BRIEFING PAPER

Powering past oil and gas

Energy choices for just and sustainable development

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Catholic Agency for Overseas Development

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Acknowledgements

Authors: Jo Khinmaung-Moore (Tearfund), Kat Kramer (Christian Aid), Sue Willsher (Tearfund) and Sarah Wykes (CAFOD).

Based on research by Andrew Scott and Sam Pickard, the Overseas Development Institute (ODI)

Copy-editor: Seren Boyd

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Summary

- Climate change is already pushing poor and marginalised communities further into poverty, and continued production and consumption of oil and gas will intensify these impacts, putting the Sustainable Development Goals at risk.
- If the growing demand for electricity in middle- and low-income countries is met using polluting energy sources, it will not be possible to limit the rise in global temperature to 1.5°C and meet the Paris Climate Agreement.
- To achieve universal access to electricity at a household level, over two-thirds of investment should be in decentralised renewable energy solutions as the 'least-cost' options.
- For access to clean cooking, fossil fuel solutions such as liquid petroleum gas (LPG) and natural gas can be important options over the next decade in some contexts, along with improved cookstoves, but the transition to cooking with clean electricity and renewables has begun in many parts of the world and requires greater investment.
- For large-scale power generation, renewables are now the cheapest source for two-thirds of the global population, due to the significant cost reductions in large-scale wind- and solar PV-power generation over the last decade.
- Oil and gas production does not necessarily lead to sustainable economic and social development in producer countries and in some cases strongly undermines it.
- New gas infrastructure is in most cases more expensive than providing power generation using renewable energy. Grid reliability can be provided by interconnection with other grids or dispatchable renewable power such as hydro or geothermal combined with energy storage solutions.
- Employment in the renewable energy sector is increasing, providing job creation which will be important for Covid-19 recovery. Worldwide, 42 million people could be employed in the sector by 2050.

Recommendations for donor governments and public finance institutions

- Put an immediate moratorium on all new fossil fuel investments (Overseas Development Aid (ODA) and non-ODA).
- Review and phase out all existing fossil fuel investments by 2021. Where there is a proven case for ODA energy support for poverty reduction, carry out an independent and transparent risk assessment and identify alternative renewable energy investments.
- Scale up significantly support for renewable energy, energy efficiency and energy access for the poorest communities, particularly for decentralised renewable energy and clean cooking as the least-cost solutions.
- Ensure any energy support as part of Covid-19 economic recovery packages is consistent with a 1.5°C pathway and promotes a just clean energy transition.

Introduction

The production and consumption of oil and gas are the source of more than 40% of global anthropogenic greenhouse gas emissions.[1] The amount of greenhouse gases being added to the atmosphere needs to be at least halved by 2030 and be near zero by 2050, if the world is to have even a reasonable chance of keeping average global temperature rise to 1.5°C and averting catastrophic climate change.[2] To have a *high* chance of reducing greenhouse gas emissions to near zero by 2050, the production and consumption of oil and gas need to be phased out urgently.

Transformation of the world's energy systems at the speed and scale necessary to address the climate emergency will have economic and social implications. Many of these are positive, for instance: reducing negative social and environmental impacts of fossil fuel use, such as air and water pollution; lowering economic and governance risks in producer countries; and protecting citizens from fluctuating fuel prices.

However, concrete impacts will depend on the policies, actions and governance of governments, private and public finance sectors, and business, both globally and in specific countries. Economic development in some regions calls for an increase in energy consumption. To manage the necessary structural changes within a transition from oil and gas to renewable energy requires planning and support for communities, businesses and workers affected.

Failure to manage a phase-out of oil and gas would significantly undermine progress to achieving the Sustainable Development Goals (SDGs). Conversely, limiting global heating to 1.5°C rather than 2°C reduces by:

- 90 million the number of people exposed and vulnerable to water stress
- more than 300 million the number of people exposed to lower crop yields
- about 2 billion the number of people exposed to heat waves
- 62–863 million the number of people exposed to poverty because of multi-sector climate risks.[3]

As the world begins to address the climate emergency and undertakes a transition to renewable energy, the strategies and plans of developing countries will need to carefully consider and manage the risks and opportunities of this transition, including who will benefit and which communities will need support to transition into new jobs. This includes considering the future role of oil and gas in specific country energy transitions, and the social, environmental and climate implications of their use.

