Published by the United Nations

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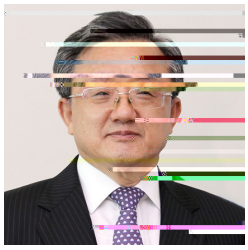
ACKNOWLEDGEMENTS

This report was prepared in support of the High-level Dialogue on Energy that will be convened by the UN Secretary-General under the auspices of the UN General Assembly in September 2021, in response to resolution 74/225. The preparation for the Dialogue has been coordinated under the leadership of the Dialogue Secretary-General, LIU Zhenmin, Under-Secretary-General for Economic and Social Affairs, and the Co-Chairs of the Dialogue and UN-Energy, Achim Steiner, Administrator of UNDP and Damilola Ogunbiyi, Special Representative of the UN Secretary-General for Sustainable Energy for All. The views expressed in this publication are those of

Energy can create transformational opportunities. For the 759 million people in the world who lack access to electricity, the introduction of clean energy solutions can bring vital services such as improved healthcare, better education and affordable broadband, creating new jobs, livelihoods and sustainable economic value to reduce poverty. In regions such as sub-Saharan Africa where half of secondary schools and a quarter of health facilities have no power, clean energy access will help save lives, and offer opportunities for prosperity at a transformative scale.

An energy revolution based on renewables and energy e f ciency is urgently needed not just to accelerate economic progress and development, but also to slash emissions that are rapidly warming our planet. The energy sector today, dominated by fossil fuels, accounts for 73 per cent of human-caused greenhouse gas emissions. Global CO_2e emissions must be halved by 2030 to avoid an increasing frequency and severity of dangerous and unprecedented weather extremes, including heatwaves, devastating f oods and droughts, risks to food and water security, population displacement, and loss of lives afr

This proposed roadmap illuminates a way forward for how the world can achieve a sustainable energy future that leaves no one behind. We hope that it will help to inspire the actions needed to get there.



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and their strategies and actions for net-zero-energy systems Countries should find ways of reorienting fossil fuel and other inefficient subsidies that encourage wasteful consumption of energy into smart subsidies for clean energy access, in particular towards poor and vulnerable households and community health and education facilities.

RECOMMENDATION 2

National governments should integrate cooking energy demand into energy planning and strategy development. A transition to universal access to clean cooking will not be a quick fix, but will build on least-cost, best-fit approaches that reflect local people's

are truly inclusive and that not only meet the specifc needs and situations of vulnerable populations, but also support their capacity to overcome energy poverty and their prospects of making progress in doing so. As the gap in fnance needed to provide energy access in the LDCs is vast, there is an urgent need for increasing funding for energy access, and delivering on climate fnance pledges, allocated

2 RESULTS AND ACTIONS MATRIX

PRIORITY RESULTS	PRIORITY ACTION AREAS	STAKEHOLDER ACTIONS				MILESTONES		
		Public	Private	Civil Society	International organisations	2025	2030	Towards 2050
Reinforced enabling policy and regulatory frameworks to attract investment:	**1.** Position universal and gender-responsive access to energy as a key enabler and driver of inclusive, sustainable, and resilient economic recovery and growth and as an integral part of the transition to a just net-zero-emissions energy system; elevate clean cooking in both international and national priority settings. **2.** Adopt national clean cooking and electrification strategies, charting comprehensive, realistic, integrated, inclusive, and resilient pathways towards achieving SDG 7 universal-access targets for households, public institutions, and productive uses. Strategies to be backed up by least-cost, best-fit plans relying on mix of technologies and user-centred implementation and business models that leverage grid, mini-grid and off-grid, and varied clean cooking technologies and fuels; specification of tiers of service to be delivered, ensuring that all population gets access to at least basic energy services in the shortest time-frame possible, while addressing affordability constraints. **3.** Enact, implement, and enforce comprehensive enabling policy and regulatory frameworks for both clean cooking and electricity access,	• Elevate gender-responsive energy access among key priorities in national development strategies and assign champions for inter-sectoral coordination, especially for clean cooking. • Adopt clean cooking and electrification strategies and plans, charting comprehensive, realistic, integrated, inclusive, and resilient pathways towards achieving SDG7 universal access targets.	• Industry associations and private sector to participate in consultations and dialogue with the government on electrification and clean- cooking strategies, plans, policies, and regulations. •				

