Quitting fossil fuels: how fast can the world do it?

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Contents

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Overview

To meet climate targets, fossil fuel use needs to rapidly decline. Has anything similar happened in the past? Do current coal phase-out efforts put us on the path to save the climate? And how would such radical fossil fuel decline affect fossil fuel workers? To answer these questions, we analyzed historical precedents of fossil fuel decline, current efforts to phase-out coal and future pathways to reach climate targets.

We found surprising precedents of fossil fuel phase-out particularly during the 1970s and 80s when wealthy industrialized countries phased-out oil from electricity at speeds comparable to what needs to happen to reach the 1.5°C target even in the face of growing demand in about a dozen cases. In addition, we found another two dozen cases of rapid decline during either the dash for gas when one fossil fuel substituted another; following the fall of the Soviet Union and overall economic contraction; or most recently in wealthy industrialized countries under stagnant electricity demand growth and with growing renewables. In the 1.5°C scenarios, coal electricity declines the fastest with a median rate of -27% over ten years, however in about half of the 1.5°C scenarios the decline of coal is unprecedented; the decline of natural gas in the Middle East and the Former Soviet Union is also unprecedented in several scenarios.

While reaching the required coal decline is a challenge, countries have started to pledge to phase-out coal. We find that the initial members of the Powering Past Coal Alliance, the first international Alliance on coal phase-out, deliver less than 1% of what is needed to meet climate targets. We also find that the implied decline rates do not break historical trends. Furthermore, we find that membership in the Alliance is restricted to wealthy countries with good governance and little coal. At the recent COP26 meeting in Glasgow, several new countries joined the Alliance which are generally in line with our prior results, but in addition, for the first time, several developing and emerging economies pledged to phase-out coal on the condition of financial support. Understanding what kind of support is needed to ensure rapid decline is an important scientific and policy question.

One of the reasons that phasing-out coal is expensive is because of the effect the policy has on fossil fuel workers and companies, which together are a formidable political force. Thus, to support phase-out we developed a tool to diagnose the phase of transition and to enable countries to learn from each other. In addition, we analyzed the job prospects of transitioning from fossil fuels to renewable jobs using both a global and a place-based analysis for coal jobs. We find that globally, an energy transition that keeps warming below 2°C would offer more jobs globally than a pathway that follows current energy and climate targets. We also find that for coal mining, which is the sector that experiences the most radical and rapid decline, local solar jobs are feasible in many of the major coal-producing regions of the world.

Phasing-out fossil fuels is one of the big challenges which the world faces to tackle climate change. While there are historical precedents of rapid fossil fuel decline and efforts are underway to phase-out coal, most experience is limited to wealthy economies. The next challenge is to learn to transfer these lessons to other sectors like natural gas and eventually oil and to developing and emerging economies, where energy demand is still growing and institutions are weaker.

Introduction

Keeping global warming below 1.5°C or 2°C requires a rapid decline in fossil fuel use[1]. In fact, in most global climate mitigation scenarios which meet the 1.5°C target, coal, the "dirtiest" fossil fuel, is fully phased-out by 2050[2,3].

Is this possible? And if so, how?

Scientists who produce these scenarios emphasize that they are *techno-economically feasible*[4,5], which means that there are economically viable solutions to substitute for today's coal in many markets. But are these solutions socially and politically feasible? In other words, can we phase-out fossil fuels in the real world fast enough to meet climate goals[6,7]?

In *Contractions* we contributed to answering these questions by analysing when and why fossil fuels are phased out and how this compares to what is required to meet the 1.5°C target.

The aim of this policy brief is to inform policies facilitating the reduction in the use of fossil fuels. We outline the main challenges associated with fossil fuel decline and identify historical precedents and current opportunities for solving these challenges.

Why is phasing out fossil fuels difficult?

Despite the scientific consensus that fossil fuels need to be rapidly phased-out[1–3] and lack of public support for fossil fuels[8,9], the use of fossil fuels is not declining sufficiently fast to meet climate goals[10]. The persistence of fossil fuels arises from a phenomenon known as *carbon lock-in*[11,12]. In essence, the same patterns of fossil fuel production and use get reproduced, even though there are affordable low carbon alternatives. This is because the familiarity with certain technologies and the existing institutions impede change once they are established, in particular when they get defended by powerful networks of beneficiaries.

Any attempts to unlock these patterns meets with *resistance* from the actors who are negatively affected by decreasing fossil fuel use. Phasing-out fossil fuels can lead to job losses[13] and trigger backlash from the potentially or newly unemployed workers, local communities and sub-national jurisdictions that are dependent on coal[14,15]. The fossil fuel industries employ approximately 12.6 million people worldwide, around two-thirds of these jobs are in coal, oil and gas extraction[13]. Thus, re-training and if necessary, relocating people to enable them to transition from coal-related jobs to employment in the green economy or even the IT sector[16] is a politically sensitive and challenging task with possible cost implications[17]. This explains why some actors have interest in continuing the operation of fossil fuel industries. In fact, the persistence of policies such as fossil fuel subsidies are often explained by the fact that they benefit powerful constituencies such as unions or fossil fuel companies[18].

Another feature that makes fossil fuel phase-out difficult is the *long lifetime of energy infrastructure*, particularly in the electricity sector. This means that even a complete stop of constructing new plants would not lead to immediate end of fossil fuel use and associated emissions without targeted phaseout measures. At the same time, if fossil fuel based infrastructure such as coal plants are retired before their expected lifetime, owners and operators may view these as stranded assets[19,20], which can ignite frustration from investors.

Finally, getting rid of fossil fuels faces the challenge of *substitution*. Essentially, whenever decision-makers decrease the use of fossil fuels, they have to replace them with other technologies while also providing for growing energy demand. While low-carbon sources are expanding, globally they are not growing faster than energy demand[21]. We even see this dilemma playing out for climate leaders like Germany which is simultaneously phasing out nuclear and coal power. To balance variable renewables, the country plans to use and potentially even expand natural gas.