The purpose of this briefing paper is to examine the evidence on the relationship between oil, gas and poverty, as well as the key considerations around energy pathways to transition to low-carbon development. It focuses on poverty eradication, economic development and job creation, access to modern energy (SDGs 1, 8 and 7), and the environmental (SDGs 13, 14, and 15) and social impacts (SDGs 3, 5, 6, 12 and 16) of oil and gas exploitation.

Increasing access to modern energy

Sustainable development depends on access to energy.[4] At its simplest, this means people having sufficient reliable, affordable energy services in their homes and communities, without suffering from the health and other negative impacts that polluting energy sources create. Energy poverty can act as a multiplier of other forms of deprivation, undermining poverty reduction and humanitarian assistance. Access to affordable, reliable, sustainable and modern energy (SDG 7) can be a positive enabler of every other SDG.[5]

Historically, fossil fuels were the only means for people living in poverty to access modern energy services. Although alternatives have been available for decades, many people living in poverty continue to use oil and gas for cooking and heating, for electricity generation and for transport. To achieve universal energy access while limiting the average global temperature rise to 1.5°C, people living in poverty need greater access to sustainable energy sources.

Cooking

2.8 billion people still rely on traditional cooking fuels and technologies

The number of people without access to clean cooking fuels and technologies[6] has barely changed in the last two decades. In 2018, 63% of the global population had access to clean cooking fuels and technologies while 2.8 billion people still did not. Even if all current policies are implemented, 2.3 billion people will still lack clean cooking by 2030.[7] Indoor air pollution from cooking with solid fuels over open fires has significant health impacts, especially on women and

A high school student from Jericho, South Africa, using a solar cooker. Photo: Shayne Robinson / Greenpeace

young children, while collecting fuelwood is a form of drudgery which, again, mostly impacts women and girls.

Natural gas and liquid petroleum gas (LPG) are widely used as a versatile household cooking fuel that can quickly deliver a range of temperatures. Alongside improved cookstoves, LPG in particular can continue to be an important modern energy option for cooking in some developing countries over the next decade, depending on the context (such as preferred local cooking methods). The transition from cooking with fossil fuels to cooking with clean electricity and renewables has begun in many parts of the world. In Ecuador, for example, the government is already working to transition households from LPG to renewable-powered cookstoves.[8] Meanwhile, sustainable biogas could be used to enable 200 million people globally to gain access to clean cooking by 2040.[9]

Although the use of LPG for cooking emits greenhouse gases, the magnitude of these emissions is minor compared to those from other sectors. The International Energy Agency[10] found that universal access to clean cooking would increase emissions by 0.2%, but that this would be entirely offset by avoided emissions from the burning of biomass on open fires.

Electricity

In 2018, 90% of the world's population lived in a household with an electricity connection, but 789 million people did not. For many, the reliability and affordability of electricity are challenging. It is not simply a matter of affording an electricity connection but also of paying for consumption. On current trends, 620 million people will remain without access to electricity in 2030, most of them in sub-Saharan Africa.[11]

Most people without electricity currently live in rural areas, remote from centralised grids, where the cheapest way to provide access is usually via off-grid or distributed renewables. The benefits that access to electricity gives people living in – and escaping from – poverty derive from the services the electricity provides, not the fuel used to produce it. Natural gas and oil are used to produce electricity distributed through centralised grids in many countries, but renewables are now the cheapest and most common

Kamla is the first female solar engineer in Rajasthan, India, and runs a rural field station fabricating solar home lighting systems and solar lanterns. Photo: © Robert Wallis/Panos

way to add new power to national networks. Some oil products fuel small generators that power mini-grids and act as a backup for wealthier consumers and businesses, but they are twice as expensive as grid-based electricity and more expensive than off-grid renewables. [12]

