paris, highlighting some of the key dynamics that have underpinned this transition. It is followed by real-world best practice examples of how to leverage these conditions to accelerate the global shift away from unabated coal power.

# State of play: The global coal power landscape

Since 2015, the global capacity of operating coal power plants (shown in dark teal in Figure 1) has increased by 170GW to a total 2,067GW as of July 2022. However, if China is removed from the picture, the rest of the world has seen a net decrease of 54GW (5%) since 2015, with coal power capacity in the rest of the world outside of China peaking in 2017.

These last five years have also seen a significant structural shift where retirements (teal in Figure 1) accelerated, particularly in the OECD and EU, with further retirements expected by 2030 (light green in Figure 1). Meanwhile, the scale of proposed coal plants at different stages of project development (red, amber, orange and yellow in Figure 1) has collapsed by 76% as countries turn their back on new coal power.

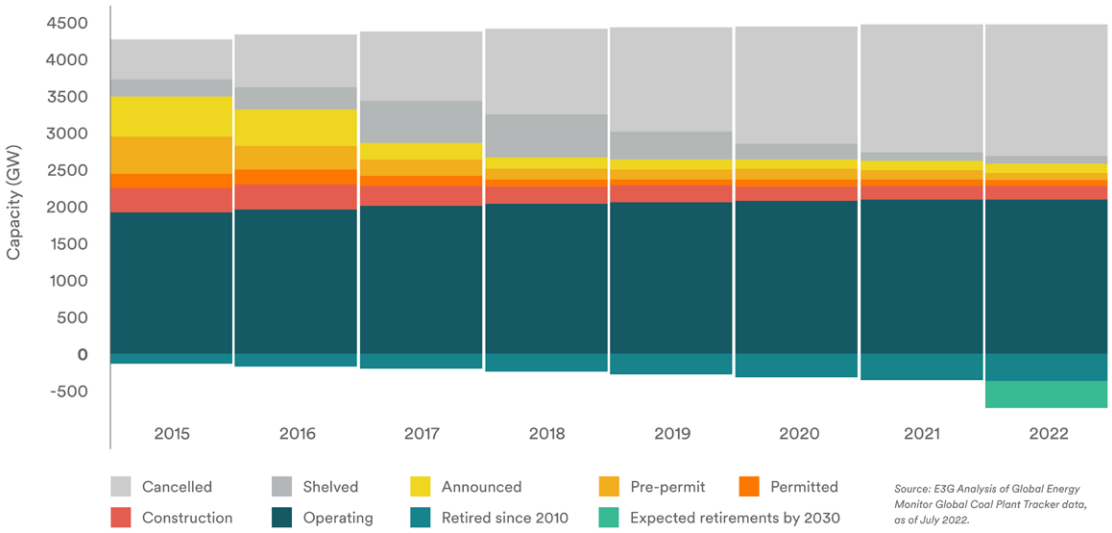



*Figure 1: Global coal-fired power capacity changes since 2015, by status*

This dramatic contraction in the scale and spread of potential new coal power projects is a key indicator of the global structural shift away from unabated coal power. The number of countries considering new coal power projects has nearly halved since 2015, from 66 to 34 countries. The remaining projects under development are increasingly concentrated, with 86% of proposed new capacity in just six countries (Figure 2). However, it is likely that many of these planned coal projects will be shelved and eventually cancelled before becoming operational.

It takes years for a coal power plant to move from proposal through permitting to construction and operation. Coal power plants currently under construction are the result of investment decisions made years ago. Today these projects face heavy economic, environmental and social headwinds that may lead to some of them being cancelled or converted to other fuels. The huge increase in project cancellations since 2015 shows that investors are increasingly not proceeding with coal power projects. Project developers, financiers, regulators and governments are all recognising that new coal infrastructure no longer makes sense.

Together, these trends tell a clear story: the global exit from unabated coal power is accelerating. Nevertheless, it must move faster to meet climate goals.

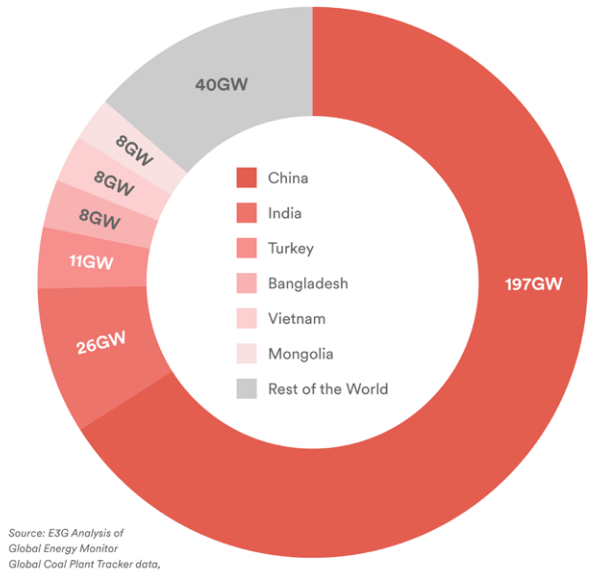



*Figure 2: Distribution of the remaining coal project pipeline by country*

# The OECD and EU: coal exit is under way but must accelerate to achieve a 2030 phase-out

Many countries in the OECD and EU have relied on coal power for over a century, but this period of history is drawing to a close. The ageing OECD and EU coal fleet is still home to 488GW of capacity, representing one-quarter of the world's coal power, but it is in structural decline. Power plant retirements and national phase-out commitments have reached critical mass in Europe and North America over the past decade. Power plant retirements are likely to accelerate as countries implement their coal phase-out plans, with a further 303GW expected to close by 2030, putting the OECD and EU on track for more than 75% of coal capacity to have closed between 2010 and 2030. This significant statistic includes active commitments to a 2030 coal exit, for example from PPCA national and subnational members, plus power plant retirements expected elsewhere. A further 92GW of capacity is due to be retired after 2030, while 88GW has yet to be given a closure date. OECD and EU countries must set an example and close all remaining unabated coal power capacity by 2030 for the world to stay on track for 1.5°C. The PPCA has played a pivotal role in advancing this objective, with two-thirds of OECD and EU countries now members of the Alliance.

In parallel to this phase out of existing plants, there are just a handful of new coal plants under consideration across the OECD, none of which are likely to proceed. Following Russia's invasion of Ukraine in early 2022, some OECD and EU countries have allowed increased generation from their last remaining operational coal power plants and/or delayed imminent power plant retirement dates. However, no country with phase-out commitments in place has revised its planned coal exit beyond the key 2030 date. Instead, governments are increasing their efforts to invest in renewables and increase energy efficiency, in order to accelerate the transition away from power generation fuelled by both coal and gas. There is no prospect of investment in new coal power plants as a response to energy security concerns.

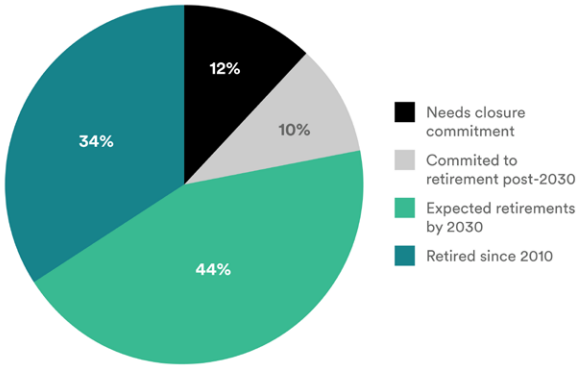



*Figure 3: Phase-out status of the OECD/EU coal fleet*

# Non-OECD countries: turning their backs on new coal power, but facing retirement challenges

Non-OECD countries (excluding China) have seen the scale of proposed new coal power plants collapse by four-fifths since 2015, with many countries moving away from intended expansion and on to a coal power exit pathway. The number of non-OECD countries that have stopped considering new coal power projects since 2015 has also more than doubled, from 20 to 43. Of the remaining 29 countries still home to proposed new coal power plants, 13 have only one project still under consideration. Many projects are highly unlikely to come to fruition. For example, China's commitment in 2021 to end support for overseas coal projects reduces the likelihood that more than 40GW of planned capacity across 20 countries could secure financing and proceed to construction.

While the scale of pre-construction projects under consideration has collapsed, construction of 124GW of previously approved coal power capacity has continued over recent years. This last wave of new coal construction means that non-OECD countries are now home to 510GW, collectively representing a second quarter of global coal power capacity.

Across non-OECD countries, the combination of younger coal plants, rapidly increasing demand, inefficient market rules, and emerging climate policies add to the complexity of power grid decarbonisation. Coal power plant retirements are beginning, but two-fifths of non-OECD coal plants started operations within the last decade, resulting in an increased risk of stranded assets and shortened operational lifetimes. Diplomatic, financial and technical assistance from the international community will be required to help non-OECD countries accelerate coal power plant retirements, achieve a just and equitable transition, and develop alternative low-carbon energy generation.

## Continued coal expansion in China

China is now home to half the world's operating coal capacity and 57% of pre-construction coal power projects. Accelerated retirements within the OECD and the collapse in the scale of new project proposals in the rest of the world have been counteracted by the ongoing expansion of the coal fleet in China. Concerns over energy security following last year's energy crunch as well as inefficient electricity market rules have combined to create the conditions for continued investment in new coal power plants, even when this is uneconomic. This has resulted in coal power overcapacity and a mismatch between supply and demand for both coal production and electricity generation.

However, there are some positive signals: only half of all proposed new coal power projects in China have proceeded to construction, and China's existing coal power plants are running at low load factors. The coal share of electricity generation in China continues to shrink as the country installs record amounts of renewable energy generation capacity, meaning increased electricity demand has largely been met by non-fossil sources including solar and wind.

*Large thermal power plant in Dezhou, China | Source: Shutterstock*

In 2021, China's announcement that it would no longer finance new coal power overseas took place in a context of similar moves by South Korea and the G7. As the rest of the world moves to end the construction of new coal power plants, President Xi has committed to phasing down China's coal consumption between 2026-2030.

