

The Production Gap

The discrepancy between countries' planned fossil fuel production and global production levels consistent with limiting warming to 1.5°C or 2°C

About This Report

The first Production Gap Report was launched in November 2019 by leading research institutions and experts, in collaboration with the UN Environment Programme (UNEP). Modelled after UNEP's Emissions Gap Report series — and conceived as a complementary analysis — the Production Gap Report conveys the large discrepancy between countries' planned fossil fuel production and the global production levels necessary to limit warming to 1.5°C and 2°C.

This year's report comes as the COVID-19 pandemic and resulting lockdown measures impact societies — and their use and production of coal, oil, and gas — in unprecedented ways. The context for fossil fuel production is thus changing rapidly. Governments are pouring money into their economies, taking on increasing debt, and even changing environmental regulations in a bid to respond and recover from the pandemic's economic and social fall-out. This could have lasting consequences for the nature and speed of transitions away from fossil fuels — and, consequently, for the production gap.

This year's report is a special issue that considers the production gap in the context of the COVID-19 pandemic. It recognizes that the world is still at a potential turning point towards a healthier and more resilient, low-carbon future. It considers government responses to the COVID-19-induced crisis and the implications of those responses for the production gap. It includes an interim update of the production gap, while acknowledging the current uncertainty of long-term government planning amid the focus on near-term solutions to the COVID-19 crisis. Next year, the 2021 Production Gap Report will include a broader assessment of the production gap, including the country profiles that were a centrepiece of the 2019 report.

This report represents a collaboration of many research and academic institutions and experts. UNEP staff provided guidance and insights from their experience leading other gap reports. The report relies on publicly accessible government plans and projections for fossil fuel production, and other publicly available government, intergovernmental, and research sources, as cited and listed in the references.

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Glossary

Carbon entanglement

The process by which government dependence on fossil fuel extraction creates heavily vested interests in bringing fossil fuels to market that stand in the way of progress in climate policy (Gurría 2013).

Carbon lock-in

The tendency for certain carbon-intensive technological systems to persist over time, “locking out” lower-carbon alternatives, owing to a combination of linked technical, economic, and institutional factors. These technologies may be costly to build, but relatively inexpensive to operate (Erickson et al. 2015).

Extraction-based emissions accounting

An accounting framework that attributes greenhouse gas emissions from the burning of fossil fuels to the location of fuel extraction.

Fossil fuel production

A collective term used in this report to represent processes along the fossil fuel supply chain, which includes locating, extracting, processing, and delivering coal, oil, and gas to consumers.

Greenhouse gases (GHGs)

Atmospheric gases that absorb and emit infrared radiation, trap heat, contribute to the greenhouse effect, and cause global warming. The principal GHGs are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), as well as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

Just transition

In the context of climate policy, this refers to a shift to a low-carbon economy that ensures disruptions are minimized, and benefits maximized, for workers, communities, consumers, and other stakeholders who may be disproportionately affected (ITUC 2017; UNFCCC 2016).

Long-term low greenhouse gas emission development strategies (LEDS)

Under the Paris Agreement and its accompanying decision, all countries are invited to communicate LEDS by 2020, taking into account their common but differentiated responsibilities and respective capabilities, in light of different national circumstances.

Multilateral development bank (MDB)

An international financial institution chartered by multiple countries to support economic and social development in lower-income countries.

Nationally determined contributions (NDCs)

Submissions by Parties to the Paris Agreement that contain their stated ambitions to take climate change action towards achievement of the Agreement’s long-term goal of limiting global temperature increase to well below 2°C, while pursuing efforts to limit the increase to 1.5°C. Parties are requested to communicate new or updated NDCs by 2020 and every five years thereafter.

National fossil fuel production plans and projections

Fossil fuel production targets, plans, and projections drawn from national plans, strategy documents, and outlooks published by governments and affiliated institutions.

Production gap

The discrepancy between countries’ planned fossil fuel production and global production levels consistent with limiting warming to 1.5°C or 2°C.

Resource curse

Refers to the fact that many resource-rich countries do not fully benefit from their natural resource wealth, and may in fact experience worse development and economic growth outcomes than countries with fewer natural resources (Sachs and Warner 1995).

Stranded assets

Assets that suffer from unanticipated or premature write-offs or downward revaluations, or that are converted to liabilities, as the result of a low-carbon transition or other environment-related risks (Ansar et al. 2013).

Subsidy

A financial benefit accorded to a specific interest (e.g. an individual, organization, company, or sector) by a government or public body.

Supply-side climate policy

Policies and measures aimed at regulating or managing the wind-down of, or transition away from, fossil fuel production.

Abbreviations

APEC	Asia-Pacific Economic Cooperation
Tcm	Trillion cubic meters
CCS	Carbon capture and storage
CDR	Carbon dioxide removal
CO ₂	Carbon dioxide
°C	Degree Celsius
EJ	Exajoule
EU	European Union
G20	Group of Twenty
GCC	Gulf Cooperation Council
GDP	Gross domestic product
GHG	Greenhouse gas
GNI	Gross national income
Gt	Gigatonne (Billion tonnes)
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
LEDS	Long-term low greenhouse gas emission development strategies
Mb/d	Million barrels per day
NDC	Nationally determined contribution
NOC	National oil company
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
SDG	Sustainable Development Goal
SOE	State-owned enterprise
UAE	United Arab Emirates
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	UN Framework Convention on Climate Change
UK	United Kingdom
US	United States
WTO	World Trade Organization

Foreword

Five years since the adoption of the Paris Agreement, the world is still far from meeting its climate goals.

As last year's Production Gap Report highlighted, this is in part due to the disconnect between climate and energy planning. Collectively, governments are planning to produce more than twice the amount of fossil fuels by 2030 than would be compatible with a 1.5°C pathway, while channeling billions in public support to fossil fuel production and consumption.

Now, with governments injecting trillions into their economies, we find ourselves at a critical juncture where government decisions can either further lock in fossil fuel energy systems or transition us to a cleaner and safer future.

This year's devastating forest fires, floods, droughts, and other unfolding extreme weather events serve as powerful reminders for why we must succeed in tackling the climate crisis. Investing instead in low-carbon energy and infrastructure is good for jobs, for economies, for health, and for clean air.

Governments must seize the opportunity to direct their economies and energy systems away from fossil fuels, and build back better towards a more just, sustainable, and resilient future.



Inger Andersen
Executive Director
United Nations Environment Programme



One year ago, the first Production Gap Report sounded the alarm on the disconnect between countries' energy plans and climate commitments. It gave a name to the troubling trend of countries planning more and more fossil fuel production, even as they agreed to Paris Agreement goals that require far less.

Since then, the world has undergone enormous change. The COVID-19 pandemic continues to take lives and force unprecedented government action, and to hit already disadvantaged and vulnerable communities the hardest.

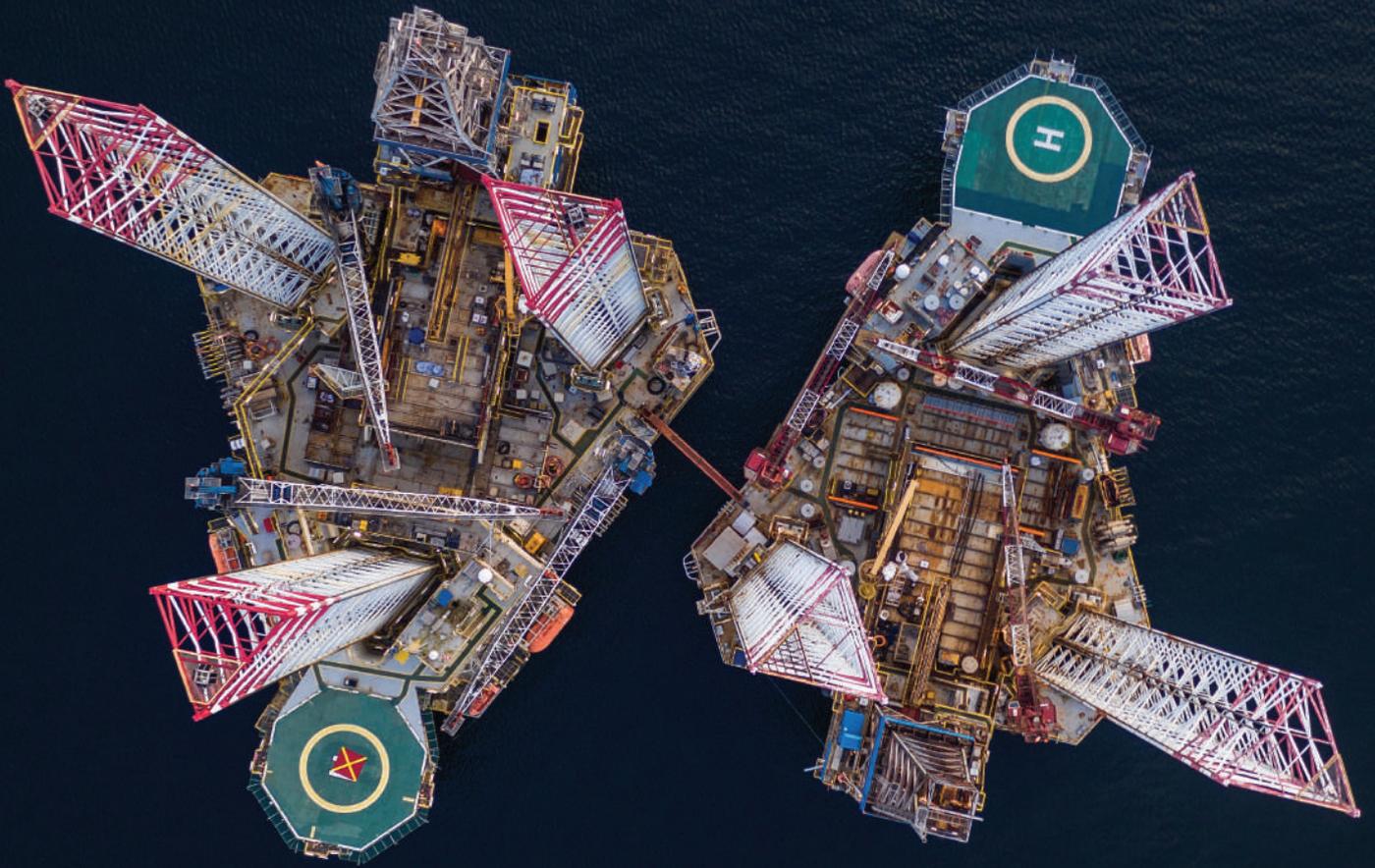
The world can and will recover. Government policies and spending priorities will determine whether that recovery leads to a healthy, resilient, and equitable future — one that avoids the severe climate disruption associated with unsustainable levels of fossil fuel production.

This report points the way forward. It shines a light on how government action, in many cases, risks locking us into fossil-fuelled pathways. And it lays out the alternative, with solutions and examples for moving beyond coal, oil, and gas production. It's time to imagine — and plan for — a better future.



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Executive Summary

Key Findings

To follow a 1.5°C-consistent pathway, the world will need to decrease fossil fuel production by roughly 6% per year between 2020 and 2030.

Countries are instead planning and projecting an average annual increase of 2%, which by 2030 would result in more than double the production consistent with the 1.5°C limit.

Pre-COVID plans and post-COVID stimulus measures point to a continuation of the growing global fossil fuel production gap, locking in severe climate disruption.

To date, governments have committed far more COVID-19 funds to fossil fuels than to clean energy. Policymakers must reverse this trend to meet climate goals.

Countries with lower dependence and higher financial and institutional capacity can undertake a just and equitable transition from fossil fuel production most rapidly, while those with higher dependence and lower capacity will require greater international support.

Policymakers can support a managed, just, and equitable wind-down of fossil fuel production through six areas of action.

Executive Summary

To limit warming to 1.5°C or well below 2°C, as required by the 2015 Paris Agreement, the world needs to wind down fossil fuel production. Instead, governments continue to plan to produce coal, oil, and gas far in excess of the levels consistent with the Paris Agreement temperature limits.

This report highlights the discrepancy between countries' planned fossil fuel production levels and the global levels necessary to limit warming to 1.5°C or 2°C. This gap is large, with countries aiming to produce 120% more fossil fuels by 2030 than would be consistent with limiting global warming to 1.5°C.

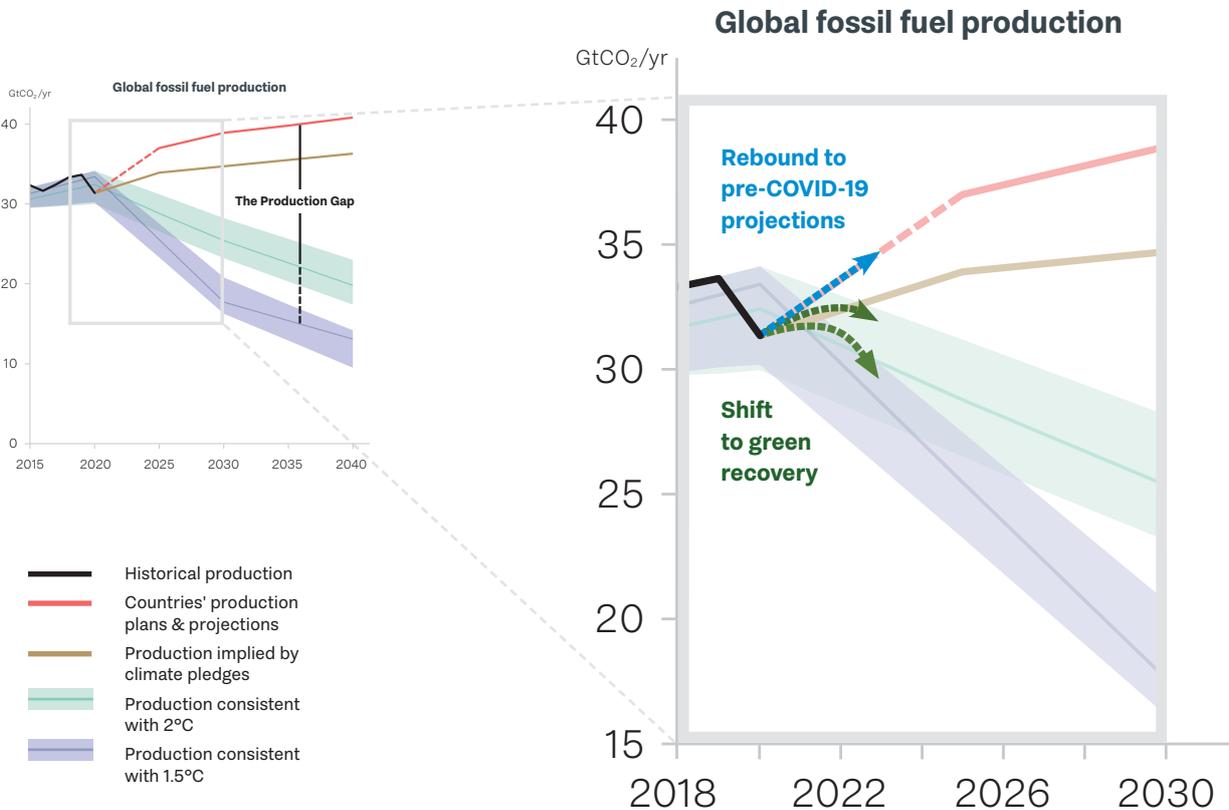
The COVID-19 pandemic and associated response measures have introduced new uncertainties to the production gap. While global fossil fuel production will decline sharply this year, government stimulus and recovery

measures will shape our climate future: they could prompt a return to pre-COVID production trajectories that lock in severe climate disruption, or they could set the stage for a managed wind-down of fossil fuels as part of a "build back better" effort.

This special issue of the Production Gap Report looks at how conditions have changed since last year, what this means for the production gap, and how governments can set the stage for a long-term, just, and equitable transition away from fossil fuels.

Figure ES.1

The fossil fuel production gap — the difference between national production plans and low-carbon (1.5°C and 2°C) pathways, as expressed in fossil fuel carbon dioxide (CO₂) emissions — will continue to widen if countries return to their pre-COVID plans and projections for expanded fossil fuel production. Alternatively, strong green recovery efforts could put future fossil fuel production on a pathway much closer to Paris Agreement limits.



The report's main findings are as follows.

To follow a 1.5°C-consistent pathway, the world will need to decrease fossil fuel production by roughly 6% per year between 2020 and 2030. Countries are instead planning and projecting an average annual *increase* of 2%, which by 2030 would result in more than double the production consistent with the 1.5°C limit (Figure ES.1).

Between 2020 and 2030, global coal, oil, and gas production would have to decline annually by 11%, 4%, and 3%, respectively, to be consistent with a 1.5°C pathway. But government plans and projections indicate an average 2% annual *increase* for each fuel (Figure ES.2).

This translates to a production gap similar to 2019, with countries aiming to produce 120% and 50% more fossil fuels by 2030 than would be consistent with limiting global warming to 1.5°C or 2°C, respectively.

However, the future of the production gap is subject to large uncertainties, as the COVID-19 pandemic and its ramifications on fossil fuel supply and demand continue to unfold.

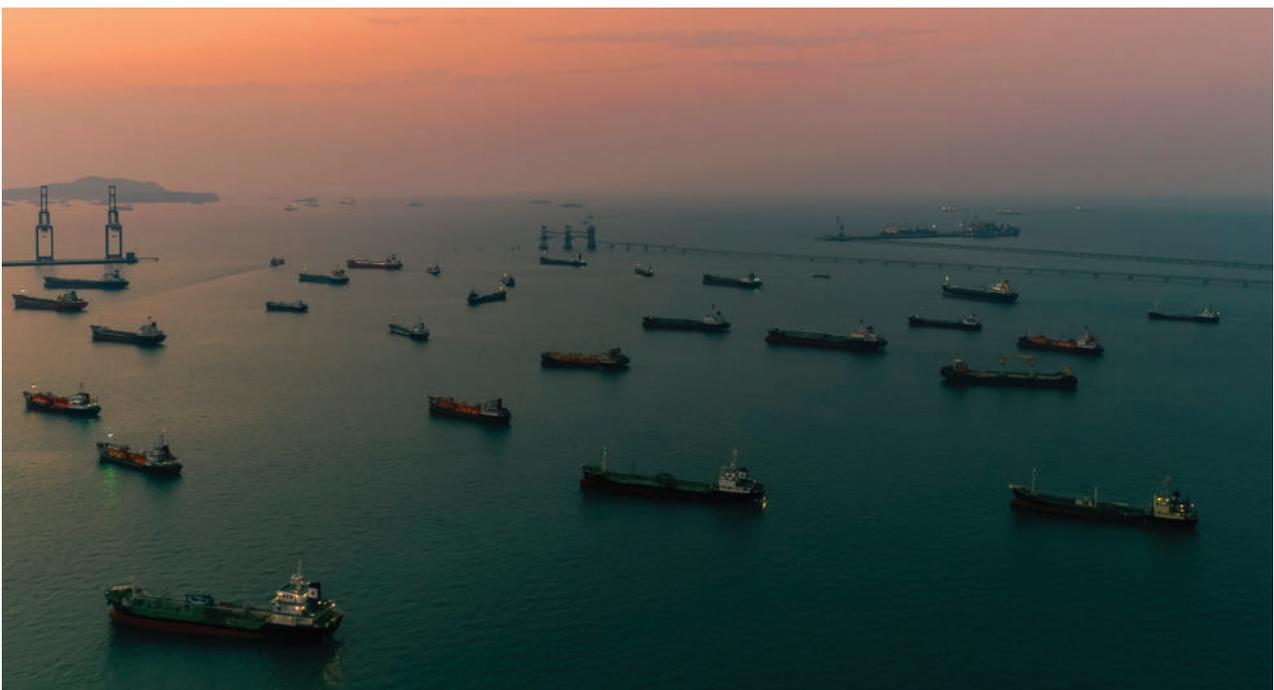
The COVID-19 pandemic — and the “lockdown” measures to halt its spread — have led to short-term drops in coal, oil, and gas production in 2020. But pre-COVID plans and post-COVID stimulus measures point to a continuation of the growing global fossil fuel production gap, locking in severe climate disruption.

Preliminary estimates suggest that global fossil fuel production could decline by 7% in 2020; more specifically, coal, oil, and gas supply could decrease by 8%, 7%, and 3%, respectively, in 2020 relative to 2019, primarily as a result of the COVID-19 pandemic and lockdown measures.

But countries are still planning to produce far more fossil fuels by 2030 than consistent with limiting warming to 1.5°C or 2°C. Of the eight governments that served as a basis for the 2019 production gap estimate (accounting for 60% of the global fossil fuel supply), seven have since updated their production plans and projections. Nearly all these updates occurred prior to the COVID-19 outbreak — and together, they pointed to a continuation of the very wide production gap.

In addition, before the COVID-19 outbreak, several countries not included in the gap analysis released or updated plans that point to intentions for major growth in oil production. For the 2020–2030 period, Mexico foresaw 50% growth, Brazil and the United Arab Emirates each planned for a 70% increase, and Argentina aimed for a 130% increase in oil production.

The 2021 Production Gap Report will include a more thorough analysis of the gap. But so far, all indications are that, overall, governments are planning to expand fossil fuel production at a time when climate goals require that they wind it down. If governments continue to direct COVID-19 recovery packages and stimulus funds to fossil fuels, these plans could become reality.



Alternatively, governments could use the momentum to plan a “green” recovery with a deliberate and managed wind-down of fossil fuel production — one driven by climate concerns, new economic and employment opportunities, and environmental and public health co-benefits. They could take the opportunity to begin a low-carbon transition, where fossil fuel production winds down in a sustainable and equitable way.

To date, governments have committed far more COVID-19 funds to fossil fuels than to clean energy. Policymakers must reverse this trend to meet climate goals.

As of November 2020, G20 governments had committed USD 233 billion to activities that support fossil fuel production and consumption (e.g. for airlines, car manufacturers, and fossil-based power consumers), as compared with USD 146 billion to renewable energy, energy efficiency, and low-carbon alternatives such as cycling and pedestrian systems (Figure ES.3).

Of the support going to fossil fuels, USD 23 billion is support specific to fossil fuel production. Some of this is directed towards environmentally beneficial activities; Canada, for example, committed USD 1.8 billion towards

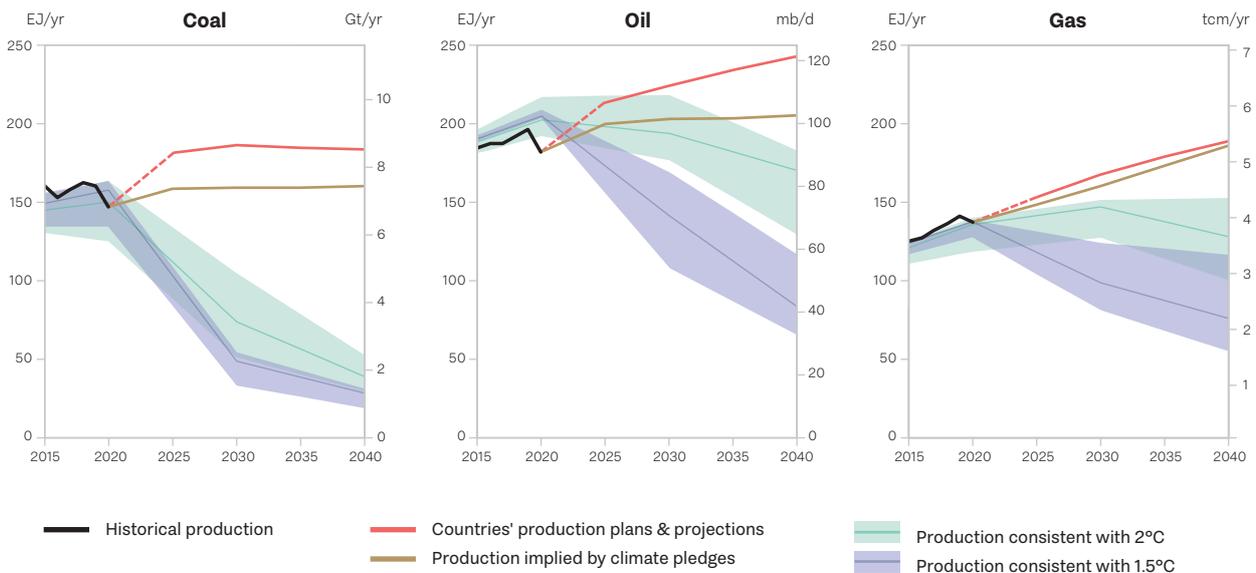
methane emission reduction and the clean-up of orphaned and abandoned oil and gas wells.

However, the vast majority of this fossil fuel production support has lacked any social, economic, or environmental conditions. Unconditional support to production includes tax cuts on fossil fuel exports in Argentina, equity and loan guarantees for the Keystone XL pipeline in Canada, a rebate on coal extraction revenue due to the government in India, a temporary tax relief package for the oil and gas industry in Norway, and reductions in oil and gas royalty rates and the weakening of environmental regulations in the United States.

In general, government responses to the COVID-19 crisis have tended to intensify patterns that existed prior to the pandemic: jurisdictions that already heavily subsidized the production of fossil fuels have increased this support, while those with stronger commitments to a transition to clean energy are now using stimulus and recovery packages to accelerate this shift. Unfortunately, most of the world’s major producing countries are in the former category; this needs to change, if the world is to meet climate goals.

Figure ES.2

Coal, oil, and gas production experienced short-term dips in 2020 amid COVID-19 restrictions. If countries rebound to the production indicated in their plans and projections, the production gap — shown here in energy and physical units — will grow most quickly for coal, but also rapidly for oil and gas.



The COVID-19 pandemic has provided a reminder of the importance of ensuring that a transition away from fossil fuels is just and equitable. Countries that are less dependent on fossil fuel production and have higher financial and institutional capacity can transition most rapidly, while those with higher dependence and lower capacity will require greater international support.

The COVID-19 pandemic — and the associated disruption — provides a strong rationale for countries to cooperate to wind down fossil fuel production in a coordinated way that avoids and minimizes social costs and helps create market stability. Developing countries have borne the brunt of the fossil fuel industry’s fragility during the pandemic, with lost oil revenue, for example, driving a 25% cut in government spending in Nigeria,

significantly reducing Iraq’s social benefits, and severely affecting Ecuador’s public sector.

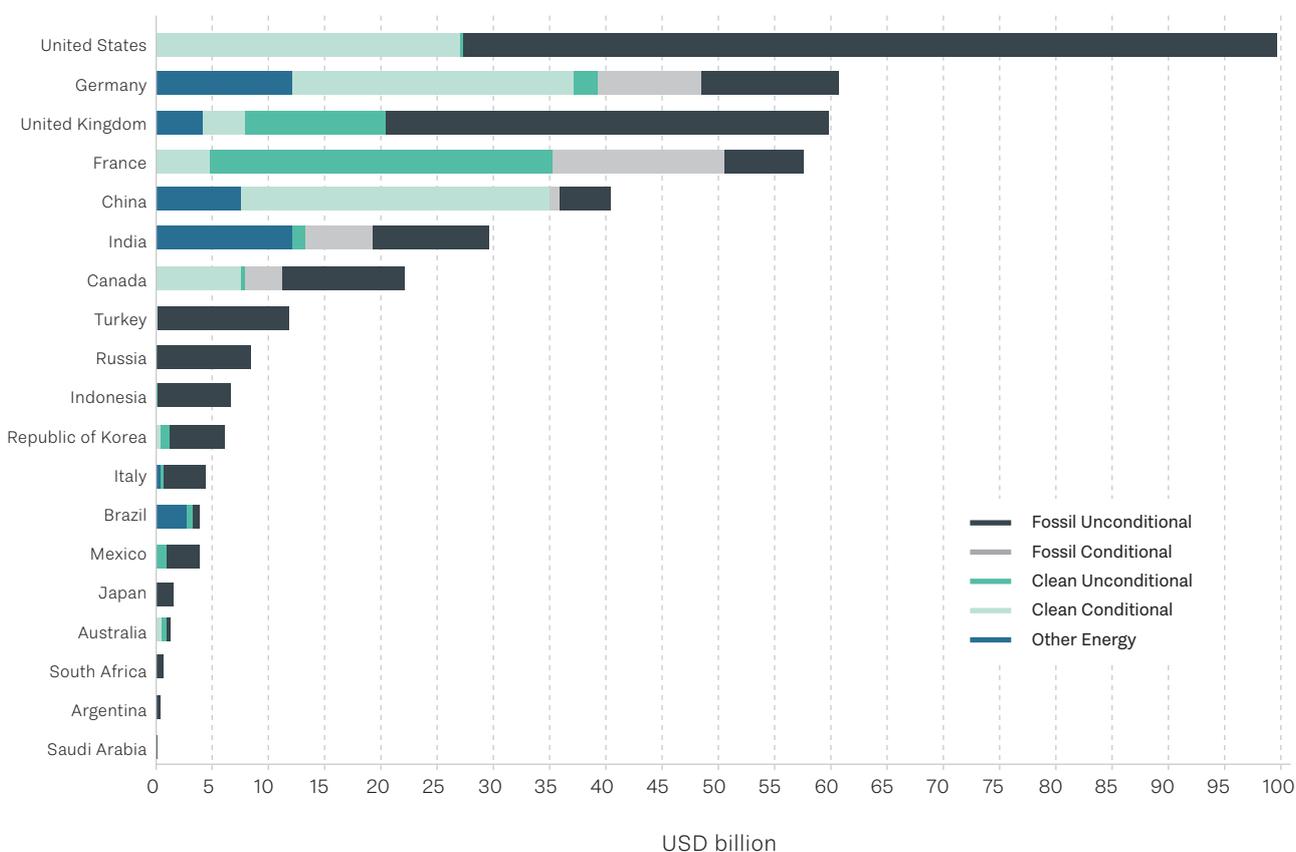
But a just and equitable transition away from fossil fuels offers the potential for alternative high-quality jobs, improvements in public health, a re-envisioning of urban areas, and a refocusing of economic systems on human well-being and equitably shared prosperity. This requires recognizing that countries’ transitional challenges differ widely, depending on their level of dependence on fossil fuel production and their capacity to support a transition.

Countries with limited capacity will need financial, technological, and capacity-building support from higher-capacity ones.

Figure ES.3

COVID-19 recovery efforts in G20 countries have committed more public funds to fossil fuels than to clean energy, as of 11 November 2020, with significant differences by country (Energy Policy Tracker 2020).

Public money commitments to fossil fuels, and clean and other energy, in recovery packages



Policymakers can support a managed, just, and equitable wind-down of fossil fuel production through six areas of action: sustainable stimulus and recovery packages, increased support for just and equitable transitions, reduced support for fossil fuels, restrictions on production, improved transparency, and global cooperation.

Six main areas of action for governments could help ensure a managed, just, and equitable transition away from fossil fuels that “builds back better” from the COVID-19 pandemic:

- 1. Ensure COVID-19 recovery packages and economic stimulus funds support a sustainable recovery and avoid further carbon lock-in.** Many countries have begun to make investments in areas such as renewable energy, energy efficiency, green hydrogen, and improved pedestrian infrastructure. But if this is accompanied by significant support for high-carbon industries, COVID-19 recovery measures still risk locking in high-carbon energy systems and development pathways for decades into the future. Governments that choose to invest in high-carbon industries to boost economies and safeguard livelihoods in the short term — perhaps because they see few near-term alternatives — can nonetheless introduce conditions to that investment to promote long-term alignment with climate goals.
- 2. Provide local and international support to fossil-fuel-dependent communities and economies for diversification and just, equitable transitions.** Each country and region faces unique challenges in a transition away from fossil fuels, depending on their dependence on production and their capacity to transition. Inclusive planning is essential, as is financial, technical, and capacity-building support for communities with limited financial and institutional capacity.
- 3. Reduce existing government support for fossil fuels.** Many long-standing forms of government support to fossil fuels — including consumer subsidies, producer subsidies, and public finance investment — stand in the way of a sustainable recovery to COVID-19 and need to be ended.

- 4. Introduce restrictions on fossil fuel production activities and infrastructure.** Restricting new fossil fuel production activities and infrastructure can avoid locking in levels of fossil fuel production higher than those consistent with climate goals. It can also reduce the risk of stranded assets and communities.

- 5. Enhance transparency of current and future fossil fuel production levels.** A key barrier to aligning energy and climate plans is the lack of clarity on levels of fossil fuel production and planned or expected growth. To improve transparency, countries could ensure that relevant production data are more readily and publicly accessible. They can also provide information on how their fossil fuel production plans align with climate goals, and on their support to the production of fossil fuels. Governments can also take steps to disclose their level of exposure to fossil fuel asset stranding and associated systemic risk, and to require companies within their jurisdiction to do so.

