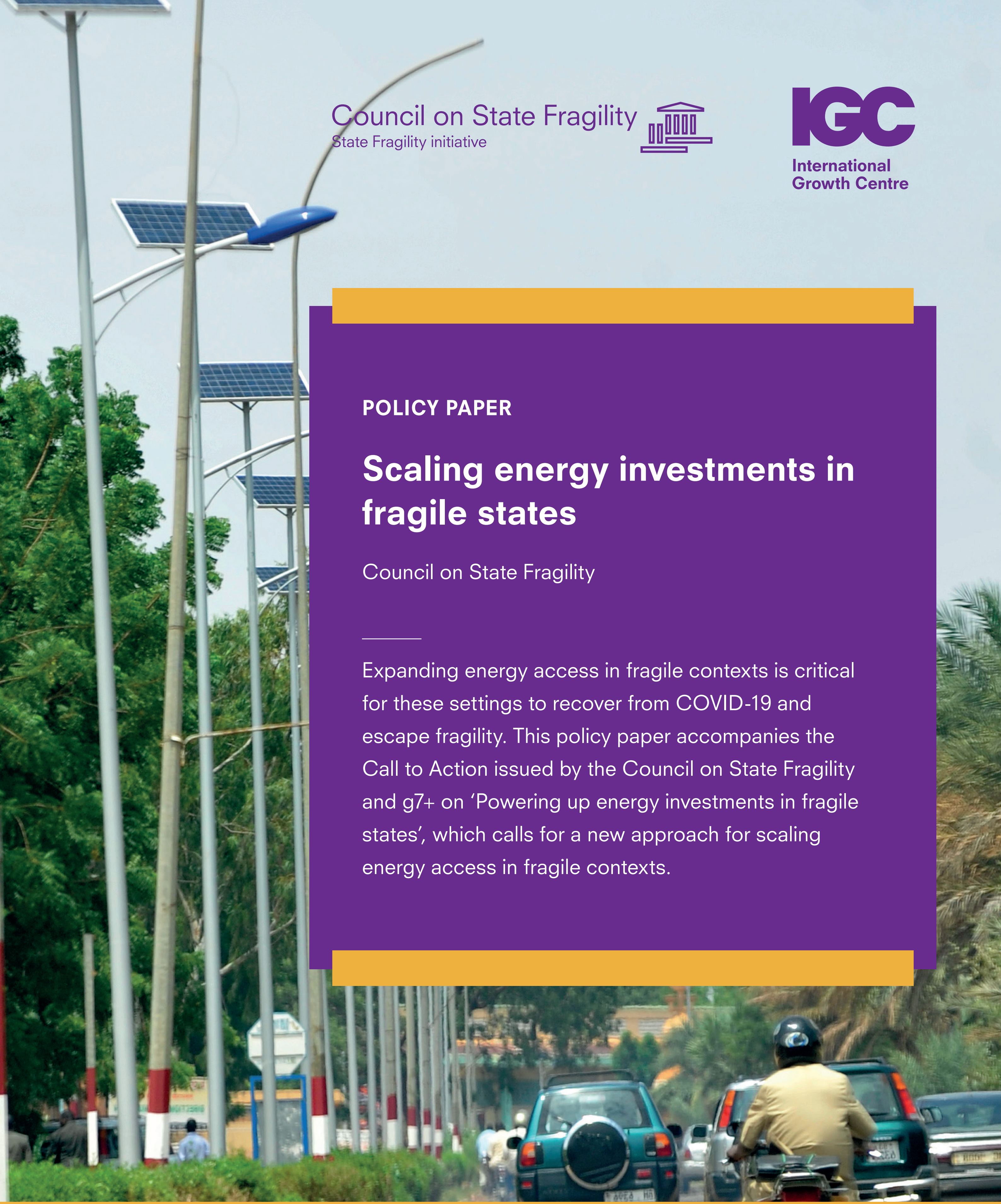

Council on State Fragility
State Fragility initiative

IGC
International Growth Centre

POLICY PAPER

# Scaling energy investments in fragile states

Council on State Fragility

Expanding energy access in fragile contexts is critical for these settings to recover from COVID-19 and escape fragility. This policy paper accompanies the Call to Action issued by the Council on State Fragility and g7+ on 'Powering up energy investments in fragile states', which calls for a new approach for scaling energy access in fragile contexts.

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# Scaling energy investments in fragile contexts

## Executive summary

**Over 800 million people worldwide have no access to electricity. A staggering 86% of them live in countries classified as fragile by the OECD, settings characterised by conflict, lack of security, weak government capacity, and divided societies. Increasingly, climate change and environmental destruction are also driving fragility across the world.**

Poor energy access in fragile contexts impedes development, traps people in extreme poverty, and creates structural conditions for the persistence of conflict and social, political, and economic instability. Fragility affects not only those living in these countries – it drives the global challenges of mass migration, terrorism, and trafficking that impact us all.

As we aspire to build back more resiliently and inclusively post COVID-19, we cannot neglect those living in the world's most challenging places. Investing in energy access in these contexts is critical to power the economic opportunities needed to support recovery, lift people out of poverty, and enable these countries to escape fragility.

Although overseas development assistance (ODA) spending in developing countries on energy has been increasing over time, it has persistently favoured and become increasingly skewed towards non-fragile settings. In 2018, spending on energy in non-fragile settings was nearly double that in fragile settings and almost four times higher than in extremely fragile locations. This is reflective, in part, of the higher uncertainty and risks associated with investing in fragile settings.

However, if we are to succeed in global efforts to achieve universal energy access and reduce poverty and inequality, we need to overcome the challenges of energy investments in fragile contexts. A new approach is needed: one that brings together a range of stakeholders to scale up investments in energy solutions that work in fragile contexts.

Fragile contexts need energy solutions that are resilient in the face of conflict and uncertainty, and are also affordable and environmentally sustainable. Distributed or off-grid systems hold much potential as they are modular and disperse risk, making them less vulnerable to the single point of failure risks associated with large-scale centralised projects.

Distributed generation systems also lend themselves to use of renewable energy sources. Cost reductions in renewable energy technologies mean that they are

now the most affordable off-grid energy option in most instances. Whereas previously fragile contexts could not afford to go green, now they cannot afford not to. Importantly, for the first time, we also have a convergence in what is good for the climate, what is needed to unlock economic growth in fragile states, and what is technologically feasible.

We have the technology needed to achieve universal energy access; now, we need to unlock financing mechanisms to make this a reality. New commitments from and partnerships between a range of stakeholders are needed; national governments, donors, development finance institutions, and the private sector all have key contributions to make. Financing facilities from multilateral, bilateral, and philanthropic donors and innovative financing instruments should be scaled up to crowd in greater private investment. Additionally, the governments of fragile states have an important enabling role, including in creating environments more conducive to investment in their countries.

Never has expanding energy access in fragile contexts been more urgent – and never has it been more attainable. A concerted effort from all partners is needed to realise this goal.

Yemeni vendors use lanterns to light their stalls at a market in the capital Sana'a on April 18, 2015 on the sixth day of a power outage across the country. Photo: Mohammed Huwais/ AFP via Getty Images

# 1 Introduction

The COVID-19 pandemic has deeply exacerbated vulnerabilities in the world's most fragile settings. In the context of a global opportunity to build back better post-COVID-19 through shifting to a more resilient and sustainable growth path, the International Growth Centre's Council on State Fragility and the g7+ group of fragile and conflict-affected states have come together to bring greater attention to the needs of fragile contexts at this critical time. We know that what works for countries in general often does not work for fragile contexts, necessitating specific approaches for these settings that need to be factored into global initiatives. Amid a growing focus on scaling energy access as a key component of resilient recovery efforts, we outline here the particular challenges and opportunities of fragile settings, and propose an approach to expanding energy access that works in these contexts.