Efforts to phase out fossil fuels unfold differently in different contexts as the presence and strength of different mechanisms and their interactions varies. For example, some developing and emerging economies, with growing electricity demand must expand their energy systems but those without large domestic coal and gas sectors may not face the fossil fuel lock-in that most developed and industrialized countries must contend with. Whereas other developing countries, like India and China face both an expanding system and a locked-in coal industry. And in many developed economies, the lock-in is weakening and capacity to support affected actors is higher.

Our approach

To understand how and why fossil fuels decline we investigated both historical precedents and current opportunities for rapid reduction in the use of fossil fuels. This helps us to understand what enables and blocks fossil fuel decline and to identify what can accelerate the speed of decline.

For learning from past experience, we examine historical precedents of reducing the use of fossil fuels within the electricity sector and lock-in dynamics within fossil fuel production and infrastructure. The electricity sector gives us insight into dynamics and preconditions of decline since this sector has experienced the most decline historically and is also the sector that needs to decarbonize most rapidly in climate scenarios[22]. Specifically, we investigated when, where and why coal electricity peaked in different countries[23] and identified the time periods and contexts when fossil-fuel based electricity declined the fastest[24]. We also investigated liquified natural gas (LNG) expansion in Germany and fossil fuel subsidies in major oil and gas producing countries. These two cases give us insight into the dynamics of lock-in and enable us to quantify and contextualize policies which can perpetuate the use of fossil fuels even in the face of climate goals.

To identify current opportunities, we analyzed pledges, policy approaches and scenarios for phasing-out fossil fuels. First, we analyzed the Powering Past Coal Alliance (PPCA), under which countries pledge to phase-out coal and which is the first set of policy pledges focused on fossil fuel decline. Here, we examined what makes countries which join the Alliance different from those which do not, and we quantified the decline rate implied under those pledges. We also compared historical decline rates and those implied under PPCA to what is needed to reach climate targets in order to identify historical precedents for climate action. Next, we analyzed the potential employment implications of an energy transition, both globally and for major coal producers. And finally, we examined the interplay between fossil fuel decline, renewable growth and energy demand.

Historical precedents of decline and overcoming lock-in

We identified historical precedents of fossil phase-out to understand if any part of the world has ever succeeded in shifting away from fossil fuels at a similar speed as what is needed to meet the 1.5°C target[24]. Historically at the global level, new energy sources have been added on top of old ones[25], however, when we zoomed in to individual countries and regions we identified more than 130 cases where oil, gas or coal declined ≥5% (as a share of total electricity supply) over ten years between 1960 and 2018[24].

We found that rapid decline is rarer in larger countries and regions because the economic, geographic, and socio-political conditions which support rapid decline are less likely to occur in diverse systems with multiple geographies and policy environments.

What do historical precedents of decline in relatively larger systems look like? We identified four main types (see Figure 1):

(1) oil substitution with nuclear and coal following energy security concerns in the 1970s and 80s like in France (Panel D) and the UK (Panel E) in the 1970s,
(2) fuel-switching in the 1990s and 2000s where natural gas substituted coal and oil following the shale gas revolution and new gas discoveries such as in UK with the North Sea (Panel E),
(3) coal decline in the face of declining electricity demand and a shrinking economy which happened following the fall of the Soviet Union (Panel F), and
(4) coal decline in industrialized wealthy countries under stagnant demand and solar and wind expansion since 2000 (Panel B).