- 6. Mobilize and support a coordinated global response.** Policies to transition away from fossil fuels will be most effective if supported by countries collectively, as this will send consistent, directional signals to energy producers, consumers, and investors. International cooperation, both through established channels and in new forums, can support a just and equitable wind-down of fossil fuels. The Paris Agreement’s global stocktake, nationally determined contributions (NDCs), and long-term low greenhouse gas emission development strategies (LEDS) offer opportunities to facilitate a transition away from fossil fuel production through the UN climate change process. International financial institutions can help shift financial support away from fossil fuel production while scaling up support for low-carbon energy.

1

Introduction

Key Messages

The COVID-19 pandemic has demonstrated the importance of government intervention and international cooperation in reducing societal risk and mitigating collective threats, such as climate change.

The increased global production of fossil fuels is at odds with a climate-safe future.

The risks of relying heavily on fossil fuel development for economic activity are numerous, including air and water pollution, increasing competition from other energy sources, and growing pressures to transition to low-carbon economies.

As countries recover and rebuild, governments face a choice: further lock societies and economies into a high-carbon system, or “build back better” towards a Paris-compatible, resilient future.

This report aims to equip policymakers with options to assess and guide the transition away from fossil fuel production, both in their COVID-19 recovery plans and beyond.

1. Introduction

For at least a century, world leaders have equated fossil fuels with power. Large stores of coal, oil, and gas have been seen as going hand-in-hand with geopolitical advantages and with more opportunities for development.

The COVID-19 pandemic has exposed the fragility of this fossil fuel dominance. Restrictions in economic and social activity and travel triggered the biggest shock to global fossil fuel consumption in seven decades (IEA, 2020d). Oil prices plunged — to historic lows in some places — and countries reliant on oil revenues found themselves saddled with additional hardships in the midst of a health crisis.

Now, with unprecedented investment in rescue and recovery packages — it has been estimated that countries will invest USD 10–20 trillion from mid-2020 through the end of 2021 (Assmann and Hastings 2020; McKinsey 2020) — governments are making decisions that may set the course of their economies for years to come. Some are doubling down on fossil fuels, a path that carries large economic risks and disastrous environmental consequences. Already, the extraction and burning of fossil fuels has contributed to air-pollution-related illnesses and deaths, intensifying extreme weather, and rising food and water insecurity worldwide (Field et al. 2014; Hoegh-Guldberg et al. 2018).

Continued production of fossil fuels at current levels, let alone the increases envisioned by governments, is at odds with a climate-safe future. Coal, oil, and gas account for over three-fourths of global greenhouse gas (GHG) emissions, including 90% of carbon dioxide emissions and roughly a third of methane emissions (IEA 2019; Jackson et al. 2020; SEI et al. 2019).

Last year's Production Gap Report found countries planned to produce fossil fuels far in excess of the levels necessary to limit global warming to 1.5°C or “well below” 2°C, the temperature limits set out in the landmark Paris Agreement, which nearly all governments have now ratified. One year later, the world has changed — but, so far, these plans have not.

Limiting climate change impacts, and meeting Paris Agreement goals, requires that countries wind down fossil fuel production by 6% annually over the coming decade under a 1.5°C pathway and by 2% annually under a 2°C pathway (see Chapter 2). As countries recover and rebuild, a key question becomes: will they return to their



previous trajectories, with plans to collectively produce far more coal, oil, and gas than is consistent with climate goals? Or will countries “build back better”, investing in clean energy and development pathways that enable them to reduce their dependence on coal, oil, and gas production and to meet their climate commitments?

This year's special edition of the Production Gap Report focuses on the implications of the COVID-19 pandemic for the production gap. It considers how government responses are widening or narrowing the production gap, and provides policymakers with policy options to chart a just and equitable transition away from fossil fuels.

The imperative of winding down fossil fuel production

Historically, fossil fuels have formed a major source of energy for billions of people. Today, many governments continue to rely heavily on revenues generated by coal, oil, and gas. Fossil fuels still supply 80% of global energy, with governments continuing a long history of subsidizing and otherwise supporting the fossil fuel industry (IEA 2020c; OECD 2020a). Diversifying revenue streams remains a challenge for many fossil-fuel-dependent regions and governments (Chapter 4).

There are signs that such dynamics are changing. The share of global electricity generated by solar and wind power has doubled in the last five years (Jones et al. 2020).

In 2020, global clean energy investment has continued to grow — and was up 5% in the first half of the year — while overall energy sector investment is expected to drop by 20% (Bloomberg New Energy Finance 2020; IEA 2020d; IEA 2020h). Countries now have compelling environmental, political, and fiscal reasons to diversify their energy sources, as well as their revenue sources. And civil society pressure for climate action is growing ever stronger, with many countries and businesses committed to bolder and more ambitious actions and targets, including dozens of countries that are aiming for net-zero emissions by mid-century or sooner (Darby 2019; Hook 2019; Science Based Targets 2020; SDG Knowledge Hub 2019). This now includes some of the world’s largest emitters, including China (carbon neutral by 2060) and the European Union (climate neutral by 2050) (European Commission 2018; China Ministry of Foreign Affairs 2020).

The risks of relying heavily on fossil fuel development for economic activity are numerous, including the volatility of fossil fuel markets, increasing competition from other energy sources, and widespread policy commitments to transition to low-carbon energy systems (Peszko et al. 2018; Peszko et al. 2020; UNU-INRA 2019). As governments look ahead to COVID-19 recovery plans — and turn to all industries for jobs and economic stimulus — these risks are especially acute.

Meanwhile, a growing number of COVID-19 recovery assessments have demonstrated that government spending on low-carbon energy and infrastructure will be a better engine of economic growth than spending on fossil fuels and associated infrastructure (Bhattacharya and Rydger

2020; Hepburn et al. 2020; IEA 2020k). In 85% of the world, renewable energy is now the cheapest source of new bulk electricity, and that percentage is only rising (Binnie 2020; Bond et al. 2020; Henze 2020). In contrast to a 5% drop in global energy demand, renewable electricity generation is expected to grow by almost 7% in 2020 (IEA 2020n).

Fossil fuels also come with other environmental, social, and political challenges. Extraction and processing can create “energy sacrifice zones” that endanger local communities and industry workers through air and water pollution, and hazardous and radioactive waste, while combustion is a major source of the air pollution that contributes to premature death and multiple diseases worldwide (Healy et al. 2019; Lelieveld et al. 2019; O’Rourke and Connolly 2003). Indeed, a rapid transition away from fossil fuels at the pace needed for a 1.5°C pathway has multiple synergies with Sustainable Development Goals (Roy et al. 2018).

Fossil fuel interests — which represent a large and concentrated political and economic force — often actively counter or resist bold climate action. When governments are dependent on fossil fuels, this “carbon entanglement” can stand in the way of climate policy progress (Gurría 2013; Newell and Johnstone 2018).

Against this evolving backdrop, the choice to heavily invest in fossil fuel production is a political decision as much as an economic one. Whether or not governments continue down this trajectory will be crucial in determining the future of the production gap and the world’s ability to achieve the goals of the Paris Agreement.



Box 1.1. How limiting fossil fuel supply can help achieve climate goals

To date, climate policy has focused almost exclusively on reducing the demand for fossil fuels, with measures to increase energy efficiency, promote renewable energy, price carbon, and incentivize behavioural shifts. While these and other demand-side policies are crucial for a low-carbon transition, the near-exclusive focus on demand has enabled a deep disconnect between countries' climate goals and their plans for energy production. Many countries express the intent to both meet Paris Agreement goals and increase coal, oil, and gas production to levels that are incompatible with those goals.

Policymakers now have a clear opportunity to resolve this contradiction as they enact policies and direct unprecedented levels of investment into economic recovery. Meeting climate goals requires a wind-down of fossil fuel production, and the adoption of recovery policies in line with that necessary wind-down can set countries on a more stable economic path.

Several countries have already paved the way, by adopting “supply-side” policies to limit coal, oil, or gas development, support transitions for affected workers and communities, remove production subsidies, and shift investment to low-carbon energy (Erickson et al. 2018; Gaulin and Le Billon 2020; SEI et al. 2019; Tudela 2020; Appendix B).

These supply-side policies can complement demand-side ones and help to reduce the overall cost of meeting climate goals (Asheim et al. 2019; Green and Denniss 2018). They also come with numerous other benefits, from reducing pollution and health impacts and conserving biodiversity, to preventing new fossil fuel infrastructure that could later be stranded as the result of financial or climate imperatives (Epstein 2017; Harfoot et al. 2018). Furthermore, such measures can send powerful signals to markets and investors that countries are committed to a low-carbon future.

Seizing the opportunity to “build back better”

In the midst of the global health and economic emergency brought on by COVID-19, government policymakers must address short-term, urgent national interests, while also taking a long-term view. It is thus perhaps no surprise that in crafting their economic recovery, many governments are turning to fossil fuels, a historically important source of revenue and energy.

But we cannot lose sight of the climate crisis — or the fact that fossil fuels are no longer the economic powerhouse they once were. This truth is acknowledged by even some major oil and gas companies: in August, BP announced it would shift a third of its investment to low-carbon energy and reduce oil output by 40% by 2030 (BP 2020b). In parallel, some investment firms have begun to shift assets away from fossil fuel holdings (BlackRock 2020; Ward 2019), but arguably far too slowly (Harrabin 2020).

However, without bold and ambitious government leadership and action, a low-carbon future will remain out of reach. The COVID-19 pandemic has demonstrated the central role of governments in mitigating crises, as well as the potential for significant and rapid societal change in the face of collective threats. While many countries have taken

assertive and swift action to prevent the worst of the pandemic, strong leadership is needed to transition the world towards a greener, safer, and more resilient future.

This report aims to equip policymakers with options to assess and guide the transition away from fossil fuels. It starts with an analysis of the size of the production gap, and the finding that governments are not yet planning to drive down coal, oil, and gas production to the levels needed to meet climate goals (Chapter 2). It then shows the extent to which governments have been aiding or moving beyond fossil fuel extraction, with a focus on their responses to the COVID-19 crisis (Chapter 3), and details how governments can foster a just and equitable transition away from fossil fuels (Chapter 4). The report closes with policy options for managing fossil fuel production in keeping with the imperative to “build back better” (Chapter 5).

2

The Production Gap

Key Messages

Between 2020 and 2030, global fossil fuel production would have to decline by 6% per year to follow a 1.5°C-consistent pathway, and by 2% per year to follow a 2°C-consistent pathway.

A 1.5°C-consistent pathway implies that coal production would decrease annually by 11% between 2020 and 2030, while oil and gas production would decrease by 4% and 3%, respectively.

Countries aim to produce 120% and 50% more fossil fuels by 2030 than would be consistent with limiting global warming to 1.5°C or 2°C, respectively. This translates to a 2% annual average growth in global production over the next decade.

While the pandemic will likely result in a production decline in 2020 due to lockdown measures, the choices made by governments as they develop their economic recovery packages will determine whether the production gap narrows or widens in the long-term.

The production gap would be even wider than estimated if carbon dioxide removal practices (such as afforestation and reforestation) or carbon capture and storage fail to supplement emissions reductions at scale.

2. The Production Gap

Many national governments publish plans and projections for fossil fuel production that inform and justify policies and investment decisions by industry and investors. However, few governments — if any — have evaluated how such plans are aligned or misaligned with their climate mitigation commitments and ambitions, including the Paris Agreement goals to limit global warming to well below 2°C and to pursue efforts to limit it to 1.5°C.

Last year, the Production Gap Report provided the first global assessment of this discrepancy. It found that the levels of fossil fuel production planned and projected by governments worldwide would exceed the levels consistent with limiting warming to 1.5°C or 2°C by 120% and 50%, respectively, in 2030 (SEI et al. 2019). Governments' projected levels of fossil fuel production also exceed those implied by countries' commitments to reduce greenhouse gas emissions under the Paris Agreement.

After the publication of the 2019 Production Gap Report — but largely prior to the widespread outbreak of COVID-19 — several countries published updates to their fossil fuel production plans and projections. However, the future of the production gap is subject to large uncertainties, as the COVID-19 pandemic and its ramifications on fossil fuel supply and demand continue to unfold, and with governments continuing to develop and implement long-term economic recovery plans. The policies embedded in these recovery plans could either deepen the lock-in of fossil fuel production or support the transition away from them. This chapter takes stock of how recent developments could either widen, maintain, or narrow the production gap.

2.1 The Fossil Fuel Production Gap

Prior to the COVID-19 pandemic, governments worldwide were planning to produce fossil fuels at levels far in excess of those consistent with the goals of the Paris Agreement. In the 2019 Production Gap Report, we quantified this discrepancy by considering four indicative pathways of future global fossil fuel production.

First, we estimated a global pathway implied by governments' plans and projections,¹ based on a review of the national energy strategies and outlooks of eight fossil-fuel-producing countries that account for over 60%



of global production. Second, we defined low-carbon pathways that limited warming to 2°C and to 1.5°C, based on the mitigation scenarios compiled by the Intergovernmental Panel on Climate Change (IPCC) for their Special Report on Global Warming of 1.5°C (IPCC 2018b; Rogelj et al. 2018). The “2°C-consistent” pathway was calculated as the median of scenarios that have at least a 66% probability of limiting warming to below 2°C, while the “1.5°C-consistent” pathway was calculated as the median of scenarios with at least a 50% likelihood of limiting warming to below 1.5°C. Both pathways were further constrained to have limited reliance on carbon dioxide removal (CDR) deployment,² given the “multiple feasibility and sustainability constraints” associated with these measures, as noted by the IPCC (IPCC 2018a, p.19). Finally, we estimated a fourth pathway that reflects the level of fossil fuel production implied by countries' first nationally determined contributions (NDCs) under the UN climate process, using the New Policies Scenario of the International Energy Agency's 2018 World Energy Outlook (IEA 2018). Further details on how all of the four pathways were estimated can be found in Appendix A of SEI et al., 2019.

¹ Throughout the report, we collectively refer to the national energy plans, projections, outlooks, and strategy documents reviewed as “plans and projections”, given that there are varying levels of certainty and intent associated with each document.

² Following the approach of the 2018 Climate Action Tracker report (New Climate Institute et al. 2018), we excluded mitigation pathways in which the average 2040–2060 values for bioenergy with carbon capture and storage (BECCS) exceeded 5.0 GtCO₂/yr, and in which the average 2040–2060 values for negative emissions achieved by the agriculture, forestry, and other land use sector (AFOLU) exceeded 3.6 GtCO₂/yr.

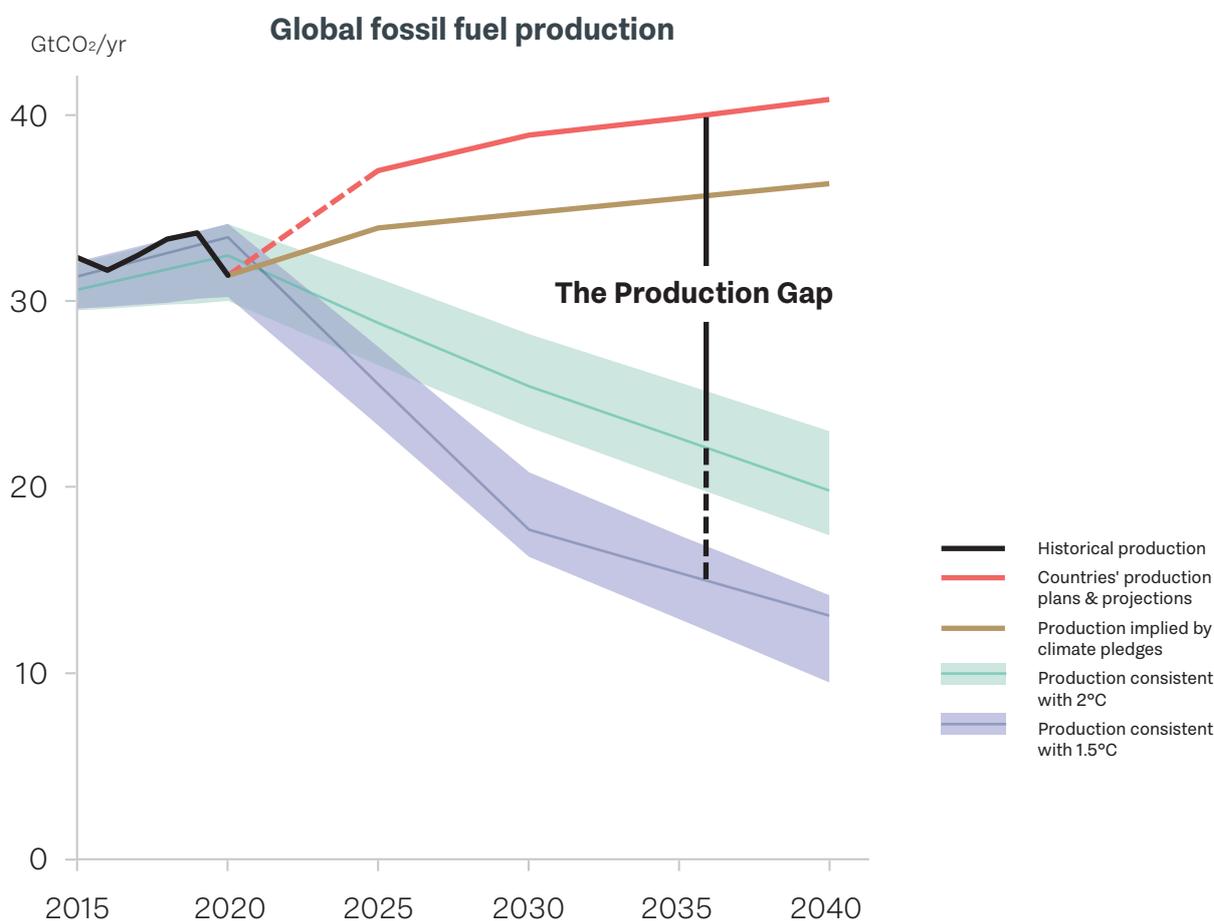
The global levels of fossil fuel production under each of these four pathways are shown in Figure 2.1. The figure is adapted from the 2019 Report with an update to show actual and estimated 2015–2020 values.³ The production gap is denominated here in units of carbon dioxide (CO₂) emissions — essentially, the carbon contained in each fuel — as that provides a single metric to tally up the gap across coal, oil, and gas.⁴ This type of accounting for CO₂ from fossil fuel extraction has been called

extraction-based accounting (Davis et al. 2011; Erickson and Lazarus 2013) or, in some cases, *physical carbon flows* (Peters et al. 2012).

As estimated in the 2019 Production Gap Report, global levels of fossil fuel production under current plans and projections would be 50% higher than levels consistent with limiting warming to 2°C, and 120% more than those consistent with limiting warming to 1.5°C, by 2030. This is the “production gap”.

Figure 2.1

Global fossil fuel production under four pathways, 2015–2040. This figure is adapted from the 2019 Production Gap Report, updated to show actual and estimated 2015–2020 values (black line). For the 1.5°C and 2°C pathways, the median (purple and green lines) and 25th to 75th percentile range (shaded areas) are shown. Note that the modelled pathways for production consistent with 1.5°C and 2°C have not been harmonized to recent actual data (black line); consequently, the median values for the 1.5°C- and 2°C-consistent pathways appear above the estimated actual production in 2020. For comparability with other emissions-based analyses, the production gap is presented in terms of the CO₂ emissions that will result from the combustion of extracted coal, oil, and gas, in units of gigatonnes of CO₂ (GtCO₂ = 10⁹ tCO₂).



³ Fuel-specific 2015–2018 production data are taken from the IEA's World Energy Balances (2019 edition) (IEA 2020f). For 2019 and 2020, preliminary supply estimates for oil are drawn from IEA's Oil Market Report (IEA 2020e). For gas, preliminary supply estimates are drawn from the IEA's Natural Gas Information Overview and from Rystad Energy (IEA 2020i; Rystad Energy 2020a). For coal, supply is calculated based on the estimated percent change in annual coal demand from the IEA's Global Energy Review (IEA 2020d). These reports and data were last accessed on 1 September 2020.

⁴ In this analysis, the 1.5°C- and 2°C-consistent levels of fossil fuel production are derived from the global "primary energy" of coal, oil, and gas variables in the mitigation scenarios compiled by the IPCC. These variables generally include "non-energy" uses of coal, oil, and gas (such as for chemical or plastics feedstocks), though this reporting may vary between models. The IPCC database does not report what fraction of coal, oil, or gas primary energy is for non-energy uses in past or future years. In this analysis, we assume that the percentage of each fuel that is non-energy remains constant at recent levels for the purpose of tallying extraction-based CO₂ emissions from fossil fuel production under all four pathways (see Appendix B of SEI et al. (2019) for more details).

The production gap would be slightly smaller if countries were to take steps to align their fossil fuel production outlooks with their existing NDCs (shown by the “production implied by climate pledges” pathway in Figure 2.1). However, this pathway is still inconsistent with the temperature limits of the Paris Agreement.

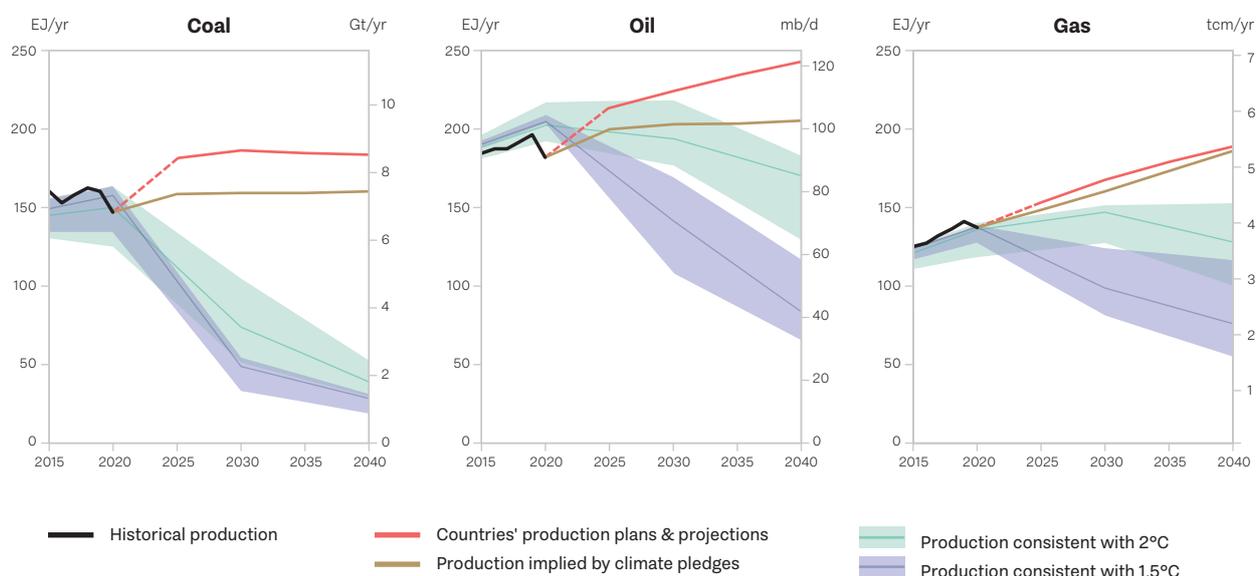
Additional insights can be drawn from comparing the annual *rates* of change of the different pathways shown in Figure 2.1. For example, global fossil fuel production would have to decline by 6% per year from 2020 to 2030 in order to follow the median 1.5°C-consistent pathway, and by 2% per year to follow the median 2°C-consistent pathway.⁵ By contrast, if global fossil fuel production were to return to the 2030 level projected by government plans and projections (red line in Figure 2.1), this instead would imply a *growth* of 2% per year between 2020 and 2030, further committing the world to dangerous climate change.

Preliminary estimates suggest that global fossil fuel production levels could decrease by 7% in 2020 relative to 2019.⁶ This would be the largest annual decrease in global fossil fuel production levels since global statistics have been recorded (1971) (IEA 2020f). However, the drivers of this decline — pandemic-induced lockdown, travel restrictions, and economic recession — are devastating and untenable. By contrast, a deliberate and systemic transition away from fossil fuels — driven by climate concerns and new economic opportunities (Bhattacharya and Rydge 2020; Hepburn et al. 2020) — would help to ensure that a low-carbon transition occurs in a way that is sustainable and equitable, as discussed in Chapter 4.

Figure 2.2 shows the global production pathways for individual fuels, updated from the 2019 Production Gap Report to show actual and estimated 2015–2020 values. To be consistent with a 1.5°C pathway, global coal, oil, and gas production would have to decline annually by 11%,

Figure 2.2

Global coal, oil, and gas production (exajoule or EJ per year) under four pathways, 2015–2040. This figure is adapted from the 2019 Report, updated to show actual and estimated 2015–2020 values (black lines). For the 1.5°C and 2°C pathways, the median (purple and green lines) and 25th to 75th percentile range (shaded areas) are shown. Note that the modelled pathways for production consistent with 1.5°C and 2°C have not been harmonized to recent actual data (black lines); consequently, the median values for the 1.5°C- and 2°C-consistent pathways appear above the estimated actual production for coal and oil in 2020. Physical units are displayed as secondary axes: billion tonnes per year (Gt/yr) for coal, million barrels per day (mb/d) for oil, and trillion cubic meters per year (tcm/yr) for gas.



⁵ These annual rates of decline are derived from the median values in 2020 and 2030 under each model pathway; the 2020 model values have not been harmonized with the estimated, actual production in 2020. The rates are slightly lower than those estimated from model results for total greenhouse gas emissions from all sources in the 2019 Emissions Gap Report (8% and 3% per year for keeping warming below 1.5°C and 2°C, respectively) (UNEP 2019). This is partly due to the fact that, from 2020 to 2030, CO₂ emissions from the agriculture, forestry, and other land use sector generally decline more quickly in the 1.5°C and 2°C pathways than CO₂ emissions from fossil fuels. In addition, by 2030, carbon capture and storage starts to reduce net CO₂ emissions without corresponding reductions in fossil fuel production and use in both pathways.

⁶ See Footnote 3.

4%, and 3%, respectively, from 2020 to 2030. Preliminary estimates suggest that global coal, oil, and gas production could decrease by 8%, 7%, and 3%, respectively, in 2020 relative to 2019,⁷ primarily as a result of the COVID-19 pandemic and lockdown measures. A return to governments' planned and projected levels in 2030 — shown by the red lines in Figure 2.2 — would imply an annual growth of 2% for each fuel.

A global wind-down of fossil fuel production that would be consistent with staying below 1.5°C or 2°C could be achieved by a different mix of decline rates for coal, oil, and gas. The trajectories shown in Figure 2.2 are dependent on the cost assumptions of the underlying models. For example, gas declines the slowest because it is about half as carbon-intensive as coal, and models have generally found gas to be a cost-competitive resource to displace coal in the short term; however, this implies substantial reliance on carbon capture and storage (CCS) at gas power plants from 2040 onwards, and assumes that methane emissions associated with producing, transporting, and distributing gas can be minimized (Rogelj et al. 2018). Moreover, switching from coal to gas could pose risks of carbon lock-in if gas power plants are not retired early (Fofrich et al. 2020).

It is also important to note that, even though the 1.5°C- and 2°C-consistent pathways used here were selected to exclude scenarios with very high reliance on certain CDR practices,⁸ the models nonetheless rely on some degree

of CDR and CCS being achieved (Rogelj et al. 2018). For example, each pathway relies on a median of around 1 gigatonne of CO₂ per year (GtCO₂/yr) of CCS (captured from bioenergy, fossil fuels, or industry) in 2030. This amount increases to around 5 GtCO₂/yr in 2040. If such technologies (or CDR practices, such as afforestation) fail to succeed at scale, or if their political appeal deters other near-term mitigation solutions (Anderson and Peters 2016; McLaren 2020), then the reductions in fossil fuels would need to be even more rapid, and the production gap would be even wider than estimated here.

2.2 Pre-COVID-19 updates to government plans and projections

In last year's report, the size of the global production gap was estimated primarily from the plans and projections of eight major fossil-fuel-producing countries representing 60% of global production. Since the release of the 2019 report — but largely prior to the outbreak of COVID-19 — seven of these countries have published updated production plans and projections (see Appendix A for details of document sources).

Table 2.1 summarizes the changes for each fuel forecasted by these updated documents, where available. Because these plans and projections are subject to large uncertainties due to the COVID-19 pandemic, a more comprehensive update of the production gap analysis is planned for our 2021 report.



⁷ See Footnote 3.

⁸ See Footnote 2.

Table 2.1

Future fossil fuel production in publicly available government plans and projections (as of September 2020) for the eight countries whose outlooks were assessed in the 2019 production gap analysis, and their respective changes. Note that the latest year of projections available differs among the countries. See Appendix A for source details. (A dash (–) denotes that no updates were available; n/a means not applicable or denotes production of less than 1 Exajoule/year.)

Country	Year of future projection	Coal (million tonnes)		Oil (million barrels per day)		Gas (billion cubic meters)	
		New projection	Change relative to prior projection	New projection	Change relative to prior projection	New projection	Change relative to prior projection
India		–	–	–	–	–	–
Australia	2024 ^a	548	+8	0.5	0	164	+19
China	2050	–	–	–	–	350	0
Norway	2023	n/a	n/a	2.3	0	119	-1
Canada	2030	n/a	n/a	6.4	+0.2	187	+7
Indonesia	2030	406	-57	0.4	-0.1	73	-2
Russia	2030 ^b	468 (low) 605 (high)	+108 (low) +115 (high)	10.4 (low) 11.2 (high)	+0.2 (low) 0 (high)	830 (low) 919 (high)	+84 (low) +61 (high)
United States	2030	484	-103	21	+0.4	1,106	+28
Net change in 2030			-52 to -45		+0.6 to +0.7		+94 to +118

^a The numbers shown here are drawn from the March 2020 edition of the Resources and Energy Quarterly from the Office of the Chief Economist. A more recent version was published in June 2020, but with forecasts out to 2022 only. The 2022 coal, oil, and gas production projections in the June version show a 1–3% decline compared to the March version.

^b Updated projections only available for 2024 and 2035. The updated 2030 values are estimated by linear interpolation between these years.

Prior to the pandemic, there were some encouraging signs, with Indonesia and the United States (US) having lowered their projections for future coal production. However, Russia increased its projected future coal production, while Australia, Canada, the US, and Russia also forecast even larger increases in their oil and gas production.

The 2019 report estimated the size of the global production gap in 2030 to be 21 and 13 GtCO₂ in excess of the 1.5°C- and 2°C-consistent pathways, respectively. The net effect of the changes in the plans and projections from countries with available updates for 2030 — Canada, Indonesia, Russia, and the US — leads to a very slight widening of the global production gap in 2030 of around 0.2 GtCO₂.

In addition, several plans and projections from other countries not assessed in the 2019 gap analysis point to intentions for major growth in oil production, though these were also published prior to the outbreak of COVID-19. For example, for the 2020–2030 period, Mexico foresaw a 50% growth (Secretaría de Energía 2017), Brazil and the United Arab Emirates each planned for a 70% increase (Abu Dhabi National Oil Company 2018; Ministério de

Minas e Energia 2019), and Argentina aimed for a 130% increase in oil production (Secretario de Gobierno de Energía 2018). These four countries currently account for around 10% of global oil production (IEA 2020f).

In summary, prior to the outbreak of COVID-19, all signs were pointing to a continuation of the global fossil fuel production gap.

2.3 Implications of government responses to the COVID-19 pandemic

The COVID-19 pandemic has led to worldwide disruptions in energy markets and industries (Box 2.1), with severe effects on the workers and communities that rely on them for livelihoods and revenues. Governments across the world have already deployed emergency rescue packages and are in the process of developing longer-term economic recovery plans.

The choices made by governments in fossil-fuel-producing regions could have profound and long-lasting implications. If recovery efforts are predicated on a rebound to pre-COVID-19 plans and projections for expansion in coal, oil, and gas supply, as depicted by the grey arrow in Figure 2.3,

then they risk maintaining the large production gap. Indeed, as Chapter 3 explains, subsidies for fossil fuel production were already on the rise prior to the COVID-19 pandemic, and government recovery measures have thus far provided far more support to fossil fuels than to clean energy.