Transport

Oil and gas power nearly all of the world's transport sector. People living in poverty are unlikely to have their own motorised transport, but may use public or non-motorised transport options.[13] These transport options can be promoted by good urban design, through policies that incentivise public transport use and by providing services more locally. The electrification of motorised transport, using renewable energy, could provide equivalent transport services without the need for oil and gas. Within the next 10–20 years, sales of electric vehicles will overtake those for vehicles powered by fossil fuels.[14] By 2040, shared and electric vehicles are forecast to displace the consumption of 18 million barrels of oil per day.[15]

The impact of fuel consumption on economic growth and poverty eradication

Most middle-income countries produce some oil or gas, though in many cases the quantities produced are very small. Overall, middle-income countries produced just over half the world's oil and gas in 2017, while low-income countries produced less than 1%.[16]

Oil and gas have helped make some countries rich, but in most producer countries, there is little evidence that all the wealth generated has benefited their citizens. The use of revenues for sustainable development and poverty reduction is dependent on the strength and transparency of governing institutions. Where high oil and gas rents are associated with corruption, they lead to higher income inequality.[17] The availability and lower cost of renewable energies, and increase in climate policies, make the development of economies dependent on oil and gas in the medium and longer term unlikely. Oil and gas can impact economic development in both positive and negative ways, directly or indirectly. Here we focus on the macroeconomic impacts of the production and consumption of oil and gas, employment in the oil and gas industry, their contribution to government revenue and distributional impacts.

Production

The impact of oil and gas production and economic growth in low- and middle-income countries is affected by governance conditions and the effectiveness of institutions. The so-called 'resource curse' is not inevitable, but the economies of countries rich in oil and gas resources have generally performed less well than those of resource-poor countries.[18] Relatively poor economic development may arise because wealth remains concentrated in the hands of social elites or because oil- and gas-producing countries have not been able, or have not chosen, to take advantage of their resource wealth and invest in increasing productivity in other sectors or in establishing strong sovereign wealth funds.

In countries that produce oil and gas, investment and extraction may directly increase national revenues, but they can also have indirect negative impacts that hamper wider economic development. For example, public investment as a proportion of GDP is often lower in resource-rich low-income countries than in other low-income countries.[19] In addition, oil and

gas development can lock countries into polluting energy systems and/or harm the development of other industries. Previous economic development pathways that relied on oil and gas paid little attention to their associated negative environmental and social impacts. These are increasingly coming into focus, at international, regional and national levels, including through transparency and disclosure regulation of oil and gas companies.

Consumption

The effect of oil and gas consumption on economic growth varies according to the type of economy, its main economic activities and how these use different energy sources. Where energy consumption powers activities that generate economic output, the consumption of energy is linked to GDP. This direct link is strongest in the industrial sector, where productivity (output per unit of input) tends to be higher than in other sectors.

Industrialisation is powered by energy sources which generate electricity, produce heat and make things move. Oil and gas, along with coal, were used by countries which industrialised in the past, but we now have alternative renewable energy sources. These alternatives, and progress in the transition to renewable energy, vary between power generation, motive power and heating. For two-thirds of the people in the world, the cheapest way to produce electricity is now with renewables.[20] In many countries, stationary motors are now mainly electric. For industrial heating, a wide range of renewable options is available to provide low-temperature heat, including solar thermal, geothermal, and electric heat pumps.[21] These are often the most cost-effective option because they have almost no running costs. High-temperature heat for industrial processes can be provided by renewable energy technologies such as concentrated solar, deep geothermal, burning sustainable biomass and renewable electricity. Renewables are therefore capable of replacing oil and gas in most industrial heating processes.

Government revenue

The potential fiscal revenue from oil and gas resources is one of the main reasons governments encourage and license their exploration. If production takes place, often several years after the discovery of viable reserves, revenues can be significant and potentially transformative. However, governments in producing countries have two main challenges to realising these revenues:

- ensuring a consistent, fair and predictable flow of revenue through the contracting process with international oil and gas corporations
- ensuring the effective deployment of revenues. [22]

Volatility in revenue can come from variations in production or, more likely, fluctuations in oil prices. The latter are a particular challenge for governments dependent on oil and gas for a large proportion of their total revenue and the future is not looking promising with the impact of Covid-19 and prices hitting 30-year lows.[23] This problem is further compounded as many oil- and gas-producing countries subsidise their oil and gas consumption to the tune of $250 billion globally.[24] For importing countries, this decreases fiscal resources that could otherwise be used for development. For net exporters of oil and gas, the desire to keep domestic prices below those of the international markets represents foregone revenue that could, indirectly, have been used for other development priorities.