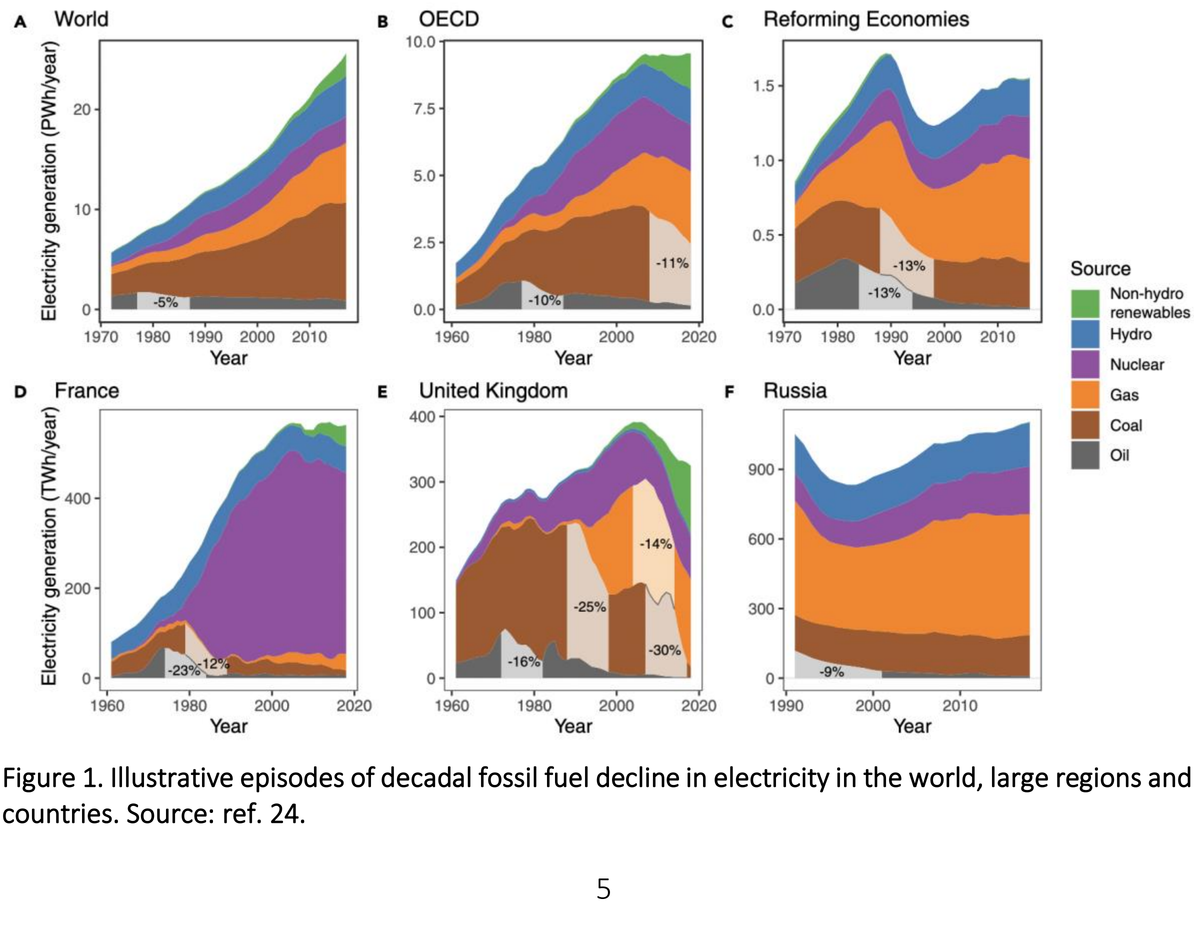

Figure 1. Illustrative episodes of decadal fossil fuel decline in electricity in the world, large regions and countries. Source: ref. 24.

These historical precedents for decline offer three lessons for addressing future challenges associated with decline of fossil fuels[24]. The first lesson is that historically, fossil fuel decline has been driven by technological innovations – nuclear power in the 1970s and 80s; fracking and offshore gas extraction in the 1990s and 2000s; and solar and wind power most recently. The second lesson is that decline of fossil fuels were also almost always accompanied with strong state policies – whether it was the rapid phase-out of oil in the 1970s and 80s driven by energy security concerns or more recent promotion of renewables. The final lesson is that political motivation is not enough – what is also required is strong state capacity to coordinate long-term policies which enable rapid decline.

In addition to investigating historical precedents for rapid and sustained decline, we identified the conditions for "peak coal", or when coal capacity stops increasing and starts declining[23]. This gives insight into the dynamics of "lock-in" and the preconditions for unlocking a carbon intensive technology such as coal power. Our analysis shows that coal capacity is more likely to peak in wealthy countries with good governance (that is when corruption is low and democracy is high), and when electricity demand growth is low. We find that almost all Powering Past Coal Alliance commitments are in countries where coal capacity has already peaked[26].

One challenge with lock-in is that it is not limited to existing technologies but also extends to new and emerging technologies and infrastructures. We found that Germany, a climate leader with a clear coal phase-out and strong renewable subsidies[27], supports the construction of liquified natural gas (LNG) terminals even though today's natural gas use already outstrips the country's emissions targets[28]. We highlight that the simultaneous decline of different fuels (coal and nuclear in Germany's case) leads to energy security concerns and an increase in domestic support for natural gas. The development of LNG terminals is further supported by the fact that Germany already has a very well-developed natural gas infrastructure. Closing this infrastructure would also lead to stranded assets in the medium to long term. Actors argue that the gas infrastructure could be used for synthetic gases in the long-term, even if the potential and costs of synthetic gases are not yet foreseeable.

On a more general level, this highlights the fraught role that natural gas plays in the energy transition. Even though natural gas is a fossil fuel, in some energy scenarios it is pictured as a technology that enables the transition to renewables. In particular, we find that phasing out natural gas becomes a particular challenge in major gas producing regions like the Middle East and Russia where natural gas expands under a number of 1.5°C scenarios before declining between 2030 and 2040[24].

A lot of hope has been placed on the impact of reforming fossil fuel subsidies[29–31], over 95% of which are targeted at consumers and two-thirds in oil and gas producing regions. But we find that removing them leads to a surprisingly modest decrease in emissions[32]. Further concerns have been raised that subsidies aimed at oil and gas producers in producing countries are underestimated in traditional estimates[33]. However, historically all the analysis detailing the impact of this effect has been based only on US data[33]. In Contractions, we conducted the first internationally-comparative analysis of the effect of production subsidies on oil prices and find that using only US data, particularly historically, leads to a misleadingly high effect of fossil fuel subsidy reform[34]. While this does not detract from the importance of subsidy reform, it does underline the necessity of detailed and accurate analysis to inform policy advice including with respect to subsidy reform[32,35].

Current opportunities for reducing the use of fossil fuels

Coal phase-out pledges

There are several opportunities for fossil fuel decline to meet climate targets. In 2017, the Powering Past Coal Alliance (PPCA), an international coalition of nation states, subnational governments and businesses committed to phasing out coal without carbon capture and storage was launched[26]. Initially, the Alliance included 27 members but by COP26, the 26th Conference of Parties to the UN's Framework Convention on Climate Change, in November of 2021, it had expanded to 48 nation states, 48 subnational governments and 69 organizations. In the original declaration, PPCA members committed to "phasing out unabated coal power generation [no later than 2030 in countries that are part of the OECD and the European Union, and by no later than 2050 in the rest of the world] and a moratorium on new coal power generation without operational carbon capture and storage"[36] . In 2019, we showed that early retirement of coal power plants from national and subnational jurisdictions in the Alliance would avoid 1.6 $GtCO_2$ of emissions, which is less than 1% of the emissions already in the pipeline from existing coal power plants and far less than what is needed to reach the Paris climate targets[26]. Furthermore, the decline rates implied by the PPCA pledges are generally in-line with historical decline rates[24], see Figure 2.