However, directing economic stimulus to boost fossil fuel production and entrench reliance on fossil fuels is a risky bet, and not just for the climate. The recent, steep drop in fossil fuel demand and oil prices has exposed the fragility and lack of resilience of economies dependent on fossil fuel revenues, as described in Chapter 4. Without a concerted plan to manage a transition away from fossil fuels, recent events could provide a glimpse of future impacts to some fossil-fuel-dependent economies.

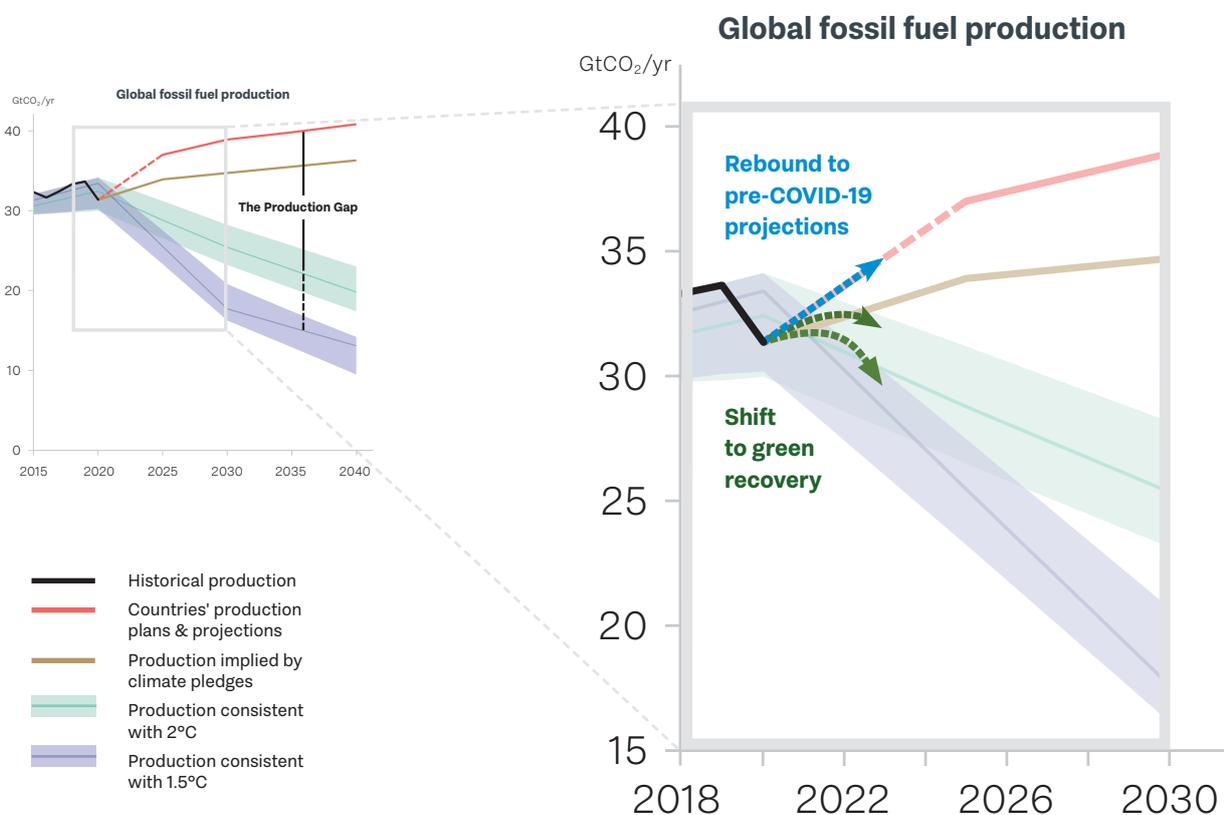
Instead of further entangling their economies with fossil fuels, governments could “build back better” and begin to close the production gap through “green” recovery

measures. As of September 2020, we are aware of only one global assessment of the possible effects of green recovery measures on fossil fuel consumption and production: the IEA’s 2021–2023 “Sustainable Recovery Plan” (IEA 2020k). Figure 2.3 shows a range of near-term energy-sector CO₂ emissions outcomes associated with this plan (dotted green lines): emissions are estimated to decline by 1.7–4.0 GtCO₂ from 2019 to 2023 (IEA 2020j).⁹ The optimistic outlook for this plan could put global CO₂ emissions from fossil fuels onto a pathway that is consistent with limiting global warming to 2°C.

However, recovery plans are by their nature short-term, and longer-term strategies will be needed to ensure that a sustainable recovery is maintained and accelerated. As described in Chapter 5, NDCs and long-term low greenhouse gas emission development strategies (LEDS) provide important avenues for countries to articulate

Figure 2.3

The fossil fuel production gap will continue to widen if countries continue to support fossil fuels and return to their pre-COVID plans and projections for expanded production (blue arrow). Alternatively, strong green recovery efforts could put future fossil fuel production on a pathway much closer to Paris Agreement limits. The trajectories of the illustrative green arrows are based on the estimated range of energy-sector CO₂ emission reductions following the IEA’s 2021–2023 “Sustainable Recovery Plan” (see text for details).



⁹ The IEA estimates that under its Sustainable Recovery Plan, global greenhouse gas emissions from the energy sector could decline from 2019 to 2023 by 2.3 to 4.9 GtCO₂e (IEA 2020j). We estimated the CO₂-specific reductions based on our correspondence with the lead author of IEA’s *Sustainable Recovery* report (IEA 2020k).

Box 2.1 Impact of the COVID-19 pandemic on coal, oil, and gas markets

The first half of 2020 saw the global onset of COVID-19 and, with it, stark reductions in economic activity and fossil fuel use. Expectations for annual coal, oil, and gas consumption across all of 2020 are down 8%, 8%, and 4%, respectively, compared to 2019 (IEA 2020e; IEA 2020d; Rystad Energy 2020a).

It remains too soon to tell how energy systems will emerge from the pandemic, as economic recovery efforts are still being designed and implemented. Energy industry forecasters have dropped their near-term outlooks for fossil fuels, though several have largely retained the view that demand for, and supply of, oil and gas will rebound in the long term to pre-COVID-19 projections. Initial industry forecasts estimate an increase in oil demand of 1%–10% by 2030 above 2019 levels, and an increase in gas demand of 9%–22% over the same period (Crooks et al. 2020; Rystad Energy 2020b), suggesting little, if any, departure from the long-term trends shown in Figure 2.2. Conversely, some analysts and industry executives have posited that, given the pandemic-induced disruption in demand and underlying long-term changes in consumption patterns, demand for oil may never return to 2019 levels; in other words, it may have peaked (Bond 2020; Grubb 2020; Kusnetz 2020; Lee 2020; Lewis 2020).

For coal, the outlook for future demand appears to be flat or declining slightly (Crooks et al. 2020). This is partly driven by the long-term trend of renewables increasing in cost-competitiveness: solar photovoltaics and onshore wind are now the cheapest sources of new-build electricity for at least two-thirds of the global population (Henze 2020). However, this outlook is subject to large uncertainties, given that coal relies almost exclusively on the electricity market, which will be highly sensitive to post-COVID-19 economic recovery (Bodnar et al. 2020; Henze 2020; IEA 2020d; S&P Global Platts 2019).

All in all, the costs of renewable electricity — and the costs of technologies that use electricity instead of fossil fuels — have been declining so rapidly that the additional hit to fossil fuel markets caused by the pandemic may represent a permanent setback to the continued dominance of fossil fuels. While these economic trends point to a low-carbon future, the question now is whether policymakers will seize this moment to ensure a long-term transition that takes place at the scale and speed necessary to meet the Paris Agreement's goals.

commitments to align their domestic energy strategies with their climate ambitions. Furthermore, countries should strive to do this in a way that is just and equitable for all countries (Chapter 4).

2.4 Conclusions

Many governments in countries endowed with large stores of coal, oil, and gas have adhered to the belief that the exploitation of these resources is essential for economic development and energy security (Strambo and González Espinosa 2020). Many, in turn, have issued optimistic outlooks for fossil fuel production, complemented by fiscal, regulatory, and other forms of government support. As a result, the world's plans for fossil fuel production are incompatible with limiting warming to 1.5°C or 2°C.

Meeting the Paris Agreement's goals will require a different approach, and it will not be easy. The ties between governments and fossil fuel interests are often strong, and public officials have, in many cases during the COVID-19 pandemic, sought to aid fossil fuel production and consumption without any climate mitigation or additional pollution reduction requirements (see Chapter 3). Nonetheless, as described in Chapters 4 and 5, leading countries have demonstrated that the policy tools — and government know-how — for bringing about a just and equitable transition from fossil fuels do exist.

As governments seek to develop long-term economic recovery plans in response to the current public health emergency, they can seize the opportunity — and responsibility — to avoid locking in the climate crisis and instead strive towards a managed, just, and equitable transition from fossil fuels.

3

Government support and COVID-19 responses: implications for fossil fuel production

Key Messages

Governments are responding to the COVID-19 crisis with major — and often new — forms of fiscal, economic, and environmental policy commitments that could have long-lasting consequences for the prospects of a low-carbon transition.

G20 governments have directed more COVID-19 recovery support to fossil fuel production and consumption than to renewable energy, energy efficiency, and other low-carbon alternatives (USD 233 billion vs. USD 146 billion, as of November 2020).

Governments' responses to the COVID-19 crisis have tended to intensify patterns that existed prior to the pandemic: jurisdictions that already heavily subsidized the production of fossil fuels have added support to coal, oil, and gas, while those with stronger commitments to a transition to clean energy are now using stimulus and recovery packages to accelerate this shift.

Governments still have the opportunity to “build back better” by enacting measures to move beyond fossil-fueled development pathways and to make any support related to fossil fuel production conditional on improved environmental performance.

3. Government support and COVID-19 responses: implications for fossil fuel production

Last year's Production Gap Report showed how government actions — including plans, targets, direct investment, public finance, and other support measures — serve to widen the production gap. Here, we consider how these and other actions have evolved in the past year, with a specific focus on new support measures introduced in response to the COVID-19 crisis, and their potential implications for the production gap.

Many governments, especially those with abundant fossil fuel reserves, provide support to fossil fuel production with the stated intention of increasing domestic energy supplies, reducing imports, and generating exports and rents (Bast et al. 2015). They also remain tied to support for coal, oil, and gas production by powerful, incumbent interests and by narratives about dependence of economic development on fossil fuels (Bang and Lahn 2019; Curran 2020; Graham et al. 2019; Stokes 2020; Strambo and González Espinosa 2020). This support, such as tax breaks and direct government spending, can encourage investment in fossil fuel production that would otherwise not be economically viable, leading to greater production, consumption, and global greenhouse gas (GHG) emissions (Erickson et al. 2020; Gerasimchuk et al. 2017; Ross et al. 2017).

Now, the COVID-19 crisis has precipitated more government commitments to support specific energy production and consumption activities. Against this backdrop, leaders of multilateral institutions — the United Nations, Organisation for Economic Co-operation and Development (OECD), International Energy Agency (IEA), World Bank Group, and others — have called for countries to “build back better,” by putting clean energy jobs and a just transition at the centre of stimulus packages and by avoiding the potential lock-in associated with boosting high-carbon industries (IEA 2020m; United Nations Secretary-General 2020).

However, between the start of the COVID-19 crisis and the time of writing in November 2020, governments have directed more support, on a global scale, to fossil fuel production and consumption than to low-carbon alternatives. While there are some national examples of good practice, a change of course is needed if the world is to recover better from the current crisis.



A US Coast Guard officer documents oil tankers anchored near the ports of Long Beach and Los Angeles amid the COVID-19 pandemic. Photo: Mario Tama / Getty Images.

3.1 Government support mechanisms for fossil fuel production

Plans, targets, and projections

National plans and projections play key roles in driving government policy and private investment. With state-owned enterprises controlling approximately 55% of current oil and gas production, up to 90% of oil and gas reserves, and well over half of coal production, government plans are central to the future development of fossil fuel resources (Beaton and Roberts 2019; Nelson et al. 2014; NRG 2020). Even in countries that do not explicitly plan or control fossil fuel production, official projections of coal, oil, and gas output send powerful signals to investors and serve to inform business decisions on new and existing infrastructure.

Government plans and projections — as updated after the 2019 Production Gap Report, but largely before the COVID-19 pandemic — suggest continued efforts among

major producers to expand the extraction of fossil fuels, especially oil and gas (see Chapter 2, Table 2.1). The recent, steep drop in oil prices amid the COVID-19 pandemic has also led governments to consider and take additional steps to support domestic production in the near-term, through threats of tariffs on imported oil and through large-scale purchases for strategic reserves in order to reduce market surpluses (IEA 2020g; Sheppard 2020).

These efforts illustrate the active roles that governments often take, individually and in coordination, to manage and support fossil fuel production in general, and oil production in particular, as discussed in Box 3.1. Indeed, coordinated government responses could eventually help to manage reductions in fossil fuel production that are in line with climate goals.

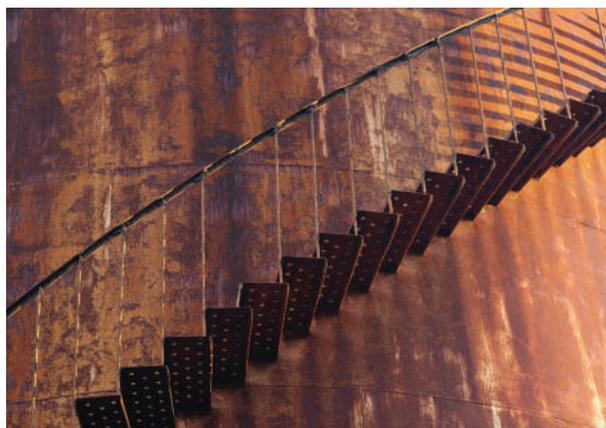
Subsidies

Fossil fuel subsidies are a form of public support.¹⁰ Through them, governments or public bodies accord financial benefits to the consumption and production of fossil fuels.

Subsidies to fossil fuel production directly benefit the extraction of coal, oil, and gas.¹¹ However, coal, oil, and gas producers also benefit from subsidies to fossil fuel consumption, which encourage demand for these commodities. In this respect, production subsidies lead to “wasteful consumption,” and consumption subsidies lead to the excessive extraction of coal, oil, and gas; the latter also largely benefits wealthier consumers of fossil fuels, rather than those in need of increased energy access (Gerasimchuk et al. 2017; Zinecker, Sanchez, et al. 2018).¹²

Consumption subsidies constitute the largest portion of total fossil fuel subsidies. Across 42 emerging and developing economies tracked by the IEA, these subsidies amounted to USD 438 billion in 2018 and USD 318 billion in 2019 (IEA 2020b). This decline was due to two factors: the fact that the magnitude of subsidies fluctuates with global oil prices, and continued progress in some countries to reform and reduce subsidies (Gerasimchuk et al. 2018).¹²

With both oil prices and demand markedly lower in 2020, the IEA has projected consumption subsidies will



drop by yet another 43% from 2019 levels to USD 180 billion in 2020 (IEA 2020b). Amid lower oil prices, several countries, including Ecuador, Nigeria, and Tunisia, have announced the deregulation of some of their domestic energy prices (España 2020; IEA 2020i; James-Igbinador 2020). However, there is a historical tendency for such reforms to backslide when oil prices go back up, leading to the reintroduction of subsidies (Beaton and Adeoti 2020; Mahdavi et al. 2020).

The recent decline in consumption subsidies has translated into an overall drop in total subsidies to fossil fuels; they fell from USD 582 billion in 2018 to USD 472 billion in 2019 across a set of 77 countries (IEA 2020b; OECD 2020b).¹³ But this masks a concerning trend: fossil fuel production subsidies are actually on the rise. According to the OECD, direct budget transfers and tax expenditure support for the production of fossil fuels increased by 38% in 2019 — to USD 54 billion, from USD 39 billion in 2018 — in a subset of 44 advanced and emerging economies (OECD 2020b).¹⁴

Leading providers of fossil fuel producer subsidies, by quantified monetary value, include Canada, China, Russia, and the United States (US) (OECD 2020b).

The actual amount of producer subsidies may be considerably higher. The OECD estimate does not include many unquantified producer subsidies identified in other studies (Bast et al. 2015). For example, many governments

¹⁰ Most of the commonly used forms of government support to fossil fuel production fall under the World Trade Organization's definition of a subsidy (Agreement on Subsidies and Countervailing Measures (ASCM) Article 1.1). By targeting fossil fuel producers, such measures typically confer benefits to a specific industry or group of industries (ASCM Article 2) (Marrakesh Agreement 1994).

¹¹ Producer subsidies span all stages of the fossil fuel production process, from research, development, and exploration, to operations, transport, processing, marketing, decommissioning, and site remediation (Aldy 2013; Koplow 2018; OECD 2013).

¹² Most consumption subsidies cover the gap between domestically regulated prices and the international price benchmark: the smaller the gap, the lower the subsidy. Therefore, as oil prices declined from USD 71 per barrel in 2018 to USD 64 in 2019 (Brent annual average), the value of oil consumption subsidies shrank accordingly (EIA 2020).

¹³ This broader figure integrates results from the IEA subsidy database, which only covers consumer subsidies in mostly non-OECD countries (IEA 2020b), with findings from the OECD inventory on both consumer and producer subsidies in the OECD member states and seven large emerging economies (OECD 2020b).

¹⁴ In 2019, increased support to producers included direct budgetary transfers to alleviate corporate debt, direct investments in fossil fuel infrastructure, and tax provisions that confer preferential treatment on capital expenditures by the industry (OECD 2020b).

Box 3.1 Coordinated government efforts to manage oil production

For decades, the Organization of the Petroleum Exporting Countries (OPEC) has attempted to regulate world oil markets through oil production quotas. This group of oil-producing countries (currently 13), led by Saudi Arabia, has joined forces with several other producers, most notably Russia, to form the so-called OPEC+ forum (24 countries). This forum seeks oil price stabilization, but with mixed results, owing in part to growing shale oil and gas production in the US (Van de Graaf and Bradshaw 2018).

Just as discussions to extend oil production cuts fell through in March 2020 (Yergin 2020), the COVID-19 shock precipitated a steep drop in oil demand, mostly because of a sudden fall in road and air travel as countries went into lockdown. Prices plummeted from well above USD 60 a barrel in January 2020, to near USD 20 by the end of March, and briefly became negative in the US, for the first time in history, due to shortages in storage infrastructure (Brower et al. 2020).

By mid-April, OPEC+ countries were back at the negotiating table and agreed to the biggest supply cut ever recorded: nearly 10 million barrels per day (mb/d) for two months, equivalent to roughly 10% of global production, and then 7.7 mb/d for the six subsequent months, and 5.8 mb/d for the following 16 months (OPEC 2020). The cuts received broad backing from the G20 and the IEA (Sheppard et al. 2020) and were joined by Norway (Norwegian Ministry of Petroleum and Energy 2020). Major consumers of oil, such as Australia, China, India, Republic of Korea, and the US, pledged to fill their strategic oil storage sites to the brim to accommodate excess oil, offering yet another form of support to producers (IEA 2020g).

As the oil sector slashes production and investment — the IEA has projected a 32% drop in oil and gas investment from 2019 to 2020 (IEA 2020h) —

and the world emerges from lockdowns, oil prices may continue to climb back closer to prior levels. However, peak oil demand, which many commentators had suggested was coming even before the COVID-19 shock, may have arrived already, due to broader market trends with potentially long-lasting demand reductions flowing from the COVID-19 pandemic (Carrington et al. 2020; Rapiere 2020; Vettese 2020).

The IEA estimates that oil demand will fall by a record 8.1 mb/d this year (IEA 2020e). While this decline will lead to a near-term drop in emissions, it will also likely lead to serious disruption for governments, workers, regions, and societies currently dependent on fossil fuels. Ideally, future declines, as needed to meet the temperature limits of the Paris Agreement (see Chapter 2), will be planned, managed, and just, with the economic burden shouldered equitably (Muttitt and Kartha 2020).

Some observers suggest that coalitions of oil producers, such as OPEC or OPEC+, could serve as agents to manage a decline in oil production (Dobson 2020; Muttitt 2020). While the recent OPEC+ arrangement was informed by some equity considerations — no cuts were asked from countries facing significant domestic challenges like Iran, Libya, and Venezuela — it does not formally include some major wealthy oil producers (e.g. the US, Canada, Norway), and has left several oil-producing developing countries, such as Iraq and Nigeria, with severe budgetary shortfalls (Trout 2020). To support oil-production-dependent developing countries in diversifying their economies and to enable a just and equitable transition, new arrangements will therefore be needed. These could include, for example, conditional financial and technology transfers, conditional debt relief, or the sharing of carbon tax revenues between fuel importers and exporters (Peszko et al. 2019; Peszko et al. 2020).

also grant labour, health, environmental, and other regulatory exemptions that artificially lower costs of production for coal, oil, and gas production (Burton, Lott, et al. 2018; Koplow 2018; Strambo et al. 2018).

All these forms of production subsidies can bring otherwise unprofitable oil and gas resources to the market, in turn stimulating greater production, demand (through lower prices), and associated GHG emissions (Erickson et al. 2017; Gerasimchuk et al. 2017; Peszko et al. 2020). Furthermore, government subsidies also send normative signals to markets and societies that extraction activities should be supported, and they can reinforce the political influence of the industry (Erickson et al. 2020; Newell and Johnstone 2018; Sovacool 2017). Producers often call for, and governments often respond with, financial support in times of fossil fuel price decline and lower returns on coal, oil, and gas production (Victor 2009).

The recent increase in subsidies for fossil fuel production stands in contrast to the pledge G20 governments made in 2009, and have reiterated since, to “phase out and rationalize, over the medium term, inefficient fossil fuel subsidies” (G20 2009). This commitment has been echoed in Sustainable Development Goal (SDG) target 12.c and the supporting indicator 12.c.1 (UN General Assembly 2015; UNEP et al. 2019).



Public finance

Governments also support fossil fuel production through development finance, export credit agencies, and other public finance institutions they invest in and govern. Public finance institutions have a wide range of instruments to reduce the costs and risks of private investment, including grants, loans, equity, insurance, and guarantees, often at a subsidized, below-market value. Their use of these instruments, signalling of government priorities, political leverage, and research and advisory capacity can increase private investment in fossil fuel production and other high-carbon sectors (OECD 2017; Tucker and DeAngelis 2020).

Governments committed under the Paris Agreement to make finance flows “consistent with a pathway towards low GHG emissions and climate-resilient development” (Article 2.1(c)). However, since the Agreement’s adoption, public finance has continued to support fossil fuels far more than clean energy. From 2016 to 2018, public finance for fossil fuels from export credit agencies, development finance institutions, and the major multilateral development banks averaged USD 77 billion a year in G20 countries, more than three times the level of support the same institutions provided for clean energy (Tucker and DeAngelis 2020). Over two-thirds of this public finance for fossil fuels came from China, Japan, Canada, and the Republic of Korea alone, and it included USD 12 billion a year for exploration and extraction of new reserves (Tucker and DeAngelis 2020).

Central banks are poised to play a major role in the COVID-19 recovery. These banks could either encourage a low-carbon pathway or further reinforce carbon entanglement, through their direct involvement in financial markets through quantitative easing (bond purchase), as well as supervisory mechanisms, including collateral requirements and climate risk disclosure regulations (NGFS 2019). However, research suggests that central banks’ bond purchase programmes prior to COVID-19 benefited incumbent fossil fuel companies (Bolton and Kacperczyk 2020; Campiglio et al. 2018; Matikainen et al. 2017; Steele 2020).

By contrast, a growing group of public finance institutions are actively reducing their support to fossil fuels. The European Investment Bank, the World Bank Group, Ireland Strategic Investment Fund, Swedfund, Agence Française de Développement, and CDC Group, among others, have implemented policies to limit all or most of their finance for coal, oil, and gas (Agence Française de Développement 2019; CDC Group 2020; Chestney 2020; European Investment Bank 2019; Swedfund 2017; World Bank 2017;

see also Appendix B). Environment ministries from 26 countries and over 100 other partners are also working to “green” China’s Belt and Road Initiative, the world’s largest infrastructure investment initiative (Treyer and Rankovic 2019; UNEP 2018). Efforts like these — which work to avoid the lock-in of resource extraction and carbon-intensive infrastructure — are critical as major public investments are considered in response to the COVID pandemic.

State-owned enterprises

As noted above, state-owned enterprises (SOEs) control the majority of global fossil fuel production. Governments often use SOEs as a means to strategically control sensitive energy supplies, and energy SOEs can be an important source of public revenue (Mahdavi 2020). Moreover, SOE investments can influence the level and type of investment by private firms (Prag et al. 2018). Many SOEs serve as major employers and fulfil other government-imposed social obligations (IEA 2020d; Victor et al. 2011).

While historically SOEs have largely managed investment and extraction to maximize production and revenue, they could also serve as effective mechanisms for winding down fossil fuel production (Araújo 2014; Aronoff 2020; Mayer et al. 2017). For instance, the ability of OPEC+ to coordinate on production targets (Box 3.1) is predicated on its high concentration of SOEs in control of oil production. To date, there is a limited, but slowly growing, list of examples of SOEs serving as vehicles of a transition away from fossil fuels. For instance, the Swedish SOE Vattenfall and the Danish SOE Ørsted (formerly DONG) have successfully diversified their investments from fossil fuels into renewables (IISD 2019). In 2018, Coal India Limited announced plans to start diversifying from coal mining and set up 20 gigawatts (GW) of solar projects over the next 10 years (IISD 2019).

3.2 COVID-19 response and stimulus measures

Wealthier countries are injecting trillions of dollars into their economies in an effort to mitigate an economic recession, create employment opportunities, and stimulate recovery from the COVID-19 crisis (Wilkes and Carvalho 2020), while poorer and heavily indebted countries are struggling to find resources to combat these and other challenges. Countries are also citing COVID-19 as the

rationale for changing laws, and in some cases rolling back environmental and labour protections (Harris 2020; US EPA 2020). As many analysts have noted, the impact of these measures on future energy systems and emissions could be profound and long-lasting, either locking in fossil fuels or facilitating a transition away from coal, oil, and gas dependence (Hanna et al. 2020; Hepburn et al. 2020).

Despite widespread calls for a green recovery, as of November 2020, governments have directed more support to fossil fuel and other carbon-intensive activities than to clean energy and low-carbon sectors. One recent assessment suggests that most countries’ stimulus packages have been “environmentally harmful” overall, with only a handful (e.g. France, Germany, and the United Kingdom) characterized as neutral or positive (Vivid Economics 2020). Another assessment finds that, as of early November 2020, government stimulus and recovery packages had committed nearly five times more to high-carbon sectors, such as fossil fuel extraction, aviation, and car manufacturing (USD 878 billion), than to low-carbon industries, such as electric vehicles, energy efficiency, and renewable energy (USD 179 billion) (Cumming 2020).¹⁵

As of November 2020, G20 governments¹⁶ had committed USD 233 billion to activities that support fossil fuel production and consumption (e.g. for airlines, airports, highways, car manufacturers, fuel, and fossil-based power consumers), as compared with USD 146 billion to renewable energy, energy efficiency, and low-carbon alternatives such as electric vehicles, rail and public transport, and cycling and pedestrian systems, according to the Energy Policy Tracker, which focuses specifically on support for clean and fossil energy (Energy Policy Tracker 2020).¹⁷ Figure 3.1 illustrates the varying levels of support by country.

Total COVID-19 response support specific to fossil fuel production stood at USD 23 billion as of November 2020. Some of this support has been directed specifically towards environmental benefit. For example, the Canadian federal government has committed USD 1.8 billion towards the clean-up of orphaned and abandoned oil and gas wells and the creation of a fund focused on methane emission reduction (Prime Minister of Canada 2020). The province of Alberta will also use some of these funds for technology and innovation opportunities in the natural gas

¹⁵ These estimates do not include the European Council’s intention to direct 30% of the Recovery Fund (EUR 750 billion) and Multi-Annual Financial Framework (EUR 1.074 trillion) funding to achieving climate targets (European Council 2020). This proposal still requires approval by the European Parliament and specification in terms of areas of spending, which may also include natural gas projects.

¹⁶ In 2019, the 19 countries of the G20 (the 20th member being the European Union) accounted for 60% of global oil and gas production and 92% of global coal production (calculations based on the volumetric data of the BP Statistical Review of World Energy (BP 2020a)).

¹⁷ The database aggregates government commitments based on the officially reported face value of different mechanisms, including grants, tax expenditure, loans, loan guarantees, and many other hybrid tools.

industry (Government of Alberta 2020). As countries respond to the COVID-19 pandemic, efforts to tackle legacy pollution can generate valuable jobs and environmental benefits in the near-term. Nevertheless, such support also poses the risk of shifting liabilities from industry to government, in seeming contradiction to the “polluter pays” principle.

The vast majority of commitments of support to fossil fuel producers have lacked any social, economic, or environmental conditions, which represents a lost opportunity to combine COVID-19 response measures and green recovery (Corkal et al. 2020). Examples of unconditional support to fossil fuel production include:

- Argentina cut its tax on fossil fuels exports (Official Bulletin of the Argentina Republic 2020).
- The Australian state of Queensland froze fees and charges for coal and gas exploration (Burt and Maykin 2020).
- The Canadian province of Alberta provided USD 5.5 billion in equity and loan guarantees for the Keystone XL pipeline (Energy Policy Tracker 2020; The Government of Alberta 2020).
- The Canadian province of British Columbia froze fees for oil and gas pipelines and levies for orphaned well liability (British Columbia Oil and Gas Commission 2020).
- Estonia allocated USD 136 million in aid to the state-owned company Eesti Energia for the construction of a GHG-intensive oil shale plant (Banks 2020; Tammiste et al. 2020).
- India provided a rebate on revenue payable to the government on coal extraction (Press Information Bureau of the Government of India 2020).
- Mexico announced a plan to reduce the tax on oil extraction in response to the international oil price crash, providing USD 3 billion in fiscal stimulus to Pemex, the national oil company (Government of Mexico 2020).
- Norway approved a temporary tax relief package for its oil and gas industry worth USD 10.8 billion (Adomaitis and Solsvik 2020; KPMG 2020).
- Russia amended its Tax Code to provide relief on the oil and gas extraction tax in its Arctic zone (Reuters 2020).
- The Bank of England provided around USD 1.3 billion in debt support to two oil service companies, Schlumberger and Baker Hughes (Bank of England 2020).

- The US government rolled back several environmental regulations, and the Department of Interior has offered waivers or reductions in royalty rates and rental payments for oil and gas extraction on federal lands and waters (Energy Policy Tracker 2020; Englund and Grandoni 2020).

One stated rationale for recent government support to the fossil fuel industry has been the prevention of job losses. However, only a few instances of support have been accompanied by specific employment stipulations; Turkey, for example, provides its direct budget transfer to coal mining on a per-worker basis (Resmî Gazete 2020). Governments’ responses to the COVID-19 crisis have tended to intensify patterns that existed prior to the pandemic: jurisdictions that already heavily subsidized the production of fossil fuels have tended to provide added support to coal, oil, and gas, while those with stronger commitments to a transition to clean energy are now using stimulus and recovery packages to accelerate this shift.

Both before and during the COVID-19 crisis, some governments have introduced measures to move beyond fossil-fuelled development pathways, including reforms and limits to fossil fuel consumption or production subsidies (e.g. Argentina, Canada, China, India, and Indonesia), bans on new extraction activities (e.g. Costa Rica, France, and New Zealand), public finance restrictions (most OECD member states), and support for economic diversification and just transition (Gerasimchuk et al. 2018; see also Chapters 4 and 5). Specifically, as part of their recovery and stimulus packages, some major fossil fuel producers, such as Australia, China, and Norway, have also begun to offer support to technologies that could play key roles in a low-carbon future, including electric vehicles, renewable energy, and hydrogen (Energy Policy Tracker 2020).

3.3 Conclusions

Governments have pledged to phase out fossil fuel subsidies and to align financial flows with low GHG emission development. Yet, government support for fossil fuel production is instead on the rise — both before the onset of COVID-19 and through pandemic recovery and stimulus measures. Producer subsidies increased by 38% (USD 15 billion) from 2018 to 2019, and, so far this year, governments have pledged at least another USD 22 billion to fossil fuel production through their COVID-19 recovery packages. They have also suspended environmental regulations, cut taxes, and provided favourable financing in the interest of sustaining and increasing production.

If unchanged, these trends could lock in additional fossil fuel infrastructure for the long term, putting climate goals at further risk, as well as the fossil-fuel-dependent communities that could be stranded by a low-carbon future. By contrast, a planned and deliberate wind-down of fossil fuel production will help avoid a more disruptive transition from fossil fuels, while green stimulus may offer significantly greater long-term economic and employment potential (Bhattacharya and Rydge 2020; Garrett-Peltier 2017; Hepburn et al. 2020).