Energy has been a key enabler of social and economic development throughout history and constitutes a basic requirement of nearly all productive economic activity. The world has made great progress towards achieving universal energy access and UN Sustainable Development Goal 7 (SDG 7). Between 2010 and 2018, the share of the world population with access to electricity rose from 83% to 90%, representing over 400 million new connections.[1] These gains have resulted from sustained commitments and fruitful cooperation among a diversity of stakeholders.

**86%**

**In 2018, of the over 800 million people in the world without access to electricity, 86% lived in countries characterised by the OECD as fragile**

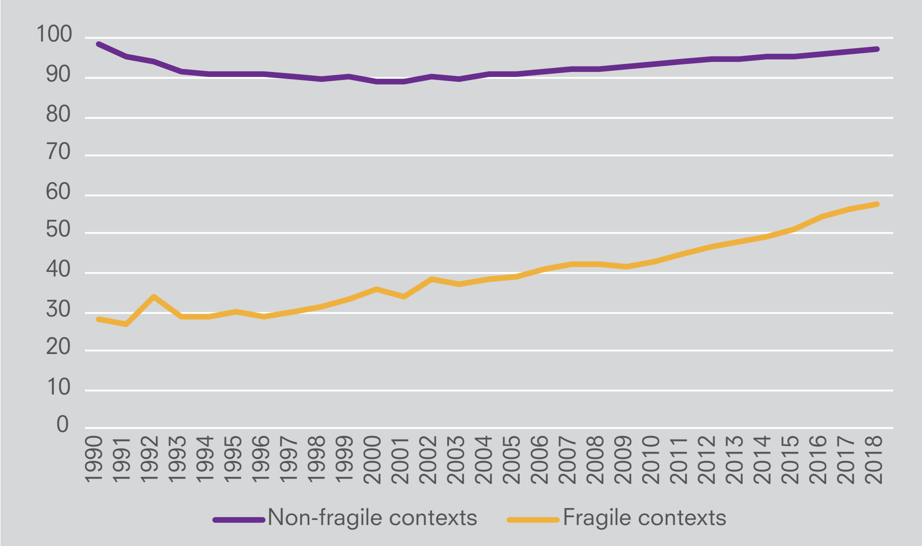
Yet, a significant share of the world population still lags behind global progress in energy access. In 2018, of the over 800 million people in the world without access to electricity, 86% lived in countries characterised by the OECD as fragile (see Figure 1).[2] Ensuring energy access in fragile countries is desirable for the positive impacts it has on social and economic development and environmental sustainability, but also because it is an essential element in creating the conditions needed to sustain peace, bring about stability, and escape fragility.

While aspects of more conventional energy planning efforts remain possible in some fragile contexts, scaling energy access in many fragile settings requires a new approach that better accounts for the unique challenges of these contexts. Distributed generation technologies hold significant promise in this regard: they are resilient in the face of conflict and uncertainty and, if coupled with renewable energy solutions, are more sustainable for the planet. Additionally, the considerable progress made in improving quality and reducing costs of renewable energy technologies means that they are now the most cost-effective option in many instances. For the first time, we have a pivotal convergence in what is good for the climate, what is needed to unlock economic growth in fragile states, and what is technologically feasible.

1 International Energy Agency et al, 2020.

2 Ibid.

**Figure 1**: Average access to electricity (% of the total population)[3]




### What do we mean by fragile contexts?

Fragility is caused by a variety of interlocking factors, and fragile contexts differ in the ways in which they are fragile. Common characteristics of fragility include "the lack of basic security, inadequate government capacity, the absence of a properly functioning private sector, and the presence of divided societies."[4] Increasingly, climate change and environmental destruction are driving fragility in countries across the world.

A country affected by fragility is often not unstable or fragile across its whole territory. In many instances, fragility may be concentrated in certain areas, such as the periphery, natural resource rich regions, parts of the country afflicted by conflict, or regions most deeply impacted by environmental destruction and climate change. When we refer to 'fragile contexts', we specifically mean these sub-national areas most affected by fragility, rather than the entire country.

We also recognise that fragility varies in severity. Our analysis and recommendations tend to focus on contexts of **greater fragility**, including those affected by conflict and violence, as less attention has been given to scaling energy access in these settings.

3 World Bank, 2020a.

4 LSE-Oxford Commission on State Fragility, Growth and Development, 2018, p. 4.

Investing in fragile contexts, with their higher perceived risks, more undeveloped markets, insufficient infrastructure, and constrained state capacity, remains difficult. But these challenges can be overcome through the concerted efforts of a range of stakeholders, including national governments, donors, development finance institutions, non-governmental organisations, and the private sector. Each of these entities can make specific contributions to joint efforts to expand energy access, and can leverage a range of innovative financing mechanisms and business models in this endeavour.

# 2 Energy, development, and fragility

A critical relationship exists between energy poverty and fragility. Unequal access to natural resources and poor energy sector management can reduce trust and state legitimacy, hurt social cohesion, increase poverty, and cause or amplify tensions and conflict. State capacity and institutions are often weak in these contexts, governments lack the revenues to fund energy investments, poor maintenance can jeopardise reliable energy supply, and conflict can damage energy infrastructure. Resistance to state authority, either from armed opposition groups or citizens wary of government control extending into their communities, can also be a key obstacle. Energy poverty is a substantive element of the fragility trap: fragility hampers development, including gains in energy access, while the lack of development creates structural conditions for the persistence of fragility, social instability, and conflict.

Consequently, overcoming the challenges of expanding energy access in fragile settings has the potential to contribute tangibly to moving these settings out of fragility. Access to affordable, reliable, and sustainable energy is crucial to catalyse social and economic development in least-developed countries and fragile settings. The far-reaching, positive impacts of ensuring energy access in fragile settings can be summarised as follows:

- **Productivity and growth**: Poor access to energy is a major constraint to economic growth in many parts of the world. Energy access has the potential to support economic opportunities and movement into higher-productivity activities and sectors, driving structural transformation and lifting millions out of poverty.

- **Environmental sustainability**: Three out of five people living in fragile contexts live in settings vulnerable to climate change.[5] In the absence of affordable alternatives, some 2.7 billion people continue to rely on biomass (firewood and charcoal) for heating and cooking. Reliance on biomass has led to widespread deforestation, expansion of arid areas, and destruction of habitats and resources needed to support livelihoods. Fragile settings are bearing the brunt of climate change, which is compounding the many underlying vulnerabilities these settings face, such as land disputes and dependence on rain-fed agriculture, further aggravating existing dynamics of conflict, poverty, and weak governance. Scaling access to improved energy sources is vital to curb deforestation and mitigate the impacts of climate change.

5 OECD, 2020a.

— **Trust in the state**: Because the consequences of expanding energy access are literally visible, and bring quick and concrete benefits, energy access plays an important role in reassuring citizens in fragile settings that their country is on a positive development trajectory. This has a tangible impact on building trust in the competency of governments and increasing state legitimacy, as well as strengthening security.[6] Expanding energy access may also provide the quick wins needed to build momentum towards larger reforms.