In our analysis of PPCA national and subnational membership, we find that the members generally use and extract less coal, have a lower share of coal in their electricity system, and have older power plants. As a result, it is easier for these countries to substitute coal with other fuels. This does not fully explain their pledge to phase-out coal. We also found that PPCA

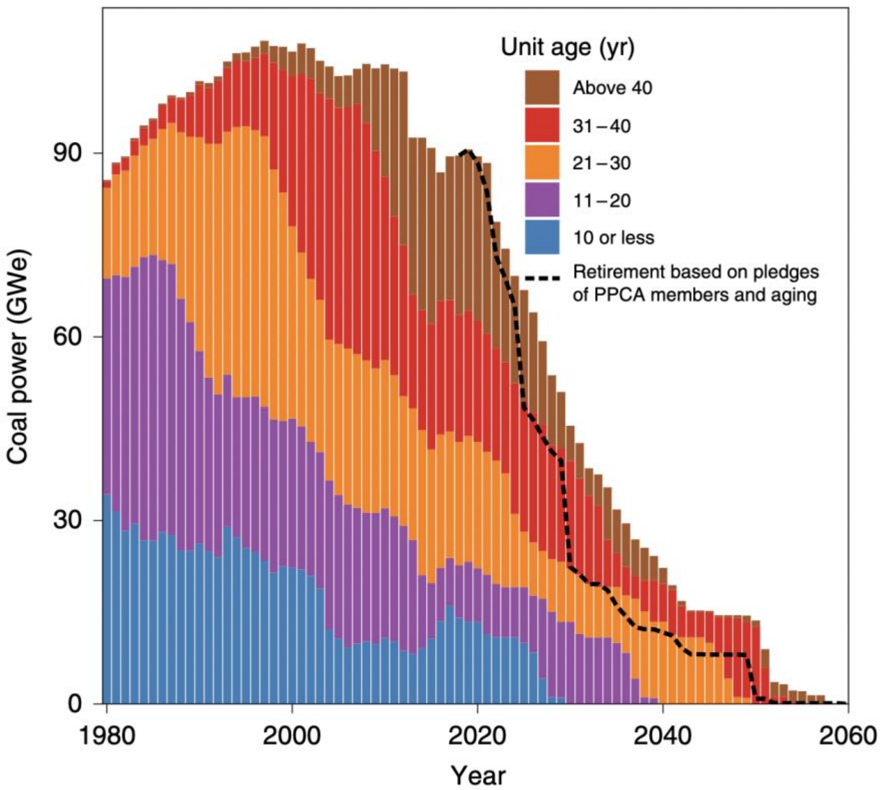

Figure 2: National and subnational PPCA members' coal power development, projections and planned reductions resulting from their PPCA pledges. Source: ref. 35.

members are wealthier (higher GPD/capita) and have more transparent and independent governments. These characteristics enable countries not only to bear the costs of coal phase-out but also to effectively formulate and implement policies such as Germany's coal phase-out package from the Commission on Growth, Structural Change and Employment.

At COP26, seven new countries joined the Alliance and 16 new countries pledged to phase-out coal under certain conditions[37]. The new PPCA member countries generally have similar characteristics as the existing members, however the new Members indicate that the dynamic feasibility frontier[6] is expanding to include countries with larger fleets and lower levels of development. For example, Peru, Hungary and Greece lay on the edge of the feasibility frontier just a few years ago and now have indicated plans to phase-out coal by 2022-25. An exceptional case is Ukraine, which is the first non-OECD PPCA member with a significant coal fleet to join. Ukraine's membership indicates a hopeful expansion, however the Ukrainian Government has begun to back-down from their COP26 commitment[38]. Pledges for coal phase-out in countries with growing energy demand like Indonesia are all post 2040 and should be carefully studied. Nevertheless, we find that expanding the Alliance to major coal consumers (such as China and India) requires identifying new phase-out mechanisms[26].

One opportunity is to learn from the just transition plans recently introduced in Europe such as Germany's coal phase-out package. Germany is an interesting case because it has a larger and younger coal fleet than most of the PPCA members along with domestic coal mining.