Many fossil-fuel-dependent regions, communities, and workers currently face significant challenges, as a consequence of the COVID-19 pandemic, lockdown measures, and the oil price drop. This can make government support to fossil fuel production and consumption seem inevita-

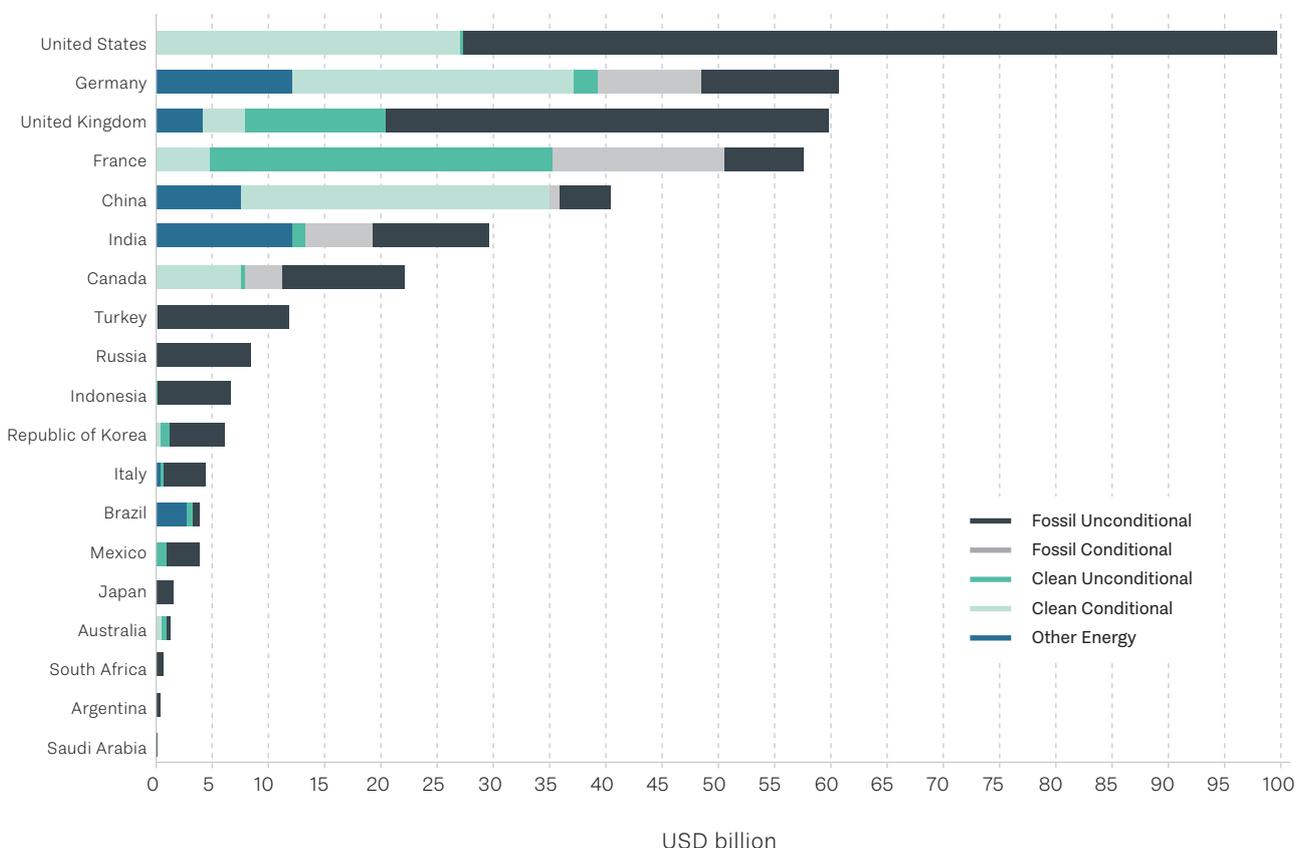
ble. But governments and financial institutions have an opportunity to reduce economic vulnerabilities and set the course for a more just, resilient, and sustainable future by introducing conditions that benefit social and environmental goals.

The opportunity to “build back better” remains strong. As the final two chapters show, domestic and international efforts to ensure an equitable transition away from fossil fuels are a critical step to addressing the climate crisis. And there are many policy options available to governments to begin to transition away from fossil fuel production. Embarking on this journey may represent one of the most challenging global undertakings of the 21st century, but one necessary for securing a more just, sustainable, and resilient future.

Figure 3.1

Public money commitments to fossil fuels, and to clean and other energy in COVID-19 recovery efforts in G20 countries, USD billion, as of 11 November 2020 (Energy Policy Tracker 2020). The Energy Policy Tracker defines fossil fuel commitments as conditional when they are accompanied by climate targets or additional emission reduction requirements, and defines clean commitments as conditional when they are unspecified about the implementation of appropriate environmental safeguards (see <http://energypolicytracker.org>).

Public money commitments to fossil fuels, and clean and other energy, in recovery packages



4

Fostering a just and equitable transition away from fossil fuel production

Key Messages

The COVID-19 pandemic has provided a reminder of the importance of ensuring that a transition away from fossil fuels is just and equitable.

A successful global transition requires recognizing that countries' transitional challenges differ widely depending on their level of *dependence* on fossil fuel production and their *capacity* to support a transition.

Countries that are less dependent on fossil fuel production and have higher capacity are best equipped to pursue a rapid, just transition away from fossil fuel production. However, some of the largest fossil fuel producers in this group are currently among those pursuing major expansions in fossil fuel supply.

Countries with limited financial and institutional capacity face significant sustainable development challenges that are being further exacerbated by the COVID-19 pandemic and will need international support to achieve a just and equitable transition.

All fossil-fuel-producing countries have incumbent interests that have a stake in continued extraction. Policy interventions associated with good governance, transparency, democratic oversight, public education, and legal recourse can help to overcome political-economic resistance from such actors.

4. Fostering a just and equitable transition away from fossil fuel production

Winding down fossil fuel production at a rate compatible with a 1.5°C or well below 2°C global warming limit will require a significant societal transformation within a limited timeframe. This raises a challenging question: how can such a transition be managed in a way that minimizes social disruption and ensures just and equitable outcomes? The answers will be as varied as the communities and countries in which fossil fuel production is a major social and economic force — from Norway to Nigeria, and Angola to Australia.

The COVID-19 pandemic has given us a peek into the potential inequity of this transition. The fossil fuel industry has been hit hard by the recent global economic disruption, which came on the heels of an expansion in oil supply that was already pushing down oil prices. This has resulted in painful social costs across the world, and particularly in developing countries.

In Nigeria, lost oil revenue has driven a 25% cut to government spending, forcing the country deeper into debt to pay for its pandemic response and public health costs (Olurounbi 2020). Iraq's salaries and social benefits — even more dependent on oil revenues — have been significantly reduced as well (Kullab and Abdul-Zahra 2020). And Ecuador's public sector has been severely affected by the combined impact of the pandemic and collapse of oil revenue, which has impaired its ability to manage the COVID-19 crisis (Long 2020).

This all comes on top of existing stresses on energy, industrial, and societal systems, from automation to urbanization and globalization. The world is in the middle of multiple intersecting transitions — and a transition away from fossil fuels presents an added challenge that can amplify the uncertainties and compound the risks. At the same time, this transition is a climate necessity, and it comes with immense opportunities. If undertaken in a just manner (see Box 4.1), it offers the potential for alternative high-quality jobs, improvements in public health, a re-envisioning of urban areas, and a refocusing of economic systems on human well-being and equitably shared prosperity (Coalition for Urban Transitions 2019; ILO 2018; Lelieveld et al. 2019; OECD 2019).

Realizing this potential is possible, and it requires recognizing that countries' transitional challenges differ widely depending on their level of dependence on fossil fuel production and their capacity to support a transition.

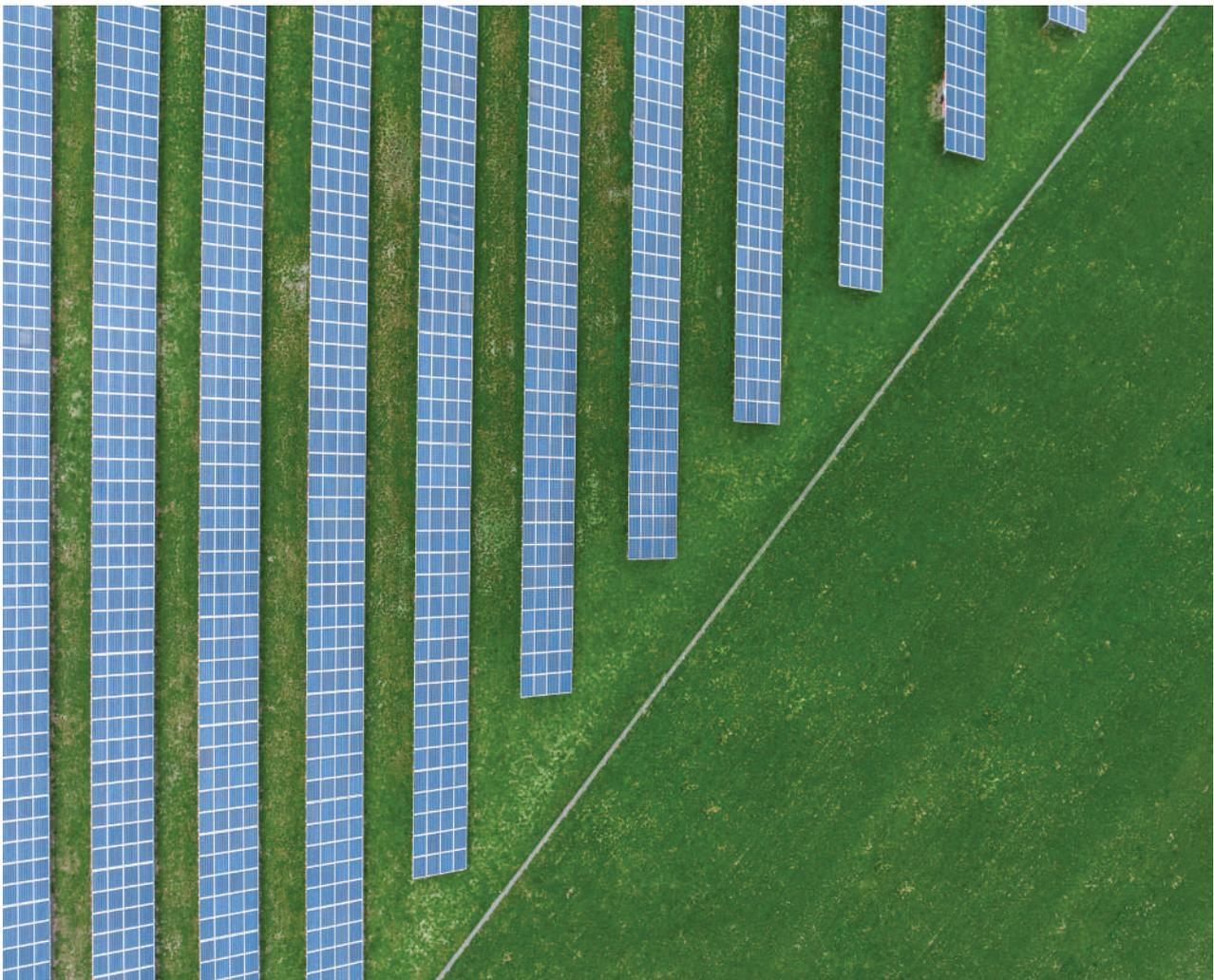


As shown in Chapter 2, major fossil-fuel-producing countries, both wealthy and poor, are planning to produce fossil fuels at levels that together far exceed those consistent with Paris Agreement goals. All countries will ultimately need to wind down their production, and a successful global transition will need to address the widely varied scale of the challenge facing different countries. Some will have to take the lead, while others will need international support if they are to transition on a timescale consistent with the Paris Agreement limits. This chapter illuminates the challenges different countries face, and the various forms of international support that can enable a global wind-down in fossil fuel production in keeping with the Paris Agreement temperature limits.

Box 4.1 Elements of a just transition

A “just transition” broadly means supporting the workers and communities affected by decarbonization. It means providing job security, training, education, and social protection, and putting in place coordinated policies and investments to protect the most affected and the most vulnerable, all developed through an inclusive process of social dialogue. More broadly, it recognizes the societal transformation that comes with a transition away from fossil fuels — and that this transformation must come hand-in-hand with goals of good jobs, social inclusion, and poverty eradication.

Economic diversification is a fundamental part of this; countries can make their economies more competitive, innovative, and resilient to external shocks by diversifying inputs, especially through investments in human capital and institutions. Climate goals require that a transition be rapid, and this can make diversification a challenge. But done equitably, a transition can help communities that now bear the ecological and social costs of extraction (ILO 2015; Just Transition Centre 2017; TUDCN & ILO 2018; TUDCN & ILO 2018; UNCTAD 2018; UNFCCC 2018).



4.1 National circumstances and transition challenges

Winding down fossil fuel production in line with Paris goals will have a range of socio-economic effects, including on employment, public revenue, the provision of public services, economic activity (including the relative profitability or viability of companies and sectors), public health, and the local environment. The specifics of these effects — and their implications — will depend on national circumstances. In particular, two factors are overwhelmingly important: the extent of the country's dependence on fossil fuel production, and the country's capacity to avert and manage the potential disruptive impacts of a transition and absorb the costs (Muttitt and Kartha 2020).¹⁸

Capacity is multi-dimensional, and relates to a country's potential to direct economic, technical, institutional, and governance-related resources towards a just transition. All of these tend to be correlated with a country's income. Poorer countries invariably possess less of this capacity and are less able to absorb the costs of a transition, such

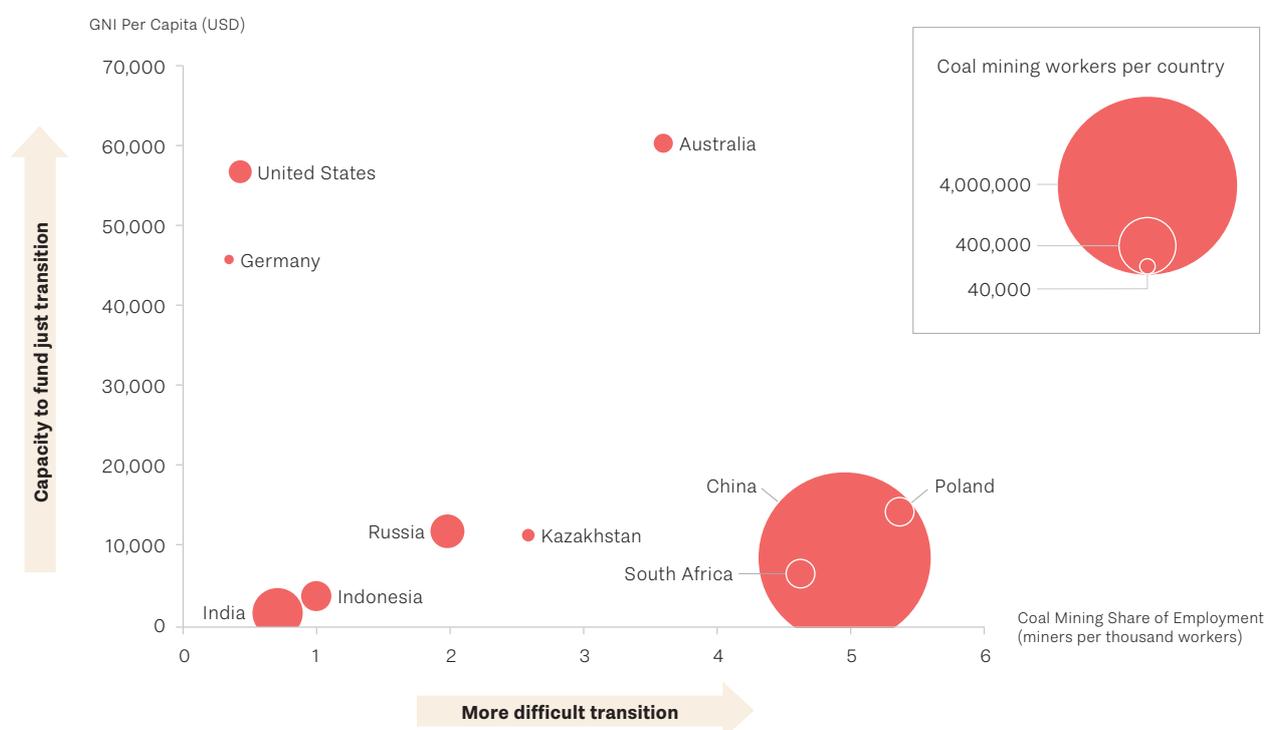
as those associated with providing workers with a social safety net, prematurely retiring capital, and investing in establishing new industries. Moreover, such countries are confronted by other developmental challenges, such as poverty eradication, provision of basic services, and investment in basic infrastructure. For this reason, income is a useful proxy for comparing various countries' potential to devote their capacities to a transition, and for indicating whether it is even possible without financial support.

Dependence also takes varied forms, and can include, for example, dependence on the fossil fuel sector for employment, reliance on fossil fuel rents for funding public services, or the importance of fossil fuel export revenues for foreign exchange.

Figures 4.1 and 4.2 illustrate the wide spectrum along which countries fall in terms of their relative capacity and dependence. Figure 4.1 compares the 10 largest coal producers in terms of their income per capita (y-axis) and the contribution of the coal sector to employment (x-axis). It shows, for example, that China is ten times more depen-

Figure 4.1

Coal mining share of employment versus per-capita gross national income (GNI), selected countries, 2015. Size of bubbles reflects absolute number of coal mining workers. Sources: Muttitt and Kartha (2020); World Bank (2020).



¹⁸ This is conceptually similar to the observation of Peszko et al. (2020) that countries can be assessed with respect to their *exposure* and *resilience*.

dent than Germany on coal mining as a source of employment (even relative to its population). Figure 4.2 compares 22 of the largest oil producers, in terms of income per capita (y-axis) and the share of public revenue obtained from oil (x-axis).

These two characteristics, dependence and capacity, provide a framework for examining transition challenges and opportunities in different countries, and considering their relative roles in a global effort to wind down fossil fuel production. As suggested in Figure 4.3, countries with higher capacity (income per capita) to manage and support a just transition and with lower fossil fuel dependence are generally better positioned to more quickly wind down their production of fossil fuels. Those countries with higher economic and social dependence on fossil fuels — and/or with limited capacity to fund diversification, retraining, and other key elements of transition strategies — will

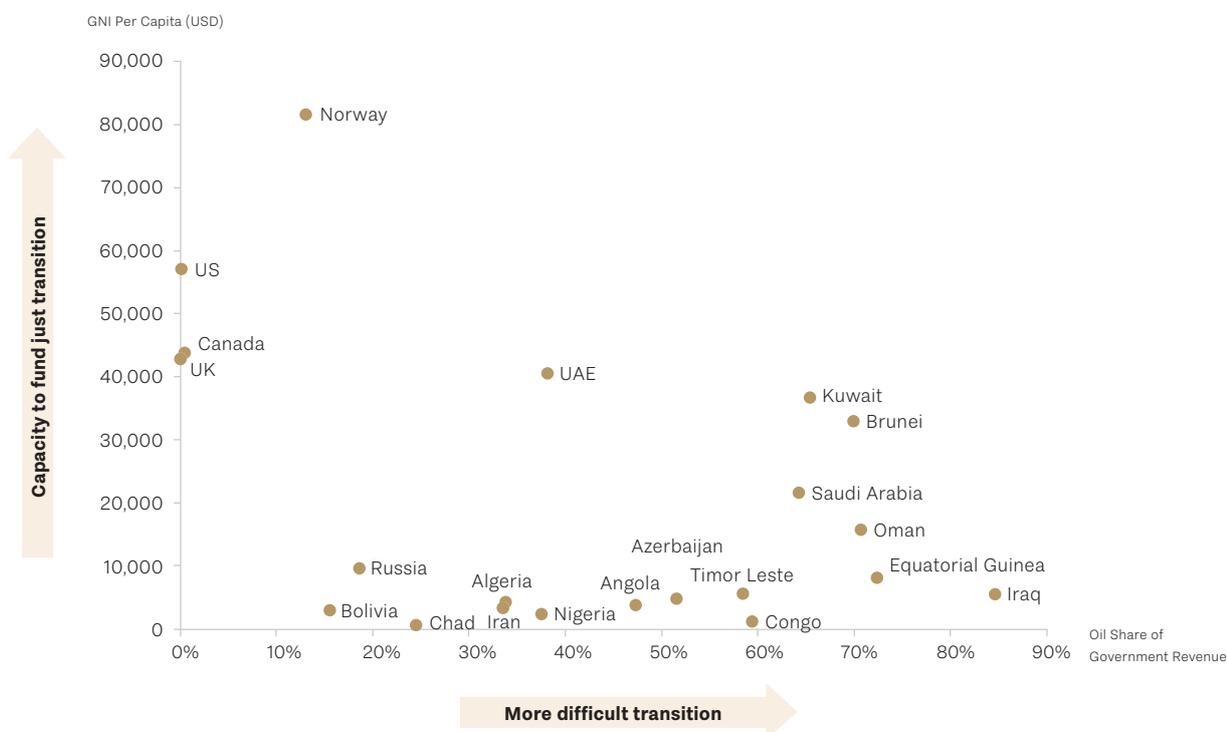
need longer to complete the transition. But they will still need to undertake a transition at a pace consistent with Paris Agreement goals; for this, they will need international support of various forms.

Closely related to dependence and capacity, political economy also plays a central role in enabling or impeding transitions. As noted in Chapter 1, actors with vested interests in fossil-fuel-based development are often powerful forces that may resist transition-related policies. Just transition policies can lessen or exacerbate this challenge. For example, transition policies that prioritize diversification and investment in regions heavily dependent on fossil fuel extraction can weaken opposition, and policies that are responsive to the needs of workers can win the political support of trade unions and local communities.

The following subsections consider the transition chal-

Figure 4.2

Share of oil in central government revenue versus GNI per capita, selected countries, 2016. Sources: Muttitt and Kartha (2020); World Bank (2020).



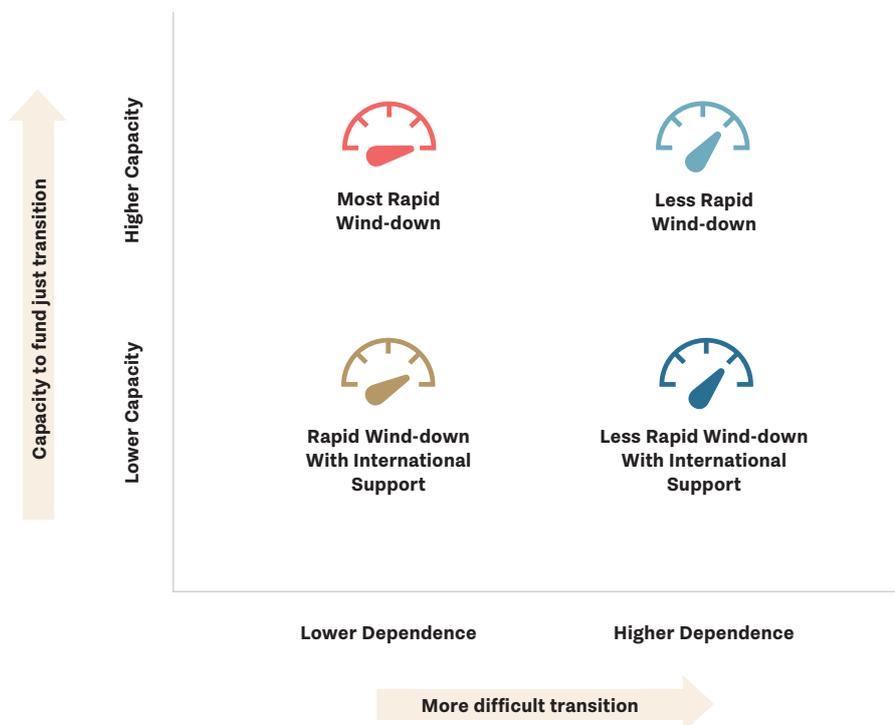
allenges and opportunities — and the potential role for international cooperation — for countries in each quadrant of Figure 4.3. The aim of our approach is to survey the features of a just transition, recognizing that countries' transitional challenges differ considerably depending on their relative level of dependence on fossil fuel production and the capacity (financial or otherwise) available to support a transition. This approach is not, however, intended to assign every country neatly into one of the four categories. Dependence and capacity are not rigid binary distinctions but can be found along a continuum, and there is no unique metric for definitively measuring either one. Other similar frameworks can also be applied; Peszko et al. (2020) is an excellent example, where multiple indicators of resilience (similar to capacity) and exposure (akin to dependence) led to a typology of countries similar to what we present here.

The approach we describe here can also contribute to discussions within the UN climate change process about facilitating a just transition. It provides a lens through which to view countries' efforts towards a just transition — one that is in line with the principles of equity and common but differentiated responsibilities enshrined in the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement.

Countries' transitional challenges differ considerably depending on their relative level of dependence on fossil fuel production and the capacity (financial or otherwise) available to support a transition.

Figure 4.3

How capacity and dependence can influence the pace of winding down fossil fuel production and need for international support. Adapted from Muttitt and Kartha (2020).



Countries with lower dependence and higher capacity



**Most Rapid
Wind-down**



Countries that have lower dependency on fossil fuel production and higher capacity to govern transitions away from such production include many of the world's largest fossil fuel producers (e.g., the US, Australia, Canada, Norway, Germany, and the UK). These countries derive a relatively small share of gross domestic product (GDP) or employment from production, because their economies are also highly diversified. Some of them have well-established institutions and legal structures for labour relations, and existing processes for social dialogue. They are well primed not only to decarbonize their own economies — with limited macroeconomic effects and major co-benefits (GCEC 2014; Pollin and Callaci 2016; Stern 2015) — but also to lead the global transition away from fossil fuel production. They are best placed to support the transitions of lower-capacity countries through financial support, technical or financial expertise, policy guidance, or by making accommodations in the multilateral regimes that govern areas such as trade, investment, and technology transfer.

Nevertheless, fossil fuel production even in these countries is often concentrated in a few subnational regions that are highly reliant on associated economic flows, jobs, and revenues. A key transition challenge, therefore, is to avoid adverse socioeconomic and political impacts in the affected subnational regions, which may exacerbate existing inter-regional inequalities.

Another general characteristic of these countries is a strong rule of law and high public sector capacity to implement enacted laws and policies, often including well-exercised processes of social dialogue and democratic participation. However, the capacity to formulate and enact the required laws and policies is subject, as in other countries, to political economic forces.

These countries' fossil fuel industries tend to be owned by private investors rather than the state (Bond et al. 2020). This introduces two general types of challenges to timely transitions. First, a low-carbon transition unfolding faster than anticipated by the investment community could threaten the stability of the financial sector in some of these countries (NGFS 2019). Second, firms in the sector tend to be highly politically organized, investing considerable resources into lobbying, campaign finance, public relations, and think tank sponsorship (Jacques et al. 2008), and exerting influence through a “revolving door” between business and government (Carboni 2017; Holley et al. 2019; Huter et al. 2018). This political activity is widely considered to be a major barrier to decarbonization (Jacques et al. 2008; Pearse et al. 2013; Downie 2019; Curran 2020; Mildemberger 2020). To overcome these challenges, a transition will require weakening these incumbent interests in general (Fouquet 2016; Turnheim and Geels 2012), engaging with industry actors that are making serious efforts to support transitions, and strengthening cooperation with other firms and labour unions (Finnegan 2018; Finnegan 2019; Green and Gambhir 2019; Lindvall 2017; Meckling and Nahm 2018).

With some notable exceptions, these countries are doing relatively little at a national level to facilitate an equitable wind-down of fossil fuel production. Many countries have policies that actively promote fossil fuel production (see Chapter 3 and SEI et al. 2019). Indeed, some of the largest fossil fuel producers in this group — Australia, Canada, and the US — are among those currently pursuing major expansions in fossil fuel supply (see Chapter 2 and SEI et al. 2019). Moreover, these and other countries have, to varying extents, expanded state support to fossil fuel producers in the context of the COVID-19 crisis, as noted in Chapter 3 (Boyle 2020; Mazenbarg 2020; Offshore 2020; Stokes and Mildemberger 2020).

At the same time, a few countries, such as France, Germany, New Zealand, and Spain have taken steps to limit production and support just transitions (Climate Change Laws of the World 2017; Farand 2020; Government of Spain 2020; New Zealand Parliament 2018; Wettengel 2020). Most of these countries also have arrangements in place to mitigate adverse socioeconomic impacts among affected workforces and communities and to support equitable transitions more broadly:

- In Germany, the government's coal exit plan recommends compensation for affected coal-fired power generation companies and employees, and a range of measures to diversify and support the economies of affected lignite mining regions (BMW 2019).
- The Spanish government in 2018 negotiated a deal with unions, which will see EUR 250 million invested in coal mining regions through a mix of early retirement schemes for miners, ecological restoration of mining sites, support for business ventures in green industries, and re-skilling of workers for employment in these industries (MITECO 2018). The new draft Spanish climate and energy law includes provisions requiring the ap-

proval of a transition strategy for fossil-fuel-dependent communities every five years and envisages the development of specific transition agreements to promote alternative economic activities in affected areas (Farand 2020; MITECO 2020).

- The Government of New Zealand is supporting a transition away from fossil fuels in the country's main offshore oil- and gas-producing region through the financing of a clean energy and clean technology research fund and the establishment of a Just Transition Unit (MBIE 2018; RNZ 2019).
- The European Commission's Platform for Coal Regions in Transition supports cross-national dialogue and capacity building (European Commission 2019), and the EU's 2021–2027 budget will channel funds to a newly-established Just Transition Mechanism (Box 4.2). However, as part of the compromise deal between member states, elements of the original Green Deal proposal were cut, and the Mechanism's Just Transition Fund budget was reduced from EUR 40 billion to 17.5 billion (Morgan 2020).



Countries with higher dependence and higher capacity



Less Rapid
Wind-down

A small handful of countries with higher capacity to manage and fund just transitions are also heavily dependent on fossil fuel production — specifically oil and gas — for a sizeable fraction of government revenue and economic activity. These include Gulf Cooperation Council (GCC) countries (see Table 4.1 below) and Brunei. These economies are characterized by high shares of worldwide oil and gas reserves, production, and exports.

As shown in Table 4.1, the oil and gas sector contributes between 20% and 50% of GDP on average, between 40% and 90% of total government revenues, and between 50% and 90% of total exports of GCC countries (Krane 2019; Marcel and Mitchell 2006; Ollero et al. 2019). Given their high economic reliance on fossil fuel export revenues, these countries tend to be highly vulnerable to external shocks affecting oil prices, such as the drop in demand caused by the global COVID-19 pandemic, and any major decline that would result if stringent climate mitigation measures were implemented overseas. Thus, despite their relatively high financial capacity (as expressed in GDP per capita), these less diversified countries may face greater challenges in undertaking their transition away from fossil fuels, minimizing economic disruption, and ensuring just and equitable outcomes.

These challenges extend beyond the oil and gas sector because governments tend to distribute oil and gas revenues to their citizens through large and well-paid public sectors, in which more than half of employed citizens

work (Ghafar and Gross 2019). Therefore, a decline in the oil and gas sector affects employees in other sectors as well. Many countries in this group contain large migrant workforces with little access to social protections (Alhussein 2020); a transition will also thus have transnational impacts, as it would affect the remittances migrants send to their home countries (Ratha et al. 2020). A transition that is just and equitable would address the impacts on these workers and the transnational economic consequences, including through international policy measures that provide safety nets, cash assistance, and offsets to the expected declines in remittances.

As in all fossil-fuel-producing countries, political economy is important (Al-Sarihi and Mason 2020). Oil and gas production in this group of countries is in the hands of state-owned national oil companies (NOCs). The institutional, political, and fiscal lines between the NOCs and their respective governments are blurry (Krane 2019; Marcel and Mitchell 2006). In these countries, the oil and gas sector shapes the economy, the political-economic structure, and state-society relations. Large proportions of national income coming from oil and gas export revenues — which are externally-derived, unproductively-earned payments (Gray 2011) — are controlled by a small number of powerful actors, with the government as the primary recipient (Beblawi 1987).