PRIORITY RESULTS	PRIORITY ACTION AREAS	STAKEHOLDER ACTIONS				MILESTONES		
		Public	Private	Civil Society	International organisations	2025	2030	Towards 2050
	including incentivizing and empowering private sector to continue to innovate in the energy-access delivery and to reach scale, in particular, in the clean cooking and distributed renewable-energy (DRE) sectors.							
	4. Incentivize sustainable grid expansion and reliable and affordable grid electricity services by empowering and incentivizing the national electricity utilities to improve their technical and ſnancial performance through cost-effective tariffs, reducing losses, digitizing their networks, supporting investments in lower-cost, climate-friendly generation, and promoting innovative ſnancing models and partnershiq ɐ	va u ű C ò	od d the model f¾ a я	ł the rshiq ɐ	7 Ŏ ɜ ȳ		o//Ñd¾ ɜ ń Ƣ	v

PRIORITY RESULTS	PRIORITY ACTION AREAS	STAKEHOLDER ACTIONS				MILESTONES		
		Public	Private	Civil Society	International organisations	2025	2030	Towards 2050
	2. Enhance gender equality in energy- access interventions, adopting gender-transformative strategies, disseminating and applying emerging good practices and instruments to enhance the role of women in the energy sector as beneficiaries, employees, and entrepreneurs, and increasing women's voices in decision-making.							
	3. Address energy poverty of populations living in conditions of fragility, conflict, and violence, with particular reference to displaced persons and host communities, by, among other things, (i) improving enabling environment and scaling up both public and private financing							

PRIORITY RESULTS	PRIORITY ACTION AREAS	STAKEHOLDER ACTIONS				MILESTONES		
		Public	Private	Civil Society	International organisations	2025	2030	Towards 2050
	5. Accelerate investments in electrification of healthcare facilities and schools and other essential public and community services, such as clean water supply, by integrating them into national electrification planning, and engaging with financiers and service providers to develop and demonstrate sustainable and scalable service-oriented models, including ones for replacing diesel back-up systems for grid-connected facilities, electrifying facilities with stand-alone off-grid solutions and integrating these with mini-grids.	last mile service delivery and attract both public and private investments; and to invest in skill development, particularly for women and youth.						
Aligned costs, reliability, quality, and affordability of energy services	**1.** Drive innovations both in technologies and business models (including through innovation accelerators, R&D, technology transfer, seed funding for piloting and commercialization, geospatial analysis for electrification planning, clustering of distributed renewable-energy sites into viable portfolios, distribution network design, and demand-stimulation and productive-use promotion) in order to reduce costs of clean-cooking technologies and fuels, distributed renewable-energy technologies, and grid expansion. **2.** Advance user-centred and gender-transformative approaches in clean cooking and DRE business models, including for access to energy-efficient cooking, cooling, productive and other appliances, in order to improve service delivery and thereby achieve long-term business sustainability and scalability. Incentivize national utilities to adopt more customer-centric approaches, including through innovative partnerships, demand-stimulation, support for appliances and productive uses, so as to improve service delivery and increase revenue generation.	• Prioritize national grid reliability and sustainability as a pre-condition for, or parallel track to, grid densification and expansion, and create incentives for more user-centric service delivery. • Create incentives for continued innovations in technologies and business models and improve intersectoral coordination with digital and financial sectors, in order to improve ecosystem for expanding digital-enabled business models, such as PAYG, in the off-grid solar sector and beyond, including for clean cooking	• Drive innovations in technologies and business models for DRE and clean cooking, with the aim of further reducing costs, increasing affordability and support last mile delivery, and drive impacts, such as through promotion of productive uses.				