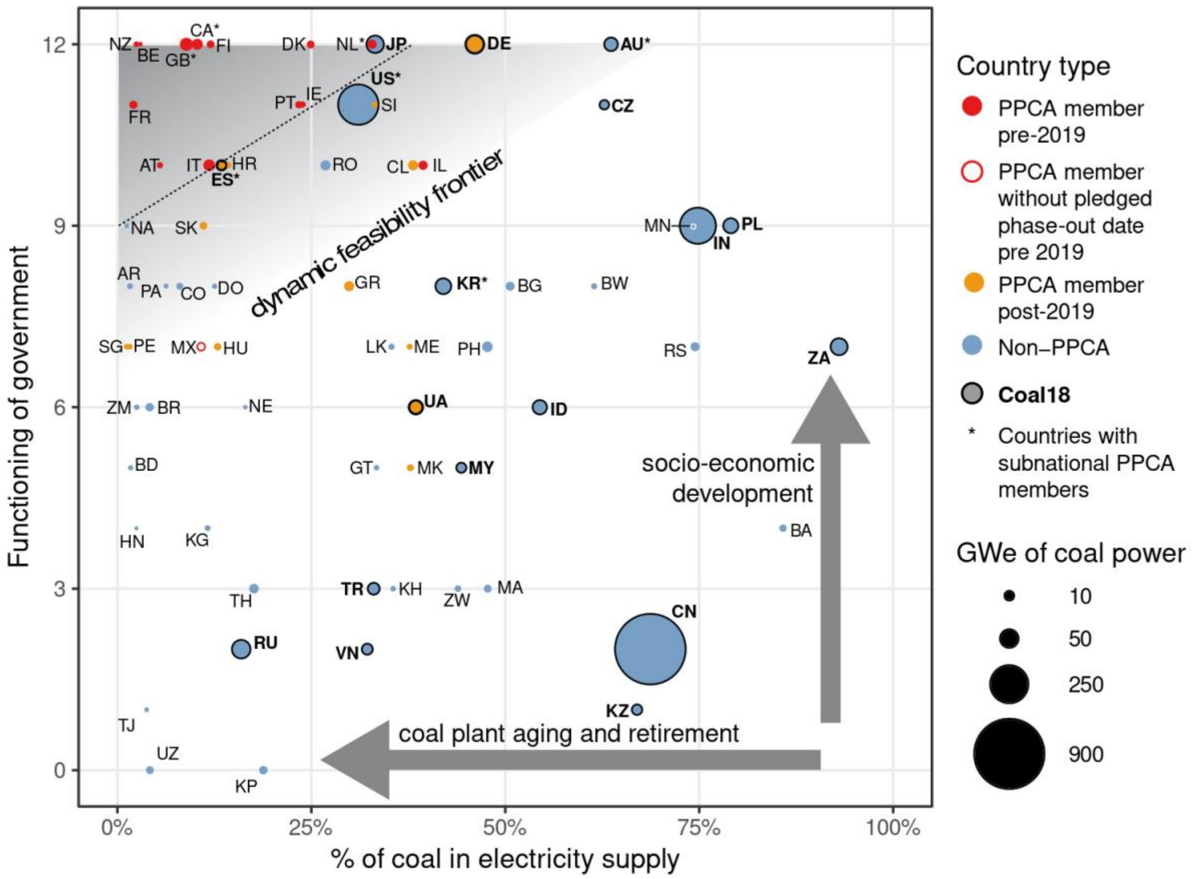

Figure 3. Dynamic feasibility space depicting the conditions which enable joining the Powering Past Coal Alliance. Modified from ref. 35. New pledges since the start of 2019 indicate the shift in the dynamic feasibility frontier.

Germany, joined the PPCA in late 2019 with initial coal phase-out plans of 2035 or 2038[39], though talks between the coalition parties have recently indicated accelerating this time line to phase-out all coal plants by 2030[40]. The original plan would avoid between 0.6-1.6 $GtCO_2$ – thus potentially doubling the emission reductions from the PPCA due to its relatively large and young fleet[41,42]. However, Germany's coal exit plan comes at a cost to taxpayers to the tune of €40 billion in the form of regional development and structural change support[43], notwithstanding the compensation for companies, electricity users and workers[39]. How this model can be translated to developing countries with large coal fleets like India and China is an open question which requires more research.

Energy transitions and jobs

Another opportunity is to use the energy transition to switch workers to jobs in new industries. One reason phasing-out fossil fuels is so difficult politically is because it leads to job losses in coal producing areas. Fossil fuel extraction jobs (such as coal mining) will decline rapidly as countries transition their energy systems from fossils to low carbon energy sources, however, jobs in the renewable energy sector (such as solar manufacturing) will expand. We found that globally there may be a net increase in direct energy jobs raising from 18 million today to 26 million by 2050[13], see Figure 4. However, global and regional distribution of job decline and expansion will be uneven: fossil fuel exporting countries and coal producing countries might face a net decline in jobs. Nevertheless, the tremendous growth in renewable jobs, in particular in manufacturing jobs which are not tied to any particular geography represents an opportunity for countries to expand energy jobs even in the face of phasing-out fossil fuels.

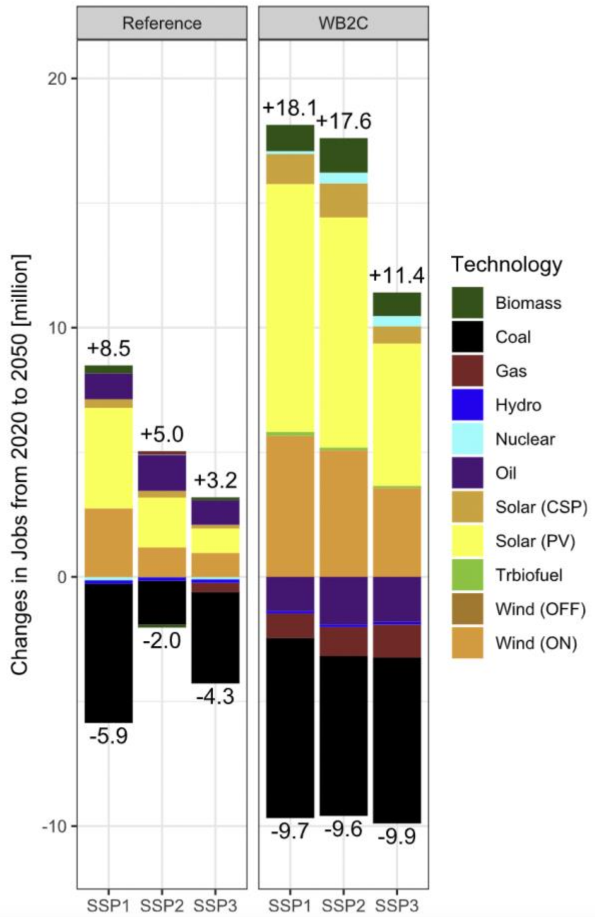

Figure 4: Job gains and losses by energy technology. Source: ref. 13.

Note: The figure shows the changes from 2020 to 2050 in energy sector jobs by energy technology across different scenarios for a single model (WITCH). Values below 0 are job losses, while those above the 0-line are job gains.[13]

Using GIS analysis, we also found over 95% of coal-mining areas in India and Australia, about 60% of coal-mining areas in the US, but just 30% of coal-mining areas in China are suitable for solar power. Wind does not represent a good technical potential for coal-mining areas in any country (always under 10%)[44]. This is an important finding because coal mining jobs are tied to specific locations and coal miners are reluctant to move for employment.