Table 4.1

Economic contribution of oil and gas in Gulf Cooperation Council countries in 2018. Source: Ollero et al. (2019)

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
Oil and gas sector, % GDP	18%	54%	41%	47%	43%	30%
Oil and gas revenue, % total revenue	82%	90%	78%	83%	68%	36%
Oil and gas exports, % total exports	47%	94%	74%	88%	80%	58%

A few of these countries have sought to reduce vulnerability by lowering domestic demand for fossil fuels in ways that improve fiscal health. For example, in 2018, the United Arab Emirates (UAE) removed long-standing fossil fuel subsidies (Boersma and Griffiths 2016), and Saudi Arabia increased domestic gasoline prices and linked them with international prices (Gasim and Aldubyan 2020). Saudi Arabia also took measures to protect lower-income households from the price increases, anticipating the policy's potential social impacts (Obaid 2017).

Most governments have undertaken efforts to diversify their economies to reduce their fiscal dependence on oil export revenues (Hvidt 2013; Ulrichsen 2016). Historically, this has often involved moving downstream in the domestic oil and gas industry and shifting to energy-intensive industries such as refining and processing. This strategy could also arise in response to stringent climate policies of fuel importers in the absence of border taxes or broader trade sanctions (Ollero et al. 2019). However, this conventional mode of diversification does not reduce dependence on fossil fuel production (Peszko et al. 2020).

Especially for highly dependent oil producers, fuller diversification thus takes time. In the mid-1970s, the UAE began an effective programme of diversification that built up the tourism, finance, and transport sectors; over the subsequent 40 years, this reduced the share of oil rents from 41% to 11% of GDP (World Bank 2020). Despite being a country with relatively high capacity, the UAE still needed to draw heavily on foreign labour and skills, while instituting bureaucratic and market reforms (Al-Sarihi and Mason 2020; Alsharif et al. 2017).

Various kinds of international engagement and cooperation may be needed to enable a more rapid transition in countries with high dependence on extraction, even those with relatively high financial capacity. Along with technical and institutional collaboration, such countries may be more willing and able, and ultimately more successful, at transitioning away from fossil fuel production with multilaterally-agreed accommodations regarding energy markets, market share, and prices. This type of cooperation could help to reduce wide swings in revenues from year to year, create a more predictable path for diversification, and make it easier to focus on, and allocate resources to, a transition.

Box 4.2 A model for international cooperation on just transition?

The EU's Just Transition Mechanism was created to support workers and regions that need to transition, and to allocate that support based on each country's dependence and capacity. This international support initiative offers a concrete example of just transition cooperation in closing the global production gap.

The Mechanism will set up a dedicated assistance facility and provide public funding to mobilize private funding to support national just transition plans that "give details on needs and measures for economic diversification, reskilling and environmental rehabilitation" (European Commission 2020b). It will

distribute finance to affected regions depending on (1) the "scale of the transition challenge" confronting the country, and (2) the country's own "capacity to finance ... and cope with the transition" (EU Monitor 2020). A Just Transition Platform will enable countries and stakeholders to share experiences and best practices as the process unfolds (European Commission 2020a).

This mechanism could serve as a model for international just transition cooperation that is politically viable, effective, and equitable.

Countries with lower dependence and lower capacity



**Rapid Wind-down
With International
Support**

Several developing countries, such as Bolivia, Mozambique, and Vietnam, produce fossil fuels, but at volumes that mean they are relatively less dependent on such production. Many have sizeable fossil fuel resources that have not yet been exploited. These resources are often seen, at least by some actors within the country, as central to their development pathway (Frynas and Buur 2020). They may be seen as especially promising for those countries confronted by severe energy poverty and other human development needs that are compounded by the COVID-19 pandemic and its associated economic downturn.

In this context, an important question facing these countries is whether to further expand domestic fossil fuel extraction as they seek to industrialize, strengthen their economies, and increase their energy security. The attraction, understandably, is the prospect that related investments and rents could contribute to government budgets, provide funding for social services, create jobs, deliver ancillary community benefits, and generate foreign exchange. Ghana's Petroleum Revenue Management Act, for instance, foresees revenues being invested in areas such as health, roads, education, and sanitation (UNU-INRA 2019). In Angola, revenue from hydrocarbons will be going towards infrastructural development and other budgetary lines related to health and education. Mozambique anticipates that natural resources revenue will supply roughly half of its health financing (UNU-INRA 2019).

Extraction can indeed result in some anticipated development benefits, but these are by no means assured, nor is it guaranteed that adverse impacts will be modest and manageable. The extraction and processing of coal, oil, and gas can deepen existing inequities and is often associated with human rights violations and local ecological damage (Amnesty International 2017; Amnesty International India 2016; Rowell et al. 2005). The Oil, Gas, and Mining Unit of the World Bank has examined how the fossil fuel extraction industry contributes to gender gaps in the distribution of assets and risks and noted that "oil revenues dramatically multiply the inequality gaps in their society... especially between the sexes" (Scott et al. 2013, p.2). In countries where conflict is rife and institutions of governance are fragile, it is particularly challenging to develop natural resources in a way that benefits social

development. In many countries, it can yield the opposite results, prolonging conflict, fuelling corruption, and further marginalizing disenfranchised communities (Epstein 2017; Harfoot et al. 2018; Ross 2012).

An extensive body of literature has examined the circumstances under which fossil fuel exploitation unfolds as a resource blessing or a "resource curse" (Ross 2015; Stevens et al. 2015), a term that reflects the fact that many resource-rich countries may experience worse development and economic growth outcomes than countries with fewer natural resources (Sachs and Warner 1995). Furthermore, the mere discovery of reserves can create a "presource curse" by leading countries to engage in imprudent borrowing and contracts (Cust and Mihalyi 2017). Mozambique — where government revenues from discovered offshore gas reserves will not materialize until the 2030s — is already showing the effects of a presource curse (Frynas and Buur 2020; Orre and Rønning 2017). Notably, one lesson from the literature is that better outcomes are generally achieved when resource development proceeds more slowly, taking time to build institutional knowledge, local capacity, and mechanisms of good governance, as was the case in Norway (Karl 1997; Stevens et al. 2015).

However, proceeding slowly also has problems as a strategy for fossil fuel development. The limits to future extraction implied by the Paris Agreement (see Chapter 2), combined with competition from rapidly advancing renewable energy technologies, are changing the market outlook for coal, oil, and gas. In this context, extractive projects, which typically have a 30- or 40-year time horizon, may well leave a legacy of stranded assets and unmet liabilities (Cust and Mihalyi 2017; Fuhr and West 2014). While some European producers are already beginning to take this into account by adjusting their future price assumptions and bringing greater caution to new investments (Grant 2020), stranded assets are often not on the policy radar of government planners in the developing world (UNU-INRA 2019).

The risks associated with stranded assets may be even higher in developing countries where large multinationals control fossil fuel extraction, where weaker institutions

are ill-equipped to negotiate contracts that meet development needs, and where fossil fuel assets and rents benefit an elite associated with the oil economy. In Africa, for instance, only six of the 500+ oil and gas companies are African-owned (Matereke 2015). Trading relations are often uneven, and investors may threaten litigation in countries where governance and institutions are poor, effectively socializing risks and privatizing profits (Bonnitcha 2017; Johnson et al. 2019; Tienhaara 2018; Tienhaara et al. 2020). Furthermore, sub-national governments and local communities often have no say in the negotiation of contracts, yet bear the greatest consequences of extraction-related pollution and health impacts, as well as face the potential stranding of economic and social capacity when export markets decline, deposits are depleted, and/or multinational companies move out (UNCTAD 2019).

It is therefore important that such countries begin to forge alternative development pathways that do not heavily rely on fossil fuel extraction as a dominant sector of the economy. It is also important that wealthier countries support them in doing so, helping to expand capacities and provide investment. This is especially the case given that the economies of many low-capacity countries are relatively undiversified, relying heavily on agriculture, specific extractive industries, and occasionally tourism. They rarely have well-established supply chains across a range of internationally marketable products, and thus lack access to both investment capital and a diverse, skilled workforce.

As part of an economy-wide diversification strategy, renewable energy provides one opportunity to expand electricity access, support industrialization, and diversify economies beyond fossil fuels. Renewables are now com-

petitive across various settings; in Zambia, for example, tariffs for recent solar photovoltaic facilities are less than half those of competing coal plants (Henze 2020; UNU-INRA 2019). A rich endowment in minerals (e.g. lithium and cobalt) used in low-carbon technologies may also help some countries generate the financial resources required to transition away from fossil fuel dependence (UNU-INRA 2019). This would necessitate not only investment capital and skills development, but also strengthening the institutions and norms for ensuring safety, health, environmental protection, community participation, and labour rights.

There is no guarantee that this new generation of energy-related resources — including hydrogen, lithium for batteries, and strategic minerals — will be accessible under more equitable regimes of trade, investment, or intellectual property. A just transition towards a diversified economy will require countries to create and maintain institutions and practices of good multi-level governance and democratic accountability; and to continually invest in skills, enterprise development, and efficient, resilient infrastructure (Caetano et al. 2020; Lahn and Bradley 2016).

Existing, successful anti-poverty programmes in developing countries could serve as models for just transition initiatives. Examples include public employment programmes, such as the Mahatma Gandhi National Rural Employment Guarantee Act in India, or payment for environmental services schemes, such as the Bolsa Verde programme in Brazil (ITUC 2018b). Given the need for a rapid transition away from fossil fuel production, many countries with lower fossil fuel dependence and lower capacity may require international support to make such programmes possible.



Countries with higher dependence and lower capacity



**Less Rapid Wind-down
With International
Support**

Finally, there are some countries that have both a higher dependence on fossil fuel production and relatively low capacity for supporting a transition away from fossil fuel production. Highly dependent countries include, for example, Angola, Iraq, Nigeria, and Venezuela, which currently receive more than 90% of their export revenues from fossil fuels (World Bank 2020). Such countries face particularly challenging transitions and are least able to manage the resulting social disruption and costs.

A major challenge for these countries will be identifying, investing in, and growing alternative sources of export revenue and domestic economic activity. In heavily indebted countries, this revenue makes it possible to service foreign debt; consequently, debt forgiveness could make a transition away from fossil fuels more viable, provided it does not sacrifice access to future finance (Fenton et al. 2014; Fischer 2019).

These countries may rely overwhelmingly on royalties and other fiscal income from fossil fuel production for a broad range of public expenditures, such as investments in education, health, and infrastructure for development and poverty reduction (Peszko et al. 2018). Therefore, building an alternative tax base may be a prerequisite to shifting away from fossil fuel production, although doing so quickly is especially challenging.

Overall, the oil and gas industry is capital-intensive and typically represents a relatively small share of jobs in major fossil-fuel-producing developing countries (UNCTAD 2017), though it is a much larger share when oil-revenue-funded public sector salaries are included, as noted above. The picture is different for coal, which employs over 7 million people and supports more indirect jobs globally (Pai et al. 2020). When a country has very high unemployment — such as South Africa, where there are about 80,000 jobs in the coal mining sector — even the loss of a relatively small share of the national workforce could have severe consequences, particularly in producing areas (Burton, Caetano, et al. 2018). In addition, an inability to fund strong social welfare systems and labour market characteristics — such as large informal workforces — make it harder for developing countries to implement active labour policies for a just transition.

This is especially the case where labour union influence is also on the decline (Glynn et al. 2020), as unions have historically played a strong role advocating for worker protections and social welfare policies. Failing to involve unions in just transition efforts appears to weaken overall outcomes (Bruha et al. 2005; Harrahill and Douglas 2019; Stanley et al. 2018).

In higher-dependence, lower-capacity countries, a powerful barrier to transitioning away from production is the strength of the extractives-led growth paradigm, combined with the lack of credible alternative socio-economic development strategies. Even though norms are changing, many multilateral development banks, donor agencies, and private investors have historically promoted this paradigm, which can be reinforced domestically by rent-seeking behaviour and patronage networks (Lahn and Bradley 2016; Peck and Chayes 2015). However, fossil fuel extraction (especially oil extraction in the context of weak governance) has often been associated with poor economic performance and high rates of multidimensional poverty, corruption, conflict, and authoritarianism (Collier and Goderis 2008; Humphreys et al. 2007; Ross 1999).

So far there has been limited discussion in these countries about a just transition, not least because their focus has been on extraction-driven development (Climate Transparency 2018a; Kartha et al. 2018). Concepts such as “unburnable carbon” and “stranded assets” have also had little traction, as concerns about poverty alleviation and infrastructure needs have prevailed (Lahn and Bradley 2016).

Nevertheless, some countries have started to take initial steps. In Colombia, the Ministry of Finances has recognized the risks associated with a decline in global demand for coal (MinHacienda 2018). China — with a higher capacity for transition than many other countries in this grouping — has established an Industrial Special Fund, totalling USD 14.5 billion, for employment restructuring in coal areas (Bridle et al. 2017). Trade unions and multilateral development banks have initiated policy discussions around transitions in Africa, Asia, and Latin America (Climate Transparency 2018a; ITUC 2018a).

South Africa has explicitly referred to a just transition in its first nationally determined contribution (NDC) under the UN climate process, and has initiated a social dialogue process under the country's National Planning Commission to develop just transition sustainable development pathways (Climate Transparency 2018b). Just transition, including support for affected workers, was also explicitly mentioned in a roadmap for reforming the electricity industry in the country (DPE 2019). The country is now developing a funding mechanism, the Just Transition Transaction, which aims to mobilize blended finance to fund the accelerated phase-out of coal and move towards renewable energy. A portion of the concessional funds is destined to contribute to a Just Transition Fund, which will support workers and communities dependent on coal (Winkler et al. 2020).

Some countries with high dependence and low capacity have made economic diversification efforts in the past, in the wake of oil price declines and the collapse of extractive industries. Though not motivated by low-carbon transitions, they do provide useful precedents. In the 1990s, authorities in South Africa's Free State responded to a rapid decline in gold mining by setting up the Free State Goldfields Development Centre to support economic diversification (Atteridge et al. 2020). The Nigerian government has been targeting education and reforming the business environment to facilitate youth entrepreneurship for economic diversification (OECD and WTO 2019).

Many highly dependent countries will need support of various types to undertake a just transition away from fossil fuel production. Higher-capacity countries can include some of this support in their just transition initiatives, through programmes to help lower-capacity countries with diversifying their economies, reinvesting in communities, building human capacity, and supporting workers.

International support can take many forms. Possibilities include: changes to international institutions, such as those relating to trade, investment, and immigration, to provide more policy space to countries seeking to implement a just transition; technological partnership targeted at decarbonization (e.g., targeted low-carbon subsidies) and diversification (e.g., green industrial policy); increased development assistance to compensate countries where reduced extraction would constrain social services; and support for migrant workers (Piggot et al. 2018; Rosemberg 2010; Rosemberg 2017; UNCTAD 2018). Fossil fuel exporters and importers could define and implement carbon pricing mechanisms cooperatively so as to allocate any surpluses or losses fairly and in a manner that best supports a just transition (Peszko et al. 2019). Debt-for-carbon swaps can be implemented to relieve strains on public resources, while providing an incentive for shifting away from fossil fuel extraction (Peszko et al. 2019).

4.2 Conclusions

The COVID-19 pandemic and associated disruptions highlight the human costs of heavy reliance on fossil fuel production, a vulnerable industry with an uncertain future. It also provides an indication of the potential value of international coordination in minimizing social costs and fostering market stability. At the same time, the global economic contraction presents an opportunity for all governments to initiate wide-reaching green transformations of their economies as part of rescue and recovery efforts (Bhattacharya and Rydge 2020; Hepburn et al. 2020).

As countries shift their focus from rescue towards economic recovery measures, numerous initiatives would assist in managing the social and economic impacts of transition, while narrowing the production gap. Governments can encourage low-carbon industry and infrastructure, regulate the fossil fuel industry, provide retraining and social protection to fossil fuel workers, and orient public and private investment towards strategic sectors.

International cooperation will be crucial for success. To meet Paris Agreement goals, all countries will need to wind down fossil fuel production, some more rapidly than others. Countries with limited capacity will need financial, technological, and capacity-building support from higher-capacity ones. The EU Green Deal's Just Transition Mechanism, as described in Box 4.2, provides one model for such international cooperation on a just and equitable transition. Multilateral development banks, which are already restricting their financing of fossil fuel projects, could also direct more financing to just transition initiatives in fossil-fuel-dependent countries and regions that invest in human capital and viable economic alternatives to extraction. The UN climate change process — which has an established programme on economic diversification and just transition of the workforce — could also play a role in facilitating international cooperation, in keeping with its underlying principles of equity.

Such cooperation would be not only ethical; it is also practical.

5

Building back better towards a managed wind-down of fossil fuel production

Key Areas of Action

1. Ensure COVID-19 recovery packages and economic stimulus funds support a sustainable recovery and avoid further carbon lock-in.

2. Provide local and international support to fossil-fuel-dependent communities and economies for diversification and just, equitable transitions.

3. Reduce existing government support for fossil fuels.

4. Introduce restrictions on fossil fuel production activities and infrastructure.

5. Enhance transparency of current and future fossil fuel production levels.

6. Mobilize and support a coordinated global response.

5. Building back better towards a managed wind-down of fossil fuel production

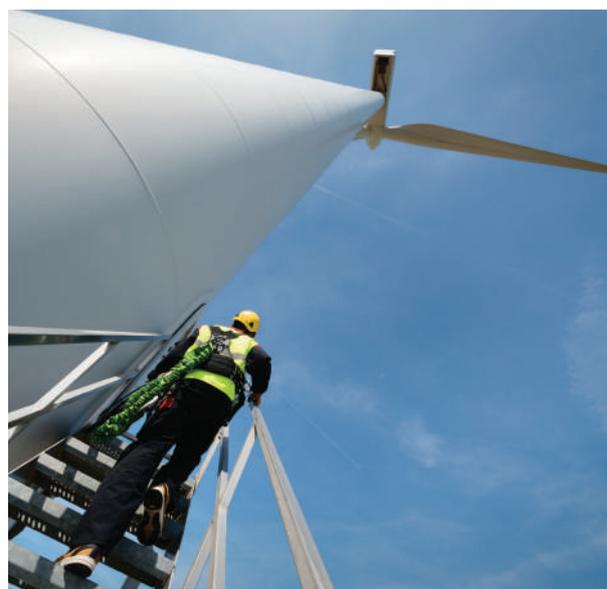
While governments have already introduced major financial commitments and other measures in attempts to boost their economies and protect livelihoods, the work of long-term economic recovery from the COVID-19 pandemic has only just begun. Governments can still seize this critical moment to “build back better” and support a well-planned transition away from fossil fuel production.

Policies and measures to regulate or manage the wind-down of fossil fuel production can play an important role in promoting policy certainty, avoiding carbon lock-in, and reducing the risk of stranded fossil fuel assets — at a time where government resources are particularly scarce (Chapter 1).

In this chapter, we summarize six main areas of action where policymakers can shape a more resilient and sustainable future through a managed, just, and equitable transition away from fossil fuels.

1. Ensure COVID-19 recovery packages and economic stimulus funds support a sustainable recovery and avoid further carbon lock-in. There is a strong case on both climate and economic grounds for promoting decarbonization as an organizing theme for recovery efforts. Renewable energy, building efficiency retrofits, and natural capital investments such as afforestation and enhancing rural ecosystems, for example, all have high potential to combine climate mitigation with job creation (New Climate Economy 2018; Hepburn et al. 2020; ILO 2018). By one estimate, investments made in renewable energy, energy efficiency, and mass transit yield three times the number of jobs than an equivalent investment in the fossil fuel sector (Garrett-Peltier 2017; IEA 2020j). At the same time, as discussed below, careful planning is needed to ensure the communities affected by a transition away from fossil fuels benefit from these and other opportunities.

In recognition of the benefits of a low-carbon transition, a wide range of officials and organizations have called on governments to ensure a green recovery from the COVID-19 pandemic (G20 Finance Ministers & Central Bank Governors Meeting 2020; IEA 2020m; United Nations Secretary-General 2020), and many countries have begun to make investments in renewable energy, energy efficiency, and other related areas (Energy Policy Tracker 2020; Table 5.1; Appendix B). However, it is not enough to invest government support towards jobs and businesses in low-carbon infrastructure and activities. If accompanied by significant support for high-carbon industries, COVID-19 recovery measures still risk locking in



high-carbon energy systems and development pathways for decades into the future. Governments that invest in high-carbon industries to boost economies and safeguard livelihoods in the short term — perhaps because they see few near-term alternatives — could still consider introducing conditions that ensure long-term alignment with climate goals, and diversification that reduces reliance on fossil fuels while ensuring worker protections. While some governments have introduced such conditionalities, particularly in the aviation and automobile sectors (Energy Policy Tracker 2020), the majority of support to the fossil fuel industry so far has been unconditional, representing a missed opportunity to ensure alignment of support packages with climate goals.

2. Provide local and international support to fossil-fuel-dependent communities and economies for diversification and just, equitable transitions. Achieving a just and equitable transition away from fossil fuels at a pace in line with Paris Agreement goals will require planned processes to ensure affected groups are not left behind. Taking such concerns into consideration can also build consensus for more ambitious climate policy. It is therefore important that governments institute processes

to manage an equitable wind-down of existing fossil fuel production (Green and Gambhir 2019). Changing market dynamics and growing pressures for decarbonization make this an opportune moment to initiate planning processes to transition economies and regions towards more environmentally and economically sustainable industries and to consider wide-reaching green transformations (Hepburn et al. 2020).

As discussed in Chapter 4, national and regional governments around the world face very different challenges with regard to achieving a fossil fuel wind-down, as a consequence of their different dependencies on fossil fuel production and capacities to transition. While there is therefore no “one-size-fits-all” approach, inclusive planning is widely considered an essential step to ensure that fossil-fuel-dependent workers, communities, and other affected stakeholders have a say in their changing futures (Atteridge and Strambo 2020). In doing so, it is important to take into account the wide range of actors affected, including workers that face job loss or change, as well as businesses that rely on workers in the industry (Zinecker, Gass, et al. 2018). Likewise, policymakers should recognize and consider the impacts of a transition on energy consumers and the general public, who may face challenges related to energy access and potentially increased energy prices (Zinecker, Gass, et al. 2018).

It is also important to ensure that such processes do not exacerbate existing inequalities (Piggot et al. 2019). Financial, technical, and capacity-building support for a just transition and for economic diversification is vital for communities and regions that remain highly dependent on fossil fuel production, including in the form of international support for countries with limited financial and institutional capacity (Chapter 4).

In recent years, several countries and regions have begun to develop transition planning processes and programmes to support fossil fuel workers as their economies begin to shift away from fossil fuels (Table 5.1; Appendix B; see also Chapter 4). As discussed in Chapter 4, some of these approaches could help to inform models for global cooperation in this area.

3. Reduce existing government support for fossil fuels.

The current crisis provides the opportunity to reconsider many long-standing forms of government support to fossil fuels that stand in the way of a sustainable recovery — including consumer subsidies, producer subsidies, and public finance investment.

While subsidies and other support for fossil fuel production have recently been on the rise (OECD 2020b; Chapter 3), this trend can be reversed by eliminating long-stand-





ing producer subsidies and ensuring any recent added support is short-lived and conditional on alignment of activities with climate and other sustainability objectives.

Governments could use the current historically low fossil fuel prices — especially for oil and gas — to reduce fossil fuel consumer subsidies, freeing up funds that can be deployed to more productive and socially desirable ends (Moerenhout and Urpelainen 2020). A promising example of this are subsidy swaps, whereby some of the savings from fossil fuel subsidy reform are reallocated to fund a clean energy transition (Bridle et al. 2019). Increasing taxation on fossil fuels can similarly support wider societal goals, with both India and Costa Rica increasing fuel taxes in 2020 to mobilize support for their COVID-19 pandemic response (Asamblea Legislativa República de Costa Rica 2020; Ohri 2020).

Bridging the production gap may also require national and international finance institutions to limit or end support to fossil fuel projects, while increasing support for low-carbon energy and sectors. Several development banks have already begun to shift away from fossil fuel investments (Table 5.1; Appendix B; see also Chapter 3).

4. Introduce restrictions on fossil fuel production activities and infrastructure. Restricting new fossil fuel exploration, extraction, or export can avoid locking in levels of fossil fuel production higher than those consistent with climate goals; it can also reduce the risk of stranded

assets and communities (Green 2018; Green and Denniss 2018; SEI et al. 2019). Examples of relevant policies include moratoria, bans, or quotas on fossil fuel production activities, or prohibitions or limits on certain fossil fuel infrastructure (e.g., oil pipelines or coal ports), or technologies (e.g., hydraulic fracturing) (Lazarus and van Asselt 2018; SEI et al. 2019).

Such measures are increasingly seen as viable and feasible tools in the climate policy toolkit. Over the past decade, various countries have begun to introduce restrictions on the production of fossil fuels, including Belize (offshore oil), Costa Rica (oil), Denmark (oil, gas, and shale gas), France (offshore oil and gas), Ireland (oil), and New Zealand (offshore oil and gas) (Danish Energy Agency 2018; Government of Belize 2017; Ministère de la transition écologique 2017; New Zealand Parliament 2018; Presidencia de la República de Costa Rica 2019; see also Table 5.1 and Appendix B). Ireland and Spain have proposed (further) production restrictions — on gas, and coal, oil and gas, respectively — in 2020 (Bray 2020; MITECO 2020).

5. Enhance transparency of current and future fossil fuel production. A key barrier to aligning energy and climate plans is the lack of clarity on levels of coal, oil, and gas production and planned or expected growth. While governments report to the UN climate process on energy use and on greenhouse gas (GHG) emissions and their trajectories, they are currently neither requested

Table 5.1

Examples of actions that can support a managed wind-down of fossil fuel production. For a more detailed overview, see Appendix B.

Action area	Examples
<p>1. Ensure COVID-19 recovery packages and economic stimulus funds support a sustainable recovery and avoid further carbon lock-in</p>	<ul style="list-style-type: none"> ▪ Many jurisdictions, including Australia, Canada, China, the EU, France, Germany, the Republic of Korea, and the UK, have designed or proposed recovery packages that support climate goals, including through measures supporting green mobility, energy efficiency, and clean energy.
<p>2. Provide local and international support to fossil-fuel-dependent communities and economies for diversification and just, equitable transitions</p>	<ul style="list-style-type: none"> ▪ Jurisdictions such as Chile, China, Germany, the EU, South Africa, and Spain have introduced just transition plans and/or measures to support affected workers, communities, and regions in transitioning away from coal, e.g. through unemployment relief, re-training, and compensation. ▪ Canada, New Zealand, and Scotland have set up bodies to support governments in designing policies that mitigate the social repercussions of the transition away from fossil fuels.
<p>3. Reduce existing government support for fossil fuels</p>	<ul style="list-style-type: none"> ▪ In Canada, Germany, the EU, France, Ireland, Sweden, and the UK, public finance institutions have begun to divest away from fossil fuels.
<p>4. Introduce restrictions on fossil fuel production activities and infrastructure</p>	<ul style="list-style-type: none"> ▪ Bans and moratoria on the exploration of certain fossil fuel resources have been enacted in Belize, Costa Rica, Denmark, France, Ireland, New Zealand, and Spain, among other countries.
<p>5. Enhance transparency of current and future fossil fuel production</p>	<ul style="list-style-type: none"> ▪ Numerous national governments, central banks, regulators as well as hundreds of companies and financial firms support the Task Force on Climate-Related Financial Disclosure guidelines for identifying and reporting on how company plans and operations align with Paris Agreement goals (Task Force on Climate-related Financial Disclosures 2020).
<p>6. Mobilize and support a coordinated global response</p>	<ul style="list-style-type: none"> ▪ Some multilateral development banks have committed to refrain from financing coal, oil, and/or gas projects, including the Asian Development Bank, the African Development Bank, the European Bank for Reconstruction and Development, the European Investment Bank, and the World Bank Group.

nor required to report on current and projected fossil fuel production. To improve transparency, governments could ensure that relevant production data are more readily and publicly accessible.

Governments can also provide information on how their fossil fuel production plans align with climate goals. They can also provide more clarity on their support to the production of fossil fuels, through public finance, subsidies, and other measures. Such data, which could be published by governments independently, as well as reported under the UN climate change process' transparency framework, would allow for better understanding and alignment of energy and climate objectives (SEI et al. 2019), and thus support efforts to “build back better”.

Governments can also take steps to disclose their level of exposure to fossil fuel asset stranding and associated systemic risk, and to require companies within their jurisdiction to do so as well. The Task Force on Climate-Related Financial Disclosure, for instance, has provided recommendations for corporations to identify and report on how their plans and operation align with Paris Agreement climate goals (Task Force on Climate-related Financial Disclosures 2017). In 2020, New Zealand became the first country to propose regulations to require the financial sector to report on climate risk (Burton 2020).

6. Mobilize and support a coordinated global response.

Policies to transition away from fossil fuels will be most effective if led by countries collectively, as they send the directional signals that energy producers, consumers, and investors follow. There are a variety of ways that international cooperation can support a just and equitable wind-down of fossil fuels. Under the UN climate change process, the global stocktake — scheduled to take place in 2023 and every five years thereafter — could take stock of the extent to which governments and other actors are winding down fossil fuel production and support (Piggot et al. 2018; SEI et al. 2019). This collective international exercise — which could be supported by information shared through the UN climate change process' transparency framework — could also facilitate lesson sharing between countries as they adopt policies and actions to transition away from fossil fuels (Piggot et al. 2018; SEI et al. 2019).

As key tools for communicating climate actions through the UN climate change process, nationally determined contributions (NDCs) and long-term low greenhouse gas emission development strategies (LEDS) can play an important role in supporting a wind-down of fossil fuel

production. As countries prepare their LEDS and next round of NDCs, they can use these documents to communicate targets, policies, and pathways to better align fossil fuel production with climate goals internationally (Verkuijl et al. 2019). The UN climate change process also expects developed country Parties to provide financial resources to assist developing country Parties with both mitigation and adaptation; in this way, it provides important avenues to facilitate financial and technological support and capacity building for developing countries to support a just transition away from fossil fuels (Piggot et al. 2018; SEI et al. 2019).

Beyond the UN climate process, international financial institutions can help shift financial support away from fossil fuel production while scaling up support for low-carbon energy. In recent years, some multilateral development banks have begun to make commitments to end support for the production of coal, oil, and gas (Table 5.1; Appendix B). In addition, governments can continue to scale up international efforts to address subsidies for fossil fuels, including through processes such as the G20, Asia-Pacific Economic Cooperation (APEC), the 2030 Agenda for Sustainable Development, and the World Trade Organization (WTO) (SEI et al. 2019).

Recent research furthermore highlights the potential of new forms of international cooperation towards a managed wind-down of fossil fuels, including through new multilateral clubs or commitments to create “fossil fuel free zones” (Green 2018) or a new supply-side or “fossil fuel non-proliferation” treaty (Asheim et al. 2019; Newell and Simms 2019).

Conclusion

As the COVID-19 pandemic continues to unfold, much remains uncertain. One thing, though, is not in doubt: a more resilient and sustainable world must be far less dependent on fossil fuels, and a managed decline can ensure a smoother and more just and equitable transition. At this historic juncture, governments face a stark choice. Will they continue to bet heavily on the fossil fuel sector, bringing risks of both increasingly severe climate impacts and an unnecessarily disruptive transition to a low-carbon economy? Or will they seize the opportunity to lay down just and equitable pathways away from coal, oil, and gas? The policy solutions are available. What is required is the political will and international cooperation to realize them.