Governments can choose to spend revenues from oil and gas production or save them for the future. In countries where capital is scarce (eg low- and lower-middle-income countries) and oil and gas revenue will be short-lived, governments should strike a balance between saving and spending to develop other sectors.

Investment of oil and gas revenues can also be wasteful due to poor governance, including corruption, or limited capacity in the public sector.[25] For example, in Nigeria, the Democratic Republic of Congo, Republic of Congo and Angola, oil and gas mining assets worth $4 billion were transferred to companies with obscure ownership, diverting vast resource revenues to unidentified private pockets. These deals deprive states of revenue that could be spent on education, health care and basic services.[26] Revenues retained by national oil companies are subject to less scrutiny than government expenditure (eg by parliamentarians) with less transparency about how they are managed. In 2016, 79% of national oil companies' oil sales were in countries with low scores in the 2017 Resource Governance Index (RGI) and countries with a large oil sales revenue relative to overall government revenue tend to have a low RGI score (eg Algeria, Angola and Nigeria).[27]

Employment

Globally, about 6 million people are directly employed in the petroleum sector.[28] Indirect employment in the sector's supply chains is estimated to be more than 60 million. More than three-quarters of those employed in the oil and gas sector are male, suggesting the industry has a poor record on promoting gender equality.

Compared with other sectors, such as agriculture, industry and commercial services, oil and gas production does not create many direct jobs. Most of the jobs are short term and occur during the development stage when the construction and installation of drilling rigs take place. The production stage entails a relatively small number of skilled jobs, but for a longer duration. In Ghana, for instance, 81% of the 6,900 jobs in upstream oil and gas in 2015 were held by citizens and 19% by expatriates, but there was a much higher proportion of expatriates in highly skilled and therefore better paid jobs.[29]

Investments in clean energy create three-and-a-half times the number of jobs as the same-size investment in fossil fuels

The renewable energy sector could employ 42 million people by 2050 and the off-grid solar sector alone is projected to create up to 1.3 million jobs by 2022

IRENA estimates that 8.2 million fossil fuel jobs would be lost by a transition to renewable energy by 2050. However, these would be outweighed by the increase in employment in the renewable energy sector, which employed more than 11 million people worldwide in 2018, and could reach 42 million by 2050.[30] The off-grid solar sector alone is projected to create up to 1.3 million jobs by 2022.[31] Dollar for dollar, investment in renewables creates three-and-a-half times more jobs than investment in fossil fuels.[32]

As jobs in fossil fuels reduce, the creation of renewable energy and wider job opportunities must be managed in a socially just way, for instance through retraining, to mitigate the impact on workers and their families.

Inequality

The effect of oil and gas production on income inequality is determined by governance: where high oil and gas rents are associated with corruption, they lead to higher income inequality.[33] Some evidence suggests that income inequality falls in the short term, as factors of production are redeployed to the oil and gas sector. However, inequality increases over time as oil and gas revenues increase.

Natural gas as a bridge or transition fuel to low-/zero-carbon electricity

It is often argued that investment in natural gas infrastructure is still needed so that it can be used to 'transition' to low- or zero-carbon energy systems. This argument is based on two assumptions. First, natural gas will reduce greenhouse gas emissions if it displaces coal use in power generation. Second, the ability to turn up or turn down power generators that run on fossil fuels means they are necessary to provide a reliable supply of electricity.

Natural gas is not a bridge fuel for electricity generation in low-income countries for several reasons:

- Few low-income countries use coal for power generation. This means there is limited opportunity to displace emissions from coal; instead, gas-fired generation creates additional emissions.
- Natural gas is not 'low carbon' as emissions are created throughout the production, transportation and combustion of natural gas.
- In most places, building new gas infrastructure will be more expensive than providing power through renewable energy.
- Grid reliability can be provided by dispatchable renewable power such as hydro or geothermal[34] that can be turned up or turned down, interconnection with neighbouring grids, energy storage and demand management.