Historical decline rates of fossil fuels and the dynamics of electricity demand

To understand the dynamics of decline and the energy transition in different markets, we also analysed the interaction between the substitution of fossil fuels with renewables and overall energy demand. This is an important question because to meet climate targets while also meeting energy demand, renewable and low-carbon energy sources need to replace fossil fuels, not only meet growing energy consumption. More rapid decline of fossil fuels (above 25-30% of the total electricity supply or electricity system size per decade) has been limited to very small countries, while in very large electricity systems the historic decline rate has been rarely faster than 10%, and never faster than 20% per decade[24]. On the other hand, we also find that solar and wind have historically achieved maximum annual growth rates of 0.4-0.9% and 0.6-1.1% of the electricity system size respectively[45], which is comparable to decadal decline rates which we observe for fossil fuels. We also find that higher decline rates have been achieved under stagnant or low demand growth and only in countries with stagnant demand have solar and wind substituted fossil fuels, see Figure 5.

However, key challenges are closing Asia's large, young and expanding coal sector, and turning away from natural gas in Russia, and Middle East and North Africa regions[24]. Many scenarios for achieving the 1.5°C goal published with the IPCC's 1.5°C report[5] require decline rates for coal in Asia that are either historically unprecedented or were only observed when oil was substituted for nuclear and coal in Western Europe in the 1970s-1980s in response to severe energy security concerns[24].

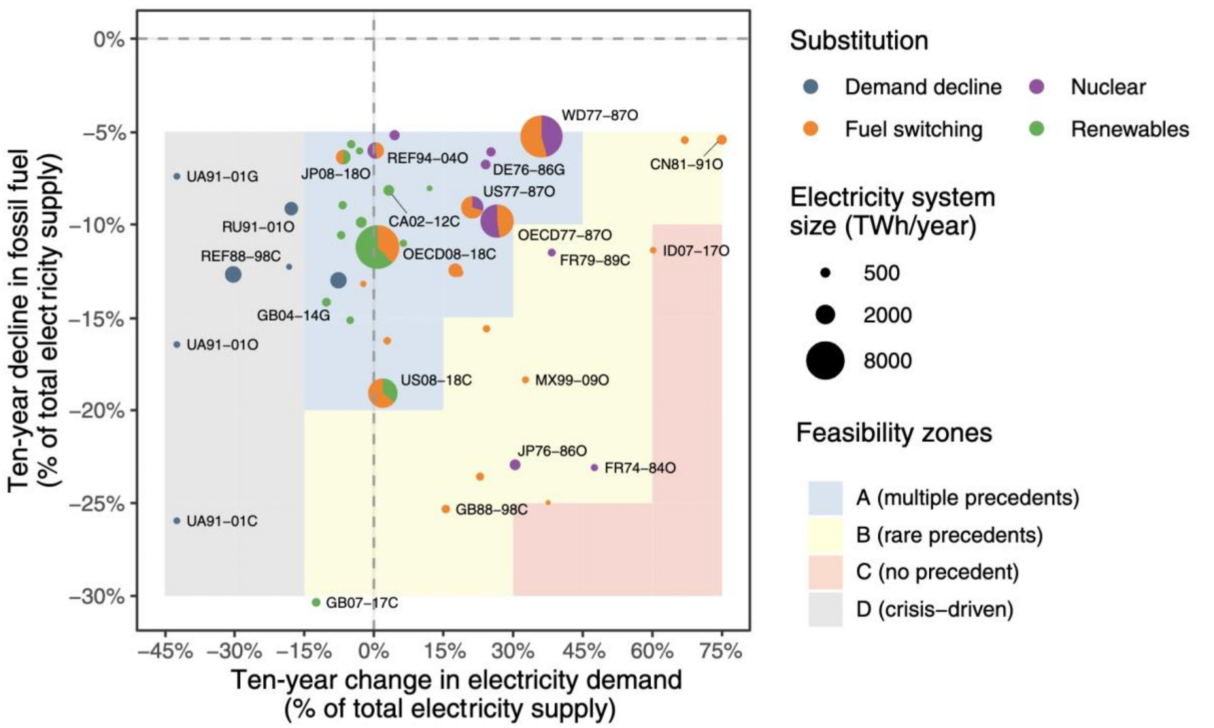

Figure 5. Feasibility space with feasibility zones for fossil fuel decline based on historical precedents of decline under different demand change in different system sizes. Source: ref. 24.