— **Peace dividend**: In conflict-prone settings, creating jobs and supporting livelihoods directly and indirectly through investment in the energy sector enables a key peace dividend. Ensuring that people benefit more from stability than from conflict reduces citizens' incentives to engage in violence and contributes to a more broad-based commitment to peace. Additionally, deploying renewable energy technology can support peacebuilding efforts, including by delivering short-term savings in humanitarian operations, while also comprising a longer-term building block for peace.[7]

— **Gender empowerment**: Energy access can positively impact gender equality. It can reduce the time women (and children) spend collecting firewood for heating and cooking, and create income-generating opportunities for women, including activities that can be run from their homes. This is particularly important in contexts where walking long distances from home leaves women vulnerable to harassment, abduction, and rape, or where there are societal restrictions on women working outside the home.[8] Surveys conducted in Chad's Farchana refugee camp, for instance, report that 90% of confirmed incidents of rape occurred while women were collecting firewood.[9] Additionally, household air pollution caused by burning biomass fuels on inefficient stoves also disproportionately affects women, who do most of the cooking. Widespread adoption of improved energy sources for cooking has the potential to yield health benefits, particularly for women, and may give them greater control over financial resources.[10]

— **Fiscal capacity**: Government revenue can be raised through expanding energy access, mainly indirectly through its growth-enhancing impacts that can broaden the tax base and raise the productivity and profitability of firms. Higher revenue can, in turn, strengthen governments' ability to deliver public services.

6 Sacchetto et al., 2020.
7 Mozersky & Kammen, 2018.
8 Sacchetto et al, 2020.
9 Clean Cooking Alliance, 2019.
10 Sacchetto et al, 2020.

**“For the first time, we have a convergence in what is good for the climate, what is needed to unlock economic growth in fragile states, and what is technologically feasible”**

Employees clean up solar panels which will be exported to Sudan at a factory on October 16, 2020 in Ji an, Jiangxi Province of China. Photo: by Deng Heping/VCG via Getty Images.

# 3 Efforts to achieve energy access in fragile settings are off-track

Despite the critical importance of energy access and the remarkable progress towards global electrification since 2010, glaring disparities persist worldwide. In 2018, almost 800 million people lacked access to electricity and 2.7 billion people did not have access to productive forms of energy.[11]

The greatest challenges converge in fragile countries, home to 86% of people with no access to electricity.[12] Conditions are most extreme in highly vulnerable settings such as refugee camps, where it is estimated that nearly 90% of individuals have minimal access to energy and largely depend on traditional biomass for cooking and heating.[13] Moreover, in stark contrast with global trends, energy access gaps in fragile environments are *widening*, as population growth outpaces the number of people that gain access to electricity, with an annual net increase of almost two million in the unconnected population in these settings.[14]

**In stark contrast with global trends, energy access gaps in fragile environments are *widening*, as population growth outpaces the number of people that gain access to electricity**

National and international energy investment efforts are falling short of what is needed to close access gaps and achieve universal access to affordable, reliable, sustainable, and modern energy by 2030, as required by SDG 7. It is estimated that the annual energy financing required to achieve these goals is just over US$ 50 billion.[15] However, at only US$ 30.2 billion, current global investment falls well below this threshold.[16] Of this amount, a third targets new household connections, while the majority is channelled towards industrial and commercial uses.

Although ODA spending in developing countries on energy as a whole, and renewable energy specifically, has been increasing over time, it has persistently favoured and become increasingly skewed towards non-fragile settings (see Figure 2 and Figure 3). In 2018, ODA spending on energy (considered on a per capita basis) in non-fragile settings was nearly double that of fragile settings and almost four times higher than in extremely fragile locations.

In sub-Saharan Africa, home to more than half a billion people without access to electricity, annual investment is around US$ 9.6 billion, far short of the region's US$ 27 billion need.[17] Despite their feasibility and value in fragile contexts, financial commitments in off-grid solutions in countries with the largest energy gaps – of which several are fragile – remains a staggeringly low 1.1% of the total finance for electricity, amounting to only US$ 460 million globally in 2018.[18] These figures highlight clear shortcomings in the international energy financing architecture, both in terms of amounts mobilised and in geographic and technological focus.

**Financial commitments in off-grid solutions in countries with the largest energy gaps – of which several are fragile – remains a staggeringly low 1.1% of the total finance for electricity, amounting to only US$ 460 million globally in 2018**

11 Global Commission to End Energy Poverty, 2019; Ayaburi et al, 2020.
12 International Energy Agency et al, 2020. See Annex 1 for further details.
13 Grafham & Lahn, 2015.
14 International Energy Agency et al, 2020.
15 International Energy Agency, 2018.
16 Global Commission to End Energy Poverty, 2019.
17 Climate Policy Initiative & Sustainable Energy for All, 2019.
18 Climate Policy Initiative & Sustainable Energy for All, 2020.

**Figure 2**: Median per capita ODA flows towards developing countries on energy (constant 2018 million US$)[19]

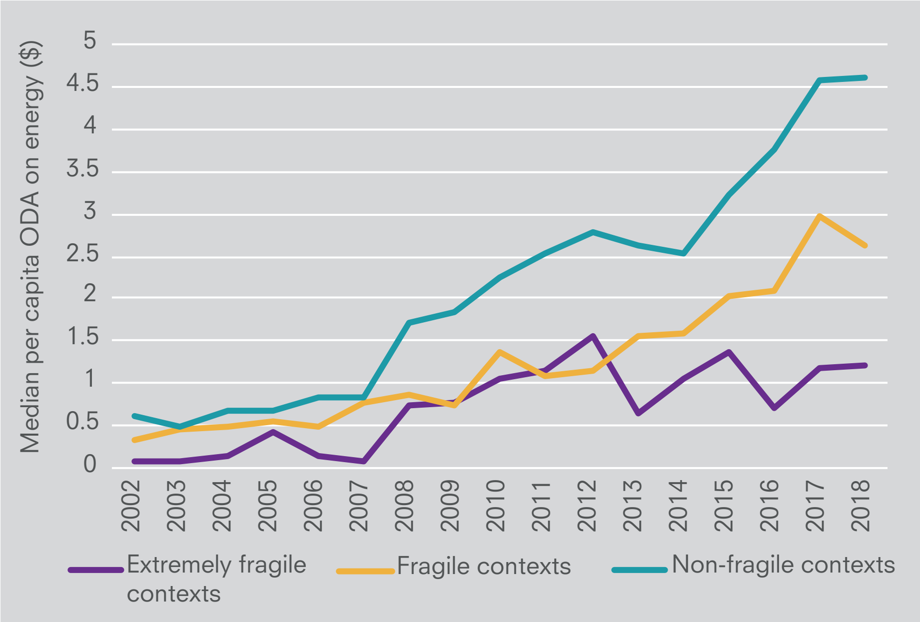
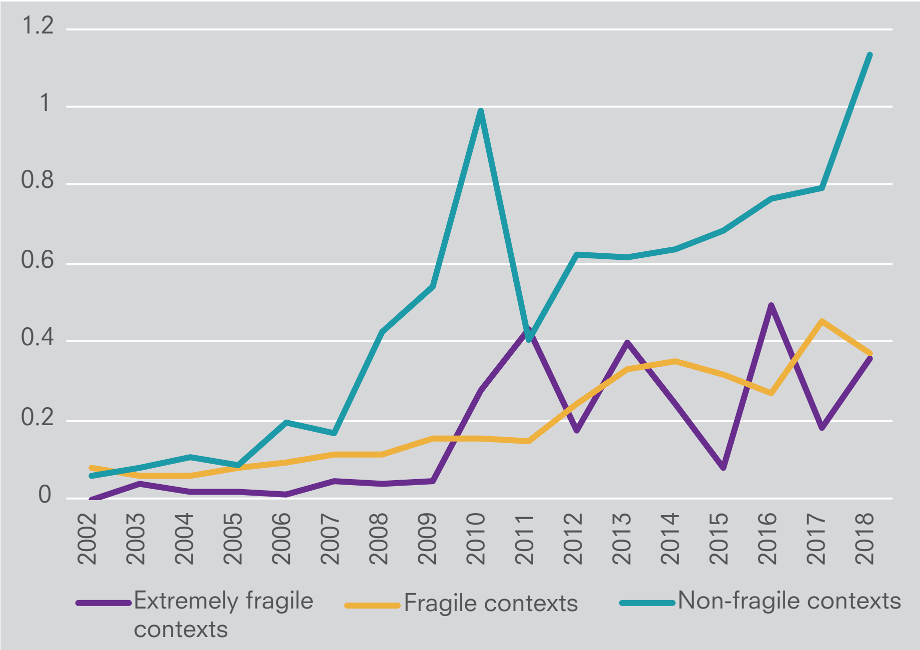