Market forces alone would limit the growth in gas power generated to just 0.6% per year to 2050, but an even greater reduction is needed to keep below 1.5°C.[35] The ambition for net-zero energy systems by 2050 requires the complete elimination of these emissions or their secure capture and storage (CCS) by 2050.

Carbon capture and storage

CCS has several disadvantages, apart from being unproven in a gas-fired power plant. First, it is energy-intensive, requiring 25% to 50% more energy for the same electricity output. Second, there would be a risk of leakage from carbon storage facilities; and, third, it would not capture upstream methane emissions, which would be higher per kilowatt hour generated as a result of CCS's energy intensity. For CCS to be 'effective', it would require the development of an industry of a similar size to the fossil fuel industry creating the emissions, and would also increase the cost of gas-fired electricity generation without addressing all the negative socio-environmental impacts of gas extraction.

The political determination to achieve this is huge and requires no further delay, but 'the longer the governments wait, the … [greater will be the] technical and economic challenges that will be encountered in the energy system transformation'.[36] Much of the electricity supply network is still to be built in low-income countries, so there is the opportunity to build a modern system that leapfrogs fossil fuels and systems set up in industrialised countries. The fast adoption of mobile phones and mobile internet access offers a useful point of comparison.

The impacts of oil and gas on climate change and the environment

Climate change

Collectively, emissions from the production of oil and gas totalled 5.2 billion tonnes of CO_2 equivalent (Mt CO_2e) in 2017.[37] This equates to about 15% of total energy-sector emissions from combustion. More than half of the emissions during oil and gas production (57%) are from deliberate venting and flaring, and preventable fugitive emissions.[38]

Total emissions from the combustion of oil and gas were about 18 billion tonnes CO_2e in 2017 (11.4 billion tonnes from oil and 6.7 billion tonnes from gas), amounting to about one third of all global greenhouse gas emissions.[39] Resulting climate change impacts will deepen existing poverty and exacerbate inequalities, especially for those people already disadvantaged or vulnerable due to their gender, age, race, class, caste, indigeneity and (dis)ability.[40]

Water

The production and use of oil and gas are inextricably linked to water resources and water scarcity. The extraction and processing of oil and gas consume large volumes of water, and produce wastewater contaminated with toxic chemicals and heavy metals, which can accidentally pollute water supplies. For example, oil spills caused by deliberate and accidental damage to pipelines, as well as poor maintenance, are a significant cause of ground and surface water pollution in Nigeria. Measurements from one well off the coast of Brazil found discharges of 320 m^3 of wastewater and 70 m^3 of other liquid waste.[41] These effects have an impact on safe water supplies, human health, species and ecosystems.

Land

Oil and gas drilling operations, processing facilities and transport (roads and pipelines) disturb and take up considerable land areas. Waste and spills containing hydrocarbons, heavy metals, radioactive material, salts and toxic chemicals have the potential to damage soils and vegetation, and ultimately food production for all species.

Biodiversity

Directly and indirectly, the production and consumption of oil and gas, as well as unplanned disasters such as oil spills and well blow-outs, contribute to the deterioration in biodiversity and ecosystem services.[42] Identified impacts include wildlife mortality, habitat destruction and localised air, water, light and noise pollution.[43] Some oil and gas reserves lie under some of the most biodiverse lands in the world, including Virunga National Park in the Democratic Republic of Congo and Yasuni National Park in Ecuador.

Social welfare and human rights

Health

12,000 premature deaths globally every day result from air pollution from fossil fuels, at a cost to the global economy of $8 billion a day

Human health is affected by oil and gas in three main ways:

- directly and indirectly by pollution from the extraction and processing of oil and gas
- directly by the localised air pollution caused by the combustion of oil and gas
- indirectly via the climate impacts of the increased greenhouse gas emissions from oil and gas.