PRIORITY RESULTS	PRIORITY ACTION AREAS	STAKEHOLDER ACTIONS				MILESTONES		
		Public	Private	Civil Society	International organisations	2025	2030	Towards 2050
Catalysed, harnessed, and redirected energy	**1.** Scale up availability, diversity, and volume of public and private financing for clean-cooking projects and technical assistance, developing product and business-model innovations, increasing RBF/performance-based payments, enhancing risk-sharing mechanisms to attract more investors, and integrating clean cooking with electrification goals. **2.** Increase the annual financing flow to electricity access, while significantly increasing the share of public and private financing for the DRE technologies (mini-grid and off-grid solar) in line with their share in least-cost geospatial modelling, including for pre-electrification. **3.** Construct and scale up comprehensive, innovative, and gender-responsive financial packages that consist of equity, debt, and grants; including scaling up proven instruments, such as results-based financing (RBF), and supporting further financial innovation, such as new guarantees, and securitization credit-management instruments focused on risk mitigation to leverage private-sector investments, including leveraging lending from local commercial banks. **4.** Scale up digitally enabled and gender-responsive consumer financing schemes, such as PAYG, on-bill financing, and other innovations to make electricity connections/systems and appliances more affordable, and mobilize public funding to reach the poorest consumers who are unable to afford clean cooking and electricity services, such as through social safety nets for energy access and creating an impact bond market for energy access, including clean cooking. **5.** Prioritize public and private investments in energy access in LDC and FCV countries.	• Reorient fossil fuel and other inefficient subsides that encourage wasteful consumption of energy in favour of both demand- and supply-side support for sustainable energy access expansion, especially regarding						

The Role of SDG 7.1

Universal access to affordable, reliable, and modern energy services by 2030 (SDG 7.1) is a prerequisite and catalyst for improving the living and working conditions of all the world's people. The lack of access to modern energy is a barrier to achieving several other SDGs, especially for the poorest and most vulnerable populations. Receiving access to modern energy helps people lift themselves out of poverty and enhances their prosperity, health, safety, well-being, educational, and

Access to affordable, reliable, modern, clean cooking fuels and technologies aims to protect people, especially women and children, from the adverse health impacts of traditional cooking and fuel gathering systems and to free them from the excessive time burdens and the gender-based violence risks that these involve. It raises living standards by improving health and safety conditions in households and food preparation institutions and by reducing time poverty and drudgery, and it also diminishes climate and environmental degradation. Universal access to clean cooking solutions is particularly urgent because the household air pollution (HAP) caused by continued cooking with traditional fuels and stoves has

Despite the gains in the past decade, the rate of advancement on both fronts, but especially on clean cooking, has been well below the levels required to meet the 2030 targets (Tracking SDG7, 2021) and has since been slowed by the physical, business, and economic constraints of the COVID-19 pandemic.

Energy access means providing sustainable and modern energy services to meet end-users' energy needs. Taking a human-centred approach, from the perspectives of households and businesses, the most common energy needs are cooking, lighting, heating/cooling (where applicable), and other productive energy uses. While, in theory, electricity can meet all end users' energy needs, it is not yet realistic to expect all cooking energy demands to be served by electricity by 2030. Currently, the use of electricity for cooking accounts for only 7% of the population in low- and middle-income countries (Tracking SDG7, 2021). In sub-Saharan Africa where electrification is low, 80% of primary energy use

These gains were the result of accelerated electrification options, including the **expansion of grids and the deployment of mini-grids and off-grid solar solutions.** Increased availability of data is extremely relevant as it allows governments to develop dynamic integrated electrification plans that appropriately combine these three approaches—grid densification and expansion, mini-grids, and off-grid solar technologies—into least-cost electrification pathways to universal access.

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Among the service enabled by electricity access—lighting, communications, cooling, educational, medical, and income-generating productive uses—the demand for cooling is growing especially fast in this age of climate change and pandemics

While the number of households with access to low HAP cooking solutions, such as liquefied petroleum gas (LPG), advanced gasifier stoves using wood pellets and electricity,[7] has grown over the past decade, the absolute number of people cooking with wood fuels, charcoal, and coal has also increased. Access interventions have not kept pace with population growth in communities using biomass in traditional stoves. The use of wood as a primary fuel has declined significantly, but it remains a major source of household energy across the world. Most clean-fuel gains can be attributed to large, government-driven fuel transition programs which have been able to tackle the key barriers of awareness, availability, and affordability.