**Figure 3**: Median per capita ODA flows to developing countries on renewable energy, including hybrid systems (constant 2018 million US$)[20]




19 OECD, 2020b.

20 Ibid.

# 4 The current window of opportunity

## COVID-19 in fragile contexts

Fragile settings have been hit particularly hard by the economic impacts of the COVID-19 pandemic. Unprecedented declines in commodity prices, trade, and remittances, as well as reversals in capital flows, have triggered a collapse in earnings at the household, firm, and national levels. This has also exacerbated vulnerability to other shocks. Less developed countries tend to have large informal sectors where workers lack basic social protections, and responses to curbing the spread of the virus, such as lockdowns and restrictions on movement, have seen informal workers lose income and risk suffering long-term unemployment. The national governments of these countries are setting recovery packages in very difficult macro-fiscal contexts, with limited fiscal space and looming debt difficulties, especially for countries unable to borrow in their own currencies.

While COVID-19 has exposed many vulnerabilities and inequities in the world, it has also created an unprecedented window of opportunity to transform entrenched systems and shift towards more sustainable and equitable growth. Recovery from COVID-19 must be designed in a way that tackles underlying weaknesses and sets the course for long-term transformation to more resilient and inclusive growth and development. Scaling up energy investments can have a tangible impact on COVID-19 recovery in fragile contexts: implementation can be undertaken quickly, is labour-intensive, generates immediate and visible benefits, and offers strong multiplier effects. These efforts have the potential to create jobs and promote social and economic recovery and resilience.[21]

## Green energy as an effective and more affordable solution

**If previously fragile contexts could not afford to go green – now they cannot afford *not* to**

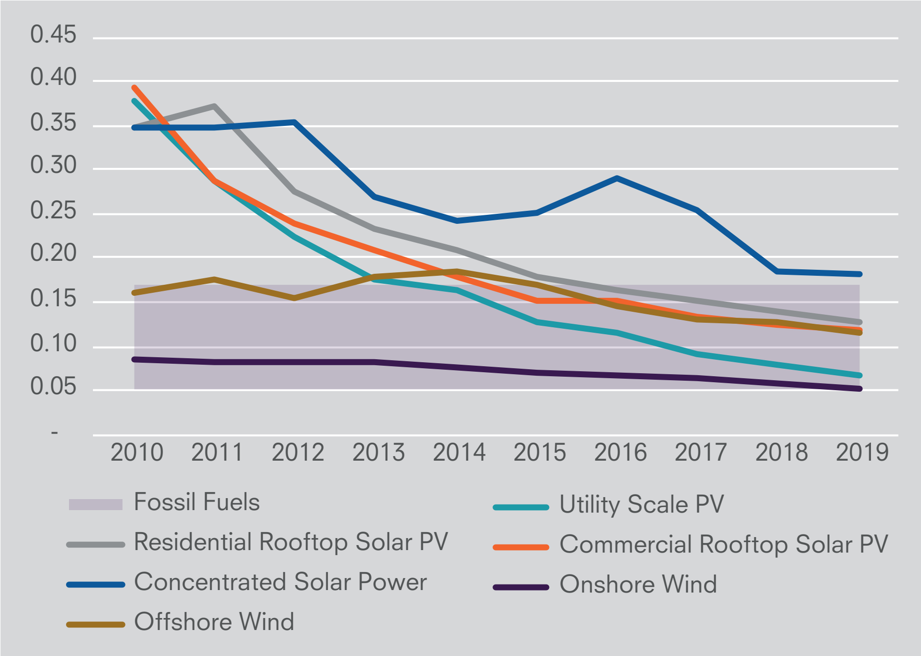
Beyond the COVID-19 pandemic, the world faces two great global challenges today: poverty and climate change. There is an opportunity to make significant gains on both these fronts by driving a big push in expanding energy access to those most in need and transitioning to renewables as we do so. Indeed, a crucial element of meeting the goals of the Paris Climate Agreement and the SDGs will be transitioning the energy sector from dependence on fossil fuels to renewable energy sources.[22]

Our ability to pursue a more sustainable path is made possible, in large part, by marked declines in the cost of renewable energy solutions in recent years due to technological improvements, greater economies of scale, more competitive supply chains, and strong firm-level know-how.[23] In many parts of the world, renewables are now the most affordable energy option. Although

21 g7+, 2020.
22 Sacchetto et al, 2020.
23 International Renewable Energy Agency, 2020a.

cost reductions have not been fully carried down to fragile contexts, progress is being made, and if previously fragile contexts could not afford to go green – now they cannot afford *not* to.

**Figure 4**: Global weighted average levelised cost of electricity (LCOE) from power generation technologies (2019 US$/kWh)[24]




As renewable energy technologies go, **solar PV holds the greatest potential** for fragile contexts as:

— A number of fragile countries hold some of the **highest practical potential for solar PV** (accounting for both solar resource and additional factors affecting PV conversion efficiency and basic land use constraints), or the output achievable by a PV system, in the world (see Figure 5).[25] This makes investing in solar energy an especially promising opportunity in many fragile countries.

— Solar PV is **scalable**. PV systems are modular and capacity can be incrementally increased over time through adding additional solar panels and/or batteries.[26] They can provide affordable electricity to remote, off-grid households at varying capacities. For instance, in East Africa, the off-grid, pay-as-you-go market is now able to offer systems in the 0–150-watt peak range that are attractively priced, often require no down-payment, and can run appliances such as radios and televisions; some higher-end options even support refrigerator-freezers.[27]

24 Ibid.
25 Practical solar PV potential is the power output achievable by a typical PV system. It simulates the conversion of the available solar resource to electric power considering the impact of air temperature, terrain horizon, and albedo, as well as module tilt, configuration, shading, soiling, and other factors affecting system performance.
26 Sacchetto et al, 2020.
27 Mozersky & Kammen, 2018.

### Cost reductions in renewable energy technologies

Between 2010 and 2019, the global weighted-average levelised cost of electricity of utility-scale solar photovoltaic (PV) fell by 82%, while that of concentrated solar power fell by 47%, onshore wind by 39% and offshore wind by 29%. For 56% of all newly commissioned utility-scale renewable power generation capacity, the costs achieved in 2019 were lower than the cheapest fossil fuel-fired option, demonstrating renewables' ability to outcompete fossil fuels on cost.[28]

While the greatest gains have been made in utility-scale technology, reductions have also been seen for smaller scale systems, with residential mini-grid costs declining between 42% and 79% over the 2010-2019 period, depending on the market.[29] While distributed renewable technologies are quickly catching up with distributed fossil fuel solutions in terms of costs, the life costs of residential PV systems currently remain slightly higher than diesel (see Figure 4). Cost differences could also be larger depending on specific contexts and geographies, and switching costs would need to be considered as both households and firms may be more familiar with diesel generators.