## The way forward: a global coal-to-clean transition

Government policies and regulations to tackle air and water pollution, introduce carbon pricing, and deliver climate commitments have helped accelerate the global structural transformation away from coal power, but its principal driver to date has been the significant economic headwind faced by coal.

The cost-competitiveness of renewables relative to coal is now overwhelming: almost everywhere, renewables outcompete coal power in terms of cost, even when the expense of co-locating electricity storage is included.

The existing global coal fleet is already economically highly fragile. As much as 27% of the operating fleet is unprofitable today, and this proportion is projected to increase to 66% by 2040 even with no change in existing pollution regulations and climate policies. This trend towards declining profitability will only intensify as tighter pollution regulations come into force, low-cost renewables continue to displace coal, and higher carbon prices take hold.

While market forces are driving out coal power generation in many parts of the world, there are places where pro-coal policies and regulations continue to support it. In such cases, coal only remains profitable thanks to market-distorting interventions resulting in extra costs for consumers and taxpayers. Through market reform these countries could now simultaneously shift to lower-cost energy for consumers and reduce the significant fiscal burden of coal subsidies.

Affordable alternatives to coal power generation already exist. It will take further political will and effective, coordinated public and private deployment of clean energy to replace existing and proposed coal power plants in all parts of the world, particularly non-OECD countries facing rapidly growing electricity demand and energy access challenges.

A combination of clear economic headwinds provide solid foundations for an accelerated phase-out: existing policy and social drivers such as carbon pricing; continued public pushback against coal power; and existing technological alternatives to coal. But concrete action is required to maximise their potential.

The following sections of this report share experiences from PPCA members and partners already acting to accelerate this transition.

## INSIGHT

# MAFALDA DUARTE

*CEO, CLIMATE INVESTMENT FUNDS*

**There is no winning the climate fight without a rapid transition away from coal. If coal were a country, it would be the single largest greenhouse gas emitter in the world. By the end of the decade, we face the urgent challenge of having to reduce coal-fired power generation by 80% to head off the worst climate impacts and achieve the Paris Agreement's goal of limiting global average temperature increase to 1.5°C.**

The good news is that the transition is already under way. Every day, renewable energy becomes increasingly competitive with coal. It is estimated that, by 2025, more than 15,000 active coal plants will come under pressure to scale back operations and the share of uncompetitive coal plants will grow by more than two-thirds.

In the world's richest countries demand for coal-fired power continues to fall sharply, but in the developing world the story is quite different. Energy needs are expanding rapidly, with fast-growing populations and even faster-growing economies. Unlike the aging coal plants in developed nations, many plants in emerging economies are young, in some cases 40 years from retirement and with long payback periods. We cannot accelerate away from coal without a massive transition in the developing world – and to do so, we must address the complex reasons why coal has such staying power.

We must grapple with the fact that, to tens of millions of people, coal represents a livelihood. In India alone, more than three million people are estimated to be employed either directly or indirectly in the coal mining sector. In communities like Jharkhand, India, coal dependency is deeply entrenched. The coal industry employs one-tenth of the region's workforce, either directly or indirectly. It contributes to local and national government revenues and funds critical projects such as hospitals and schools. Coal is crucial in public transportation, too: Indian Railways, which has the highest railway passenger volume in the world, derives 40% of its freight revenue from coal – money it then uses to subsidise fares for the poorest passengers. In short: moving away from coal will inevitably affect millions of lives.

We must also recognise that in many regions it may not be possible to fully replace jobs in coal with renewable energy jobs, particularly if renewable energy resources are distant from coal regions. South Africa's coal-producing region of Mpumalanga, for example, where 80% of the country's coal is mined, is very distant geographically from areas of the country, such as the Northern Cape, where solar infrastructure and wind farms have been most successful.

A new economic strategy must be designed around each region's strengths and natural advantages. We must also grapple with the significant capacity, regulatory and financial gaps that often prevent the expansion of clean-energy alternatives to coal. None of it will be easy.

But just as these challenges are real, so too is the massive opportunity if we get the transition right. We now have a small window to accelerate a just transition from coal to clean energy across the developing world. This will avert the worst impacts of climate change, create an estimated 24 million new, sustainable jobs in the green economy by 2030 and ensure a better future for all of us.

There is no one-size-fits-all solution. Yet the case studies featured in this report provide invaluable insights into the different pathways that nations are taking to phase out coal while meeting their social, economic and climate ambitions. Although each pathway is unique to country and context, there are common themes.

Some countries and regions can still take a better path to begin with – investing in cheaper renewable energy instead of new coal, thus avoiding the pain, complexity and expense of a just transition. Wise decisions over the next few years can prevent nations from committing to soon-to-be stranded assets and can shape a better course towards clean-energy investments.

If planned well and sufficiently financed, a just transition represents a powerful opportunity to tackle important development challenges associated with high-carbon economies. Developing nations embarking on a just transition can pursue clean and secure energy systems that are saving lives and promoting equality in other countries.

Experts estimate that almost two million people die from water pollution each year, and another six million from air pollution – about 95% of those in low- and middle-income countries. Just transitions can turn the tide. But every step will require careful planning to avoid leaving coal-dependent communities behind and to ensure that the losses and gains of the transition are distributed fairly.

Presented in this report are tools, strategies and programmes to help developing nations achieve exactly that – including the Climate Investment Funds' Accelerating Coal Transition (ACT) investment programme, which supplies a holistic toolkit for a just and inclusive transition in developing countries. By recognising country-specific considerations including social, political and economic realities and ambitions, these kinds of tools will help high-impact nations such as India, Indonesia and South Africa accelerate away from coal in a way that offers meaningful support to all stakeholders.

This transition will not be simple or swift. Coal remains deeply entrenched in our markets and the global economy. And yet, at this moment in time, I think of Dr. Jane Goodall's powerful reminder: "It is knowing what can be done that gives people the courage to fight."

We *know* what must be done now: push ahead at unprecedented scale and speed with a transition across many sectors that involves a myriad of stakeholders. We can achieve it if we work as one. It is time to move together towards a cleaner, greener and more resilient future.

SECTION 2

# A WORLD OF SOLUTIONS

## TOOLS FROM THE FRONT-LINE OF A GLOBAL COAL POWER PHASE-OUT

- THE ART OF THE POSSIBLE: POLICY SOLUTIONS
- A BETTER FUTURE FOR ALL: SOCIAL SOLUTIONS
- A NEW ECONOMIC REALITY: FINANCE & INVESTMENT SOLUTIONS
- KEEPING THE LIGHTS ON: TECHNICAL SOLUTIONS

## The transition from coal power generation to clean electricity systems is both one of the greatest challenges and biggest opportunities faced by humanity.

The good news is that the technology is here. The economics are favourable. There are ways to navigate the transition that are just, inclusive and supportive of coal workers and their communities. Governments can lead the way.

There are of course still tough challenges. But many of the barriers that remain are down to inertia: they are walls inherited from the past that must now be torn down.

**Ending emissions from coal power worldwide requires:**

**Political leadership** - a long-term vision for an energy system that provides for economic growth and development using sources that protect people's health while preserving the wellbeing and capital of future generations.

**New systems to deploy proven technologies,** new models for purchasing and distributing power, and the adoption of new practices for operating grids.

**Investments in young or nascent markets** - different business models and relationships with innovators and service providers.

**Genuine engagement** (and sometimes challenging conversations) with those people whose livelihoods depend on the coal industry to find a just way to continue to provide good, meaningful jobs and opportunities that sustain the fabric of communities.

From across the Alliance, this report gathers examples of how to overcome these barriers. Here you will find case studies from across the world, covering the range of elements that are necessary for a successful transition: policy, social, economic and technical solutions.

These case studies show that the transition is already happening and, the PPCA firmly believes, is inevitable.

# The art of the possible: **Policy solutions**

Government leadership is an essential enabling condition for any transition away from unabated coal power. It is the bedrock upon which the rest of the transition architecture is built. Policy leadership sets a clear path for all others who have a role – from investors, generators, utilities and system operators to workers, communities and civil society.

Embarking on a transition away from coal can be challenging. It starts with political will but relies upon genuine public engagement and consultation, resulting in new thinking to identify the necessary legislative, regulatory and policy changes.

Some of the models that governments frequently deploy – often in combination – to build a coordinated policy framework include the following:

- **Phase-out mandates,** setting a firm political or policy commitment to phase out emissions from coal power by a specific date, preferably aligned with science-based climate goals. Most countries use mandates as one of the first steps in implementing a coal phase-out framework.
- **Legislation** to enshrine coal power phase-out in law, in parallel with the use of **pollution regulations**, such as emissions performance standards. Existing air pollution rules can be a powerful tool to accelerate the retirement of unabated coal power plants.
- **Carbon pricing** systems, ensuring that unabated coal power pays the true costs of carbon pollution. As the price of carbon rises, unabated coal power plants face the economic reality that there is no business case for them.
- **Models that expose coal generators to market prices,** enabling more competition in the electricity market, especially from renewable energy technologies. This can create opportunities for innovation and lower prices, but may involve a different model and more price variability than long-term power purchase agreements where the sale of the electricity is guaranteed at a fixed price for several years.

Once a policy framework is in place, phase-out can happen faster than anyone would have believed. Three case studies in this section from the national governments of the UK, Canada and Chile explore how policy leadership has kick-started a national shift from coal to clean energy.

Leadership is not, however, exclusively a national affair. Subnational governments – from provinces and states to counties and municipalities – can drive meaningful change. The last study in this section explores the measures that the province of South Chungcheong, South Korea has taken to lead the country in a transition away from coal power.

**Making coal history: The United Kingdom**

**Putting policy in drive: National and subnational phase-out frameworks align in Canada**

**Finding the balance: Chile brings industry and people together to accelerate coal exit**

**Chungnam style: A policy playbook for subnational leadership in South Korea**

The art of the possible: **Policy solutions**

# MAKING COAL HISTORY

## THE UNITED KINGDOM

**Decades of energy and climate policy action will culminate in an October 2024 phase-out of the fuel that powered the industrial revolution.**

Unabated coal power generation in Great Britain will be phased out by 1 October 2024 as part of efforts to meet the UK's net-zero target by 2050. This represents a genuine historical milestone, given coal's prominence in UK power generation and industrial activities.