COVID-19 Pandemic Impact on Energy Access.

The COVID-19 pandemic has magnified the health and economic challenges of energy access, as well as its inherent opportunities and inequalities.

Underlying chronic diseases that are predictive of the severity and outcome for COVID-19 patients are exacerbated by exposure to air pollution. This linkage suggests a heightened risk for women across all age groups who lack clean cooking solutions and continue to endure the HAP from having to cook with traditional fuels and technologies.

In the poorest and most vulnerable countries, such as in LDCs, LLDCs, and SIDS, resources for COVID responses and immediate health priorities are likely to further constrain the already limited fiscal capacity and increase the risk of energy insecurity.

The economic downturn and supply chain disruptions, due to restrictive measures, have curtailed the ability of utilities, mini-grid operators, and off-grid companies, as well as the suppliers of clean cooking fuels and stoves to operate, maintain, and expand their services. There has been a sudden drop in energy sales from the utilities' most profitable industrial and commercial consumers, which accounts for over 70% of the power sector's revenues. Sector-specific policies introduced by some countries (e.g., bill reductions, cancellations, and deferrals) will also have a large short-term, negative impacts on utility finances. The impact on smaller mini-grid and off-grid solar service providers is even more devastating. These companies are reporting severe financial distress, as their revenues have plummeted, and they are unable to raise new funds. In 2020, the drop in market growth due to the impacts of COVID-19 resulted in an estimated 10–15 million people and 300,000–450,000 enterprises missing out on improved energy access (GOGLA, 2021b).

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5 CHALLENGES

The pathways of receiving and providing universal access of modern energy services—the fuels and technologies adopted, the financing mechanisms used, and the inclusiveness of the planning, decision-making, investment, entrepreneurial, and operational tasks involved—are critical to maximizing the role of SDG 7.1 in meeting associated sustainable development goals and to achieving net-zero emissions in a just and inclusive way by 2050.

While the immediate effort is to ensure the world is back on track to meet SDG 7.1 by 2030 by meeting the critical 2025 targets, the medium- to long-term strategy will have to be to dramatically reduce unmitigated fossil-fuel combustion in order to achieve net-zero emissions by 2050. This can be particularly challenging for access to clean cooking, as LPG and natural gas are scalable clean cooking solutions but could make the net-zero-emissions goal more difficult to achieve. As countries need to balance the strategy of achieving short-, medium-, and long-term goals, the international community needs to commit scaled-up international climate and development finance to help countries to eventually phase out fossil fuels and align with the net-zero-emissions target by 2050.

Despite the increasing political commitment to the goal of universal energy access by 2030, the current rate of expansion of electricity and clean cooking technologies and fuels, which is highly uneven across regions, is insufficient to achieve SDG 7 by 2030. The pace is constrained by (i) inadequate development and/or suboptimal implementation of **enabling policy and regulatory frameworks**; (ii) incomplete **social-economic inclusiveness of energy access**, (iii) misaligned **costs, reliability, quality, and affordability of energy services**; and (iv) insufficient and misdirected

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Inadequate and Suboptimal Enabling Policy and Regulatory Frameworks

According to the Regulatory Indicators for Sustainable Energy Report (RISE),[8] there have been improvements in policy and regulatory frameworks in recent years,but only a quarter of RISE energy-access-deficit countries[9] have enacted advanced enabling frameworks for electricity access, and fewer have done so for clean cooking (ESMAP, 2020a). In both cases, these figures need to increase to 100% by 2025, given that such strategies and plans are the essential first step in driving ambitious nation-wide energy access–expansion programmes.