— Renewables can now **outcompete most fossil fuel options on cost**, including for some distributed generation systems. Affordability considerations are all the more relevant in contexts suffering from high poverty incidence and low purchasing power.[30] While grid-based electricity would generally be the cheapest choice, this option frequently does not exist in more fragile contexts. Households with solar lighting could save on average over US$ 60 per year and spend only 2% of their income on lighting, compared with spending 10% of their income for just four hours per day of illumination using kerosene, candle, or torch-light.[31]

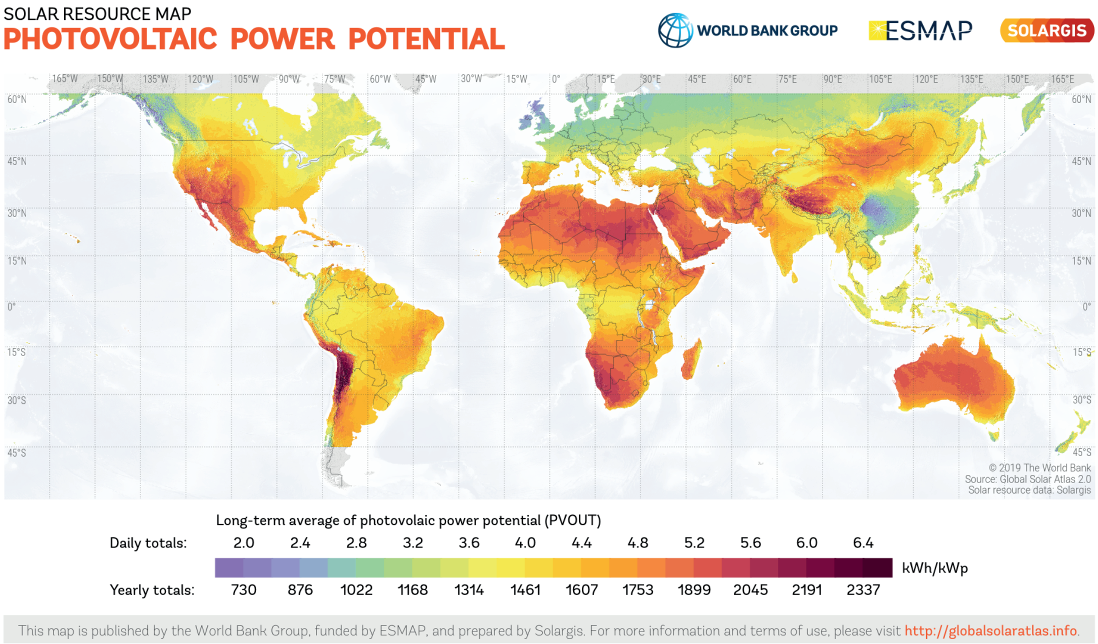
— When coupled with battery storage systems, solar PV systems can provide a **more reliable and uninterrupted supply**, and can extend lighting and use of some appliances beyond daylight generation hours; however, battery storage facilities come at additional cost.

— Solar mini-grids can be made to be **compatible with the grid**, should the grid ever extend to the area. Any surplus power generation achieved from mini-grids could thus theoretically be sold into the grid. This would enable communities or households to generate income while also lowering the need for governments to import electricity, thereby contributing to economic resilience at both the household and national level.

— Of critical importance is the fact that renewable energy technologies lend themselves to **distributed generation systems**, which are the most appropriate energy systems for fragile settings, as detailed below.

28 International Renewable Energy Agency, 2020a.
29 Ibid.
30 Sacchetto et al, 2020.
31 Harrison et al, 2016.

**Figure 5**: Global photovoltaic power potential[32]




While the cost of off-grid electrification solutions has come down significantly in recent years and novel business and financing models have proliferated, these options frequently remain too expensive for poor households and cannot be viable without donor support, government subsidies, or other interventions. **International support and financing** from a wide range of stakeholders – including private, development, and concessional finance – will be essential to enable any significant expansion in energy access in these settings.

# 5 A different approach is needed for fragile settings

In many but not all instances, traditional power planning approaches have been of limited success in fragile contexts. They have occasionally failed spectacularly by not adequately taking into account a country's context and social, political, and security dynamics. The risks of political instability, significant delays and cancellations in infrastructure projects, projects coming in at very high cost, or the risk of violence and damage can be rife in contexts of conflict or severe fragility, and security issues can significantly hamper, or make infeasible, the delivery of power system plans.[33]

There is no established model for energy planning and infrastructure development in fragile contexts. What is feasible varies from country to country, as well as within countries, and planners must operate under **radical uncertainty** that cannot be quantified or easily incorporated into planning models. That said, there is evidence

32 World Bank, 2019.
33 Bazilian & Logan, 2020.

on what does and does not work in more fragile contexts – and this can form a solid basis for approaching energy access efforts in these settings.

**Power planning in extreme fragility or conflict**[34]

Conflict, in particular, makes power planning and infrastructure development very difficult and affects power system planning in specific ways, including:

— **Forced outages** increase during conflict: Power system assets are frequent targets of attack; repair times increase due to site access problems, labour shortages, and unavailability of imported spare parts.

— **Fuel shortages** increase during conflict, including as a result of deliberate attacks on fuel supply lines, and disruption of imports and transportation.

— **Cost changes** are experienced due to currency depreciation and exchange rate fluctuation, unforeseen repair and maintenance costs, and the need for extra security measures.

— **Construction time** is often prolonged by conflict due to problems importing equipment or recruiting workers, site access, sabotage, and suspension of funding.

## More conventional energy planning may not work in fragile contexts

**Large-scale, centralised energy infrastructures** may not work well in some fragile contexts. Traditional least-cost planning models frequently tend toward the economies of scale offered by large-scale systems and produce plans that make technical and economic sense if projects can be financed, developed in a timely manner, and operated in a conventional way.[35] However, this is often not possible in fragile contexts, where far greater uncertainty and risks abound. As a result, centralised grids may be problematic in fragile situations for a number of reasons:

— They are vulnerable to **disruption from physical damage** caused by targeted attacks or as a by-product of wider conflict. Attacking infrastructure is a common practice in conflicts and electric power systems are obvious targets.[36] For example, after more than two years of violent civil war in Syria, more than 30 power stations were inactive and at least 40% of the country's high voltage lines had been attacked, with the total value of damage to the energy sector estimated at $650-$800 million.

34 Ibid.
35 Ibid.
36 Sacchetto et al, 2020.

— They are **significantly more expensive** to build, and governments of fragile countries generally lack the resources needed to fund these large-scale projects. They also take **many years to complete**, during which time millions of people may remain without electricity access.

— They are inherently **more dependent on functioning government systems and institutions**, as well as some level of **political and social stability** – factors which are often absent in fragile contexts.[37]

— Concentration of power generation also means that control of the grid is similarly concentrated, predisposing centralised grid systems to **corruption**.[38]

— They run the risk of becoming **stranded assets**. For example, Pakistan's latest long-term power capacity plan, the Indicative Generation Capacity Expansion Plan 2047 demonstrates overcapacity and stranded coal and LNG plants by 2030.

— Significant rural to urban migration in many fragile countries, as rural inhabitants seek greater safety and better economic opportunities in urban areas, reduces the relative size and concentration of rural populations. This is likely to **lower rural demand** for energy, reducing the financial feasibility of extending grids into many rural areas.

— Large-scale energy projects can **ignite discontent and tensions** in already fragile locations by causing the forced displacement of vulnerable populations, ecological disruption, and negative impacts on livelihoods. The transnational aspect of natural resources can also have implications for geopolitical equilibria.[39] For instance, disputes have intensified between Ethiopia on one side and Egypt and Sudan on the other over the filling of Ethiopia's US$ 4.5 billion hydroelectric Grand Ethiopian Renaissance Dam. The dam will reduce the flow of Blue Nile waters to Sudan and Egypt, where food security and livelihoods of millions of people are dependent on agriculture supported by the Nile. Ethiopia's continued action despite a lack of agreement on an acceptable rate of filling the dam is destabilising regional dynamics.[40]

## A new approach for fragile contexts

New planning methods that explicitly recognise the risks inherent in fragile contexts and integrate them into planning tools are needed to support flexible and incremental options that prioritise resiliency in settings of severe insecurity.[41]

**Distributed generation technologies** show much potential: they are more resilient in the face of fragility and conflict and, importantly, have considerable synergies

37 Bazilian & Logan, 2020.
38 Sacchetto et al, 2020.
39 Morris, 2017.
40 Walsh, 2020.
41 Bazilian & Logan, 2020.

with **renewable energy solutions**. Distributed generation systems offer the following benefits in fragile settings; they:[42]

— **Mitigate risk** as they reduce reliance on a small number of large generators and on the transmission and distribution grid; they spatially distribute risk and lower the risk of failure.