References

- Abu Dhabi National Oil Company (2018). Supreme Petroleum Council Approves ADNOC's 2019-2023 Business Plan and AED 486 Billion CAPEX to Deliver Growth Across Value Chain. 4 November.
- Adomaitis, N. and Solsvik, T. (2020). Norway parliament grants more tax relief to oil sector. *Reuters*, 8 June 2020. <https://www.reuters.com/article/us-health-coronavirus-norway-oil-idUSKB-N23FINV>
- Agence Française de Développement (2019). *Energy Transition Strategy 2019-2022*. <https://www.afd.fr/en/ressources/energy-transition-strategy-2019-2022>
- Aldy, J. (2013). Eliminating fossil fuel subsidies. In *15 Ways to Rethink the Federal Budget*. Greenstone, M., Harris, M., Li, K., Looney, A., and Patashnik, J. (eds). The Hamilton Project. Brookings Institution Press, Washington, DC. http://www.hamiltonproject.org/papers/15_ways_to_rethink_the_federal_budget
- Alhoussein, E. (2020). Migrant Workers at the Epicenter of Public Health Crisis in the Gulf. *Arab Gulf States Institute in Washington*, 24 April 2020. <https://agsi.org/migrant-workers-at-the-epicenter-of-public-health-crisis-in-the-gulf/>
- Al-Sarihi, A. and Mason, M. (2020). Challenges and opportunities for climate policy integration in oil-producing countries: the case of the UAE and Oman. *Climate Policy*. DOI: [10.1080/14693062.2020.1781036](https://doi.org/10.1080/14693062.2020.1781036)
- Alsharif, N., Bhattacharyya, S. and Intartaglia, M. (2017). Economic diversification in resource rich countries: history, state of knowledge and research agenda. *Resources Policy*, 52, 154–64. DOI: [10.1016/j.resourpol.2017.02.007](https://doi.org/10.1016/j.resourpol.2017.02.007)
- Amnesty International (2017). *Shell's Involvement in Human Rights Violations in Nigeria in the 1990s*. <https://www.amnesty.org/en/documents/AFR44/7393/2017/en/>
- Amnesty International India (2016). 'When Land Is Lost, Do We Eat Coal?' *Coal Mining and Violations of Adivasi Rights in India*. Amnesty International India. <https://www.amnesty.org/download/Documents/ASA2043912016ENGLISH.PDF>
- Anderson, K. and Peters, G. (2016). The trouble with negative emissions. *Science*, 354(6309), 182–83. DOI: [10.1126/science.aah4567](https://doi.org/10.1126/science.aah4567)
- Ansar, A., Caldecott, B. and Tilbury, J. (2013). *Stranded Assets and the Fossil Fuel Divestment Campaign: What Does Divestment Mean for the Valuation of Fossil Fuel Assets?* Stranded Assets Programme. Smith School of Enterprise and the Environment, University of Oxford, Oxford, UK. <https://www.smithschool.ox.ac.uk/publications/reports/SAP-divestment-report-final.pdf>
- Araújo, K. (2014). The emerging field of energy transitions: progress, challenges, and opportunities. *Energy Research & Social Science*, 1, 112–21. DOI: [10.1016/j.erss.2014.03.002](https://doi.org/10.1016/j.erss.2014.03.002)
- Aronoff, K. (2020). A moderate proposal: nationalize the fossil fuel industry. *The New Republic*, 17 March 2020. <https://newrepublic.com/article/156941/moderate-proposal-nationalize-fossil-fuel-industry>
- Asamblea Legislativa República de Costa Rica (2020). Gobierno dará subsidio a personas afectadas por el COVID-19. http://www.asamblea.go.cr/p/_layouts/15/listform.aspx?PageType=4&ListId=%7B8FCD023B%2D3D06%2D4E97%2DA7A2%2DFDFD-D5A524C1%7D&ID=9088&ContentTypeID=0x0100AEFFC-8C3B152B24EB8D5FA5DE427D586
- Asheim, G. B., Fæhn, T., Nyborg, K., Greaker, M., Hagem, C., Harstad, B., Hoel, M. O., Lund, D. and Rosendahl, K. E. (2019). The case for a supply-side climate treaty. *Science*, 365(6451), 325–27. DOI: [10.1126/science.aax5011](https://doi.org/10.1126/science.aax5011)
- Assmann, C., & Hastings, C. (2020). Will 2020 Be the Year of the Green Industrial Revolution? SDG Knowledge Hub, IISD. <https://sdg.iisd.org/443/commentary/guest-articles/will-2020-be-the-year-of-the-green-industrial-revolution/>
- Atteridge, A., Blanco, I. and Strambo, C. (2020). *Insights from Historical Cases of Transition: Background Paper for the EBRD Just Transition Initiative*. European Bank for Reconstruction and Development, London. <http://www.ebrd.com/documents/policy/insights-from-historical-cases-of-transition.pdf>
- Atteridge, A. and Strambo, C. (2020). *Seven Principles to Realize a Just Transition to a Low-Carbon Economy*. Stockholm Environment Institute, Stockholm. <https://www.sei.org/publications/seven-principles-to-realize-a-just-transition-to-a-low-carbon-economy/>
- Bang, G. and Lahn, B. (2019). From oil as welfare to oil as risk? Norwegian petroleum resource governance and climate policy. *Climate Policy*, 1–13. DOI: [10.1080/14693062.2019.1692774](https://doi.org/10.1080/14693062.2019.1692774)
- Bank of England (2020). Businesses with outstanding CP held by the CCF, and nominal value. 16 September 2020. <https://www.bankofengland.co.uk/-/media/boe/files/markets/covid-corporate-financing-facility/cp-held-by-ccff-by-business.xlsx>
- Banks, M. (2020). Estonia gives 125 million EUR for fossil fuel production. *EU Today*, 4 April 2020. <https://eutoday.net/news/energy/2020/estonia>
- Bast, E., Doukas, A., Pickard, S., van der Burg, L. and Whitley, S. (2015). *Empty Promises: G20 Subsidies to Oil, Gas and Coal Production*. Overseas Development Institute, London, and Oil Change International, Washington, DC. <https://www.odi.org/publications/10058-empty-promises-g20-subsidies-oil-gas-and-coal-production>
- Beaton, C. and Adeoti, J. (2020). Fuel subsidies have been bad for Nigeria — dump them for good. *BusinessDay NG*, 10 May 2020. <https://businessday.ng/opinion/article/fuel-subsidies-have-been-bad-for-nigeria-dump-them-for-good/>
- Beaton, C. and Roberts, L. (2019). *G20 Coal Subsidies: India*. ODI, London, UK. <https://www.odi.org/publications/11365-g20-coal-subsidies-india>
- Beblawi, H. (1987). The Rentier State in the Arab World. *Arab Studies Quarterly*, 9(4), 383–98.

References (cont.)

- Bhattacharya, A., Rydge, J., & under the guidance of Stern, N. (2020). Better Recovery, Better World: Resetting Climate Action in the Aftermath of the COVID Pandemic. Informal Note for Members of the Coalition of Finance Ministers for Climate Action.
- Binnie, I. (2020). Europe steams towards coal exit — research. *Reuters*, 21 July 2020. <https://www.reuters.com/article/us-eu-rome-climatechange-coal/europe-steams-towards-coal-exit-research-idUSKCN24M32C>
- BlackRock (2020). Sustainability as BlackRock's new standard for investing. BlackRock. <https://www.blackrock.com/corporate/investor-relations/blackrock-client-letter>
- Bloomberg New Energy Finance (2020). Clean Energy Investment Trends 1H 2020. <https://about.bnef.com/clean-energy-investment/>
- BMW (2019). *Commission on Growth, Structural Change and Employment*. Federal Ministry for Economic Affairs and Energy (BMW), Berlin, Germany. <https://www.bmw.de/Redaktion/EN/Publikationen/commission-on-growth-structural-change-and-employment.html>
- Bodnar, P., Gray, M., Grbusic, T., Herz, S., Lonsdale, A., Mardell, S., Ott, C., Sundaresan, S. and Varadharajan, U. (2020). *How to Retire Early: Making Accelerated Coal Phaseout Feasible and Just*. Rocky Mountain Institute. <https://rmi.org/insight/how-to-retire-early>.
- Boersma, T. and Griffiths, S. (2016). *Reforming Energy Subsidies: Initial Lessons from the United Arab Emirates*. Brookings, Washington, DC. <https://www.brookings.edu/research/reforming-energy-subsidies-initial-lessons-from-the-united-arab-emirates/>
- Bolton, P. and Kacperczyk, M. T. (2020). *Do Investors Care about Carbon Risk?* SSRN Scholarly Paper, ID 3398441. Social Science Research Network, Rochester, NY. DOI: 10.2139/ssrn.3398441
- Bond, K. (2020). Was 2019 the peak of the fossil fuel era? *Carbon Tracker Initiative*, 1 May 2020. <https://carbontracker.org/was-2019-the-peak-of-the-fossil-fuel-era/>
- Bond, K., Vaughan, E. and Benham, H. (2020). *Decline and Fall: The Size and Vulnerability of the Fossil Fuel System*. Carbon Tracker, London. https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Decline_and_Fall_report_CTI.pdf
- Bonnitcha, J. (2017). *Assessing the Impacts of Investment Treaties: Overview of the Evidence*. International Institute for Sustainable Development (IISD), Winnipeg, Canada. <https://www.iisd.org/publications/assessing-impacts-investment-treaties-overview-evidence>
- Boyle, L. (2020). Oil lobby group asks for environmental laws to be suspended due to coronavirus. *The Independent*, 17 April 2020. Environment. <https://www.independent.co.uk/environment/oil-lobby-environmental-laws-suspend-canada-climate-change-coronavirus-a9471081.html>
- BP (2020a). *Statistical Review of World Energy 2020*. BP, London, UK. <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2020-full-report.pdf>
- BP (2020b). From international oil company to integrated energy company: BP sets out strategy for decade of delivery towards net zero ambition. BP. <https://www.bp.com/en/global/corporate/news-and-insights/press-releases/from-international-oil-company-to-integrated-energy-company-bp-sets-out-strategy-for-decade-of-delivery-towards-net-zero-ambition.html>
- Bray, J. (2020). Programme for government: Binding targets under 'Green new deal'. *The Irish Times*, 15 June 2020. <https://www.irishtimes.com/news/politics/programme-for-government-binding-targets-under-green-new-deal-1.4279576>
- Bridle, R., Kitson, L., Duan, H., Sanchez, L. and Merrill, T. (2017). *At the Crossroads: Balancing the Financial and Social Costs of Coal Transitions in China*. International Institute for Sustainable Development (IISD), Winnipeg, Manitoba. <https://www.jstor.org/stable/resrep14775>
- Bridle, R., Sharma, S., Mostafa, M. and Geddes, A. (2019). *Fossil Fuel to Clean Energy Subsidy Swaps: How to Pay for an Energy Revolution*. International Institute for Sustainable Development. <https://www.iisd.org/articles/fossil-fuel-clean-energy-subsidy-swap>
- British Columbia Oil and Gas Commission (2020). Initial commission actions in response to COVID-19. 16 April 2020. <https://web.archive.org/web/20200503183649/https://www.bcogc.ca/node/15935/download>
- Brower, D., Sheppard, D., Raval, A. and Meyer, G. (2020). What negative US oil prices mean for the industry. *Financial Times*, 21 April 2020. <https://www.ft.com/content/88997d67-bf69-409e-8155-911fc1f2fd6f>
- Bruha, J., Ionascu, D. and Jeong, B. (2005). *Organized Labor and Restructuring: Coal Mines in the Czech Republic and Romania*. Working Paper Number 773. William Davidson Institute. <https://deepblue.lib.umich.edu/bitstream/handle/2027.42/40159/wp773.pdf?sequence=>
- Burt, J. and Maykin, M. (2020). Resources industry to receive coronavirus boost with land release for coal and gas exploration in Queensland. *ABC News*, 6 May 2020. <https://www.abc.net.au/news/2020-05-07/queensland-coal-and-gas-exploration-coronavirus/12220636>
- Burton, J., Caetano, T. and McCall, B. (2018). *Coal Transitions in South Africa: Understanding the Implications of a 2°C-Compatible Coal Phase-out Plan for South Africa*. IDDRI and Climate Strategies. https://www.iddri.org/sites/default/files/PDF/Publications/Catalogue%20Iddri/Rapport/20180609_Report-Coal_SouthAfrica.pdf

References (cont.)

- Burton, J., Lott, T. and Rennkamp, B. (2018). Sustaining Carbon Lock-In: Fossil Fuel Subsidies in South Africa. In *The Politics of Fossil Fuel Subsidies and Their Reform*. Skovgaard, J. (ed.). van Asselt, H. Cambridge University Press. 229–45. DOI: [10.1017/9781108241946.015](https://doi.org/10.1017/9781108241946.015)
- Burton, M. (2020). New Zealand to require financial firms report climate change risks. *Reuters*, 14 September 2020. <https://uk.reuters.com/article/us-climate-change-newzealand-idUKKB-N2653EG>
- Caetano, T., Winker, H. and Depledge, J. (2020). Towards zero carbon and zero poverty: integrating national climate change mitigation and sustainable development goals. *Climate Policy*, 20(7). 773–78. DOI: [10.1080/14693062.2020.1791404](https://doi.org/10.1080/14693062.2020.1791404)
- Campiglio, E., Dafermos, Y., Monnin, P., Ryan-Collins, J., Schotten, G. and Tanaka, M. (2018). Climate change challenges for central banks and financial regulators. *Nature Climate Change*, 8(6). 462–68. DOI: [10.1038/s41558-018-0175-0](https://doi.org/10.1038/s41558-018-0175-0)
- Carboni, M. (2017). *The Financial Impact of Political Connections: Industry-Level Regulation and the Revolving Door*. Springer
- Carrington, D., Ambrose, J. and Taylor, M. (2020). Will the coronavirus kill the oil industry and help save the climate? *The Guardian*, 1 April 2020. Environment. <https://www.theguardian.com/environment/2020/apr/01/the-fossil-fuel-industry-is-broken-will-a-cleaner-climate-be-the-result>
- CDC Group (2020). *Investing for Clean and Inclusive Growth: Climate Change Strategy*. https://assets.cdcgroup.com/wp-content/uploads/2020/07/01170324/CDC_Climate_Change_Strategy_spreads.pdf
- Chestney, N. (2020). Ireland commits to divesting public funds from fossil fuel companies. *Reuters*, 13 July 2020. <https://www.reuters.com/article/us-ireland-fossilfuels-divestment-idUSKBN1K22AA>
- China Ministry of Foreign Affairs. (2020, September 22). *Statement by H.E. Xi Jinping President of the People's Republic of China at the General Debate of the 75th Session of The United Nations General Assembly*. https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1817098.shtml
- Climate Change Laws of the World (2017). Law no. 2017-1839 on the end of exploration and exploitation of hydrocarbons and diverse dispositions related to energy and the environment. Climate Change Laws of the World. <https://climate-laws.org/cclow/geographies/france/laws/law-no-2017-1839-on-the-end-of-exploration-and-exploitation-of-hydrocarbons-and-diverse-dispositions-related-to-energy-and-the-environment>
- Climate Transparency (2018a). *Brown to Green: The G20 Transition to a Low-Carbon Economy*. Climate Transparency, Berlin, Germany. <https://www.climate-transparency.org/wp-content/uploads/2019/01/2018-BROWN-TO-GREEN-REPORT-FINAL.pdf>
- Climate Transparency (2018b). *Brown to Green: The G20 Transition to a Low-Carbon Economy. South Africa*. Climate Transparency. https://newclimate.org/wp-content/uploads/2018/11/B2G_2018_South_Africa.pdf
- Coalition for Urban Transitions (2019). *Climate Emergency, Urban Opportunity*. World Resources Institute (WRI) Ross Center for Sustainable Cities and C40 Cities Climate Leadership Group., London and Washington, DC. <https://urbantransitions.global/urban-opportunity/>
- Collier, P. and Goderis, B. (2008). *Commodity Prices, Growth, and the Natural Resource Curse: Reconciling a Conundrum*. ID 1473716. Social Science Research Network, Rochester, NY. DOI: [10.2139/ssrn.1473716](https://doi.org/10.2139/ssrn.1473716)
- Corkal, V., Gass, P. and Cosbey, A. (2020). *Green Strings: Principles and Conditions for a Green Recovery from COVID-19 in Canada*. International Institute for Sustainable Development. <https://www.iisd.org/publications/green-strings-recovery-covid-19-canada>
- Crooks, E., Martin, P., Thompson, G., Mielke, E., Flowers, S., Hittle, A. L., Gelder, A., Maade, D. and Manghani, R. (2020). *The World after Covid-19*. Wood Mackenzie, Edinburgh, UK. <https://www.woodmac.com/news/feature/the-future-of-energy-after-covid-19-three-scenarios/>
- Cuming, V. (2020). Covid-19 green policy tracker. Bloomberg New Energy Finance. 11 November 2020.
- Curran, G. (2020). Divestment, energy incumbency and the global political economy of energy transition: the case of Adani's Carmichael mine in Australia. *Climate Policy*, 20(8). 949–62. DOI: [10.1080/14693062.2020.1756731](https://doi.org/10.1080/14693062.2020.1756731)
- Cust, J. and Mihalyi, D. (2017). *Evidence for a Presource Curse? Oil Discoveries, Elevated Expectations, and Growth Disappointments*. 8140. The World Bank. DOI: [10.1596/1813-9450-8140](https://doi.org/10.1596/1813-9450-8140)
- Danish Energy Agency (2018). Regeringen lukker for efterforskning og boring efter olie- og gas på land i Danmark. Danish Energy Agency. <https://presse.ens.dk/news/regeringen-lukker-for-efterforskning-og-boring-efter-olie-og-gas-paa-land-i-danmark-295546>
- Darby, M. (2019). Which countries have a net zero carbon goal? *Climate Home News*, 14 June 2019. Climate Politics. <https://www.climatechangenews.com/2019/06/14/countries-net-zero-climate-goal/>
- Davis, S. J., Peters, G. P. and Caldeira, K. (2011). The supply chain of CO₂ emissions. *Proceedings of the National Academy of Sciences*, 108(45). 18554–59. DOI: [10.1073/pnas.1107409108](https://doi.org/10.1073/pnas.1107409108)
- Dobson, M. (2020). Why climate advocates should welcome the historic OPEC++ deal. *Climate Home News*, 15 April 2020. Comment. <https://www.climatechangenews.com/2020/04/15/climate-advocates-welcome-historic-opecc-deal/>
- Downie, C. (2019). *Business Battles in the US Energy Sector: Lessons for a Clean Energy Transition*. Routledge, London. <https://www.taylorfrancis.com/books/9780429402074>
- DPE (2019). *Roadmap for Eskom in a Reformed Electricity Supply Industry*. Department of Public Enterprises, Hatfield, South Africa. <https://dpe.gov.za/roadmap-for-eskom-in-a-reformed-electricity-supply-industry/>

References (cont.)

- EIA (2020). *Short-Term Energy Outlook*. U.S. Energy Information Administration. <https://www.eia.gov/outlooks/steo/report/prices.php>
- Energy Policy Tracker (2020). Track public money for energy in recovery packages. Energy Policy Tracker. <https://www.energy-policytracker.org/>
- Englund, W. and Grandoni, D. (2020). Oil companies drilling on federal land get break on royalties. Solar and wind firms get past-due rent bills. *Washington Post*, 21 May 2020. <https://www.washingtonpost.com/business/2020/05/20/blm-royalty-relief/>
- Epstein, A. C. (2017). The Human Health Implications of Oil and Natural Gas Development. In *Advances in Chemical Pollution, Environmental Management and Protection*, vol. 1. Elsevier and Academic Press, Cambridge, MA. 113–45. DOI: [10.1016/bs.apmp.2017.08.002](https://doi.org/10.1016/bs.apmp.2017.08.002)
- Erickson, P., Down, A., Lazarus, M. and Koplow, D. (2017). Effect of subsidies to fossil fuel companies on United States crude oil production. *Nature Energy*, 2(11), 891–98. DOI: [10.1038/s41560-017-0009-8](https://doi.org/10.1038/s41560-017-0009-8)
- Erickson, P., Kartha, S., Lazarus, M. and Tempest, K. (2015). Assessing carbon lock-in. *Environmental Research Letters*, 10(8), 084023. DOI: [10.1088/1748-9326/10/8/084023](https://doi.org/10.1088/1748-9326/10/8/084023)
- Erickson, P. and Lazarus, M. (2013). *Accounting for Greenhouse Gas Emissions Associated with the Supply of Fossil Fuels*. Stockholm Environment Institute, Seattle, WA. <https://www.sei.org/publications/accounting-for-greenhouse-gas-emissions-associated-with-the-supply-of-fossil-fuels/>
- Erickson, P., Lazarus, M. and Piggot, G. (2018). Limiting fossil fuel production as the next big step in climate policy. *Nature Climate Change*, 8, 1037–1043. DOI: [10.1038/s41558-018-0337-0](https://doi.org/10.1038/s41558-018-0337-0)
- Erickson, P., van Asselt, H., Koplow, D., Lazarus, M., Newell, P., Oreskes, N. and Supran, G. (2020). Why fossil fuel producer subsidies matter. *Nature*, 578(7793), E1–4. DOI: [10.1038/s41586-019-1920-x](https://doi.org/10.1038/s41586-019-1920-x)
- España, S. (2020). La emergencia del coronavirus propicia la liberalización del precio de la gasolina en Ecuador. *El País*, 21 May 2020. <https://elpais.com/economia/2020-05-21/la-emergencia-del-coronavirus-propicia-la-liberalizacion-del-precio-de-la-gasolina-en-ecuador.html>
- EU Monitor (2020). Explanatory Memorandum to COM(2020)22 - Just Transition Fund. EU Monitor. https://www.eumonitor.eu/9353000/1/j4nvhd3k3hyd3q_j9vvik7m1c3gyxp/vl-5bgb7s1szs
- European Commission. (2018). *A Clean Planet for all: A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy*. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52018DC0773&from=EN>
- European Commission (2019). Initiative for coal regions in transition. https://ec.europa.eu/energy/topics/oil-gas-and-coal/EU-coal-regions/initiative-for-coal-regions-in-transition_en
- European Commission (2020a). Just Transition Platform. https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/just-transition-mechanism/just-transition-platform_en
- European Commission (2020b). Proposal for a Regulation of the European Parliament and of the Council establishing the Just Transition Fund. 14 January 2020. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020PC0022>
- European Council (2020). Special meeting of the European Council (17, 18, 19, 20 and 21 July 2020) — Conclusions. 21 July 2020. <https://www.consilium.europa.eu/media/45109/210720-euco-final-conclusions-en.pdf>
- European Investment Bank (2019). EU Bank launches ambitious new climate strategy and Energy Lending Policy. European Investment Bank. <https://www.eib.org/en/press/all/2019-313-eu-bank-launches-ambitious-new-climate-strategy-and-energy-lending-policy>
- Farand, C. (2020). Spain unveils climate law to cut emissions to net zero by 2050. *Climate Home News*, 18 May 2020. Climate Politics. <https://www.climatechangenews.com/2020/05/18/spain-unveils-climate-law-cut-emissions-net-zero-2050/>
- Fenton, A., Wright, H., Afionis, S., Paavola, J. and Huq, S. (2014). Debt relief and financing climate change action. *Nature Climate Change*, 4(8), 650–53. DOI: [10.1038/nclimate2303](https://doi.org/10.1038/nclimate2303)
- Field, C. B., Barros, V. R. and Intergovernmental Panel on Climate Change, eds. (2014). *Climate Change 2014: Impacts, Adaptation, and Vulnerability: Working Group II Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, New York, NY
- Finnegan, J. J. (2018). *Changing Prices in a Changing Climate: Electoral Competitiveness and Fossil Fuel Taxation*. Centre for Climate Change Economics and Policy Working Paper 341/ Grantham Research Institute on Climate Change and the Environment Working Paper 307, London. <http://www.lse.ac.uk/granthaminstitute/publication/changing-prices-in-a-changing-climate-electoral-competitiveness-and-fossil-fuel-taxation/>
- Finnegan, J. J. (2019). *Institutions, Climate Change, and the Foundations of Long-Term Policymaking*. Centre for Climate Change Economics and Policy Working Paper 353/ Grantham Research Institute on Climate Change and the Environment Working Paper 321, London. <http://www.lse.ac.uk/granthaminstitute/publication/institutions-climate-change-and-the-foundations-of-long-term-policymaking/>
- Fischer, L. (2019). *The Politics of the Global Gas Transition*. E3G and ODI. <https://www.e3g.org/publications/the-politics-of-the-global-gas-transition/>
- Fofrich, R. A., Tong, D., Calvin, K. V., Boer, H. S. de, Emmerling, J., et al. (2020). Early retirement of power plants in climate mitigation scenarios. *Environmental Research Letters*. DOI: [10.1088/1748-9326/ab96d3](https://doi.org/10.1088/1748-9326/ab96d3)

References (cont.)

- Fouquet, R. (2016). Historical energy transitions: speed, prices and system transformation. *Energy Research & Social Science*, 22, 7–12. DOI: [10.1016/j.erss.2016.08.014](https://doi.org/10.1016/j.erss.2016.08.014)
- Frynas, J. G. and Buur, L. (2020). The presource curse in Africa: economic and political effects of anticipating natural resource revenues. *The Extractive Industries and Society*. DOI: [10.1016/j.exis.2020.05.014](https://doi.org/10.1016/j.exis.2020.05.014)
- Fuhr, L. and West, J. (2014). Risky Reserves. *Project Syndicate*, 12 May 2014. Economics & Finance. <https://www.project-syndicate.org/commentary/lili-fuhr-and-johnny-west-encourage-oil-producing-countries-to-prepare-for-more-robust-climate-policies>
- G20 (2009). Leaders' Statement: The Pittsburgh Summit. Pittsburgh, PA. <http://www.g20.utoronto.ca/2009/2009communique0925.html>
- G20 Finance Ministers & Central Bank Governors Meeting (2020). Communiqué. 18 July 2020. <https://g20.org/en/media/Documents/Final%20G20%20FMCBG%20Communiqu%C3%A9%20-%20July%202020.pdf>
- Garrett-Peltier, H. (2017). Green versus brown: comparing the employment impacts of energy efficiency, renewable energy, and fossil fuels using an input-output model. *Economic Modelling*, 61, 439–47.
- Gasim, A. and Aldubyan, M. (2020). *Why Did Domestic Gasoline Prices Fall in Saudi Arabia?* King Abdullah Petroleum Studies and Research Center, Riyadh. <https://www.kapsarc.org/research/publications/why-did-domestic-gasoline-prices-fall-in-saudi-arabia/>
- Gaulin, N. and Le Billon, P. (2020). Climate change and fossil fuel production cuts: assessing global supply-side constraints and policy implications. *Climate Policy*. DOI: [10.1080/14693062.2020.1725409](https://doi.org/10.1080/14693062.2020.1725409)
- GCEC (2014). *Better Growth Better Climate*. The Global Commission on the Economy and Climate, Washington, D.C. https://newclimateeconomy.report/2014/wp-content/uploads/sites/2/2014/08/NCE-Global-Report_web.pdf
- Gerasimchuk, I., Bassi, A., Ordonez, C., Doukas, A., Merrill, L. and Whitley, S. (2017). *Zombie Energy: Climate Benefits of Ending Subsidies to Fossil Fuel Production*. International Institute for Sustainable Development. <https://www.iisd.org/library/zombie-energy-climate-benefits-ending-subsidies-fossil-fuel-production>
- Gerasimchuk, I., Whitley, S., Beaton, C., Bridle, R., Doukas, A., Di Paola, M. and Touchette, Y. (2018). *Stories from G20 Countries: Shifting Public Money out of Fossil Fuels*. International Institute for Sustainable Development. <https://www.iisd.org/library/stories-g20-countries-shifting-public-money-out-fossil-fuels>
- Ghafar, A. A. and Gross, S. (2019). *The Shifting Energy Landscape and the Gulf Economies' Diversification Challenge*. Brookings. https://www.brookings.edu/wp-content/uploads/2019/12/FP_20191210_gcc_energy_ghafar_gross.pdf
- Glynn, P. J., Błachowicz, A. and Nicholls, M. (2020). *Incorporating Just Transition Strategies in Developing Country Nationally Determined Contributions*. Climate Strategies. https://climatestrategies.org/wp-content/uploads/2020/03/CS_Just-Transition-NDCs-report_web.pdf
- Government of Alberta (2020). Investing in Keystone XL pipeline. <https://www.alberta.ca/investing-in-keystone-xl-pipeline.aspx>
- Government of Alberta (2020). Investing in northern Alberta utilities. <https://www.alberta.ca/release.cfm?x-ID=7280048B71C01-0C70-6182-7997E24568C33837>
- Government of Belize (2017). *Petroleum Operations (Maritime Zone Moratorium) Act*. <https://www.elaw.org/petroleum-operations-maritime-zone-moratorium-act-2017>
- Government of Mexico (2020). Decreto por el que se otorgan beneficios fiscales a los contribuyentes que se indican. 21 April 2020. https://www.dof.gob.mx/nota_detalle.php?codigo=5591969&fecha=21/04/2020
- Government of Spain (2020). *Plan Nacional Integrado de Energía y Clima 2021-2030*. Government of Spain. https://ec.europa.eu/energy/sites/ener/files/documents/es_final_necp_main_es.pdf
- Graham, N., Carroll, W. K. and Chen, D. (2019). *Big Oil's Political Reach: Mapping Fossil Fuel Lobbying from Harper to Trudeau*. Corporate Mapping Project and the Canadian Centre for Policy Alternatives BC and Saskatchewan offices. <https://www.policyalternatives.ca/publications/reports/big-oil%E2%80%99s-political-reach>
- Grant, A. (2020). *The Impair State: The Paris Agreement Starts to Impact Oil & Gas Accounting*. Carbon Tracker Initiative. <https://carbontracker.org/reports/the-impair-state/>
- Gray, M. (2011). *A Theory of "Late Rentierism" in the Arab States of the Gulf*. Occasional Paper, No. 7. Center for International and Regional Studies, School of Foreign Services in Qatar, Georgetown University. <https://repository.library.georgetown.edu/bitstream/handle/10822/558291/CIRSOccasionalPaper7MatthewGray2011.pdf>
- Green, F. (2018). The logic of fossil fuel bans. *Nature Climate Change*, 8(6), 449–51. DOI: [10.1038/s41558-018-0172-3](https://doi.org/10.1038/s41558-018-0172-3)
- Green, F. and Denniss, R. (2018). Cutting with both arms of the scissors: the economic and political case for restrictive supply-side climate policies. *Climatic Change*, 150(1), 73–87. DOI: [10.1007/s10584-018-2162-x](https://doi.org/10.1007/s10584-018-2162-x)
- Green, F. and Gambhir, A. (2019). Transitional assistance policies for just, equitable and smooth low-carbon transitions: who, what and how? *Climate Policy*. 1–20. DOI: [10.1080/14693062.2019.1657379](https://doi.org/10.1080/14693062.2019.1657379)
- Grubb, M. (2020). Why oil prices will never recover. *Asia Times*, 16 April 2020. <https://asiatimes.com/2020/04/after-the-storm-why-oil-will-never-recover/>

References (cont.)