In the middle of the 20th Century, coal dominated all sectors of the UK economy: steel production; industrial processes; domestic heating; the production of 'Town gas' for lighting and cooking; railway transport; as well as fuel for electricity generation. 70 years ago, in 1952, coal provided 96% of UK electricity production. The UK's former state-owned Central Electricity Generating Board then constructed a large part of the country's modern coal fleet in the 1960s and 1970s, building coal power plants that were the biggest in Europe.

The UK continued the development of its power sector with the construction of nuclear power plants during this period. Another step taken in 1992 saw legislation permitting the use of natural gas to generate electricity. This led to a rapid shift by the newly privatised electricity sector towards the generation of electricity from gas (the so-called 'dash for gas') in the 1990s.

The share of coal power gradually declined as other sources of generation were added, but the past decade has seen a significant transformation. Coal's share of UK electricity supply has fallen dramatically from almost 40% in 2012 to less than 2% in 2020. In parallel, the UK has seen massive growth in renewable generation, particularly offshore wind. These structural trends enabled the UK to become the first national government to commit to phasing out coal power generation, which it announced in 2016.

There were several key moments in achieving this. EU policy placed the first major hurdle in the way of the UK's coal fleet in 2001 with the Large Combustion Plant Directive, leading to 8GW of

The share of coal power gradually declined as other sources of generation were added, but **the past decade has seen a significant transformation**. Coal's share of UK electricity supply has fallen dramatically from almost 40% in 2012 to less than 2% in 2020.

shutdowns over the following 15 years. UK government policy then created the conditions for the full removal of coal-fired power generation from the country's power mix, particularly through the 2008 Climate Change Act, the 2011 Electricity Market Reform and 2017-2021 Coal Phase-out Plans.

A crucial step in the acceleration of the UK's coal phase-out was the introduction in 2013 of a Carbon Price Floor (CPF), imposing a tax on energy generators using fossil fuels to generate capacity. It consists of two components: (i) the EU Emissions Trading System (ETS) price, and (ii) the Carbon Price Support mechanism (CPS), which tops up the EU ETS allowance price as projected by the UK government to the CPF target. The CPF was frozen at a maximum of £18/$tCO_2$ from 2016 to 2020 to limit the competitive disadvantage faced by business and to reduce energy bills for consumers.

The introduction of UK Contracts for Difference (CfDs) in 2014 represents another landmark in support of the transition from coal-fired to low-carbon electricity generation. CfDs boost investment in renewable energy by providing the developers of projects that have high upfront costs and long lifetimes with direct protection from volatile wholesale electricity prices. CfDs also protect consumers by paying back when electricity prices are high, a mechanism which is projected to result in £1 billion of savings in 2022-2023. Overall, renewables provided 40% of UK electricity generation in 2021.

By March 2021, only three coal plants remained open: Drax, Ratcliffe and West Burton A. All three faced a national phase-out date of 2024 but were scheduled to stop operating earlier as a result of the CPF's impact on the economics of coal-fired electricity generation.

As a temporary response to the impact on natural gas markets of Russia's invasion of Ukraine, the UK government has agreed with National Grid Electricity System Operator and the owners of these power plants that they will provide additional short-term winter reserve capacity.

These short-term extensions to closure dates help to mitigate the risks to security of supply, supporting further investment in renewables and the full decarbonisation of the UK power sector. The UK government remains committed to ending the use of coal power by October 2024 as planned.

*Wind turbines in Royd Moor, United Kingdom | Source: Shutterstock*

The art of the possible: **Policy solutions**

# PUTTING POLICY IN DRIVE

## NATIONAL AND SUBNATIONAL PHASE-OUT FRAMEWORKS ALIGN IN CANADA

**Through policy leadership at both the national and subnational levels, Canada is phasing out coal emissions in a way that makes it an attractive centre for energy investment and development.**

A decade ago, Canada became the first country in the world to introduce regulations requiring coal-fired power plants to meet stringent performance standards after it recognised that no fossil fuel produces more emissions than coal in generating electricity. Following the Paris Climate Conference in 2015, Canada went further, announcing a phase-out of unabated coal power by 2030 and amending regulations to achieve this by setting a limit on greenhouse gas emissions from unabated coal power plants.

But Canada's coal phase-out story is as much about subnational leadership as it is about national policy, since it is Canada's provinces that make decisions on how to generate power.

Canada's most populous province, Ontario, was the first jurisdiction in North America to eliminate coal power. It committed to phasing out coal-fired generation in 2003, when coal accounted for approximately 25% of its electricity supply mix, subsequently closing its last coal unit in 2014. This policy decision was primarily motivated by the health impacts and economic costs of air pollution. Ontario's coal phase-out resulted in the number of smog days declining from 53 in 2005 to zero in 2014. In addition, the policy was praised for being "the single largest greenhouse gas reduction measure in North America" at the time.

Coal phase-out is also well under way in the province of Alberta, where coal used to provide over 80% of electricity. Alberta will be off coal power by the end of 2023 – a full seven years ahead of the 2030 federal target and almost 40 years sooner than was forecast in 2015.

The province of Saskatchewan hosts Boundary Dam 3, the world's first commercial-scale coal unit to operate with Carbon Capture and Storage (CCS) technology designed to capture up to 1Mt of emissions per year.

As it transitions to a low-carbon economy, Canada is committed to putting people first and ensuring that workers have the skills and opportunities to thrive in a net-zero world. A Just Transition Task Force was launched in 2018 to determine how best to support workers and communities impacted by the phase-out of coal power. The Taskforce's final report in 2019 included ten recommendations that resulted in the government committing C$185 million to transition initiatives that support skills development, economic diversification and infrastructure projects in impacted communities.

Canada's accelerated coal phase-out supports its latest 2030 Emissions Reduction Plan to achieve a net-zero electricity grid by 2035, eliminating more than 12Mt of greenhouse gases by 2030 and nearly 100Mt by 2050. These measures will also reduce air pollution and protect human health while advancing Canada's transition to a clean growth economy.

## The art of the possible: Policy solutions

# FINDING THE BALANCE

## CHILE BRINGS INDUSTRY AND PEOPLE TOGETHER TO ACCELERATE COAL EXIT

**Chile has put in place an ambitious coal power phase-out strategy. It is on track to be coal-free sooner than the country ever imagined possible.**

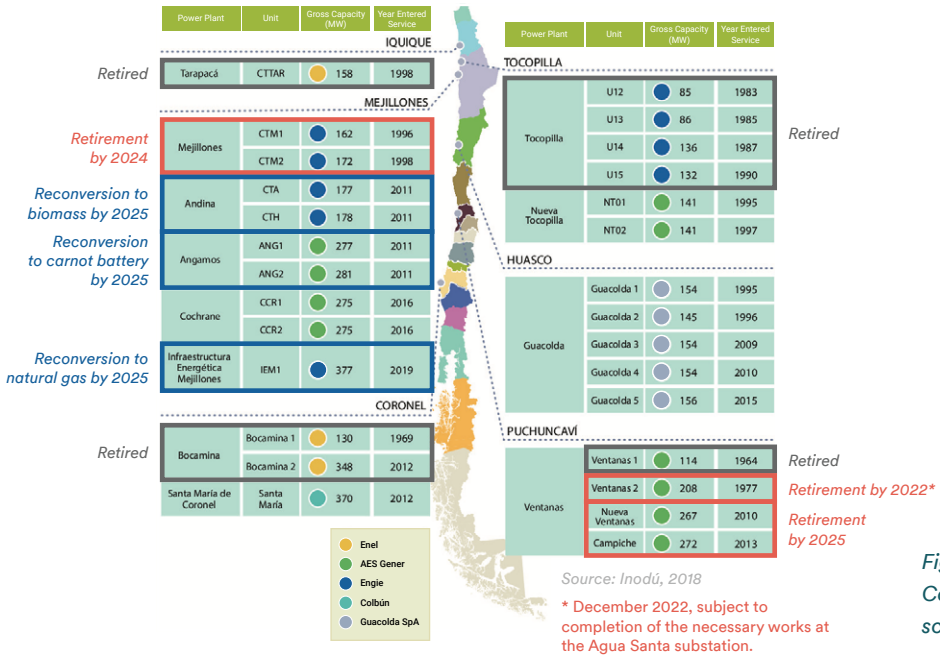
Nearly 40% of Chile's electricity comes from coal. Phasing this capacity out is a core measure that will account for 13% of planned greenhouse gas abatements by 2050 and trigger transformational changes in other energy-related sectors. Achieving a faster coal phase-out enables more renewables on the system and promotes electrification in key sectors such as mining, industry and transport. It also supports the development of a green hydrogen industry.

To eliminate coal from the energy matrix, in 2018 Chile's Energy Ministry assembled stakeholders and set up a round table including trade unions, non-governmental organisations (NGOs), and public and private entities. The aim was to collectively identify the key issues to be considered for a just, responsible and planned transition.

Since mid-2019, as a result of this process, Chile has had a public-private agreement in place under which energy utilities have committed to decommissioning or reconverting their coal power plants before 2040. They have also pledged to stop investing in new coal-fired plants without carbon capture and storage.

While the agreement is voluntary in nature, it has been fully implemented and its original schedule has been accelerated. The initial target of retiring eight out of 28 coal power plant units by 2025 has been brought forward by three years. In 2022, eight power plant units have now been retired and one more could be added to the phase-out scheme (Ventanas 2), with several others pushing their withdrawal dates forward (Figure 4).

- From June 2019 to October 2022, **8 power plant units** have been retired.
- By 2025, **13 power plant units** will be retired and **5 more** will be reconverted, representing 65% of Chile's coal-fired power plants.
- Plants with no retirement date: to be phased out no later than 2040.