— Can use **locally available renewable energy sources**, which reduces dependency on import and transportation of fossil fuels.

— Allow for a **diversified energy supply**, increasing resilience.

— Are feasible in contexts of **low state institutional and fiscal capacity**. They can be managed and operated by households, communities, or private firms, lowering demands on government capacity.

— Are **modular, flexible, and less capital-intensive**, making them easier and quicker to roll out and manage in unpredictable, conflict-prone settings.

**Robust decision-making** favours options that perform equally well across a range of plausible futures. For example, stand-alone systems like mini-grids work alone and could also be engineered to be compatible with the grid if and when it arrives.[43]

**Data-driven decision-making** is important in these contexts, where conflict and fragility intensity, location, and dynamics change over time. Energy planning approaches must have adaptive strategies that collect data on these and other changes, acknowledge improvement or deterioration in conditions in all or part of the country, and adjust management decisions accordingly. Given the often-complex reality on the ground, innovative data collection approaches that eliminate the need for on-the-ground collection, such as use of satellite images, would be beneficial in contexts of conflict or extreme fragility.

**Incorporating a conflict or fragility lens into models.** This brings critical information on the impact that conflict or fragility may have on the project and that the project may have on conflict or fragility into the decision-making process, and prompts consideration of appropriate mitigation measures.[44] Conflict-specific risks that have to be factored in would include, for example, the possibility that readily portable distributed generation technologies could be removed and potentially support illicit activities or black market economies.

For the reasons above, **solar PV mini-grids and off-grid solutions** appear to hold the greatest promise to expand energy access in very fragile situations. Indeed, evidence suggests that solar PV has made successful inroads even in conflict situations. For example, war-torn Yemen has shown unexpected improvements in energy access during conflict due to greater use of solar power at the household level.[45]

42 Sacchetto et al, 2020; Bazilian & Logan, 2020.
43 Bazilian & Logan, 2020.
44 Ibid.
45 Al-Akwaa, 2019.

**Solar PV mini-grids**

The specific considerations of fragile settings suggest that mini-grids (or smaller micro-grids or nano-grids) are the most promising solution for very fragile contexts. A mini-grid is "a set of small-scale electricity generators and possibly energy storage systems interconnected to a distribution network that supplies electricity to a small, localised group of customers and operates independently from the national transmission grid."[46]

Mini-grids can be powered by diesel or various renewable options (solar PV, wind, hydro), or can be diesel-renewable hybrids. Solar PV appears to have the greatest potential given the geographic location and climate of many fragile countries, as well as a lower land requirement which minimises population displacement and security of land tenure concerns.

Mini-grids can serve a collection of households or commercial businesses, and can also support some productive activities such as irrigation and grinding mills. The mini-grid structure would also integrate well with a usage-based pay-as-you-go (PAYG) model, ensuring greater reliability of payment for services.

## Additional considerations

There are several additional considerations that should be taken into account when planning energy access expansion in fragile contexts, including:

- **The effect of decentralisation of energy generation on political dynamics**. Decentralisation is often fiercely resisted by central governments that see it as a loss of central control and, in some cases, empowerment of opposition groups. Armed opposition groups and citizens wary of state expansion into their communities may also resist efforts. Therefore, depending on the political context, citizens may perceive decentralisation of energy generation as either strengthening or weakening political stability or national sentiment. Additionally, where renewable energy technologies are not equally feasible across all fragile areas in a country, questions of fairness and preferential treatment of some groups will likely arise. Any efforts to scale energy access in fragile contexts will therefore need to factor in the particular dynamics of a region and work closely with all stakeholders.

- **Fragile contexts require energy in different forms and hybrid solutions are needed**. While solar PV generates energy for the very important purposes of lighting and powering some appliances in households, it is not an energy access panacea for either urban or rural areas. Although solar PV can support some productive uses, including irrigation, it is not sufficient to power heavier industry and has not yet offered adequate cooking solutions, which necessitates hybrid systems. Grid or larger-scale off-grid options would be

46 African Development Bank, n.d.

needed to support most industrial activity, and grid developments should be prioritised accordingly. For cooking, switching household use away from biomass to liquified petroleum gas (LPG) or liquified natural gas (LNG) is vital to curb the massive deforestation occurring in many energy poor environments. Widespread adoption of LPG or LNG for cooking will require better affordability, accessibility, and reliability of supply of these energy sources, as well as behavioural change in households, an aspect that has proved to be difficult and will need behavioural and policy nudges to achieve.

— **Expanding distributed technologies may reduce government incentives to extend grid connection**. Adoption of off-grid systems would satisfy some energy demand and lower the financial viability of grid extension, particularly into rural areas. In contexts where citizens would prefer grid connection and there is a feasible likelihood of grid extension, they may resist the roll-out of off-grid alternatives, seeing it as potentially weakening governments' incentives to extend the grid.

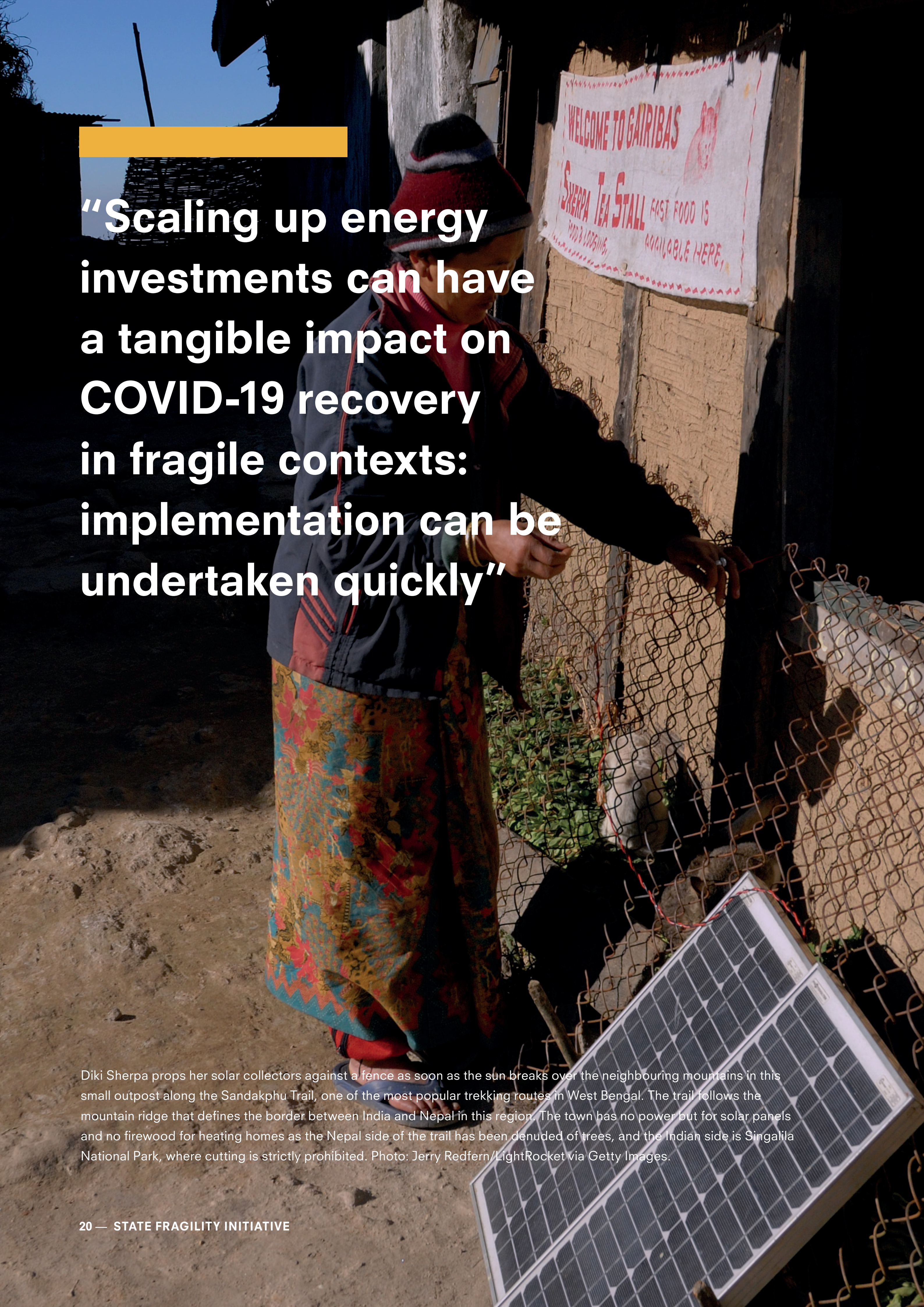
— **Maintenance and replacement of equipment**: Ongoing maintenance services and equipment repair and replacement costs must be factored into energy access initiatives. These aspects are often overlooked, with the result that households do not extract optimal benefit from these systems and may become unwilling to pay for services. Capabilities of PV panels and batteries decline over time and this equipment needs to be replaced every few years, highlighting the need for replacement parts to be easily available.