- Guerra, A. (2013). The climate challenge: achieving zero emissions. *Lecture by the OECD Secretary-General*, 9 October 2013. <http://www.oecd.org/about/secretary-general/the-climate-challenge-achieving-zero-emissions.htm>
- Hanna, R., Xu, Y. and Victor, D. G. (2020). After COVID-19, green investment must deliver jobs to get political traction. *Nature*, 582(7811), 178–80. DOI: [10.1038/d41586-020-01682-1](https://doi.org/10.1038/d41586-020-01682-1)
- Harfoot, M. B. J., Tittensor, D. P., Knight, S., Arnell, A. P., Blyth, S., et al. (2018). Present and future biodiversity risks from fossil fuel exploitation. *Conservation Letters*, 11(4), e12448. DOI: [10.1111/conl.12448](https://doi.org/10.1111/conl.12448)
- Harrabin, R. (2020). Bank of England chief Mark Carney issues climate change warning. *BBC News*, 30 December 2020. <https://www.bbc.com/news/business-50868717>
- Harrahill, K. and Douglas, O. (2019). Framework development for 'just transition' in coal producing jurisdictions. *Energy Policy*, 134, 110990. DOI: [10.1016/j.enpol.2019.110990](https://doi.org/10.1016/j.enpol.2019.110990)
- Harris, K. (2020). Trudeau announces aid for struggling energy sector, including \$1.7B to clean up orphan wells. *CBC*, 17 April 2020. <https://www.cbc.ca/news/politics/financial-aid-covid-19-trudeau-1.5535629>
- Healy, N., Stephens, J. C. and Malin, S. A. (2019). Embodied energy injustices: unveiling and politicizing the transboundary harms of fossil fuel extractivism and fossil fuel supply chains. *Energy Research & Social Science*, 48, 219–34. DOI: [10.1016/j.erss.2018.09.016](https://doi.org/10.1016/j.erss.2018.09.016)
- Henze, V. (2020). Scale-up of solar and wind puts existing coal, gas at risk. BloombergNEF Press Release. <https://about.bnef.com/blog/scale-up-of-solar-and-wind-puts-existing-coal-gas-at-risk/>
- Hepburn, C., O'Callaghan, B., Stern, N., Stiglitz, J. and Zenghelis, D. (2020). Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change? *Oxford Review of Economic Policy*. graa015. DOI: [10.1093/oxrep/graa015](https://doi.org/10.1093/oxrep/graa015)
- Hoegh-Guldberg, O., Jacob, D., Bindi, M., Brown, S., Camilloni, I., et al. (2018). Impacts of 1.5 C global warming on natural and human systems. *Global Warming of 1.5° C. An IPCC Special Report*.
- Holley, C., Mutongwizo, T., Shearing, C. and Kennedy, A. (2019). Shaping unconventional gas regulation: industry influence and risks of agency capture in Texas, Colorado and Queensland. *Environmental and Planning Law Journal*, 36(5), 510–30. DOI: [10.2139/ssrn.3467892](https://doi.org/10.2139/ssrn.3467892)
- Hook, L. (2019). Millions of demonstrators join largest climate protest in history. *Financial Times*, 20 September 2019. <https://www.ft.com/content/d1b401d6-dbc1-11e9-8f9b-77216ebe1f17>
- Humphreys, M., Sachs, J. D. and Stiglitz, J. E. (2007). *Escaping The Resource Curse*. Columbia University Press, New York
- Huter, M., Polfliet, A., Cummins-Tripodi, P., Kopečný, O. and Gandalovičová, L. (2018). *Revolving Doors in the Fossil Fuel Industry*. Greens/EFA EU Parliament. <https://www.greens-efa.eu/en/article/news/report-on-revolving-doors-in-the-fossil-fuel-industry-reveals-widespread-potential-for-conflicts-of-interest-to-undermine-climate-policy/>
- Hvidt, M. (2013). *Economic Diversification in GCC Countries: Past Record and Future Trends*. London School of Economics and Political Science, London. <http://eprints.lse.ac.uk/55252/>
- IEA (2018). *World Energy Outlook 2018*. International Energy Agency, Paris, France. <https://www.iea.org/weo2018/>
- IEA (2019). *CO₂ Emissions from Fuel Combustion 2018*. OECD Publishing. https://doi.org/10.1787/co2_fuel-2018-en
- IEA (2020a). COVID-19. International Energy Agency. <https://www.iea.org/topics/covid-19>
- IEA (2020b). Energy subsidies. International Energy Agency. <https://www.iea.org/topics/energy-subsidies>
- IEA (2020c). *Global Energy Review 2019 — Analysis*. International Energy Agency, Paris. <https://www.iea.org/reports/global-energy-review-2019>
- IEA (2020d). *Global Energy Review 2020: The Impacts of the Covid-19 Crisis on Global Energy Demand and CO₂ Emissions*. International Energy Agency, Paris. <https://www.iea.org/reports/global-energy-review-2020>
- IEA (2020e). *Oil Market Report — August 2020*. International Energy Agency, Paris. <https://www.iea.org/reports/oil-market-report-august-2020>
- IEA (2020f). World Energy Statistics and Balances. International Energy Agency, Paris, 12 March 2020. DOI: [10.1787/42865fbc-en](https://doi.org/10.1787/42865fbc-en)
- IEA (2020g). Executive Director's speech to Extraordinary G20 Energy Ministerial. International Energy Agency. <https://www.iea.org/news/executive-director-s-speech-to-extraordinary-g20-energy-ministerial>
- IEA (2020h). *World Energy Investment 2020*. International Energy Agency, Paris, France. <https://webstore.iea.org/world-energy-investment-2020>
- IEA (2020i). Low fuel prices provide a historic opportunity to phase out fossil fuel consumption subsidies. *International Energy Agency*, 2 June 2020. <https://www.iea.org/articles/low-fuel-prices-provide-a-historic-opportunity-to-phase-out-fossil-fuel-consumption-subsidies>
- IEA (2020j). Sustainable Recovery: World Energy Outlook Special Report. Launch Presentation, 18 June 2020. <https://iea.blob.core.windows.net/assets/bdc1328a-b3ca-40b1-9dad-bddb5df57124/SustainableRecoveryReport.pdf>

References (cont.)

- IEA (2020k). *World Energy Outlook Special Report: Sustainable Recovery*. International Energy Agency. <https://www.iea.org/reports/sustainable-recovery>
- IEA (2020l). *Natural Gas Information: Overview*. International Energy Agency. <https://www.iea.org/reports/natural-gas-information-overview>
- IEA (2020m). 40 Ministers from around the world gather to address the world's energy and climate challenges. *International Energy Agency*, 9 July 2020. <https://www.iea.org/news/40-ministers-from-around-the-world-gather-to-address-the-world-s-energy-and-climate-challenges>
- IEA (2020n). *Renewables 2020: Analysis and forecast to 2025*. International Energy Agency. <https://www.iea.org/reports/renewables-2020>
- IISD (2019). *State-Owned Companies Transitioning Away from Coal Mining and Coal-Fired Power*. International Institute for Sustainable Development
- ILO (2015). *Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All*. International Labour Organization, Geneva, Switzerland. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_432859.pdf
- ILO (2018). *World Employment and Social Outlook 2018: Greening with Jobs*. International Labour Organization, Geneva, Switzerland. https://www.ilo.org/weso-greening/documents/WESO_Greening_EN_web2.pdf
- IPCC (2018a). Summary for policymakers. In *Global Warming of 1.5 °C: An IPCC Special Report on the Impacts of Global Warming of 1.5 °C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. World Meteorological Organization, Geneva, Switzerland. https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf
- IPCC (2018b). *Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. Masson-Delmotte, V., Zhai, P., Pörtner, H.-O., Roberts, D., Skea, J., et al. (eds). Intergovernmental Panel on Climate Change, Geneva, Switzerland. <http://www.ipcc.ch/report/sr15/>
- ITUC (2017). *Just Transition - Where Are We Now and What's next? A Guide to National Policies and International Climate Governance*. International Trade Union Confederation. <https://www.ituc-csi.org/just-transition-where-are-we-now>
- ITUC (2018a). *Developing a Just Transition Framework for Africa — Key Issues Arising*. International Trade Union Confederation. [https://www.afrikadag.nl/doc/\(4\)%20a%20Just%20Transition%20Framework%20for%20Africa%20ITUC%20Africa,%202018.pdf](https://www.afrikadag.nl/doc/(4)%20a%20Just%20Transition%20Framework%20for%20Africa%20ITUC%20Africa,%202018.pdf)
- ITUC (2018b). *The Role of Social Protection in a Just Transition*. International Trade Union Confederation. <https://www.ituc-csi.org/Social-Protection-in-a-Just-Transition?lang=en>
- Jackson, R. B., Saunio, M., Bousquet, P., Canadell, J. G., Poulter, B., et al. (2020). Increasing anthropogenic methane emissions arise equally from agricultural and fossil fuel sources. *Environmental Research Letters*, 15(7). 071002. DOI: [10.1088/1748-9326/ab9ed2](https://doi.org/10.1088/1748-9326/ab9ed2)
- Jacques, P. J., Dunlap, R. E. and Freeman, M. (2008). The organisation of denial: conservative think tanks and environmental scepticism. *Environmental Politics*, 17(3). 349–85. DOI: [10.1080/09644010802055576](https://doi.org/10.1080/09644010802055576)
- James-Igbinador, N. (2020). Ending petrol subsidy, price capping, a brave way out. *This Day Live*, 7 June 2020. <https://www.thisdaylive.com/index.php/2020/06/07/ending-petrol-subsidy-price-capping-a-brave-way-out/>
- Johnson, L., Sachs, L. and Lobel, N. (2019). Aligning international investment agreements with the Sustainable Development Goals. *Columbia Journal of Transnational Law*, 58. DOI: [10.2139/ssrn.3452070](https://doi.org/10.2139/ssrn.3452070)
- Jones, D., Graham, E. and Tunbridge, P. (2020). *Wind and Solar Now Generate One-Tenth of Global Electricity: Global Half-Year Electricity Analysis*. Ember. <https://ember-climate.org/project/global-electricity-h12020/>
- Just Transition Centre (2017). *Just Transition. A Report for the OECD*. Just Transition Centre. <https://www.oecd.org/environment/cc/g20-climate/collapsecontents/Just-Transition-Centre-report-just-transition.pdf>
- Karl, T. L. (1997). *The Paradox of Plenty: Oil Booms and Petro-States*. University of California Press, Berkeley, CA
- Kartha, S., Caney, S., Dubash, N. K. and Muttitt, G. (2018). Whose carbon is burnable? Equity considerations in the allocation of a “right to extract”. *Climatic Change*, 150(1). 117–29. DOI: [10.1007/s10584-018-2209-z](https://doi.org/10.1007/s10584-018-2209-z)
- Koplow, D. (2018). Defining and measuring fossil fuel subsidies. In *The Politics of Fossil Fuel Subsidies and Their Reform*. Cambridge University Press. 23–46
- KPMG (2020). Norway: amendments to petroleum tax law. KPMG, 15 June 2020. <https://home.kpmg/us/en/home/insights/2020/06/tnf-norway-amendments-to-petroleum-tax-law.html>
- Krane, J. (2019). *Energy Kingdoms: Oil and Political Survival in the Persian Gulf*. Columbia University Press, New York; Chichester, West Sussex
- Kullab, S. and Abdul-Zahra, Q. (2020). How the oil crash affects oil-dependent countries like Iraq. *Christian Science Monitor*, 27 April 2020. <https://www.csmonitor.com/World/Middle-East/2020/0427/How-the-oil-crash-affects-oil-dependent-countries-like-Iraq>

References (cont.)

- Kusnetz, N. (2020). BP and Shell write-off billions in assets, citing Covid-19 and climate change. *InsideClimate News*, 2 July 2020. <https://insideclimatenews.org/news/01072020/bp-shell-coronavirus-climate-change>
- Lahn, G. and Bradley, S. (2016). *Left Stranded? Extractives-Led Growth in a Carbon-Constrained World*. Chatham House, London, UK. <https://www.chathamhouse.org/sites/default/files/publications/research/2016-06-17-left-stranded-extractives-bradley-lahn-final.pdf>
- Lazarus, M. and van Asselt, H. (2018). Fossil fuel supply and climate policy: exploring the road less taken. *Climatic Change*, 150, 1–13. DOI: [10.1007/s10584-018-2266-3](https://doi.org/10.1007/s10584-018-2266-3)
- Lee, M. (2020). Shell CEO: Oil may not recover from 'demand destruction'. *E&E News*, 1 May 2020. <https://www.eenews.net/stories/1063015845>
- Lelieveld, J., Klingmüller, K., Pozzer, A., Burnett, R. T., Haines, A. and Ramanathan, V. (2019). Effects of fossil fuel and total anthropogenic emission removal on public health and climate. *Proceedings of the National Academy of Sciences*, 116(15), 7192–97. DOI: [10.1073/pnas.1819989116](https://doi.org/10.1073/pnas.1819989116)
- Lewis, M. (2020). Why we may have already seen the peak in oil demand. *Financial Times*, 17 April 2020. <https://www.ft.com/content/bea183be-779c-491b-8ec6-f05da9fa5337>
- Lindvall, J. (2017). *Reform Capacity*. Oxford University Press, Oxford, New York
- Long, G. (2020). Ecuador takes far-reaching measures to save economy. *Financial Times*, 20 May 2020. <https://www.ft.com/content/dfa8fab2-5c65-4eb3-808e-75f26353b412>
- Mahdavi, P. (2020). *Power Grab: Political Survival through Extractive Resource Nationalization*. Business and Public Policy. Cambridge University Press, Cambridge. DOI: [10.1017/9781108781350](https://doi.org/10.1017/9781108781350)
- Mahdavi, P., Martinez-Urtaza, C. and Ross, M. L. (2020). *Why Do Governments Tax or Subsidize Fossil Fuels?* Working Paper 541. Center for Global Development. <https://www.cgdev.org/publication/why-do-governments-tax-or-subsidize-fossil-fuels>
- Marcel, V. and Mitchell, J. V. (2006). *Oil Titans: National Oil Companies in the Middle East*. Brookings Institution Press, Washington, D.C. <https://www.jstor.org/stable/10.7864/j.ctt12879z9>
- Marrakesh Agreement (1994). *Agreement on Subsidies and Countervailing Measures, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1867 U.N.T.S. 14*. <https://treaties.un.org/doc/Publication/UNTS/Volume%201867/volume-1867-A-31874-English.pdf>
- Materike, K. (2015). Financing local participation in Africa's extractive industries: the role of African export-import bank. Presentation at 17th Africa OILGASMINE, Khartoum, 23 November 2015. <https://unctad.org/meetings/en/Presentation/17OILGAS-MINE%20Kadukwashe%20Materike%20S5.pdf>
- Matikainen, S., Campiglio, E. and Zenghelis, D. (2017). *The Climate Impact of Quantitative Easing*. Policy Paper. The Centre for Climate Change Economics and Policy, and the Grantham Research Institute on Climate Change and the Environment. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2017/05/ClimateImpactQuantEasing_Matikainen-et-al.pdf
- Mayer, B., Rajavuori, M. and Fang, M. M. (2017). The contribution of state-owned enterprises to climate change mitigation in China. *Climate Law*, 7(2–3), 97–124. DOI: [10.1163/18786561-00702002](https://doi.org/10.1163/18786561-00702002)
- Mazenbarg, M. (2020). Experts warn of growing fossil fuel influence in Morrison's Covid-19 response. *Renew Economy*, 13 May 2020. <https://reneweconomy.com.au/experts-warn-of-growing-fossil-fuel-influence-in-morrison-covid-19-response-60053/>
- MBIE (2018). *Just Transition: Making a Just Transition to a Low Emissions Economy*. New Zealand Ministry of Business, Innovation and Employment, Wellington, New Zealand. <https://www.mbie.govt.nz/business-and-employment/economic-development/just-transition>
- McKinsey. (2020). How a post-pandemic stimulus can both create jobs and help the climate. <https://www.mckinsey.com/business-functions/sustainability/our-insights/how-a-post-pandemic-stimulus-can-both-create-jobs-and-help-the-climate>
- McLaren, D. (2020). Quantifying the potential scale of mitigation deterrence from greenhouse gas removal techniques. *Climatic Change*. DOI: [10.1007/s10584-020-02732-3](https://doi.org/10.1007/s10584-020-02732-3)
- Meckling, J. and Nahm, J. (2018). The power of process: state capacity and climate policy. *Governance*, 31(4), 741–57. DOI: [10.1111/gove.12338](https://doi.org/10.1111/gove.12338)
- Mildenberger, M. (2020). *Carbon Captured: How Business and Labor Control Climate Politics*. The MIT Press, Cambridge, MA
- MinHacienda (2018). *Marco Fiscal de Mediano Plazo 2018*. Ministerio de Hacienda y Crédito Público. https://www.minhacienda.gov.co/webcenter/portal/oracle/webcenter/page/scopedMD/sa5f5bd5d_730c_48ce_a947_74ff5fcb5a61/Page9cb11c44_5edc_495b_bc1a_74aff53aa9c5.jsp?wc.contextURL=%2Fspaces%2FEntidadesFinancieras
- Ministère de la transition écologique (2017). Le projet de loi hydrocarbures est adopté par le Parlement. *Ministère de la transition écologique*, 7 November 2017. <https://www.ecologique-solidaire.gouv.fr/projet-loi-hydrocarbures-est-adopté-parlement>
- Ministério de Minas e Energia (2019). *Plano Decenal de Expansão de Energia 2029* (The Ten-Year Energy Expansion Plan 2029). Empresa de Pesquisa Energética. <http://www.mme.gov.br/web/guest/secretarias/planejamento-e-desenvolvimento-energetico/publicacoes/plano-decenal-de-expansao-de-energia>

References (cont.)

- MITECO (2018). *Framework Agreement for a Just Transition of Coal Mining and Sustainable Development of the Mining Regions for the Period 2019-2027*. Ministerio para la Transición Ecológica, Madrid, Spain. <https://www.miteco.gob.es/es/prensa/ultimas-noticias/el-gobierno-y-el-sector-de-la-miner%C3%ADa-del-carb%C3%B3n-firman-un-acuerdo-para-la-transici%C3%B3n-justa-y-el-desarrollo-sostenible-de-las-comarcas-mineras/tcm:30-483648>
- MITECO (2020). *Proyecto de Ley de Cambio Climático y Transición Energética*. Ministerio para la Transición Ecológica y el Reto Demográfico. <https://www.miteco.gob.es/es/ministerio/proyecto-de-ley-de-cambio-climatico-y-transicion-energetica.aspx>
- Moerenhout, T. and Urpelainen, J. (2020). A sustainable economic recovery from COVID-19: the G-20 must end fossil fuel subsidies now. *Global Policy*, 13 May 2020. <https://www.globalpolicyjournal.com/blog/13/05/2020/sustainable-economic-recovery-covid-19-g-20-must-end-fossil-fuel-subsidies-now>
- Morgan, S. (2020). Climate policy endures rough EU budget summit. *EURACTIV*, 22 July 2020. Climate change. <https://www.euractiv.com/section/climate-environment/news/climate-policy-endures-rough-eu-budget-summit/>
- Muttitt, G. (2020). What role for OPEC in the last generation of oil? In *Handbook of OPEC and the Global Energy Order*. Routledge. 338–50
- Muttitt, G. and Kartha, S. (2020). Equity, climate justice and fossil fuel extraction: principles for a managed phase out. *Climate Policy*, 20(8). 1024–42. DOI: [10.1080/14693062.2020.1763900](https://doi.org/10.1080/14693062.2020.1763900)
- Nelson, D., Hervé-Mignucci, M., Goggins, A., Sarah Jo, S., Vladeck, T. and Zuckerman, J. (2014). *Moving to a Low-Carbon Economy: The Impact of Policy Pathways on Fossil Fuel Asset Values*. CPI Energy Transition series. Climate Policy Initiative. <https://climatepolicyinitiative.org/wp-content/uploads/2014/10/Moving-to-a-Low-Carbon-Economy-The-Impacts-of-Policy-Pathways-on-Fossil-Fuel-Asset-Values.pdf>
- New Climate Economy. (2018). *Unlocking the Inclusive Growth Story of the 21st century: Accelerating Climate Action in Urgent Times*. The Global Commission on the Economy and the Climate.
- New Climate Institute, Ecofys and Climate Analytics (2018). *Some Progress since Paris, but Not Enough, as Governments Amble towards 3°C of Warming*. Climate Action Tracker. https://climateanalytics.org/media/cat_temp_update_dec2018.pdf
- New Zealand Parliament (2018). *Crown Minerals (Petroleum) Amendment Bill*. 105–2. https://www.parliament.nz/en/pb/bills-and-laws/bills-proposed-laws/document/BILL_80358/crown-minerals-petroleum-amendment-bill
- Newell, P. and Johnstone, P. (2018). The political economy of incumbency: fossil fuel subsidies in global and historical context. In *The Politics of Fossil Fuel Subsidies and Their Reform*. Skovgaard, J. (ed.). van Asselt, H. Cambridge University Press. 66–80. DOI: [10.1017/9781108241946.006](https://doi.org/10.1017/9781108241946.006)
- Newell, P. and Simms, A. (2019). Towards a fossil fuel non-proliferation treaty. *Climate Policy*, 20(8). 1043–54. DOI: [10.1080/14693062.2019.1636759](https://doi.org/10.1080/14693062.2019.1636759)
- NGFS (2019). *A Call for Action: Climate Change as a Source of Financial Risk*. Central Banks and Supervisors Network for Greening the Financial System. <https://www.ngfs.net/en/first-comprehensive-report-call-action>
- Norwegian Ministry of Petroleum and Energy (2020). Reducing oil production on the Norwegian Continental Shelf. 29 April. <https://www.regjeringen.no/en/aktuelt/reducing-oil-production-on-the-norwegian-continental-shelf/id2700542/>
- NRGI (2020). *The National Oil Company Database*. Natural Resource Governance Institute. https://resourcegovernance.org/sites/default/files/documents/national_oil_company_database.pdf
- Obaid, R. (2017). ‘Citizen Account Program’ to help Saudis face economic changes. *Arab News*, 13 December 2017. <https://www.arabnews.com/node/1208256/saudi-arabia>
- OECD (2013). *Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels 2013*. Organisation for Economic Co-operation and Development, Paris, France. <http://www.oecd-ilibrary.org/content/book/9789264187610-en>
- OECD (2017). *Investing in Climate, Investing in Growth*. Organisation for Economic Co-operation and Development, Paris, France. <http://www.oecd.org/env/investing-in-climate-investing-in-growth-9789264273528-en.htm>
- OECD (2019). *Accelerating Climate Action: Refocusing Policies through a Well-Being Lens*. Organisation for Economic Co-operation and Development, Paris, France. DOI: [10.1787/2f4c8c9a-en](https://doi.org/10.1787/2f4c8c9a-en)
- OECD (2020a). OECD analysis of budgetary support and tax expenditures — 2020 country notes. Organisation for Economic Co-Operation and Development. <http://www.oecd.org/fossil-fuels/data/>
- OECD (2020b). Rising fossil fuel support poses a threat to building a healthier and climate-safe future. Organisation for Economic Co-Operation and Development. <https://www.oecd.org/fossil-fuels>
- OECD and WTO (2019). Economic diversification: lessons from practice. In *Aid for Trade at a Glance 2019: Economic Diversification and Empowerment*. OECD Publishing, Paris. 135–60. https://www.oecd-ilibrary.org/development/aid-for-trade-at-a-glance-2019_f61d8ce8-en
- Official Bulletin of the Argentina Republic (2020). *Petróleo Crudo En El Mercado Local. Establécese Precio Para Facturación de Entregas*. <https://www.boletinoficial.gob.ar/detalleAviso/prime-ra/229470/20200519>
- Offshore (2020). Norway proposes temporary tax break to stimulate offshore oil and gas projects. *Offshore*, 4 May 2020. <https://www.offshore-mag.com/business-briefs/coronavirus/article/14175252/norway-proposes-temporary-tax-break-to-stimulate-offshore-oil-and-gas-projects>

References (cont.)

- Ohri, N. (2020). Government hikes taxes on petrol and diesel by Rs 10-13/litre. *Bloomberg Quint*, 6 May 2020. <https://www.bloombergquint.com/economy-finance/government-hikes-taxes-on-petrol-and-diesel-by-rs-10-13litre>
- Ollero, A. M., Hussain, S. S., Varma, S., Peszko, G. and Al-Naber, H. M. F. (2019). *Economic Diversification for a Sustainable and Resilient GCC*. Gulf Economic Update, 5. World Bank Group, Washington, D.C. <http://documents.worldbank.org/curated/en/886531574883246643/Economic-Diversification-for-a-Sustainable-and-Resilient-GCC>
- Olurounbi, R. (2020). Nigeria dangerously exposed to oil crash. *Petroleum Economist*, 24 March 2020. <https://www.petroleum-economist.com/articles/politics-economics/africa/2020/nigeria-dangerously-exposed-to-oil-crash>
- OPEC (2020). The 10th (Extraordinary) OPEC and non-OPEC Ministerial Meeting concludes. 12 April. https://www.opec.org/opec_web/en/press_room/5891.htm
- O'Rourke, D. and Connolly, S. (2003). Just oil? The distribution of environmental and social impacts of oil production and consumption. *Annual Review of Environment and Resources*, 28(1). 587–617. DOI: [10.1146/annurev.energy.28.050302.105617](https://doi.org/10.1146/annurev.energy.28.050302.105617)
- Orre, A. J. and Rønning, H. (2017). *Mozambique: A Political Economy Analysis*. Chr. Michelsen Institute. <https://www.cmi.no/publications/file/6366-mozambique-a-political-economy-analysis.pdf>
- Pai, S., Zerriffi, H., Jewell, J. and Pathak, J. (2020). Solar has greater techno-economic resource suitability than wind for replacing coal mining jobs. *Environmental Research Letters*, 15(3). DOI: [10.1088/1748-9326/ab6c6d](https://doi.org/10.1088/1748-9326/ab6c6d)
- Pearse, G., McKnight, D. and Burton, B. (2013). *Big Coal: Australia's Dirtiest Habit*. University of New South Wales Press, Sydney
- Peck, S. and Chayes, S. (2015). *The Oil Curse: A Remedial Role for the Oil Industry*. Carnegie Endowment for International Peace, Washington, DC, US
- Peszko, G., Golub, A. and van der Mensbrugghe, D. (2019). *Cooperative Carbon Taxes Under the Paris Agreement That Even Fuel Exporters Could Like*. First International Conference on Carbon Pricing. The World Bank, Washington, D.C. DOI: [10.1596/1813-9450-9315](https://doi.org/10.1596/1813-9450-9315)
- Peszko, G., van der Mensbrugghe, D., Golub, A., Ward, J., Zenghelis, D., Marijs, C., Schopp, A., Rogers, J. and Midgley, A. (2018). *Crossroads: Climate Strategies of Fossil Fuel-Dependent Countries*. World Bank, Washington, D.C.
- Peszko, G., van der Mensbrugghe, D., Golub, A., Ward, J., Zenghelis, D., Marijs, C., Schopp, A., Rogers, J. and Midgley, A. (2020). *Diversification and Cooperation in a Decarbonizing World: Climate Strategies for Fossil Fuel-Dependent Countries*. The World Bank, Washington, D.C. DOI: [10.1596/978-1-4648-1340-5](https://doi.org/10.1596/978-1-4648-1340-5)
- Peters, G. P., Davis, S. J. and Andrew, R. (2012). A synthesis of carbon in international trade. *Biogeosciences*, 9(8). 3247–76. DOI: [10.5194/bg-9-3247-2012](https://doi.org/10.5194/bg-9-3247-2012)
- Piggot, G., Boyland, M., Down, A. and Raluca Torre, A. (2019). *Realizing a Just and Equitable Transition Away from Fossil Fuels*. Stockholm Environment Institute. <https://www.sei.org/publications/just-and-equitable-transition-fossil-fuels/>
- Piggot, G., Erickson, P., van Asselt, H. and Lazarus, M. (2018). Swimming upstream: addressing fossil fuel supply under the UNFCCC. *Climate Policy*, 18(9). 1189–1202. DOI: [10.1080/14693062.2018.1494535](https://doi.org/10.1080/14693062.2018.1494535)
- Pollin, R. and Callaci, B. (2016). The economics of just transition: a framework for supporting fossil fuel-dependent workers and communities in the United States. *Labor Studies Journal*, 44(2). 93–138. DOI: [10.1177/0160449X18787051](https://doi.org/10.1177/0160449X18787051)
- Prag, A., Röttgers, D. and Scherrer, I. (2018). *State-Owned Enterprises and the Low-Carbon Transition*. OECD Environment Working Papers, 129. OECD, Paris, France. https://www.oecd-ilibrary.org/environment/state-owned-enterprises-and-the-low-carbon-transition_06ff826b-en
- Presidencia de la República de Costa Rica (2019). Presidente Alvarado extiende moratoria petrolera hasta el año 2050. Presidencia de la República de Costa Rica. <https://www.presidencia.go.cr/comunicados/2019/02/presidente-alvarado-extiende-moratoria-petrolera-hasta-el-ano-2050/>
- Press Information Bureau of the Government of India (2020). Finance Minister announces new horizons of growth; structural reforms across eight sectors paving way for Aatma Nirbhar Bharat. 16 May 2020. <https://pib.gov.in/Pressreleaseshare.aspx?PRID=1624536>
- Prime Minister of Canada (2020). Prime Minister announces new support to protect Canadian jobs. <https://pm.gc.ca/en/news/news-releases/2020/04/17/prime-minister-announces-new-support-protect-canadian-jobs>
- Rapier, R. (2020). This is what the end of the oil age looks like. *Forbes*, 1 April 2020. <https://www.forbes.com/sites/rrapier/2020/04/01/this-is-what-the-end-of-the-oil-age-looks-like/#19d0b3023dd3>
- Ratha, D., De, S., Kim, E., Plaza, S., Seshan, D. and Yameogo, N. (2020). *COVID-19 Crisis Through a Migration Lens*. World Bank Group. <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/989721587512418006/covid-19-crisis-through-a-migration-lens>
- Resmî Gazete (2020). CUMHURBAŞKANI KARARI. 25 March 2020. <https://www.resmigazete.gov.tr/eskiler/2020/03/20200325-2.pdf>
- Reuters (2020). Russia introduces tax relief for new Arctic LNG projects. *Reuters*, 18 March 2020. <https://www.reuters.com/article/us-russia-gas-arctic-idUSKBN21537F>
- RNZ (2019). \$27m clean energy centre announced for Taranaki. *Radio New Zealand*, 9 May 2019. Politics. <https://www.rnz.co.nz/news/political/388820/27m-clean-energy-centre-announced-for-taranaki>

References (cont.)

- Rogelj, J., Shindell, D., Jiang, K., Fifita, S., Forster, P., et al. (2018). Chapter 2: Mitigation pathways compatible with 1.5°C in the context of sustainable development. In *Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. World Meteorological Organization, Geneva, Switzerland. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter2_Low_Res.pdf
- Rosemberg, A. (2010). Building a just transition: the linkages between climate change and employment. *International Journal of Labour Research*, 2(2), 125.
- Rosemberg, A. (2017). *Strengthening Just Transition Policies in International Climate Governance*. The Stanley Foundation, Muscatine, IA. <https://www.stanleyfoundation.org/publications/pab/RosembergPABStrengtheningJustTransition417.pdf>
- Ross, M. L. (1999). The political economy of the resource curse. *World Politics*, 51(2), 297–322.
- Ross, M. L. (2012). *The Oil Curse*. Princeton University Press, Princeton and Oxford. <https://press.princeton.edu/books/paperback/9780691159638/the-oil-curse>
- Ross, M. L. (2015). What have we learned about the resource curse? *Annual Review of Political Science*, 18(1), 239–59. DOI: [10.1146/annurev-polisci-052213-040359](https://doi.org/10.1146/annurev-polisci-052213-040359)
- Ross, M. L., Hazlett, C. and Mahdavi, P. (2017). Global progress and backsliding on gasoline taxes and subsidies. *Nature Energy*, 2, 16201. DOI: [10.1038/nenergy.2016.201](https://doi.org/10.1038/nenergy.2016.201)
- Rowell, A., Marriott, J. and Stockman, L. (2005). *The Next Gulf: London, Washington and Oil Conflict in Nigeria*. Constable, London
- Roy, J., Tscharket, P., Waisman, H., Abdul Halim, S., Antwi-Agyei, P., et al. (2018). Sustainable development, poverty eradication and reducing inequalities. In *Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. World Meteorological Organization, Geneva, Switzerland
- Rystad Energy (2020a). Global gas output set to fall by 2.6% in 2020, associated gas to take the hardest hit. <https://www.rystadenergy.com/newsevents/news/press-releases/global-gas-output-set-to-fall-by-2point6-in-2020-associated-gas-to-take-the-hardest-hit/>
- Rystad Energy (2020b). *Cube Browser*. <https://www.rystadenergy.com/Products/EnP-Solutions/UCube/Default>
- Sachs, J. D. and Warner, A. M. (1995). *Natural Resource Abundance and Economic Growth*. NBER Working Paper No. 5398. National Bureau of Economic Research
- Science Based Targets (2020). Corporate commitments to 1.5°C and net zero ramp up on World Environment Day. <https://sciencebasedtargets.org/2020/06/04/corporate-commitments-to-1-5c-and-net-zero-ramp-up-on-world-environment-day/>
- Scott, J., Dakin, R., Heller, K. and Eftimie, A. (2013). *Extracting Lessons on Gender in the Oil and Gas Sector: A Survey and Analysis of the Gendered Impacts of Onshore Oil and Gas Production in Three Developing Countries*. Extractive Industries for Development Series, 28. World Bank, Washington, D.C.
- SDG Knowledge Hub (2019). 73 Countries Commit to Net Zero CO₂ Emissions by 2050. *International Institute for Sustainable Development*, 2019. <https://sdg.iisd.org/443/news/73-countries-commit-to-net-zero-co2-emissions-by-2050/>
- Secretaría de Energía (2017). *Oil and Oil Products Outlook 2017-2031*. Gobierno de Mexico. https://www.gob.mx/cms/uploads/attachment/file/325632/Crude_Oil_and_Oil-Products_Outlook_2017-2031.pdf
- Secretario de Gobierno de Energía (2018). *National Energy Plan*. https://www.argentina.gob.ar/sites/default/files/energy_plan_-_october_2018_0.pdf
- SEI, IISD, ODI, Climate Analytics, CICERO and UNEP (2019). *The Production Gap: The Discrepancy between Countries' Planned Fossil Fuel Production and Global Production Levels Consistent with Limiting Warming to 1.5°C or 2°C*. <http://productiongap.org/2019report/>
- Sheppard, D. (2020). US and Canada discuss putting tariffs on Saudi and Russian oil. *Financial Times*, 4 April 2020. <https://www.ft.com/content/5f4704e9-0942-4707-97c0-eba79f4fcb88>
- Sheppard, D., Raval, A. and Brower, D. (2020). G20 backs largest oil supply agreement in history. *Financial Times*, 10 April 2020. <https://www.ft.com/content/16ac91d8-42bf-4190-88de-f3d89b2b36f4>
- Sovacool, B. K. (2017). Reviewing, reforming, and rethinking global energy subsidies: towards a political economy research agenda. *Ecological Economics*, 135, 150–63. DOI: [10.1016/j.ecolecon.2016.12.009](https://doi.org/10.1016/j.ecolecon.2016.12.009)
- S&P Global Platts (2019). *2020 Outlook*. https://www.spglobal.com/platts/plattscontent/_assets/_files/en/specialreports/oil/platts_2020_outlook_report.pdf
- Stanley, M. C., Strongman, J. E., Perks, R. B., Nguyen, H. B. T., Cunningham, W., Schmillen, A. D. and McCormick, M. S. (2018). *Managing Coal Mine Closure: Achieving a Just Transition for All*. Working Paper 130659. World Bank Group, Washington, D.C. <http://documents.worldbank.org/curated/en/484541544643269894/Managing-Coal-Mine-Closure-Achieving-a-Just-Transition-for-All>
- Steele, G. (2020). Confronting the “Climate Lehman Moment”: the case for macroprudential climate regulation. *Cornell Journal of Law and Public Policy*, forthcoming. <https://papers.ssrn.com/abstract=3542840>

References (cont.)