Source: Inodú, 2018

* December 2022, subject to completion of the necessary works at the Agua Santa substation.

*Figure 4: Coal phase-out schedule in Chile*

It is very likely that the Chilean power system will be coal-free sooner than 2040, with renewable energy replacing capacity and paving the way to the country achieving net-zero by 2050.

These transformational changes do not come without challenges, including maintaining system reliability, upgrading transmission lines, and ensuring a just transition in its broadest sense. A national just transition strategy aims to deliver reduced impacts on communities, the relocation of workers to new facilities, and adequate retirement plans.

A decarbonisation plan encompassing an accelerated closure or reconversion of coal-fired power plants is also being drawn up. It includes:

*Solar panels in the Atacama desert in Chile | Source: Shutterstock*

- **thermal power plant reconversion options**
- **smart grids to deal with more renewables**
- **energy storage**
- **upgraded transmission and distribution infrastructure.**

Decarbonisation is achieved not only by phasing out coal and other fossil fuels. It requires an energy system that is resilient to the impacts of climate change. Recent prolonged droughts have added to the other challenges, making fossil-fuel power generation look like the most feasible option in the short term. But Chile does not want to follow that path. A sustainable energy future is a must, and mitigation and adaptation to climate change must be included in every action taken under the country's plan for carbon neutrality.

The art of the possible: **Policy solutions**

# CHUNGNAM STYLE

## A POLICY PLAYBOOK FOR SUBNATIONAL LEADERSHIP IN SOUTH KOREA

**The coal-power heartland of South Korea – South Chungcheong Province – has blazed a pathway towards carbon neutrality through bold policies and intensive collaboration at home and abroad.**

Chungnam is home to two million people, around 4% of the country's population, but hosts 29 of South Korea's 57 coal-fired power plants. As of 2019, the region was the country's largest greenhouse gas emitting province with 154Mt, or 22% of national emissions. From such a difficult starting point, Chungnam initiated collaboration with governments at home and abroad to curb emissions and embark on a pathway towards carbon neutrality.

Since 2017, Chungnam has convened an annual International Conference on Coal Phase-Out and used this event to announce forward-looking policies and encourage public discourse on decarbonisation and the energy transition.

In 2018, the province became the first in South Korea to join the Under 2 Coalition, laying the groundwork for global collaboration in tackling climate change. It also signed the 'Agreement on Air Environment Improvement' with China's Jiangsu Province to reduce fine particulate matter (PM 2.5). Likewise, it put before the central government plans for the early retirement of ageing coal power plants. That same year, Chungnam also joined the PPCA.


*Chungnam Governor Kim Tae-heum participates at the* **2022 Chungnam International Conference on Net Zero and Coal Phase-Out** *alongside representatives from subnational governments in Japan and China*

By 2022, Chungnam had reduced its $CO_2$ emissions to 154Mt – down 7Mt from 161Mt in 2018 – and had begun developing a roadmap to achieve **the ambitious goal of carbon neutrality by 2045**.

Chungnam was the first East Asian local government to declare a climate emergency in 2019 and has made coal phase-out policies, including the early retirement of coal power plants, a cornerstone of its 2050 Carbon Neutrality Strategy. Units 1 and 2 of the Boryeong coal power plant, for example, were shut down in 2020, two years ahead of the national government's schedule.

In 2020, Chungnam also announced an initiative of 56 subnational administrations to add "coal phase-out" as a criterion when selecting banks for the deposit of their public funds. Having subsequently spread through the country, this initiative now covers 69 administrations with US$200 billion worth of annual funds. This effort has diverted significant capital flows away from coal power and spurred the South Korean national government, in April 2021, to ban new public financial support for overseas coal-fired power investment.

By 2022, Chungnam had reduced its $CO_2$ emissions to 154Mt – down 7Mt from 161Mt in 2018 – and had begun developing a roadmap to achieve the ambitious goal of carbon neutrality by 2045 based on seven pillars: climate change, just transition, future industry, green life, transport/architecture, circular economy and education/promotion. The province also plans to report transparently on its progress.

Chungnam will continue to invest in and develop projects that promote carbon neutrality as an opportunity to elicit united action and cooperation among Asian countries and the PPCA to pursue the phase out of coal power generation by 2030.


*Governor Kim Tae-heum, PPCA representatives, and special guests celebrate PPCA-Chungnam cooperation at the* **2022 Chungnam International Conference on Net Zero and Coal Phase-Out**

# A better future for all: **Social solutions**

It is not enough for policies to be well designed. To deliver a just transition, coal phase-out plans must be developed through a suitable process that places workers and their representatives, along with impacted communities, at the centre of effective social dialogue and robust stakeholder engagement.

Supporting programmes need to offer critical support to workers and communities, including access to sustainable jobs in the clean energy sector, social protection, and economic diversification. By investing in new, high-quality jobs, re-employment programmes, and local economic development, climate action gains support and emissions start to decline.

By creating opportunities for workers and communities through the growth of a clean energy sector, a well-managed phase out of coal-fired power generation not only requires a just transition, but it can also enable one.

The International Labour Organization's *Guidelines for a just transition* describe 'just transition' as a process "towards an environmentally sustainable economy" that "needs to be well managed and contribute to the goals of decent work for all, social inclusion and the eradication of poverty." At the same time, a just transition is a critical enabling factor for an ambitious and effective shift from coal to clean. Just transition should be embedded directly within policy efforts through:

- **Clear targets and pathways towards decarbonisation,** as well as investment in good jobs and social protection. This helps impacted communities, workers and utilities to plan for the retirement of facilities and leverage or create new opportunities.
- **Early negotiations and decision-making that involves robust stakeholder engagement** (through social dialogue between employers, workers and their representatives, and often government). Early participation is essential for crafting just transition policies that fairly and adequately address challenges faced by workers and communities affected by the energy transition.
- **Inclusion of transition financing mechanisms in decarbonisation policies.** A successful energy transition requires adequate funding to ensure sustainable long-term outcomes. Funding can come from public and private finance, including revenues from climate policies such as a carbon tax.
- **Giving priority to impacted communities in clean energy procurement programmes.** Communities and workers who have been affected by the coal phase-out can benefit greatly from increased access to opportunities within the clean energy economy.

If managed well, just transition efforts can provide better and decent jobs, social protection, and more training opportunities for all workers affected by global warming and climate change policies.

Read on for case studies from three jurisdictions developing just transition solutions: Leduc County in Alberta, Canada, Eastern Wielkopolska in Poland, and Germany.

**The hard road:**
**Leduc County, Alberta, navigates an uncertain future**

**Opportunity in disguise:**
**Grassroots leadership guides Poland's Eastern Wielkopolska**

**Framework for action:**
**Germany follows a just process in pursuit of a green grid**

A better future for all: **Social solutions**

# THE HARD ROAD

## LEDUC COUNTY, ALBERTA, NAVIGATES AN UNCERTAIN FUTURE

**When the Government of Canada launched a Just Transition Taskforce to ask for recommendations on how to support coal workers and communities, few had more to lose than Rick Smith, Councillor of Leduc County.**

Home to a coal mine and a generating station that had been key contributors to the tax base since 1988, Leduc County, Alberta, feared the coal phase-out would affect its ability to deliver municipal services and possibly lead to community erosion. Beyond the 450 coal workers whose jobs were at risk, firefighters, teachers and municipal workers could all be affected.

Working with federal and provincial governments, Leduc County secured funding to help diminish the impacts of the coal phase-out, estimated at approximately C$20 million annually. The funding includes C$17.7 million from the federal government to complete the Nisku Spine Road which, when fully constructed in 2023, will increase the accessibility of high-volume transport between key areas creating 950 local jobs and attracting up to 60 businesses.

The process of economic diversification in Leduc County was not easy. The local community was sceptical about the benefits of phasing out coal. Councillor Rick Smith, however, saw promise where most saw challenges. Selected as the municipal representative on Canada's Just Transition Task Force and inspired by Ontario's coal phase-out success, Rick embraced the transition from coal.

Gradually, Leduc County residents and people from surrounding communities started to see the benefits of the transition. The county's economic diversification into logistics and value-added agriculture has resulted in thousands of jobs, keeping workers in the community and offsetting the tax base loss. Emissions were cut by 50% as a result of the power plant being retrofitted to natural gas.

Leduc County's experience shows that building credibility, delivering on promises, and measuring outcomes such as number of programmes established, jobs created, and metric tonnes of greenhouse gases removed, are essential components of a successful transition.

The county's economic diversification into logistics and value-added agriculture has resulted in **thousands of jobs**, keeping workers in the community and offsetting the tax base loss.

A better future for all: **Social solutions**

# OPPORTUNITY IN DISGUISE

## GRASSROOTS LEADERSHIP GUIDES POLAND'S EASTERN WIELKOPOLSKA

**Faced with the challenge of transforming its energy system, Polish policy makers have sought the involvement of different stakeholders as they create a new, shared identity for the region.**

"Every problem is an opportunity in disguise." This statement from the second President of the US John Adams Jr. resonates with the Polish region of Eastern Wielkopolska and its ongoing quest to transform its energy system.

Eastern Wielkopolska includes the city of Konin and the counties of Konin, Koło, Słupca and Turek. Historically, the area's economy has been heavily dependent on and dominated by the mining and energy sectors. Four years ago, the region embarked on a new vision for its development, guided by the goal of a just transition. This process was not imposed top-down. Instead, it arose from broad engagement with the community and through social dialogue between trade unions and the largest employer in the region – ZE PAK Group.

Eastern Wielkopolska's just transition is first and foremost a social process. As coal mining lies at the heart of the region's identity, a shift in the society's collective mindset was required to create an entirely new, coal-free identity that remained authentic to its residents. Prioritising public dialogue and involving individuals from different backgrounds made it possible to understand distinct points of view. Stakeholders were encouraged to examine all the solutions offered and could add fresh concepts and suggestions. This collaborative approach enabled policy makers to see opportunities they had overlooked, and even change their minds on certain topics, while allowing information on the just transition to reach a wider audience.