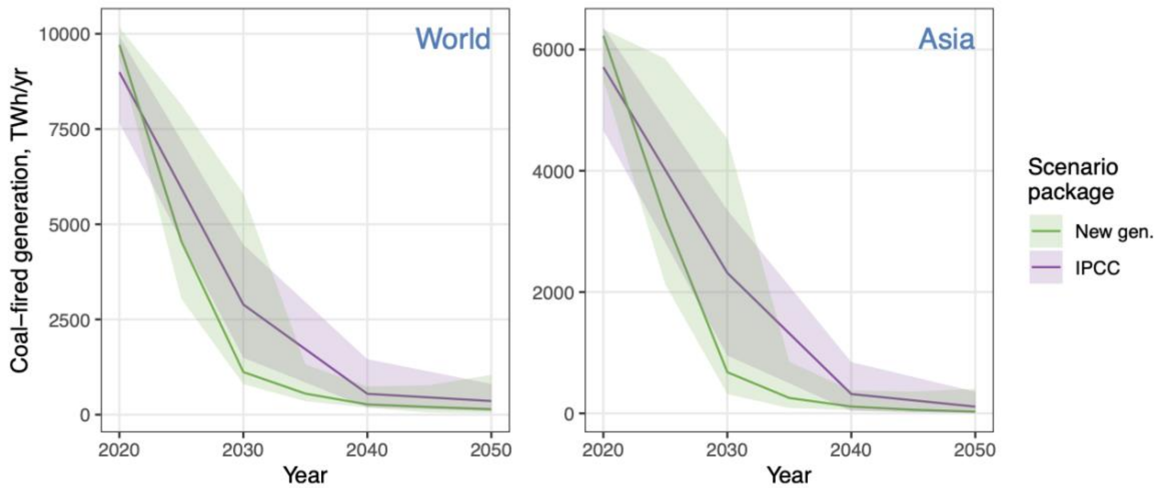

Figure 6. Coal use in electricity generation globally and in Asia in 1.5°C-consistent scenarios from IPCC 1.5 Special report (ref. 5.), and new generation of scenarios from ref. 44. (line – median, shaded area – inter-quartile range containing one half of pathways).

Recently, a new set of climate scenarios was published in *Nature Climate Change*[46] which explores the attainability of climate targets (1.5°C and 2°C) without overshooting the carbon budget. We have compared the coal decline rates required to limit the warming to 1.5°C in the "new generation" scenarios and in the IPCC Special Report. Figure 6 shows that the new scenarios (green line) require on average faster decline of coal both globally and in Asia. Particularly rapid decline is required in 2020-2030.

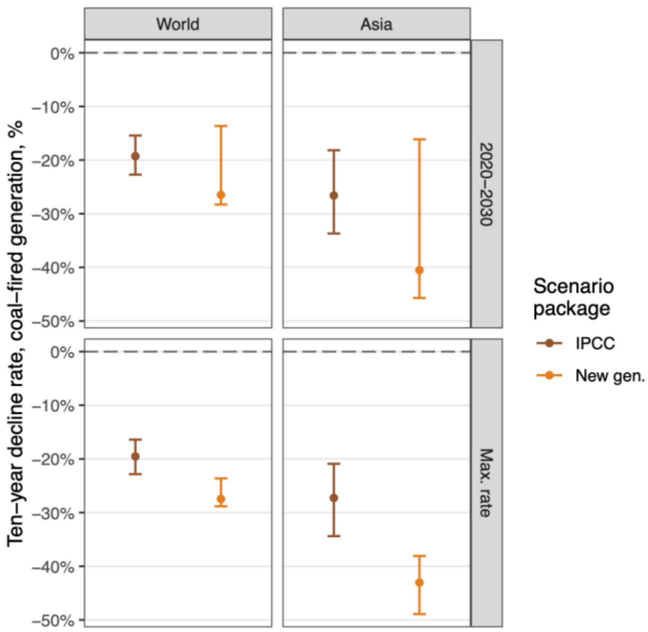

Figure 7. Decadal coal decline rates in electricity generation globally and in Asia (median and IQR) in scenarios from IPCC 1.5 Special report (ref. 5.), and in new generation of scenarios from ref. 44. Top row – 2020–2030, bottom row – maximum decadal rate between 2020 and 2050.

To further illustrate these differences, we calculated 10-year decline rates expressed as percentage of the total electricity supply as shown in Figure 7. The top panel shows the rates for a specific decade of 2020-2030 and the bottom - the maximum rates in any of the decades before 2050. The dots indicate the median values and the vertical lines - the inter-quartile ranges (IQR) of coal decline rates in the IPCC and the new generation scenarios.

The new generation scenarios envision much faster decline of coal in both Asia and the world as a whole. The median decadal decline rate in Asia across the IPCC scenarios is -27% (IQR: -34% – -18%), while in the new generation scenarios this rate is almost 1.5 times faster -41% (IQR: -46% – -16%). In terms of maximum rates (bottom panel), the difference is more striking: two-thirds of the new generation scenarios require coal decline in Asia faster than -38% per decade, whereas two-thirds of the IPCC scenarios require maximum rates *slower* than -35% per decade.

These rates can be compared with historical rates of decline of the use of fossil fuel in electricity as shown in Figure 8. The pale circles show historically observed decline rates, and the triangles show decline rates implied in coal phase-out pledges made as part of the Powering Past Coal Alliance. To reflect the fact that faster decline rates have been historically observed in smaller countries, we show a “frontier” of historical rates with a purple line. The dots and vertical color brackets show maximum decadal rates across both IPCC and the new generation scenarios in Asia, OECD and the world as a whole.

In sum, Figure 8 shows that the rates of coal decline required in Asia and globally for achieving 1.5°C target are further away from historical observations in the new generation scenarios, many of which achieve 1.5°C target while avoiding temperature overshoot, than in the previous IPCC scenarios.

Nevertheless, the recent decisions and declaration made at COP26 suggest that some countries are ready to make the necessary steps. Translating these pledges into action and accelerating fossil fuel phase-out globally will require a concerted effort.