- Stern, N. (2015). *Why Are We Waiting?: The Logic, Urgency, and Promise of Tackling Climate Change*. The MIT Press, Cambridge, Massachusetts
- Stevens, P., Lahn, G. and Kooroshy, J. (2015). *The Resource Curse Revisited*. Chatham House: The Royal Institute of International Affairs, London. <https://www.chathamhouse.org/sites/default/files/publications/research/20150804ResourceCurseRevisitedStevensLahnKooroshyFinal.pdf>
- Stokes, L. (2020). *Short Circuiting Policy: Interest Groups and the Battle over Clean Energy and Climate Policy in the American States*. Studies in Postwar American Political Development. Oxford University Press, Oxford, New York
- Stokes, L. and Mildenerger, M. (2020). Green stimulus, not dirty bailouts, is the smart investment strategy during the coronavirus recession. *Equitable Growth*, 18 May 2020. Coronavirus Recession. <https://equitablegrowth.org/green-stimulus-not-dirty-bailouts-is-the-smart-investment-strategy-during-the-coronavirus-recession/>
- Strambo, C., Espinosa, A. C. G. and Puertas, A. (2018). The politics of subsidies to coal extraction in Colombia. In *The Politics of Fossil Fuel Subsidies and Their Reform*. Cambridge University Press. 246–64
- Strambo, C. and González Espinosa, A. C. (2020). Extraction and development: fossil fuel production narratives and counternarratives in Colombia. *Climate Policy*. 1–18. DOI: [10.1080/14693062.2020.1719810](https://doi.org/10.1080/14693062.2020.1719810)
- Swedfund (2017). *Position Paper on Climate Impact*. <https://www.swedfund.se/media/2015/swedfunds-position-paper-on-climate-2017-10-27.pdf>
- Tammiste, L., Kirsimaa, K., Suik, K., Org, M. and Meeliste, S. (2020). *Reaching Climate Neutrality in Estonia*. Stockholm Environment Institute. <https://www.sei.org/publications/reaching-climate-neutrality-in-estonia-brief/>
- Task Force on Climate-related Financial Disclosures (2017). *Final Report: Recommendations of the Task Force on Climate-Related Financial Disclosures*. <https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-2017-TCFD-Report-11052018.pdf>
- Task Force on Climate-related Financial Disclosures (2020). More than 1,000 global organizations declare support for the Task Force on Climate-Related Financial Disclosures and its recommendation. 12 February. https://www.fsb-tcfd.org/wp-content/uploads/2020/02/PR-TCFD-1000-Supporters_FINAL.pdf
- Tienhaara, K. (2018). Regulatory chill in a warming world: the threat to climate policy posed by investor-state dispute settlement. *Transnational Environmental Law*, 7(2). 229–50. DOI: [10.1017/S2047102517000309](https://doi.org/10.1017/S2047102517000309)
- Tienhaara, K., Johnson, L. and Burger, M. (2020). Valuing fossil fuel assets in an era of climate disruption. *Investment Treaty News*, 20 June 2020. <https://www.iisd.org/itn/2020/06/20/valuing-fossil-fuel-assets-in-an-era-of-climate-disruption/>
- Treyer, S. and Rankovic, A. (2019). Can the Belt and Road Initiative reinforce the multilateral agenda for sustainable development? *IDDR*, 30 April 2019. <https://www.iddri.org/en/publications-and-events/blog-post/can-belt-and-road-initiative-reinforce-multilateral-agenda>
- Trout, K. (2020). Deep Dive: 5 reasons governments must act now to phase out oil and gas production. *Oil Change International*, 20 May 2020. Blog Post. <http://priceofoil.org/2020/05/20/deep-dive-5-reasons-governments-must-act-now-phase-out-oil-gas-production/>
- Tucker, B. and DeAngelis, K. (2020). *Still Digging: G20 Governments Continue to Finance the Climate Crisis*. Oil Change International and Friends of the Earth United States. <http://priceofoil.org/2020/05/27/g20-still-digging/>
- TUDCN & ILO (2018). *The Contribution of Social Dialogue to the 2030 Agenda: Formalising the Informal Economy*. EN-D/2018/11.962/8. Trade Union Development Cooperation Network and International Labour Organization, Brussels, Belgium and Geneva, Switzerland. <https://www.ituc-csi.org/social-dialogue-for-sdgs-formalising-informal-economy>
- Tudela, F. (2020). Obstacles and opportunities for moratoria on oil and gas exploration or extraction in Latin America and the Caribbean. *Climate Policy*. DOI: [10.1080/14693062.2020.1760772](https://doi.org/10.1080/14693062.2020.1760772)
- Turnheim, B. and Geels, F. W. (2012). Regime destabilisation as the flipside of energy transitions: lessons from the history of the British coal industry (1913–1997). *Special Section: Past and Prospective Energy Transitions — Insights from History*, 50. 35–49. DOI: [10.1016/j.enpol.2012.04.060](https://doi.org/10.1016/j.enpol.2012.04.060)
- Ulrichsen, K. C. (2016). *Economic Diversification Plans: Challenges and Prospects for Gulf Policymakers*. The Arab Gulf States Institute in Washington, Washington, D.C. <https://agsiw.org/economic-diversification-plans-challenges-and-prospects-for-gulf-policymakers/>
- UN General Assembly (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development*. A/RES/70/1. <https://www.refworld.org/docid/57b6e3e44.html>
- UNCTAD (2017). *The Least Developed Countries Report 2017*. United Nations Conference on Trade and Development. https://unctad.org/en/PublicationsLibrary/ldcr2017_en.pdf
- UNCTAD (2018). *Climate Policies, Economic Diversification and Trade*. United Nations Conference on Trade and Development, Geneva, Switzerland. https://unctad.org/en/PublicationsLibrary/ditcted2018d4_en.pdf
- UNCTAD (2019). *Commodity Dependence, Climate Change and the Paris Agreement*. Commodities and Development Report 2019. UNCTAD. <https://unctad.org/en/pages/PublicationWebFlyer.aspx?publicationid=2499>

References (cont.)

- UNEP (2018). The Belt and Road Initiative International Green Development Coalition (BRIGC). UN Environment Programme regions. <http://www.unenvironment.org/regions/asia-and-pacific/regional-initiatives/belt-and-road-initiative-international-green>
- UNEP (2019). *The Emissions Gap Report 2019*. United Nations Environment Programme, Nairobi, Kenya. <https://wedocs.unep.org/bitstream/handle/20.500.11822/30797/EGR2019.pdf>
- UNEP, OECD and IISD (2019). *Measuring Fossil Fuel Subsidies in the Context of the Sustainable Development Goals*. UN Environment Programme, Nairobi, Kenya. <https://wedocs.unep.org/bitstream/handle/20.500.11822/28111/FossilFuel.pdf>
- UNFCCC (2016). *Just Transition of the Workforce, and the Creation of Decent Work and Quality Jobs. United Nations Framework Convention on Climate Change*, Bonn, Germany. <http://unfccc.int/resource/docs/2016/tp/07.pdf>
- UNFCCC (2018). *Solidarity and Just Transition Silesia Declaration*. United Nations Framework Convention on Climate Change. https://cop24.gov.pl/fileadmin/user_upload/Solidarity_and_Just_Transition_Silesia_Declaration_2_.pdf
- United Nations Secretary-General (2020). Remarks to International Energy Agency Clean Energy Transition Summit. United Nations Secretary-General. <https://www.un.org/sg/en/content/sg/speeches/2020-07-09/remarks-international-energy-agency-clean-energy-transition-summit>
- UNU-INRA (2019). *Africa's Development in the Age of Stranded Assets*. United Nations University - Institute for Natural Resources Africa. https://i.unu.edu/media/inra.unu.edu/publication/5247/Discussion-paper-Africas-Development-in-the-age-of-stranded-Assets_INRAReport2019.pdf
- US EPA (2020). COVID-19 Implications for EPA's Enforcement and Compliance Assurance Program. *US Environmental Protection Agency*, 26 March 2020. <https://www.epa.gov/sites/production/files/2020-03/documents/oecamemooncovid-19implications.pdf>
- Van de Graaf, T. and Bradshaw, M. (2018). Stranded wealth: rethinking the politics of oil in an age of abundance. *International Affairs*, 94(6). 1309–29. DOI: 10.2139/ssrn.3291655
- Verkuijl, C., Jones, N. and Lazarus, M. (2019). *Untapped Ambition: Addressing Fossil Fuel Production through NDCs and LEDS*. Stockholm Environment Institute, Stockholm, Sweden. <https://www.sei.org/publications/addressing-fossil-fuel-production-through-ndcs-and-leds/>
- Vettese, T. (2020). Is this the end of the oil era? *New Statesman*, 23 April 2020. <https://www.newstatesman.com/world/north-america/2020/04/end-oil-era>
- Victor, D. (2009). *The Politics of Fossil Fuel Subsidies. International Institute for Sustainable Development*, Winnipeg, Canada. <https://www.iisd.org/library/politics-fossil-fuel-subsidies>
- Victor, D., Hults, D. and Thurber, M., eds. (2011). *Oil and Governance: State-Owned Enterprises and the World Energy Supply*. Cambridge University Press
- Vivid Economics (2020). Greenness of Stimulus Index. Vivid Economics. <https://www.vivideconomics.com/casestudy/greenness-for-stimulus-index/>
- Ward, R. (2019). Goldman Sachs curbs new lending on coal and Arctic oil. *Bloomberg*, 16 December 2019. <https://www.bloomberg.com/news/articles/2019-12-16/goldman-sachs-strengthens-climate-policy-as-global-talks-falter>
- Wettengel, J. (2020). Spelling out the coal exit — Germany's phase-out plan. *Clean Energy Wire*, 3 July 2020. <https://www.cleanenergywire.org/factsheets/spelling-out-coal-phase-out-germanys-exit-law-draft>
- Wilkes, T. and Carvalho, R. (2020). \$15 trillion and counting: global stimulus so far. *Reuters*, 11 May 2020. <https://uk.reuters.com/article/uk-health-coronavirus-cenbank-graphic-idUKKB-N22N2EP>
- Winkler, H., Keen, S. and Marquard, A. (2020). *Climate Finance to Transform Energy Infrastructure as Part of a Just Transition in South Africa*. University of Cape Town. DOI: 10.25375/uct.12871883.v1
- World Bank (2017). Q&A: The World Bank Group and Upstream Oil and Gas. *The World Bank*, 12 December 2017. <https://www.worldbank.org/en/topic/climatechange/brief/qa-the-world-bank-group-and-upstream-oil-and-gas>
- World Bank (2020). World Development Indicators. DataBank. <https://databank.worldbank.org/source/world-development-indicators>
- Yergin, D. (2020). The Oil Collapse. 4 May. <https://www.foreignaffairs.com/articles/2020-04-02/oil-collapse>
- Zinecker, A., Gass, P., Gerasimchuk, I., Jain, P., Moerenhout, T., Oharenko, Y., Suharsono, A. and Beaton, C. (2018). *Real People, Real Change: Strategies for Just Energy Transitions. International Institute for Sustainable Development*. <https://www.iisd.org/sites/default/files/publications/real-people-change-strategies-just-energy-transitions.pdf>
- Zinecker, A., Sanchez, L., Sharma, S., Beaton, C. and Merrill, L. (2018). *Getting on Target: Accelerating Energy Access through Fossil Fuel Subsidy Reform*. International Institute for Sustainable Development. <https://www.iisd.org/publications/getting-target-accelerating-energy-access-through-fossil-fuel-subsidy-reform>

Appendix A

Government Plans and Projections

Table A.1

Sources for government plans and projections cited in Table 2.1. Last accessed on 1 September 2020.

Country	Source document for updated projection	Publication date	Overlapping future years in prior and updated plans
Australia	Resources and Energy Quarterly from the Office of the Chief Economist (Office of the Chief Economist 2020)	March 2020	2021-2024
Canada	Canada's Energy Future: Energy Supply and Demand Projections to 2040 (National Energy Board 2019)	2019	2021-2040
China	2050 World and China Energy Outlook (Sinopec Economic Technology Research Institute 2019)	2019	2050
Indonesia	Indonesia Energy Outlook 2019 (Secretary General of National Energy Council 2019)	2019	2030, 2040, 2050
Norway	Historical and projected production in Norway, 1970-2024 (Norwegian Petroleum Directorate 2020)	May 2020	2021-2023
Russia	Energy Strategy of the Russian Federation to 2035 (Ministry of Energy of the Russian Federation 2020)	June 2020	2024, 2035
United States	Annual Energy Outlook 2020 (US EIA 2020)	January 2020	2021-2050

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Ministry of Energy of the Russian Federation (2020). *Energy Strategy of the Russian Federation to 2035*. Ministry of Energy of the Russian Federation, Moscow, Russia. <https://minenergo.gov.ru/node/1920>

National Energy Board (2019). *Canada's Energy Future 2019: Energy Supply and Demand Projections to 2040*. National Energy Board, Calgary. <https://www.cer-rec.gc.ca/nrg/ntgrtd/fttr/2019/ccssndxplr/index-eng.html>

Norwegian Petroleum Directorate (2020). *Norwegian Petroleum: Historical and Expected Production in Norway, 1970-2024*. May 2020. <https://www.norskpetsroleum.no/en/production-and-exports/production-forecasts/#production-forecasts>

Office of the Chief Economist (2020). *Resources and Energy Quarterly – March 2020*. Office of the Chief Economist, Department of Industry Innovation and Science. <https://publications.industry.gov.au/publications/resourcesandenergyquarterly-march2020/index.html>

Secretary General of National Energy Council (2019). *Indonesia Energy Outlook 2019*. Center of Assessment for Process and Energy Industry (PPIPE) and Agency for the Assessment and Application of Technology (BPPT), Jakarta, Indonesia. <https://www.esdm.go.id/assets/media/content/content-indonesia-energy-outlook-2019-english-version.pdf>

Sinopec Economic Technology Research Institute (2019). *2050 World and China Energy Outlook* (2019 Edition).

US EIA (2020). *Annual Energy Outlook 2020*. U.S. Energy Information Administration, Washington, DC. <http://www.eia.gov/forecasts/aeo/>

Appendix B

Examples of actions that can support a managed wind-down of fossil fuel production

Action area	Illustrative examples	Source
1. Ensure COVID-19 recovery packages and economic stimulus funds support a sustainable recovery and avoid further carbon lock-in	In Australia, several states are investing in Renewable Energy Zones with the goal of developing jobs and innovation in clean energy. For example, Queensland has invested AUD 145 million (USD 102 million) and New South Wales AUD 31.6 million (USD 22.3 million).	Queensland plan for Renewable Energy Zones: https://www.covid19.qld.gov.au/_data/assets/pdf_file/0025/128194/economic-recovery-plan.pdf New South Wales plan for Renewable Energy Zones: https://www.environment.nsw.gov.au/news/renewable-energy-zone-sparking-investment-boom
	The government of Canada has committed up to CAD 2.47 billion (USD 1.8 billion) towards the clean-up of orphaned and abandoned oil and gas wells and the creation of a fund focused on methane emission reduction.	https://pm.gc.ca/en/news/news-releases/2020/04/17/prime-minister-announces-new-support-protect-canadian-jobs
	In China, the government has pledged CNY 100 billion (USD 15 billion) to national railway development, and has committed to build more battery charging and swapping facilities and promote wider use of "new-energy" automobiles.	http://english.www.gov.cn/premier/news/202005/30/content_WS5ed197f3c6d0b3f0e94990da.html
	France has committed EUR 30 billion (USD 35 billion) for energy efficiency, rail and green technologies and EUR 1.5 billion (USD 1.7 billion) for the development of zero-emission planes in its COVID-19 recovery package. Its EUR 7 billion (USD 8 billion) support package for Air France also includes loans that are conditional upon emission reductions from certain flights and reduction of domestic flights where rail alternatives are available.	Plan for the ecological transition: https://www.economie.gouv.fr/plan-de-relevance/lancement-plan-relevance-3-septembre-2020 Support to the aviation sector: https://minefi.hosting.augure.com/Augure_Minefi/r/Contenu-EnLigne/Download?id=94C9F4D9-0CB4-4D85-9026-7801E5E7F1E7&filename=2196%20DP%20-%20Plan%20de%20soutien%20%C3%A0%20l%27a%C3%A9ronautique.pdf
	The European Council has proposed directing 30% of its EUR 750 billion (USD 883 billion) COVID-19 recovery fund and its EUR 1.074 trillion (USD 1.265 trillion) 2021 – 2027 budget to achieving climate targets. This proposal still requires approval by the European Parliament and specification in terms of areas of spending.	https://www.consilium.europa.eu/media/45109/210720-euco-final-conclusions-en.pdf
	Germany will invest EUR 7 billion (USD 8 billion) to support the country's hydrogen strategy, relying on electricity used in offshore wind farms. The government is also supporting accelerated conversion to more efficient types of aircraft.	Hydrogen strategy: https://www.bmwi.de/Redaktion/DE/Publikationen/Energie/die-nationale-wasserstoffs-2strategie.pdf?__blob=publicationFile&v=12 Policy supporting accelerated conversion to more efficient types of aircraft: https://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Schlaglichter/Konjunkturpaket/2020-06-03-eckpunkt Papier.pdf?__blob=publicationFile&v=9
	The government of the Republic of Korea has committed KRW 608 billion (USD 519 million) to supporting 100 innovative green businesses.	http://me.go.kr/home/web/board/read.do?pagerOffset=10&maxPageItems=10&maxIndexPages=10&searchKey=&searchValue=&menuId=286&orgCd=&boardId=1382295&boardMasterId=1&boardCategoryId=&decorator=
	The UK has committed GBP 2 billion (USD 2.6 billion) for walking and cycling infrastructure and GBP 3 billion (USD 3.8 billion) for building efficiency.	Walking and cycling infrastructure: https://www.gov.uk/government/news/2-billion-package-to-create-new-era-for-cycling-and-walking Building efficiency: https://www.gov.uk/government/news/rishis-plan-for-jobs-will-help-britain-bounce-back

Appendix B (cont.)

Examples of actions that can support a managed wind-down of fossil fuel production

Action area	Illustrative examples	Source
2. Provide local and international support to fossil-fuel-dependent communities and economies for diversification and just, equitable transitions	Canada has established a Task Force on Just Transition for Canadian coal power workers and communities which has issued recommendations for the government. In 2018, the government dedicated CAD 35 million (USD 26 million) over five years to support skills development and economic diversification activities, to help workers and communities adapt to Canada's transition to a low-carbon economy.	https://www.canada.ca/en/environment-climate-change/news/2018/02/just_transition_taskforce.html https://www.canada.ca/en/environment-climate-change/services/climate-change/task-force-just-transition/final-report/section-7.html
	China's 13th Five-Year Plan for the Coal Industry includes just transition support measures such as support for workers, unemployment relief and training and job placement services (2016-2020).	https://policy.asiapacificenergy.org/node/3047
	The government of Chile has begun to develop a Just Transition Strategy, to be elaborated by 2021. Local Action Plans will be set up to assess the needs of coal regions, mitigate the socioeconomic repercussions of coal-fired power plant closures, and maximize the benefits of the transition in affected areas.	https://www.energia.gob.cl/mini-sitio/estrategia-de-transicion-justa-en-energia
	The EU's Just Transition Mechanism offers targeted support to regions most affected by the transition. It includes a Just Transition Platform providing knowledge, technical and advisory support related to the just transition (2021 – 2027).	https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/just-transition-mechanism_en https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/just-transition-mechanism/just-transition-platform_en
	The European Bank for Reconstruction and Development's just transition initiative (2020) aims to support those whose livelihoods are affected by the transition process, and regional economic development.	https://www.ebrd.com/what-we-do/just-transition-initiative
	The German government's coal exit plan recommends compensation for affected coal-fired power generation companies and employees, and a range of measures to diversify and support the economies of affected lignite mining regions (2019).	https://www.bmwi.de/Redaktion/EN/Publikationen/commission-on-growth-structural-change-and-employment.html
	New Zealand's "Just Transitions Unit" (est. 2018) focuses on supporting regions most dependent on the oil and gas industry.	https://www.mbie.govt.nz/business-and-employment/economic-development/just-transition/
	Scotland's Just Transition Commission is examining opportunities of decarbonization for achieving a sustainable and inclusive labour market (2018 – Jan 2021).	https://news.gov.scot/news/leading-the-way-to-a-low-carbon-future https://www.gov.scot/groups/just-transition-commission/
	South Africa has included measures to support a just transition in coal areas in a key electricity planning document (2019). Since 2019, the country has also been designing a financing mechanism, the Just Transition Transaction.	https://zivahub.uct.ac.za/articles/report/Climate_finance_to_transform_energy_infrastructure_as_part_of_a_just_transition_in_South_Africa/12871883 https://dpe.gov.za/roadmap-for-eskom-in-a-reformed-electricity-supply-industry/
Spain's Just Transition plan includes early retirement for miners over the age of 48, retraining for green jobs, and environmental restoration (2019-2027).	https://www.miteco.gob.es/es/prensa/ultimas-noticias/el-gobierno-y-el-sector-de-la-miner%C3%ADa-del-carb%C3%B3n-firman-un-acuerdo-para-la-transici%C3%B3n-justa-y-el-desarrollo-sostenible-de-las-comarcas-mineras/tcm:30-483648	

Appendix B (cont.)

Examples of actions that can support a managed wind-down of fossil fuel production

Action area	Illustrative examples	Source
3. Reduce existing government support for fossil fuels	Canada's export credit agency (Export Development Canada) has ended financing for the new development, construction, or expansion of thermal coal mines or dedicated thermal coal-related infrastructure, and new financing to companies for which thermal coal mining and/or thermal coal power generation account for more than 40% of their revenue (2019 onwards).	https://www.edc.ca/content/dam/edc/en/non-premium/climate_change_policy_board_final_en.pdf https://www.edc.ca/EN/About-Us/News-Room/News-Releases/Pages/climate-change-policy-2019.aspx
	The European Investment Bank's energy lending policy phases out direct and indirect financing of energy projects reliant on fossil fuels by 2021. This includes upstream oil or gas production, coal mining, and infrastructure dedicated to coal, oil, and natural gas.	https://www.eib.org/en/press/all/2019-313-eu-bank-launches-ambitious-new-climate-strategy-and-energy-lending-policy
	The French government's development finance institution (Agence Française de Développement) abstains from financing projects for the exploration or production of coal, or projects exclusively dedicated to transporting coal, gas, or oil (conventional or unconventional) (2019 – 2022).	https://www.afd.fr/en/ressources/energy-transition-strategy-2019-2022
	In 2007, Germany committed to phase out subsidies for the domestic hard coal industry by 2018.	https://www.bundestag.de/resource/blob/505892/0a3577d00633e51547e8b148f2d58e01/wd-5-033-17-pdf-data.pdf
	Ireland's Fossil Fuel Divestment Act 2018 requires the Ireland Strategic Investment Fund (ISIF) to divest from fossil fuel undertakings (2018 onwards).	https://www.reuters.com/article/us-ireland-fossilfuels-divestment-idUSKBN1K22AA https://www.oireachtas.ie/en/bills/bill/2016/103/
	Swedfund (Development Finance Institution of the Swedish government) has adopted a ban on fossil fuel investments (2017 onwards).	https://www.swedfund.se/media/2015/swedfunds-position-paper-on-climate-2017-10-27.pdf https://www.swedfund.se/media/2015/swedfunds-position-paper-on-climate-2017-10-27.pdf
	The UK's CDC Group will not make new investments – either directly or through a fund – in fossil fuel sub-sectors that they have classified as misaligned with the Paris Agreement (2020 onwards). The UK government has ended overseas aid for thermal coal mining and coal power plants (2020 onwards).	https://assets.cdcgroup.com/wp-content/uploads/2020/07/01170324/CDC_Climate_Change_Strategy_spreads.pdf https://www.gov.uk/government/speeches/pm-africa-investment-summit-speech-20-january-2020
The Association of European Development Finance Institutions (EDFI), an association of 15 bilateral European development finance institutions that invest in the private sector in emerging and frontier markets, has committed to immediately ending new coal or fuel oil financing, including coal prospecting, exploration, mining or processing; oil exploration or production; and transport and related infrastructure primarily used for coal for power generation, as well as to ending most forms of standalone fossil gas exploration and/or production (announced 2020).	https://www.edfi.eu/wp/wp-content/uploads/2020/11/1.-EDFI-Statement-on-Climate-and-Energy-Finance-Final.pdf	

Appendix B (cont.)

Examples of actions that can support a managed wind-down of fossil fuel production

Action area	Illustrative examples	Source
4. Introduce restrictions on fossil fuel production activities and infrastructure	Belize has adopted a moratorium on offshore oil exploration and drilling (2018 onwards).	https://www.elaw.org/petroleum-operations-maritime-zone-moratorium-act-2017
	Bulgaria has adopted a ban on shale gas exploration and production, and a conditional ban on the application of hydraulic fracturing methods (2012 onwards).	http://shalegas-bg.eu/download/documents/2012-br7-Reshenie-Zabrana-Hidravlichno-Razbivane.pdf https://www.cms-lawnow.com/ealerts/2012/06/bulgaria-eases-ban-on-fracking?cc_lang=en
	Canada has adopted a moratorium on offshore oil and gas activities in Arctic waters (building off a moratorium on issuing new oil and gas licenses announced in 2016, and to be reviewed every five years) (2019 – 2021). It has also banned oil and gas activities in designated marine protected areas (2019 onwards).	https://orders-in-council.canada.ca/attachment.php?attach=38451&lang=en https://www.dfo-mpo.gc.ca/oceans/mpa-zpm/standards-normes-eng.html
	Costa Rica has adopted a moratorium on oil exploration and exploitation (2011 – 2050).	https://presidencia.go.cr/comunicados/2019/02/presidente-alvarado-extiende-moratoria-petrolera-hasta-el-ano-2050/
	Denmark has banned exploration and drilling for oil, gas, and shale gas on land and in inland waters (2018 onwards).	https://www.ecologique-solidaire.gouv.fr/projhttps://presse.ens.dk/news/regeringen-lukker-for-efterforskning-og-boring-efter-olie-og-gas-paa-land-i-danmark-295546
	France no longer issues new or renews exploration permits for conventional and unconventional fossil fuels and will phase out all oil and gas production within the country and its overseas territories by 2040 (2017 onwards).	https://www.ecologique-solidaire.gouv.fr/projet-loi-hydrocarbures-est-adopte-parlement
	Ireland prohibits exploration for and extraction of onshore petroleum by hydraulic fracturing (2017 onwards) and has announced an end to new oil exploration (2019 onwards).	https://www.oireachtas.ie/en/bills/bill/2016/37/ https://www.dccae.gov.ie/en-ie/natural-resources/publications/Documents/62/Policy%20Statement%20Petroleum%20Exploration%20and%20Production%20Activities.pdf
	Mexico prohibits hydrocarbon exploration and extraction activities in Safeguard Zones (biodiverse areas) (2014 onwards).	https://www.cms-lawnow.com/ealerts/2016/12/mexico-publishes-environmental-safeguard-zones https://www.gob.mx/sener/documentos/zonas-de-salvaguarda
	The Netherlands has banned shale gas exploration (2013 onwards) and is expected to complete the phasing out of gas extraction in the province of Groningen by 2022 “under normal circumstances” (announced in 2019).	https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/rapporten/2018/06/11/structuurvisie-ondergrond/structuurvisie-ondergrond.pdf https://www.government.nl/latest/news/2015/07/10/no-extraction-of-shale-gas-during-the-next-five-years https://www.rijksoverheid.nl/actueel/nieuws/2020/09/21/gaskraan-groningen-verder-dicht
New Zealand has banned new offshore oil and gas exploration permits (2018 onwards).	https://www.parliament.nz/en/pb/bills-and-laws/bills-proposed-laws/document/BILL_80358/crown-minerals-petroleum-amendment-bill	

Appendix B (cont.)

Examples of actions that can support a managed wind-down of fossil fuel production

Action area	Illustrative examples	Source
4. Introduce restrictions on fossil fuel production activities and infrastructure (cont.)	Norway has closed certain offshore areas for drilling including the Lofoten archipelago, other coastal and sensitive areas, and in the Arctic (2005 onwards, renewed political commitment for each new government period).	https://www.regjeringen.no/no/dokumenter/stmeld-nr-8-2005-2006-/id199809/
	The US has imposed a moratorium on oil and gas exploration in Arctic and Atlantic areas (2015 onwards).	https://obamawhitehouse.archives.gov/the-press-office/2015/01/27/presidential-memorandum-withdrawal-certain-areas-united-states-outer-con
	Uruguay has issued a four-year moratorium on hydraulic fracturing (2018 – 2021).	https://www.impo.com.uy/bases/leyes/19585-2017
5. Enhance transparency of current and future fossil fuel production	Numerous national governments, central banks, regulators as well as hundreds of companies and financial firms support the Task Force on Climate-Related Financial Disclosure guidelines for identifying and reporting on how company plans and operations align with Paris Agreement goals.	https://www.fsb-tcfd.org/wp-content/uploads/2020/02/PR-TCFD-1000-Supporters_FINAL.pdf
6. Mobilize and support a coordinated global response	The African Development Bank will not finance oil and gas exploration (2012 policy).	https://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Energy_Sector_Policy_of_the_AfDB_Group.pdf
	The Asian Development Bank will not finance oil and gas exploration. It will not fund oil field development projects, but will consider supporting the development of “marginal and already proven” fields if considered economically sound. It will not directly finance coal mine development “except for captive use by power plant” (2009 policy).	https://www.adb.org/sites/default/files/institutional-document/32032/energy-policy-2009.pdf
	The European Bank for Reconstruction and Development will not finance thermal coal mining or coal-fired electricity generation capacity, any upstream oil exploration, or upstream oil development projects except in “rare and exceptional” circumstances, where the projects reduce GHG emissions or flaring (2018 policy; covers the period 2019 – 2023).	https://www.ebrd.com/news/2018/ebd-puts-decarbonisation-at-centre-of-new-energy-sector-strategy.html
	Per above, the European Investment Bank is ending virtually all financing for fossil fuel energy projects from end of 2021 onwards (2019 policy).	https://www.eib.org/en/press/all/2019-313-eu-bank-launches-ambitious-new-climate-strategy-and-energy-lending-policy
	The World Bank Group will only finance coal mining in “rare circumstances” (2013 policy). In addition, the Group will not provide direct financing for upstream (exploration and production of) oil and gas after 2019 (in exceptional circumstances, consideration will be given to financing upstream gas in the poorest countries) (2017 policy).	http://documents.worldbank.org/curated/en/745601468160524040/pdf/795970SST-0SecM00box377380B00PUBLIC0.pdf https://www.worldbank.org/en/news/press-release/2017/12/12/world-bank-group-announcements-at-one-planet-summit

Based on data (including currency conversion rates) and online sources as of mid-September 2020 with additional measures added after the November 2020 Finance in Common Summit.

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