Eastern Wielkopolska's participation in the European Commission's *Initiative for Coal Regions in Transition* has paved the way for the region's own just transition. Alongside providing capacity-building and technical assistance, this programme created a space for a diverse group of stakeholders from Eastern Wielkopolska to exchange ideas on the region's transformation.

As coal mining lies at the heart of the region's identity, a shift in the society's collective mindset was required to create an entirely new, coal-free identity that remained authentic to its residents. **Prioritising public dialogue and involving individuals from different backgrounds made it possible to understand distinct points of view.**

Meetings of the initiative were not only attended by local government representatives, but also by NGOs, trade unions, and private sector representatives such as ZE PAK Group, the owner of the local mines and power plants. The region's transformation also gained international attention, enabling local policy makers to connect to the World Bank (now acting as an advisor on the just transition process), NGOs such as the Polish Green Network and WWF, and experts from the European Investment Bank's JASPERS Initiative and PwC, amongst others.

Building on a base of effective public dialogue and community solidarity, grassroots leaders found opportunities to forge a new identity that utilised the existing strengths of the region including:

- **a central location in Poland**
- **perfect conditions for green energy development**
- **power grid resources and the potential for convenient connections**
- **a highly qualified labour force**
- **a university.**

Analysing these strengths has supported policy makers in developing a vision of how to open up new economic opportunities through specialisation in sectors such as e-mobility, renewable energy sources, and modern energy technologies including hydrogen production.

As part of efforts to evolve its clean energy capacity, the region has created the Wielkopolska Hydrogen Valley brand which provides a foundation for the region's new identity and underpins the *Territorial Just Transition Plan and Development Strategy of Eastern Wielkopolska.* Key objectives have been established for the region to achieve climate neutrality as early as 2040, while ensuring a high quality of life for its residents. These include ending coal-use in the energy sector and reducing $CO_2$ emissions in the sector by 90% by 2030.

Ultimately, the success of Eastern Wielkopolska's just transition rests upon its ability to forge a new and greener identity underpinned by shared knowledge and understanding.


*Wielkopolska Hydrogen Valley | Source: Poznan City Hall*

A better future for all: **Social solutions**

# FRAMEWORK FOR ACTION

## GERMANY FOLLOWS A JUST PROCESS IN PURSUIT OF A GREEN GRID

**Various policy reforms are being used to deliver a national plan to phase out coal that will create good jobs and secure more energy from wind and solar sources.**

Germany's energy transformation, the "Energiewende", is well under way, with the share of renewable energy in gross electricity consumption reaching a record 45% in 2020. The new government coalition of Greens, Social Democrats and Free Democrats targets a doubling of this share to 80% in 2030, culminating in a nearly decarbonised electricity grid by 2035.

Several obstacles have stood in the way of further expanding renewable energy, including historical reliance on fossil fuels. As coal mining has been at the heart of the economy in several regions, Germany set up a Coal Commission in 2018 and tasked it to develop a plan for coal phase-out. Key stakeholders from industry, trade unions, coal regions, environmental NGOs, research institutes, and communities developed an action plan for a just transition. The German government later adopted the Commission's recommendations for phase-out dates, a compensation programme, the creation of good jobs, and a just process, putting them all into legislation.

In total, up to €40 billion is being made available for regional economic development in the states of Brandenburg, North Rhine-Westphalia, Saxony-Anhalt and Saxony over two decades. By August 2021, a year after the plan's adoption, these states had submitted to the federal government 175 projects in areas ranging from research, digitalisation and small and medium-sized enterprise (SME) development to green economy, green energy industry, green mobility, tourism, culture, and nature protection. In addition, federal and state administrations have jointly approved several rail and road infrastructure projects as the backbone of a future-oriented regional development. A compensation scheme supports older workers losing their jobs before reaching retirement, and the federal Government is setting up new offices and agencies itself in the coal regions to help create 5000 new jobs by 2028.

As coal mining has been at the heart of the economy in several regions, **Germany set up a Coal Commission in 2018 and tasked it to develop a plan for coal phase-out.** Key stakeholders from industry, trade unions, coal regions, environmental NGOs, research institutes, and communities developed an action plan for a just transition.

The April 2022 Osterpaket (Easter Package) also introduced a raft of energy policy reforms designed to remove barriers, such as lengthy permitting procedures, that have slowed the growth of Germany's wind and solar capacity in recent years, and gives renewable energy projects priority status with an "overriding public interest". Another new requirement, which ensures that 2% of land area is available for wind energy developments, will also help push regions and federal states to align more local legislation with national expansion targets.

Availability of renewable energy was widely seen as a key factor and localised advantage that supported investment and growth. Allianz Economic Research estimates that the Osterpaket segment of the country's "Klimaschutzsofortprogramm" or "immediate climate protection programme," represents a great value for the country, with growth and employment benefits that will vastly exceed the fiscal support required.

Germany's overall plan will dramatically increase the share of renewables while phasing out coal and nuclear energy, but crucially maintains a stable and secure electricity grid. Over the rest of this decade, expansion goals for wind and solar will triple in order to reach targets set for each technology, while also meeting increased electricity demand from various sectors including transport and industry. The energy crisis resulting from Russia's invasion of Ukraine has required a temporary extension of service for several coal power plants held in reserve, however, Germany stands firmly by its goal to phase out coal, ideally by 2030.

*Solar panels on rooftops in Freiburg, Germany | Source: Shutterstock*

INSIGHT

# MICHAEL R. BLOOMBERG

*UN SECRETARY-GENERAL'S SPECIAL ENVOY FOR CLIMATE AMBITION AND SOLUTIONS AND FOUNDER OF BLOOMBERG LP AND BLOOMBERG PHILANTHROPIES*

**Russia's invasion of Ukraine has reinforced the urgent need for countries to speed up investment in clean energy to address energy security as well as climate challenges. Without enough renewable energy capacity to power their economies, European countries that had depended on Russian gas have been forced to fall back on the dirtiest and most harmful power source there is: coal.**

Ending coal use is the single most important step we can take to fight climate change, because coal-fired power plants emit more greenhouse gases globally than any other source. It's also the most important thing we can do to improve public health around the world, because pollution from coal plants poisons the air and water. Coal is also increasingly harmful for electricity consumers and a drag on economic growth, because wind and solar power are now cheaper than coal in most of the world. Public and private sector leaders understand the clear incentives for ending coal use. But we still have a long way to go – and no time to waste. Speeding up the transition to clean energy – and closing the book on coal for good – is the goal of the Powering Past Coal Alliance.

Since the Alliance launched five years ago, it has grown to include more than 165 members and we've seen a lot of important progress. For instance: in the 38 countries that make up the OECD, more than 50% of coal power capacity has retired in the last five years, and the pipeline of future coal projects has shrunk dramatically. In the US, almost two-thirds of coal-fired power plants have closed or switched to cleaner energy in the last decade. In just five years, half of Europe's coal plants closed or announced their retirement before 2030. Since 2015, the number of non-OECD countries without any planned new coal plants more than doubled. Meanwhile, more countries are committing to phasing out coal completely, and more public and private investors are committing to ending coal financing, including by signing up to the PPCA's Finance Principles, because they recognise the enormous financial risks posed by climate change.

Coal's days are numbered, and the impacts cascading from Russia's invasion of Ukraine won't change that. But many challenges remain, including subsidies and other policies that tilt energy markets towards coal and away from cheaper, cleaner energy. In many developing countries with growing populations and energy needs, not enough investment is flowing to clean energy projects. And many countries and private investors continue to invest in coal: since 2019, financial firms have invested around $1.5 trillion in the global coal industry.

Driving investment away from new coal and towards clean energy, and supporting the early retirement of coal power, is essential to winning the battle against climate change. It will also save lives, create new jobs, and spur economic growth. It couldn't be more important or more urgent. This report is a blueprint for how we can do it – and an invitation to leaders across the world to join us.

# A new economic reality: **Finance & investment solutions**

It has never been clearer that there is no justifiable business case for unabated coal power. According to the think tank Carbon Tracker, almost one-third of the existing global coal power fleet now operates at a loss. Based on current pollution regulations and climate policies, this is expected to rise to two-thirds of the fleet by 2040.

Cheap financing is effectively over, with China, South Korea and G7 countries committing in 2021 to end international public finance for new unabated coal power. The coal power industry faces the prospect of an estimated US$90-220 billion in stranded assets even if no new coal power plants are built.

The private sector has not yet woken up to this economic reality, however. Since 2019, financial institutions have pumped more than US$1.5 trillion into the global coal sector, even though financial firms are increasingly committed to net-zero targets.

While COP26 saw the greatest ever number of net-zero commitments by financial institutions, a net-zero commitment without a robust, credible coal policy is a breach of trust. Urgent action is required today, not in 2050, to put the world on track to meet net-zero targets.

Savvy investors will know that one sector's risk is another's opportunity. There is money to be made in a growing global market for clean energy and the repurposing of coal sector assets. According to the International Energy Agency, getting the world on track to meet a 1.5°C warming target will require annual investments in the order of US$4 trillion. This is a huge opportunity for financial institutions, with the biggest prizes awaiting those who successfully shift from coal to clean energy.

Luckily, there are tools and approaches to direct the massive shift in capital and investment needed to meet climate goals. Within the PPCA, this blueprint is enshrined in the PPCA Finance Principles, which translate the requirements for global coal phase-out into tangible actions for the financial sector. These principles are backed by guidance and tools defined by the evolving state of art and best practices on coal policies, indicators and metrics – not to mention a growing membership of more than 30 financial businesses and institutions.

The case studies in this section cover exciting areas of financial innovation and experimentation. New Mexico is demonstrating new business models for accelerating coal power retirement. In France, government encouragement has inspired world-leading private sector policies. And several clean energy funds, including the Climate Investment Funds, are applying new models of support for developing countries designed to meet energy access goals by breaking the shackles of coal power on emerging economies.