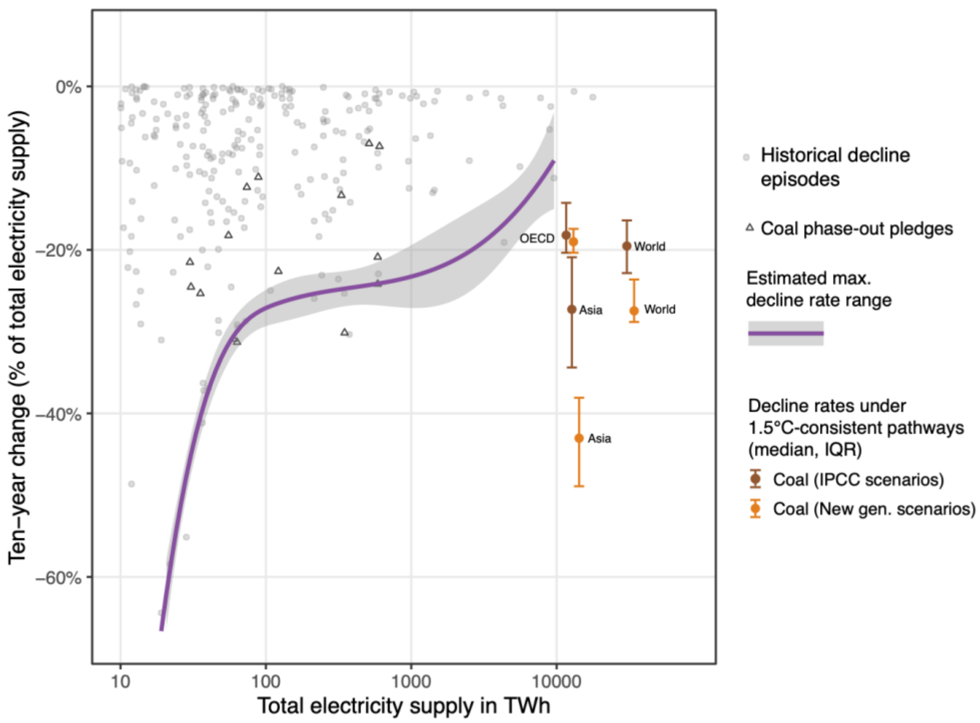

Figure 8. Rates in historical decadal decline episodes as a function of system size compared with required coal decline rates in 1.5°C-consistent scenarios (maximum decadal rate between 2020 and 2050) in IPCC 1.5 special report, see ref. 5, and the new generation scenarios from ref. 44.

Conclusions and way ahead

Phasing out fossil fuels is difficult because of lock-in, resistance from affected actors and the need to substitute fossil fuels with clean low-carbon energy options to meet climate targets. Nevertheless, there are historical precedents for rapid fossil fuel decline, particularly in the electricity sector where the speed of decline achieves what is depicted in many scenarios which reach the 1.5°C target. Additionally, there are also significant and accelerating efforts to phase-out fossil fuels, particularly coal through national strategies and the Powering Past Coal Alliance.

These cases of rapid and planned decline offer several policy lessons. First, rapid decline is accompanied by technological developments – nuclear power replacing oil in the 1970s and 80s, natural gas replacing coal in the 1990s and 2000s, and wind and solar power replacing coal in the 2000s and 2010s. However, technological developments, when they accompany fossil-fuels come with their own set of risks and care should be taken so they do not lead to new forms of lock-in as (liquified) natural gas infrastructure may.

The second major lesson about rapid decline is that it is often accompanied by strong political motivations – whether it was the energy security concerns of the 1970s and 80s or increasing concerns over climate change now. At COP26 countries announced several pledges to tackle their dependence on fossil fuels, including expanding the *Powering Past Coal Alliance*[47], the *Just transition declaration*[48], the *Global Coal to Clean Power Transition Statement*[37] and *Statement on International Public Support for the Clean Energy Transition*[49].

Translating these words into actions brings us to the third lesson – political motivation is not enough but it must be accompanied by strong state capacity and good governance to implement long-term policies to support alternatives and quell resistance from affected actors. In developed economies like Germany and Canada, the state has been able to negotiate 'Just transition plans' which compensate affected actors. Just transition plans are also being discussed in countries like India and South Africa, which have a higher reliance on coal and lower state capacity.

For emerging economies with rapidly expanding energy systems the priority is to stop the construction of new coal power plants, given the lock-in that results from the long lifetime of energy infrastructure. Here, there are encouraging signs. Between 2013 and 2021 the total capacity of coal plants in construction halved and the total capacity of planned plants declined by five times (Figure 9.).

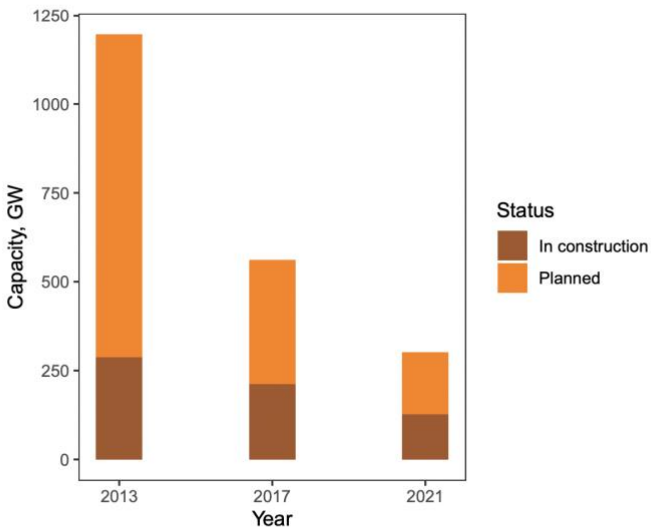

Figure 9. Evolution of global coal power plant "pipeline" (plants in construction and planned). Calculations based on ref. 50.

However, certain countries still rely on coal to support growing electricity demand. For example, China accounts for approximately one-third of global coal capacity both planned and in construction, and Indonesia opted out of the “no new coal plants” clause while signing the Global Coal to Clean Power Transition Statement at COP26[37]. India, which accounts for 27% of the global coal capacity under construction and 7% of the globally planned coal capacity, vetoed the reference to coal phase-out at COP26. Overall, 95% of coal capacity in construction and 98% of planned coal capacity is outside OECD. Thus, a challenge for emerging economies is deploying low-carbon energy sources fast enough to support the expansion of their electricity systems. International financial aid and technology transfer should play a role in supporting this.

Several countries at COP26 signaled willingness to phase-out coal on the condition of sufficient international support. Learning to translate the emerging experience of just transition policies from developed countries to a new context in emerging and developing economies will be a crucial policy challenge for the coming years.

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