The lack of coordination within and between institutions in country contexts has stymied cooking interventions from becoming high-impact policy priorities. Multiple countries in sub-Saharan Africa—where financing could potentially have the greatest impact—have seen financing commitments more than halve in the past decade. This challenge is exacerbated by the cross-cutting nature of cooking policy and interventions. Truly holistic solutions require the participation of stakeholders across multiple sectors, ranging from energy, health, climate, industry, and finance to rural and urban development, gender, and social protection, among others. **The absence of 'champions' and intergovernmental coordination** has therefore hindered progress in the **clean cooking** sector.

Policies frameworks supporting access to clean cooking are at an advanced level (RISE green zone) in only 15% of the countries with access deficits in clean cooking solutions.[10] In addition, many countries are still without clear access targets for cooking. While governments may include accelerating access to modern cooking energy in their policy agendas, they often lack the required institutional leadership and incentives for making major progress. Furthermore, a lack of integrated energy planning often isolates electrification programs fr

For grid electrification, which is still the predominant electrification technology in most of the 95 energy-access-deficit countries, the poor creditworthiness of utilities has been the largest constraint slowing electrification efforts. Addressing utility performance has registered the least progress in the past decade and is likely to worsen as a result of COVID-19 impacts. It is particularly concerning that the utilities in low-access countries have lower cost-recovery compared to the utilities in higher-access countries, meaning the former have meagre financial resources for grid expansion. For example, utilities in 75% of countries with an electrification rate below 33% do not recover their operating costs before subsidies are considered (World Bank, 2021b).[12] Utilities should improve their commercial performance by leveraging the data they have to follow a more customer-centric approach and by improving customer engagement/communications.

While the frameworks for mini grids and off-grid solutions are more advanced than grid frameworks,

Female headed households (FHHs) and women in the energy business, in particular, face additional inequalities and challenges, because (i) there is a lack of data and market information about women customers, their needs, and the characteristics of their energy demand; (ii) unequal access to assets

especially lower-income rural and increasingly urban ones. This narrow framing leads to the promotion of solutions that are less likely to be adopted and used by the consumers they seek to help, which in turn makes the supply sector unattractive for investors and policymakers.

A more complete and rigorous perspective on cooking would re f ects local users' concerns for exposure, e f ciency, convenience, safety, affordability, and availability in the context of local fuel and stove market conditions.

In-depth data from MTF makes it possible to understand stacking behaviour (i.e., use of multiple stoves and fuels in the same household) and thus be able to distinguish between the negative trend of "dirty" stacking with polluting, traditional stoves and fuels and the high potential of "clean" stacking. Even in

Considerable progress has, however, been achieved in reducing connection fees for grid electrification in recent years. Some 52 out of 54 low access countries are now considered to have affordable connection fees (ESMAP, 2020a).[14] However, the poorest and more vulnerable households may still find affordability barriers, particularly where connection fees have to be paid upfront and where additional expenses, such as for internal wiring, are needed. For example, as evidenced by the Multi-Tier Framework (MTF) surveys,[15] high connection fees and associated expenses to get a connection continue to be the primary reasons why 'under the grid' households are not connected. Affordability of off-grid solar systems also significantly improves when consumer financing options are offered (World Bank, 2020. [MTF surveys]). However, consumer financing options, including digital and pay-as-you-go (PAYG) technologies, are not yet widely available in the majority of low-access countries, in particular for rural consumers.

Utilities should operate under a customer-centric approach rather than a utility-centric solution, using real-time data to systematically refine their business model and tailoring services to specific consumer segments and needs. They can be helped by technologies to achieve this. Conversely, to acquire and customize the right set of technologies, a utility providing end-consumer services must have good information on the changing needs of its customers and a deep understanding of the existing customer classes (residential, public institutions, small and medium commercial, industrial, agricultural), as well as emerging (e-mobility).