**Accelerated retirement: New Mexico pioneers the business case for closing coal**

**France: Encouraging private finance to take climate action**

**Clean energy for all: New funds for emerging economies to phase out coal power**

A new economic reality: **Finance & investment solutions**

# ACCELERATED RETIREMENT

## NEW MEXICO PIONEERS THE BUSINESS CASE FOR CLOSING COAL

**In the US, the use of low-cost financing in the form of securitisation in the state of New Mexico has enabled the early retirement of coal plants with a boost for renewables and support for communities.**

Coal-fired power in the US has declined significantly in the last decade, with generation falling by around 60% between 2010 and 2020. In 2022, coal is expected to account for more than 85% of all power plant retirements, representing 13GW in total.

While these trends are encouraging for a Paris-aligned future, the US still has the third largest coal fleet in the world. The bulk of coal retirements happened in competitive markets, where coal power is exposed to cheaper alternatives. Most remaining coal is insulated from such competition, making it more challenging to chart a clear pathway to early decommissioning.

Tools like ratepayer-backed bond securitisation have an important role to play. This refinancing mechanism has quickly grown in popularity with supporting legislation introduced or enabled in no fewer than 12 US states. Through its design, securitisation can facilitate very low-cost financing to transition coal plants early, reinvest in clean energy, and support affected workers and communities.

Securitisation was enabled in New Mexico in 2019 as part of the state's Energy Transition Act. Since then, the state's largest utility, the Public Service Co. of New Mexico (PNM), has applied and received approval for refinancing the cost of transitioning coal plants well ahead of their full economic lives.

Several provisions in New Mexico's legislation ensure bondholders will be repaid from securitisation through guarantees that mean:

- **Bondholders can recoup their investments via securitisation to customer bills.**
- **These surcharges can be periodically adjusted to reflect changes in the customer base.**
- **The state will not interfere in the recouping of investments.**

To protect customers and affected stakeholders, the legislation also ensured:

- **Limits on recouping coal plant costs, adjusted for plant size.**
- **Transition assistance for displaced workers and communities, and tribal and native people.**
- **Procurement of replacement resources according to emissions and environmental impacts, costs and economic development opportunities.**

PNM placed a request to transition coal-fired units in the San Juan Generating Station. In April 2020, the regulators issued orders approving the securitisation of US$360 million in costs.

A separate legal entity - known as a Special Purpose Vehicle (SPV) - was subsequently created to take the San Juan Generating Station units off the utility's balance sheet. This was a key part of the securitisation process as the SPV was then able to issue low-interest bonds, share those proceeds with the utility, and ensure recoupment of investment through customer bill charges.

This particular transaction is expected to reduce average residential customer bills by US$6.87 per month in 2023. Net savings from securitisation are estimated to reach US$80 million in 2023, with additional savings over following years. It also drove a 950MW replacement energy portfolio, comprising 650MW of solar photovoltaic and 300MW of battery energy storage, as well as 24MW of demand response.

With securitisation enabled in the state, New Mexico's stakeholders have an ongoing opportunity to avail themselves of low-cost financing to retire coal plants early, replace them with clean energy, and support affected workers and communities.

*Solar panels in the Ranchos de Taos valley in New Mexico | Source: Shutterstock*

A new economic reality: **Finance & investment solutions**

# FRANCE

## ENCOURAGING PRIVATE FINANCE TO TAKE CLIMATE ACTION

**New legislation and interventions by the government have led French financial institutions to adopt ambitious climate commitments and prompted the development of sectoral guidance on how to achieve them.**

In late 2018, during Climate Finance Day, France's Minister for Economy and Finance, Bruno Le Maire, urged the French financial sector to act swiftly to address climate risk. In 2019, a new energy and climate law was adopted which, among many things, requires French financial institutions to report on the portion of their investments exposed to fossil fuels.

In 2019, professional federations representing the whole of the French financial sector (asset management, banking, insurance, and private equity) signed a commitment to publish individual coal-exit strategies with an explicit goal to support the achievement of net-zero carbon emissions by 2050 (in line with French and EU targets).

In practice, this pledge means most French financial institutions will no longer finance coal in EU member states and OECD countries from 2030, and across the rest of the world after 2040. It also means each French institution must, from 2020 onwards, include a reference to its coal divestment strategy (including a detailed timetable) within its wider sustainability reporting.

Controls and accountability mechanisms were swiftly established to ensure the credibility of these commitments, including supervision and monitoring by the Financial Markets Authority and the Prudential Supervision and Resolution Authority. The first two annual assessments in 2020 and 2021 showed varying levels of ambition and effort on the part of financial institutions. Coal phase-out plans differed significantly, as did the scope of banking and financial services covered by the policies and the definition of coal applied.

[Regulatory] supervisors have published annual assessments around the time of Climate Finance Day each year along with updated guidance. To date, they have made nearly **30 recommendations to guide financial institutions** toward defining their commitments and reporting on implementation more effectively.

The economy and finance ministry watched these developments closely and in 2020, Minister Bruno Le Maire called on the sector to renew its coal phase-out commitment and to adopt common and detailed criteria. He also asked the Paris financial centre to develop an exit strategy for the financing of unconventional fossil fuel activities.

The Sustainable Finance Observatory, launched in October 2020 by *Finance for Tomorrow* together with the French Business Federations, has worked to arrive at common definitions and methods for implementing financial institution commitments and has developed an open-access platform gathering data on commitments and their implementation.

While built originally to support the Paris financial centre's coal-divesting commitments, the platform has quickly broadened its remit, gathering information on sustainable finance across four areas:

- **Coal-exit strategies.**
- **Financing the transition to a low-carbon economy.**
- **Responsible investment in accordance with ESG criteria.**
- **Responsible product offerings.**

By the end of 2021, the Sustainable Finance Observatory had proposed a common set of criteria for coal divestment across the financial sector and a set for the alignment of financial institutions on the phase-out of financing for unconventional fossil fuels.

In the meantime, supervisors have published annual assessments around the time of Climate Finance Day each year along with updated guidance. To date, they have made nearly 30 recommendations to guide financial institutions toward defining their commitments and reporting on implementation more effectively.

At the same time, Minister Bruno Le Maire called on French financial institutions to also commit to a credible and transparent trajectory to reduce the carbon intensity of all their investments in line with the Paris agreement and asked Yves Perrier, CEO of Amundi and Vice President of Paris Europlace, to produce a report on how to achieve this. Published in March 2022, this document recommends major changes to the governance of the French financial sector to help ensure it will better address the climate challenge.

A new economic reality: **Finance & investment solutions**

# CLEAN ENERGY FOR ALL

## NEW FUNDS FOR EMERGING ECONOMIES TO PHASE OUT COAL POWER

**New investment programmes share universal lessons through a holistic approach to support governments, businesses and communities as they move towards a just coal-to-clean transition.**

Despite its potential benefits, there continue to be significant barriers to a just transition away from coal, which is responsible for more emissions than any other fossil fuel, representing approximately 41% of global fossil $CO_2$ emissions.

The state of Jharkhand, India, is home to around a million people working across the coal supply chain, several million informal coal miners, and 150,000 coal industry pensioners. More broadly, millions of railway passengers nationwide rely on cross-subsidised fares from the coal industry, and national and local governments receive direct revenues from coal companies. Similarly, in Mpumalanga, South Africa, direct jobs in the coal sector account for 10% of total employment in the province. More than half of the small businesses in the area offer services to coal mines or coal power stations.

The broad dependence on coal in these regions underscores the challenges of leaving it behind. Pursuing a just transition will mean considering impacts on communities, businesses and local governments whose revenues and ability to deliver basic services may be affected, as well as environmental legacies such as degraded forests or contaminated lands. While these impacts can be especially acute in coal regions, their implications are far-reaching, extending across sectors, geographies and value chains. All of this calls for a holistic and inclusive approach.

A new breed of investment programmes seeks to address these complex challenges in developing countries.

The Climate Investment Funds (CIF) was established in 2008 to mobilise finance through multilateral development banks for low-carbon, climate-resilient infrastructure in developing countries. CIF's large-scale, low-cost, long-term financing lowers the risk and cost of climate financing, tests

Pursuing a just transition will mean **considering impacts on communities, businesses and local governments** whose revenues and ability to deliver basic services may be affected, as well as environmental legacies such as degraded forests or contaminated lands.

new business models, builds track records in unproven markets, and boosts investor confidence to unlock additional sources of finance.

CIF's Accelerating Coal Transition (ACT) investment programme was designed to address coal sector interdependencies using a holistic financial toolkit. It offers concessional financing at scale to India, Indonesia, the Philippines and South Africa to support three interconnected action areas that are critical to facilitating a transition to cleaner energy sources:

1. Through its *governance* pillar, ACT helps countries to design transition strategies, including the policy and institutional reforms needed to put the country on a sustainable coal transition pathway.

2. The programme's *people* pillar provides funding to ensure a just transition of communities. Re-skilling, re-training and economic diversification (among others) not only prepare people for the jobs of the future but also create alternative opportunities to generate an income.

3. Finally, the *infrastructure* pillar finances the decommissioning, repurposing and repowering of existing coal assets to salvage remaining economic value and fill electricity supply gaps (among others).

The ACT programme was launched at COP26 with an indicative allocation of US$200-500 million for each of the four recipient countries. Actual funding will be based on a needs assessment of each country's key priorities as presented in the form of an investment plan by early 2023. The programme is also a key pillar of the Just Energy Transition Partnership announced for South Africa last year. As the ACT programme is implemented over the coming years, it will demonstrate potential approaches and identify critical lessons that will inform not only developing but also developed countries' just energy transition strategies.

ACT is just one of several programmes tackling the complex economic and societal impacts of coal phase-out. The Asian Development Bank has launched an Energy Transition Mechanism to use market-based mechanisms to retire coal faster. The South East Asia Energy Transition Partnership is a unique collaboration of governments, philanthropies, and other partners seeking to establish coal transition dialogues in the region. As these programmes are implemented in the coming years, they will produce critical lessons that will inform just energy transition strategies for both developing and developed countries.