— **Securing payment from customers**: Willingness and ability to pay must be considered and projects structured to ensure payment.

  — Despite the obvious benefits of both solar PV and LPG/LNG, the willingness of customers to pay for these energy sources has consistently been far lower than their cost. This raises questions around whether a lack of knowledge of the benefits of energy access or problems around system performance or availability of repair and replacement services are lowering willingness to pay, and if these problems could be addressed through appropriate interventions.

  — The PAYG business model holds promise in ensuring customer payment for energy used. Usage-based PAYG models consist of solar PV systems that function upon customers loading money (equivalent to a given amount of kilowatt-hours) onto pre-paid meters. Once the amount of electricity paid for has been used up, the system ceases to function until a new payment is made. In lease-to-own PAYG models, customers pay for the cost of the entire energy system through a set of instalments over time.

  — The relatively high upfront costs of distributed renewable energy systems pose an obstacle to adoption and necessitate potentially rebalancing costs for customers by lowering upfront costs (such as equipment or connection costs) and raising variable costs (such as usage tariffs).




# “Scaling up energy investments can have a tangible impact on COVID-19 recovery in fragile contexts: implementation can be undertaken quickly”

Diki Sherpa props her solar collectors against a fence as soon as the sun breaks over the neighbouring mountains in this small outpost along the Sandakphu Trail, one of the most popular trekking routes in West Bengal. The trail follows the mountain ridge that defines the border between India and Nepal in this region. The town has no power but for solar panels and no firewood for heating homes as the Nepal side of the trail has been denuded of trees, and the Indian side is Singalila National Park, where cutting is strictly prohibited. Photo: Jerry Redfern/LightRocket via Getty Images.

# 6 Constraints to scaling energy investments in fragile environments

There are a number of constraints to scaling energy investments in fragile settings, and these constraints affect different energy projects to varying extents. While larger-scale energy projects face greater difficulties, some of the constraints of distributed and smaller-scale projects may be easier to navigate.

## Limited state capacity

Limited state capacity has been a major roadblock preventing progress in expanding energy access for decades. Governments in fragile settings tend to have limited capacity to undertake key activities in the power planning and investment process, including longer-term planning, project appraisal, and structuring energy projects to optimise outcomes. Short-term political objectives also often take precedence over and undermine longer-term planning efforts.

State capacity is not, however, a prerequisite for energy investments; efforts to advance energy access and develop state capacity can be undertaken simultaneously and are mutually reinforcing.[47] The private sector could also play a role in expanding existing capacity if they are included in planning phases in addition to their role as investors and implementers in later project phases. Importantly, a distributed generation approach would have a lower state capacity burden than larger-scale, centralised projects, further easing this constraint.

## Severely undeveloped energy markets

There are pronounced challenges in fragile situations that prevent investors from entering undeveloped energy markets at scale:

- **Disproportionately high project preparation costs**: Undeveloped markets require considerable upstream and project preparation work before projects can be realised. The cost of project preparation can constitute 3-10% of the capital cost of projects and can run over several years.

- **Small investment ticket sizes** mean that overheads constitute a larger proportion of project costs. Together with high project preparation costs, this makes it difficult for investments to break even, let alone achieve profitability.

- **Poor credit worthiness of utility companies** is frequently an issue in poorer countries and can be a problem when utility companies are off-takers in larger-scale energy projects. Structuring projects to ensure that investors can collect income is critical as it will ultimately determine whether a project will be invested in. Assistance from more creditworthy intermediary off-takers or power trading companies may be essential.

47 Sacchetto et al, 2020.

— **Credit constraints** tend to be severe in fragile settings and funding from foreign sources is frequently essential to finance projects. However, risk premia attached to fragile contexts makes funding from foreign private investors more expensive.

— **Land issues** often arise in land-intensive energy projects, including larger-scale renewable projects, especially when some degree of population displacement is necessary or land ownership is contested. Investors also need to feel assured of the security of land tenure in order to make investments in immovable infrastructure.

— **Due diligence requirements** are more difficult to fulfil in fragile situations where there is frequently a lack of transparency regarding information on local individuals and firms. Due diligence requirements are made considerably more burdensome if there are sanctions of any type against the country or certain named individuals.

— **Political instability** dissuades investments or lending for more than relatively short periods of time, which makes it difficult for borrowers to use credit for productive, longer-term investments.

— **Currency risk** is often a critical issue in fragile contexts, particularly where governments cannot borrow in their own currency. Exchange rate fluctuations mean project costs often increase, and depreciation of local currency against the US$ makes it more expensive for borrowers to repay loans. To address this, currency risk management instruments have been developed, but they need to be reasonably priced for fragile contexts for investors to make greater use of them.

— **Bureaucratic processes** mean it is often essential to have a project champion with the political clout to help investors overcome obstacles they face, including ensuring that decisions are made in a timely manner.

## Financing

While in some developing country contexts, a lack of bankable projects may be a more pressing constraint than finance, finance is certainly a bottleneck in fragile settings, even for relatively small projects, due to excessive perceived risk and uncertain returns. Specific global effort is needed to unlock energy finance to enable investments in those locations where energy gaps are greatest.

# 7 What needs to be done

**New commitments and partnerships are needed to catalyse funding for energy investments in fragile contexts**. Key stakeholders in financing efforts include:

- **Donors**: Donor funding (bilateral, multilateral, philanthropic) will be essential, at least in the short- to medium-term. Donors have a key role to play in mobilising financing through new and existing facilities and injecting funding into multilateral development banks to increase their lending capability. These entities have funding that can accept lower returns than private investors demand, allowing them to take on a uniquely important role in energy expansion efforts in fragile contexts.

- **Development finance institutions (DFIs)**: DFIs have a critical role to play in making catalytic investments that have the potential to support the development of a pipeline of bankable projects, achieve improvements in the regulatory and enabling environments, and facilitate private investors entering these challenging contexts on de-risked terms. The upstream work required to develop bankable projects is costly, and if these costs are added onto individual projects, they sink otherwise promising projects. A different way to finance this work is therefore needed.