Furthermore, data from MTF surveys and impact evaluations show that electrified households, particularly in rural areas, have very low ownership of appliances and are thus not reaping all the benefits of electrification. Energy-efficient appliances would make services more affordable, but there are often issues of appliance availability (they may not be available for purchas0 0 0 10ilabilvvas af (p)0045(da)]TJEMC

increased international public finance. However, only one third of this finance (USD 12.6 billion) benefted

For mini-grids and off-grid solutions, the principal barriers are the relative novelty of the technologies and new business models (including uncertainty about the demand profiles of mini-grid users) and the sector's preponderance of start-up companies, which are also perceived to be risky, many of which are yet to achieve the path to profitability. Additional barriers arise from the general country risks of the low-access areas where these companies operate. Financing flows, especially to smaller companies, have normally been constrained, but are worsening under COVID conditions. For mini-grids especially, private-sector debt financing has remained the main bottleneck. Access to local currency debt, in particular, is difficult to obtain for both mini-grid and off-grid solar companies.

is twofold: (i) insufficient financial flows for access; and (ii) unbridged gaps between the needs, constraints and incentives of consumers on one hand, and energy suppliers, equipment distributors, private investors and lenders, and public funders, on the other. End users require credit or flexible payment methods to be able to afford the connection costs and the upfront investments in systems and appliances. Service providers require access to low-cost working capital to finance the systems over long repayment periods. The capital also needs to be made available in both local and foreign currency to efficiently manage currency fluctuation risks, as is evident from the COVID-19 crisis and other past external shocks. However, without more targeted demand-side interventions, the existing market in

6 RECOMMENDATIONS

Achieving SDG 7 will require a **system-level paradigm shift, challenging the habitual ways in which energy policy and investments are directed**. SDG 7 calls for an integrated approach that delivers on

The pace of electrification needs to increase from the current 1.5 percentage points to at least 2 percentage points per year, which will raise global electrification rate by 2025 to 94%. (ESMAP calculations based on Tracking SDG7, 2021).[21] This will require, among others, building 14,200 mini-grids per year by 2025, from the less than 1,000 today[22] (ESMAP, 2019), while the global sales of the off-grid solar systems (Tier 1 and larger) need to increase from 15 million in 2019 to 30 million by 2025.[23] Country-specific pathways and roadmaps are needed to guide the countries' transitions up to MTF Tier 5 levels of capacity, availability, reliability, quality, affordability, formality, and safety of electricity access 5 (00)10.5 ( )]TJETEM≥149.7 .

and interdependencies, acknowledging the multi-dimensional character of cooking practices and electricity uses, and addressing underlying inequalities. Furthermore, communities and users should be seen not only as beneficiaries, but also as co-creators of future energy systems. People-centred energy-access approaches will also need to include a social safety net to deliver modern energy services to those people who cannot afford the full cost of access to electricity and clean cooking. Clean cooking interventions will be successful only if they address cooking preferences and behaviours. The user-centric approach is at the heart of the Modern Energy Cooking Concept (MECS). This approach acknowledges the multi-dimensional character of cooking practices and the need to consider variations in cooking practices, preferences, and behaviours, including fuel and stove stacking, in designing and implementing clean cooking policies and interventions. Similarly, electrification efforts need to transition from counting connections to delivering energy services (which include cooking services) that enable users to enjoy the full benefits of reliable and affordable electricity access, including the ability to deploy appliances and equipment for both domestic and income-generating/productive uses. This should be supported as part of energy-access expansion efforts. Research and entrepreneurship, in which a critical role will be played by women and youth, will be important for driving innovations in clean cooking and electrification technologies, and business models, supported by enabling policies and regulations, to drive down the costs of energy services, make them affordable, and ensure that they are aligned with user needs and preferences. These innovations need strong support from governments, development partners, and financiers. The reliability and quality of energy services, essential for human and economic development, need to be emphasized for all technologies and business models. For the clean cooking and decentralized renewable energy (DRE) sectors, quality standards in line with international best practices are needed, and governments should continue to play a key role in adopting, implementing, and enforcing them. Development partners should work with governments and service providers to increase access to high-quality, energy-efficient appliances and productive use equipment, including through the provision of affordable end-user financing.