*Worker installing solar panels in rural village in India | Source: Shutterstock*

# Keeping the lights on: **Technical solutions**

No one ever thought that a fundamental transition in how to make and distribute electricity would be simple. But as regulators, utilities and system operators get down to the business of switching off coal, they are finding solutions that can make it easier to keep the lights on.

Grid operators that are used to large, centralised coal-fired power plants can find it difficult to envision a grid that runs on decentralised and variable sources like wind and solar. In practice, grid reliability and flexibility will only become more important as a growing number of economic sectors switch to low-carbon electricity – think electric vehicles, electric heating for buildings, and the electrification of some industrial processes.

To navigate this transition, utilities and grid operators are deploying reliable technological solutions more effectively and in innovative ways:

- Diversifying energy sources with renewables while investing in storage and modernised grids that allow more flexible and dynamic operation.
- Using demand-side management and energy efficiency to better match the demand for power with its supply.
- Building interconnections between regions to move power from where there are abundant cheap renewables to where it is most needed.
- Adopting new approaches to system planning and operations to run grids more flexibly.
- Fundamentally rethinking what it means to be an energy company or service provider, to realign corporate goals and priorities with the energy transition.

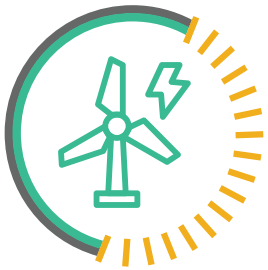
As they embrace these changes, grid operators are seeing the benefits. A decentralised, diversified grid is more resilient to planned or unplanned outages of any one power source and provides greater protection against large-scale disruptions. Planners are finding that clean energy portfolios can provide the same level of reliability as coal power plants but at a lower cost in many cases. And it is possible to operate a nimble, modernised grid flexibly to respond quickly to changing demand profiles.

Read on to learn more about the corporate and operational changes that are making a difference. At Ørsted, the Danish energy company has completely reimagined its business practices for a carbon-constrained future. Meanwhile, in the UK, grid operator National Grid is pioneering practices to enable a full transition from coal. Finally, Germany is investing heavily in interconnections, demand-side measures and storage to maintain grid reliability as it accelerates coal retirements.

**Ørsted:**
**A corporate model for transition**

**National Grid UK:**
**A swift and safe transition from coal to cleaner energy**

**Non-stop power:**
**Securing grids without coal in Germany**



Keeping the lights on: **Technical solutions**

# ØRSTED

## A CORPORATE MODEL FOR TRANSITION

**A Danish oil and gas company's inspiring transformation into a green energy pioneer shows how to achieve both climate sustainability and financial success.**

Around 15 years ago, Ørsted was a domestic Danish energy firm called Dong Energy (Danish Oil and Natural Gas) that made most of its money from fossil fuels. As one of Europe's most coal-intensive companies, with 85% of its power and heat production coming from fossil fuels, it was responsible for one-third of Denmark's $CO_2$ emissions.

Several factors forced the company to confront a changing landscape. Senior leadership saw that growing societal focus on climate change would fundamentally challenge and eventually erode its fossil-based business. For example, despite substantial investment, the company failed to develop a new 1.6GW coal-fired power station in north-eastern Germany following strong local opposition.

At the same time, the economic potential of the renewable energy sector was growing, the science on climate change was gaining clarity and visibility, and countries were beginning to set emissions reduction targets. Meanwhile, the firm's fossil-based earnings were under pressure due to several external events, including the financial crisis of the late 2000s.

In 2008, the company set out a vision to transition away from fossil fuels and become a green energy business. This included a strategic goal of flipping the ratio of power and heat production from fossil fuel to renewable sources so that, by 2040, 85% would be green and only 15% would be from fossil fuels.

To make this happen, the company took several actions to develop a global renewable energy business:

- **Closed its coal-fired heat and power plants, or converted them to sustainable biomass.**
- **Set a coal phase-out target date of 2023.**
- **Divested its upstream oil and gas business.**
- **Increased investment in offshore wind, making it a core business.**
- **Diversified further into onshore wind, solar, green hydrogen and energy storage.**

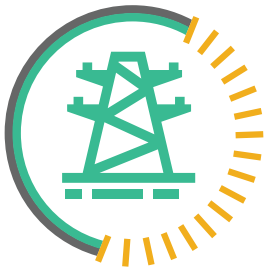
In 2019, Ørsted met its goal of green transformation a full 21 years ahead of schedule, having achieved a 90% share of its generation from renewable sources. The company has reduced the emissions intensity in its energy generation and operations by more than 87% and is on track to become a carbon-neutral business by 2025. In 2023, it will retire its last remaining coal plant.

Ørsted's decarbonisation journey does not end there: it is also the first energy company in the world with a science-based net-zero target covering its full value chain (so-called scope 1-3 under the Greenhouse Gas Protocol). It aims to reduce its emissions intensity by 99% by 2040.

As well as being the global leader in offshore wind, Ørsted now has an expanding set of renewable hydrogen and green fuel projects under development and is ranked as the world's most sustainable energy company in the Corporate Knights Global 100 Index. Its story shows that a strategic shift away from coal can be both financially viable and technically feasible.

Throughout its transformation, Ørsted learned valuable lessons, including the need to confront the reality of a shifting long-term commercial and political landscape, the key role of decarbonisation targets in driving tangible action, and the importance of expecting exponential change.

*Ørsted's offshore wind farms | Source: Ørsted*



Keeping the lights on: **Technical solutions**

# NATIONAL GRID UK

## A SWIFT AND SAFE TRANSITION FROM COAL TO CLEANER ENERGY

**The grid operator looks back on the quiet revolution that allowed the UK's energy system to move away from coal without compromising on costs or security of supply.**

Coal has been at the heart of the economy in the UK for over 200 years, but its decline has been rapid over the last decade, replaced by cheaper and cleaner sources of energy. Although some coal plants are now on standby for the 2022-2023 winter due to unprecedented problems in global energy markets, the UK remains committed to phase-out by 2024.

With coal accounting for 40% of coal power generation as recently as 2012, transitioning away from its use in power generation marks a dramatic shift and has been a major factor in the UK's success in cutting its $CO_2$ emissions to date. While the move away from coal has been rapid, several policy and technical tools have helped achieve a smooth transition with system reliability, performance and costs unchanged as a result.

As well as playing a vital role in connecting millions of people to the energy they use, National Grid continually seeks ways to make the energy system cleaner.

As part of planning for the phase-out of coal power stations, National Grid developed several future scenarios. These were regularly updated to allow engineers and market operators to understand the impact of these planned changes and to develop the tools to operate the power grid securely without coal. The business developed these scenarios publicly with wide involvement of industry experts and academics.

National Grid's analysis of the power market balance and investment showed that new measures would be needed to ensure confidence in future supply capacity. This led to the development of a capacity mechanism that went into operation in 2016.

Alongside this, the introduction of new rules for grid connection allowed windfarms to connect ahead of completion of wider network upgrades, accelerating the rate of connection and removing investment risk for new renewables.

In the end, the decline in coal-burning for electricity was much more rapid than anyone thought possible [...] As a result, the economics of **keeping such large coal-fired facilities operating became increasingly unviable.**

National Grid's technical analysis of the power system highlighted that new sources of voltage management and system security services would be needed to replace services delivered by coal stations. These were approved as required, forming part of the investment plan for the development of the grid.

In the end, the decline in coal-burning for electricity was much more rapid than anyone thought possible. Energy efficiency standards for electricity use slowed growth in demand and the combination of the UK carbon price, the rise of cheaper renewables, and alternative capacity from existing gas power stations meant that coal power stations ran less and less. As a result, the economics of keeping such large coal-fired facilities operating became increasingly unviable.

These rapid changes kept the UK energy industry on its toes. There was a need to quickly replace some of the services that coal power stations had provided, such as local voltage support and services that permit the grid to repower in the event of a total shutdown. National Grid accelerated and successfully delivered investment plans to ensure that coal power stations could close without affecting costs or system reliability.

Looking back, it is inspiring to remember that 15 years ago a transition that looked challenging and slow has in fact proved to be both reliable and very swift. The UK has moved on. The skilled technicians, engineers, traders and scientists employed in coal now work in a booming jobs market, using their skills to support the growth of the power grid for electrification and renewable energy. Moreover, the industries that once underpinned coal supply chains now deliver goods and technologies for offshore wind, solar and batteries as the clean energy economy grows and the power grid moves steadily to zero carbon.

*Wind turbines and electricity pylons in East Sussex, United Kingdom | Source: Shutterstock*

Keeping the lights on: **Technical solutions**

# NON-STOP POWER

## SECURING GRIDS WITHOUT COAL IN GERMANY

**Germany's experience proves that economic growth, energy security, and grid expansion can go hand in hand.**

In 2021, Germany's federal parliament adopted a climate protection law committing the country to becoming climate neutral by 2045. Central pillars for achieving this goal are government plans to phase out coal-fired power generation, ideally by 2030, and to reach a share of at least 80% renewable electricity by 2030 on the way to a decarbonised power sector. The energy transition represents a massive social, economic and technical transformation of the entire country where capacity to generate power from renewable sources will have to expand by more than 30GW annually on average in the coming years.

Security of supply has always been a top priority for the government. Despite the expansion of renewables over the last two decades which provide almost half of Germany's electricity today, households have seen electricity supply disruptions halve to only ten minutes a year, with the country boasting the most reliable grid of all industrialised nations.

As Robert Habeck, Federal Minister of Economic Affairs and Climate Action has stated, "Grid expansion is the prerequisite for the energy transition to work." The Federal Network Agency (Bundesnetzagentur) is responsible for keeping the grid – and grid expansion plans – under constant review. More than 11,500km of power lines are to be modernised or newly built in the coming decades. Of these, about 2,600km have been completed or are nearing completion, while about half (5,500km) are in the approval and planning stage. For the remaining 3,400km, the need for work has been identified but no further action has been taken. Work is ongoing to strengthen lines between wind farms in the north and industrial centres with high electricity demand in the south.