Exposure to particulate emissions, nitrous oxide and other pollutants from the burning of oil and gas is linked to increased incidence of disease, including ischaemic heart disease, chronic obstructive pulmonary disease, lung cancer, lower respiratory infections, premature births, type 2 diabetes, strokes and asthma. Air pollution from fossil fuel combustion causes an estimated 12,000 premature deaths worldwide every day and costs 3.3% of global GDP.[44]

Climate change is also projected to increase illnesses that disproportionately affect the poor. Unchecked oil and gas combustion could lead to a rise of 3°C or more in global temperatures, increasing the number of people exposed to malaria by 150 million, aggravating water scarcity and inhibiting progress on hygiene and sanitation.[45] Outbreaks of schistosomiasis and cholera could become more frequent and the burden of diarrhoea could increase by 10%, with children being the most vulnerable.[46] Healthcare expenses alone already push more than 100 million people into poverty each year.[47] This number is likely to escalate with climate change.

Human rights

'States and corporations that persist in exploiting fossil fuels produce a major gap in international solidarity as their behaviour does not reflect the highest possible ambition, nor cooperation, and it compromises the human rights of peoples around the world.'[48]

Now that a solar-powered pump has been installed in his village, 14-year-old Fabiano can get water safely and easily and have time and energy for school. Photo: CAFOD

Oil and gas production has been linked to human rights violations for many years, mostly against vulnerable populations in lower-income countries. There is also growing awareness that the impact of oil and gas consumption on climate change indirectly violates people's rights.

The 2019 Corporate Human Rights Benchmark[49] report includes scores for 56 companies in the extractives sector. On average, these companies scored 3.2 out of 10 for policy commitment and governance, and 6 out of 25 for due diligence and embedding human rights in company culture and practices.

Violations of human rights can occur from the operations and actions of oil and gas companies throughout the value chain, the operations of suppliers and contractors, and the consumption of oil and gas. Pollution from oil spills affects the right to an adequate standard of living and, by shortening people's lifespan, it affects their fundamental right to life. In Nigeria, pollution from oil production in the Niger Delta has contaminated drinking water for up to 1 million people with potentially carcinogenic pollutants.[50] In Myanmar, human rights abuses committed during the construction of oil pipelines forced the US company Unacol to settle a claim with 15 villagers who had been abducted.[51]

Rights abuse can also occur when land acquisition is not properly negotiated, and compensation is insufficient. Inadequate consultation with communities affected by the operations of oil and gas companies, or planned operations, infringes the right of participation in decision-making. In Argentina, oil companies and local authorities have ignored an expert committee's ruling that the land being drilled in Vaca Muerta belonged to the indigenous Mapuche communities.[52]

As major sources of greenhouse gas emissions, the extraction and use of oil and gas affect the enjoyment of human rights indirectly through the impacts of climate change.[53] The negative impacts of climate change can be a threat-multiplier, jeopardising rights indirectly through, for example, increases in food prices, social disruption and political instability.

Conclusions

Oil and gas need to be phased out rapidly in all regions of the world if we are to have a high chance of achieving global climate change goals and to avoid the worst impacts of climate change, which particularly impact poor and marginalised communities. If climate change is not addressed, the SDGs will not be achieved and poverty will deepen. Oil and gas production also contribute to increasing inequality in many places, exacerbating existing social problems.

Distributed renewable energies are the least-cost solution for most people who are currently without electricity, and renewables already provide cheaper power generation for most people in the world. Electricity powers most industrial motors, and electricity and other renewables can be used for industrial heating and transport. Combined with the right planning, enabling policies and investments, renewable energies offer countries a huge opportunity for leapfrogging over, or transitioning away from, polluting fossil fuels. They also offer significant social and environmental co-benefits, including job creation far outweighing that of the oil and gas industry.

The phase-out of oil and gas needs to be managed to minimise disruption and potential negative effects for workers currently employed in the fossil fuel sector and their families. A just energy transition, where benefits are fairly distributed and reach poor and marginalised communities, is critical. Industrialised countries, where per capita energy consumption is highest, have greater capacity and historic responsibility to lead the way in phasing out production and consumption of oil and gas, and to support developing countries in their own just transitions.

Donor governments and public finance institutions have a key role to play in supporting energy pathways consistent with keeping below the 1.5°C limit and delivering a just, clean energy transition, by phasing out fossil fuels and scaling up investments in renewable and efficient energy systems and energy access. Any energy support included in Covid-19 recovery packages must be aligned with this goal.

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Street vendor selling solar panels in Uganda. Photo: Andrew Philip/Tearfund

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