  The most promising route is for DFIs to use aid funding to cover the costs of project preparation and de-risking, leveraging their ability to accept lower rates of return to take on investments that others cannot make. By doing this, DFIs could bring private investors in on terms that only need de-risked capital, making private investment in these contexts far more feasible. If used strategically to crowd in private investment, aid funding can have an outsized impact by reaching greater scale through private sector participation. The public good nature and desirable impacts of greater energy access in fragile environments make a strong case for development agencies to subsidise these investments.

  DFIs could also potentially play a valuable coordinating role to facilitate the movement of multiple energy companies into a fragile country at the same time. Experience has shown that foreign firms are more likely to enter a challenging environment if they are not going alone, particularly if they are moving with their suppliers, as this reduces the individual risk faced by each firm. However, this simultaneous market entry does not happen without careful coordination and support – a role DFIs are well placed to play.

- **Private sector**: The financial resources, expertise, and management efficiency of the private sector are crucial for sufficient scale to be reached in these efforts. However, private investors often do not consider infrastructure investments in fragile contexts and when they do, they typically require high rates of return (generally exceeding 10-12%) to compensate for perceived or actual risks.[48] There are few projects where such rates are feasible, especially when taking into account the additional costs of operating in these environments. Even if energy was generated under these terms, it would make

48 Infrastructure funds in Europe attract internal rates of return in region of 12% (Deloitte, 2016), so can extrapolate above this for fragile contexts.

the cost of energy far too high, placing energy access beyond the reach of a majority of people in these countries.

What is needed are partnerships and financial arrangements that will allow private investors to participate on de-risked terms. If commercially acceptable returns can be attained through the roll-out of new financing mechanisms, financial sustainability of efforts is possible and private sector participation would enable greater scale to be achieved.

**Innovative financing instruments and business models should be leveraged**. A range of these are already in use and their terms can be further tailored to meet the needs of fragile settings.

— **Grant and blended finance**: A lack of long-term, risk-tolerant capital at affordable rates prevents businesses from scaling up in fragile settings. Given the desirable social and economic benefits generated by energy investments, the donor and international finance community should leverage grant or blended finance targeting early-stage project phases, focusing on projects where this financing is most additional. This would improve the viability of investment opportunities and ready them to tap into larger commercial financial markets at later stages.

— **Currency risk management instruments**: Local currency instability is a factor determining high investment risk and driving underinvestment in fragile settings. Instruments have been developed to address this risk and are available to investors seeking to enter fragile contexts. However, it is vital that they are affordably priced for fragile settings to ensure greater investor use.

— **Political Risk Insurance (PRI)**: Political risk, such as war, asset expropriation, contractual breach, or prohibitions on exports, is a deterrent to investment in fragile settings. PRI protects against investment losses that may result from these events. However, PRI remains limited or prohibitively expensive in fragile contexts and is generally only made available to foreign investors. Between 2010 and 2019, only 10% or an average of US$353 million annually of the new guarantee volume of the World Bank's Multilateral Investment Guarantee Agency (MIGA) was in fragile contexts.[49] Efforts to scale up PRI and to also provide cover for domestic investors could be effective in encouraging greater investment in fragile markets. Multilateral institutions such as MIGA are best placed to undertake this as they can assume greater risk than private insurers, offer longer tenure of coverage and lower and more constant premiums, and can use their institutional influence to mitigate disputes between government and investors.[50]

— **Pay-as-you-go payment solutions**: These have already been pioneered for distributed solar PV and cleaner cooking technologies, and building on these platforms could unlock additional private capital for energy expansion in fragile settings. Securing payment directly from customers is straightforward with mini-grid solutions and can help avoid issues of non-payment from utilities or larger off-takers that arise when selling power into the grid.

49 World Bank, 2020b.
50 Mayer, 2018.

**The national governments of fragile states have an important role to play in supporting scaling of distributed generation technologies**. In addition to building state capacity and working to address the weaknesses posed by very undeveloped markets, including energy markets, in their countries, governments can drive efforts in the following ways:

— Developing regulatory frameworks to support energy investments, including enabling private ownership and operation of distributed generation systems and developing national programmes for mini-grids.

— Committing to transparency and upholding the rule of law to build a safer environment for investors as a way to lower risk premia and create a more attractive environment for investment and private sector development.

— Introducing financial incentives to encourage adoption of renewable energy technologies or make scale-up of efforts more financially feasible, such as lowering import tariffs on renewable energy assets.

— Enabling interconnection by facilitating technical and legal procedures governing connecting mini-grids to the national electricity grid, and be willing to purchase excess generation from households and communities.

— Leading by example by adopting distributed renewable generation systems for use in public buildings such as schools, clinics, and government office buildings.[51]

**Strengthening government capacity in the energy sector is crucial**. Multilateral and bilateral development agencies should support the strengthening of government capacity in fragile states, including for energy planning, project appraisal, and project implementation. Improving government capacity to take on greater responsibilities as well as deepening local workforce capabilities in the energy sector is key for sustainability. Peer learning among fragile countries has proven to be an effective form of cooperation and should be supported as well.


Yemenis look at solar panels displayed during a fair for solar technology and alternative energy on February 23, 2016 at Sana'a's university. Photo: Mohammed Huwais/ AFP via Getty Images

51 Energy.gov, n.d.

# Annex 1: List of countries considered fragile[52,53]

| Country | Country |
|---|---|
| Afghanistan | Nepal |
| Angola | Liberia |
| Bangladesh | Libya |
| Burkina Faso | Madagascar |
| Burundi | Mali |
| Egypt | Mauritania |
| Cameroon | Mozambique |
| Central African Republic | Myanmar |
| Chad | Malawi |
| Comoros | Niger |
| Congo | Nigeria |
| Côte d'Ivoire | Pakistan |
| Democratic People's Republic of Korea | Papua New Guinea |
| Democratic Republic of the Congo | Sierra Leone |
| Djibouti | Solomon Islands |
| Equatorial Guinea | Somalia |
| Eritrea | South Sudan |
| Eswatini | Sudan |
| Ethiopia | Syrian Arab Republic |
| Gambia | Tajikistan |
| Guatemala | United Republic of Tanzania |
| Guinea | Rwanda |
| Guinea-Bissau | Uganda |
| Haiti | Venezuela (Bolivarian Republic of) |
| Honduras | State of Palestine |
| Iran (Islamic Republic of) | Yemen |
| Iraq | Zambia |
| Kenya | Zimbabwe |
| Lao People's Democratic Republic | |

52 OECD, 2018.

53 We have tried to ensure the accuracy of data on energy access by country and have used the World Bank's Tracking SDG 7.1.1 Electrification Dataset, but we recognise that there may be inconsistencies between various data sources.

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The **Council on State Fragility** brings together global leaders who are passionate about addressing the challenges of state fragility and supporting governments of fragile and conflict-affected states as they transition out of fragility. Eradicating extreme poverty and achieving global peace, stability, and prosperity is not feasible without realistic approaches to address the interlocking characteristics that define state fragility, and the Council aims to advance new ideas and evidence-based thinking to forge new approaches in this space.

The **State Fragility initiative** (SFi) serves as the Secretariat for the Council on State Fragility and is an International Growth Centre (IGC) initiative that aims to work with national, regional, and international actors to catalyse new thinking, develop more effective approaches to addressing state fragility, and support collaborative efforts to take emerging consensus into practice. SFi brings together robust evidence and practical insight to produce and promote actionable, policy-focused guidance in the following areas: state legitimacy, state effectiveness, private sector development, and conflict and security.

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