Rather than building new power lines, it is almost always cheaper to make better use of existing lines or to upgrade them. In Germany, 220kV overhead lines are often increased to a capacity of 380kV so that they can transport more electricity. In addition, it is important to digitalise grids and to equip them with sensors that enable continuous monitoring so that grid operators can set the temperature of overhead lines and increase the amount of electricity they can carry by up to 30% in colder months. Interconnections with neighbouring countries like Norway, Denmark and Belgium are also being expanded to combine resources and balance grids more efficiently. In 2021, Germany exported 57TWh and imported almost 40TWh, equal to about 11% and 8% of its net electricity production, respectively.

Besides targeting a more efficient use of energy, the government is also looking to increase the flexibility of electricity demand and to expand battery and other forms of storage to reduce the need for grid expansion. Finally, Germany maintains a reserve capacity (additional power generating plant to be used when necessary) that will be expanded over time and converted to fully utilise green hydrogen as an additional source of flexibility. Together, all these measures will help maintain the high reliability of the German grid while continuing to decarbonise it.

# CONCLUSION: MAKING URGENT PROGRESS TOGETHER

**One factor more than any other will determine whether humanity achieves global energy access and climate goals: the ability to work together on this common purpose.**

It is now possible to build secure systems that avoid the catastrophic effects of climate change and air pollution, ensure geopolitical stability and deliver meaningful livelihoods as well as affordable energy. So, now more than ever, it is essential to tear down the barriers to achieving the energy systems required to realise a sustainable future.

The stories in this report show what is possible when we work together:

**Reliable, flexible, affordable and emission-free electricity grids** that replace centralised coal power with a portfolio of solutions, including clean and renewable energy, energy efficiency, modernised grids, and storage.

**Legislation, policies and regulations** that are informed by social dialogue and stakeholder engagement.

A **just transition** that sustains livelihoods and the social fabric of communities.

**Realignment of public & private investment from coal to clean energy** backed by robust financial institution coal policies, engagement with existing clients, and transparent reporting on progress and climate risks.

**Holistic support for developing countries through coal transition mechanisms** to accelerate coal asset retirement, deploy more clean energy, and position countries to capitalise on new market opportunities in clean technology.

This is what the Powering Past Coal Alliance is building: a world-leading partnership that brings together all the key enablers - from governments to industry, financiers, workers and civil society - to answer the call of United Nations Secretary-General António Guterres to “break the world’s deadly addiction to coal power”.

This report demonstrates that the transition from coal power to clean electricity is politically and technically possible, as well as socially and economically desirable. More importantly: the time to act is now.

**We all have a role to play and there are no excuses for delay.**

**Come join us in this effort.**

# Bibliography

## Section 1


Carbon Brief, 2020, Why coal use must plummet this decade to keep global warming below 1.5C

Carbon Tracker Initiative, 2021, Do Not Revive Coal

CNBC, 02/08/2022, Coal consumption is expected to return to 2013's record levels: IEA (cnbc.com)

E3G, 2021, Explained: what does 'unabated coal' mean?

E3G, 2021, No New Coal by 2021: The collapse of the global coal pipeline

E3G, 2022, E3G Coal Transition Progress Tracker: OECD & EU Countries

E3G, 2022, No New Coal Progress Tracker

Ember, 2022, Why Clean Power 2035 means No Coal by 2030

Global Energy Monitor, 2022, Boom And Bust Coal 2022

Global Energy Monitor, 2022, Global Coal Plant Tracker July 2022

Intergovernmental Panel on Climate Change, 2022, Sixth Assessment Review (AR6)

International Energy Agency, 2021, World Energy Outlook 2021

International Energy Agency, 2022, Coal Market Update, July 2022

NewClimate Institute, 2022, The climate and health double dividend


## Section 2


Agora Energiewende and Aurora Energy Research, 2019, The German Coal Commission. A Roadmap for a Just Transition from Coal to Renewables

Allianz, 2022, Germany's Easter package: Great green intentions

Canadian Association of Physicians for the Environment, 2017, Ontario's Coal Plant Phase-out Produced Many Health and Environmental Benefits

Carbon Brief, 2019, Interactive: how the UK transformed its electricity supply in just a decade

Chilean Ministry of Energy, 2019, Decarbonization Strategy: Phase-out and/or Reconversion of Coal Units

Chilean Ministry of Energy, 2020, Carbon Neutrality in the Energy Sector/Projections for National Energy Consumption (Spanish)

Climate Investment Funds, 2022, Accelerating Coal Transition

Climate Investment Funds, 2022, Accelerating Climate Action

Department for Energy and Climate Change (UK), 2009, 60th Anniversary digest of UK energy statistics

Department for Business, Energy & Industrial Strategy (UK), 2018, Implementing the End of Unabated Coal by 2025

E3G, 2015, G7 coal phase out: United Kingdom, a review for Oxfam

E3G, 2018, Insights from the UK coal phase out experience: report to Chile decarbonisation roundtable

E3G, 2021, No New Coal by 2021

EDF press release, 14/6/2022, West Burton A closure update

Ember, 2021, COP26: Making Coal History

Energy and Climate Intelligence Unit, 2022, Latest round of renewables would be paying back £7bn under current prices, over £100 off bills

Environment and Climate Change Canada, 2012, Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations (SOR/2012-167)

Environment and Climate Change Canada, 2018, Regulations Limiting Carbon Dioxide Emissions from Natural Gas-fired Generation of Electricity (SOR/2018-261)

French Financial Market Authority & Prudential Supervision and Resolution Authority, 2021, Assessment report on climate commitments made by French financial institutions (in French only)

French Observatory on Sustainable Finance, February 2021, Preliminary recommendations from the Scientific and Expert committee

French Observatory on Sustainable Finance, September 2021, Recommendations of the Scientific and Expert Committee on unconventional hydrocarbons and alignment strategies

French Observatory on Sustainable Finance, 2022, Commitments and achievements in favour of and sustainable finance made by the actors of the Paris financial centre

Government of Canada, 2018, Technical backgrounder: Federal regulations for electricity sector

Government of Canada, 2022, Final Report by the Task Force on Just Transition for Canadian Coal Power Workers and Communities: section 7

Government of Canada, 2022, 2030 Emissions Reduction Plan: Clean Air, Strong Economy

Government of Eastern Wielkopolska, 2019, Agreement for a just energy transformation of Eastern Wielkopolska

Government of Eastern Wielkopolska, 2021, Concept of Just Transition of Eastern Wielkopolska (English version)

Government of Eastern Wielkopolska, February 2022, Territorial Just Transition Plan for Eastern Wielkopolska

Grantham Research Institute on Climate Change and the Environment, 2021, Policy brief: Financing the transition beyond coal

IHS Markit, 14/4/2022, Germany launches full-scale renewable power transition in Easter Package

Inodú, 2018, Study of environmental and social variables to be addressed for the programmed and gradual closure or reconversion of coal-fired electricity generation

Institute for Research on Public Policy, Policy Options, 2017, Coal phase-out improved Ontario's air quality

International Institute for Sustainable Development, 2015, The End of Coal: Ontario's coal phase-out

International Labour Organization, 2015, Guidelines for a just transition towards environmentally sustainable societies for all

International Trade Union Confederation, Building Workers' Power Just Transition Centre

Leduc County, 2019, Leduc County welcomes federal government coal transition task force recommendations

National Grid ESO, 2021, The Road to Zero Carbon

New Mexico Indian Affairs Department, 2019, Energy Transition Act

Oak Ridge National Laboratory for the US Department of Energy, 2019, Extreme Weather and Climate Vulnerabilities of the Electric Grid: A summary of Environmental Sensitivity Quantification Methods

Ørsted, 2021, Our Green Business Transformation: What we did and lessons learned

Pembina Institute, 2021, From Coal to Clean: Canada's progress towards phasing out coal power

Pembina Institute, 2022, Supporting workers and communities in a coal phase-out: Lessons learnt from just transition efforts in Canada, 2022

Perrier Report, March 2022: Making the Paris Financial Centre a reference for climate action. English report summary

PJM, 2019, Reliability and Resilience

PPCA Insights, 2018, UK Government policy ushers coal towards retirement

Reclaim Finance, Online Coal Policy Tool

Reclaim Finance, Urgewald, Banktrack and others, 2022, Banking on Climate Chaos

Rocky Mountain Institute, 2018, The Economics of Clean Energy Portfolios

Rocky Mountain Institute, 2020, How to Retire Early

Rocky Mountain Institute, 2021, Securitization in Action: How US States Are Shaping an Equitable Coal Transition

Stoney Plains Reporter, 2020: New centre in Parkland County aims to help those hit by coal phase-out

Urgewald, 2022, Who is still financing the global coal industry

US Energy Information Administration, 2022, Coal will account for 85% of U.S. electric generating capacity retirements in 2022

Washington Post, 20/06/2022, Germany sticks to 2030 coal exit target amid energy worries

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**The Powering Past Coal Alliance (PPCA)** is a coalition of national and subnational governments, businesses and organisations taking action to advance the transition from unabated coal power generation to clean energy. Launched at COP23 in 2017, and playing a pivotal role at the forefront of global efforts to deliver the Paris Agreement, the Alliance aims to:

- Secure commitments from governments and the private sector to phase out existing unabated coal power.
- Encourage a global moratorium on the construction of new unabated coal-fired power plants.
- Shift investment from coal to clean energy, including by working to restrict financing for coal-fired projects.
- Achieve coal phase-out in a sustainable and economically inclusive way, with appropriate support for workers and communities.

PPCA is co-chaired by the governments of Canada and the UK. PPCA currently has more than 165 members, including 49 national governments, 48 subnational governments (across 13 countries) and 71 other organisations. All PPCA members endorse the PPCA Declaration and the 34 who are financial institutions also commit to the PPCA's Finance Principles.

PPCA is also supported by 15 Partner organisations, each contributing expertise and support from their network to further support the PPCA's mission.

For more information about the Alliance and becoming a member visit www.poweringpastcoal.org

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