RECOMMENDATION 5

Lack of access to clean cooking and electricity is disproportionately affecting the low-income and vulnerable segments of the population, including displaced people and host communities, which face affordability constraints for clean cooking stoves, fuels, electricity services, and appliances alike. Women and girls are also disproportionately affected. Evidence from various coun (vUS)/MCIDg04900520t5909(o)7 (v)6 ser(o)6isprelectr(en-US)/MCID 281

while ensuring that these efforts also leverage the opportunities to create jobs, improve livelihoods, build human capital, and engage youth and women. Gender gaps should be closed through the support of gender-transformative strategies, enhancing the role of women in the energy sector as beneficiaries, employees, and entrepreneurs, and raising their voice in decision-making. Affordability constraints need to be addressed through a careful design and implementation of sustainable, efficient, and targeted end-user subsidies, which should be prioritized by governments and the international community. Furthermore, public and community institutions providing essential services, such as health, education, and clean-water provision, require special attention as users to increase their resilience to future shocks and support human capital formation; they can also be leveraged as vectors for raising awareness for change. As the gap in finance needed to provide energy access in the LDCs is vast, there is an urgent need to increase funding for energy access, and to deliver on climate finance pledges allocated to LDCs. This can have a direct impact on accelerating poverty eradication and as a key enabler for sustainable development.

RECOMMENDATION 6

Enterprises with innovative, cost-effective, and scalable energy-access business models must be supported so that they can expand their operations and rapidly accelerate access. The private sector

BOX 1. SPECIFIC ACTIONS ON DATA AVAILABILITY AND QUALITY

- **End-user data**
  -
  - To collect more detailed and nuanced data on access to electricity and clean cooking at the end-user level by integrating the recommended energy module into the national household survey.
  - To build the capacities of statistical agencies, for instance, national statistical o f ces (NSOs) and other key stakeholders involved in data collection and use.
- **End-user insights**
  - Governments, with support of development partners, industry associations and civil society organizations
  - To invest in generating stronger user insights by supporting enterprises and entrepreneurs in conducting deeper user research, and in generating coordinated research and analysis on user needs and behaviours related to cooking and productive use.
- **Supply-side data**
  -
  - To encourage utilities to make supply-side data more reliable and publicly available.
  - To build capacities of statistical agencies and other key stakeholders involved in data collection and use.
-

Key Building Blocks

The 2025 outputs referenced above, and the associated paradigm shift, will require accelerated and sustained progress in: (i) reinforcing the **enabling policy and regulatory frameworks**, (ii) enhancing **social-economic inclusiveness of energy access**, (iii) aligning the **costs, reliability, quality, and affordability of energy services**, and (iv) catalyzing, harnessing, and redirecting
to the degree needed to deliver universal energy access by 2030.

This section summarizes recommendations for each of these essential building blocks, sets milestones to be achieved by 2025, and prioritizes immediate actions to deliver on these milestones.

BUILDING BLOCK 1: REINFORCING THE ENABLING POLICY AND REGULATORY FRAMEWORKS

Comprehensive energy-access strategies. All access-deficit countries should adopt comprehensive national electrification and clean-cooking strategies and integrate energy-access priorities into their broader economic development and climate strategies, including nationally determined contributions (NDCs). The national strategies and accompanying plans should have specific targets and milestones, be up-to-date, well-consulted and publicly available, and integrate best practices. The strategies and plans, including targets and milestones, must be country- and context-specific and, in particular, reflect the user-centric approach described in Recommendation #3, and provide context-appropriate solutions to electrify all segments of the population, productive use and public institution segments, based on the 'leave no one behind' approach, described in Recommendation #4. It is therefore recommended that the plans should provide targets for tiers of access, specifically targeting the highest-possible tiers that are technically, economically and financially feasible, while ensuring, however, that everyone gets access to at least basic energy-access service in the shortest possible time period, while specifically addressing affordability constraints.

countries with clean cooking RISE scores above 67 (advanced framework) must increase to 100% from the current 15%. For clean cooking, all strategies need to particularly highlight (i) institutional strengthening, (ii) building of/3026005DID 2957 BDC BT/TT0 1 Tf1n(BTginstit957 Bgipolicy1n0520004≥19. 8Te2 (an

Enabling policy and regulatory environment. Both the electricity and clean cooking sectors need to continue to improve their enabling ecosystems, including their policy and regulatory frameworks. The RISE score is used here as a proxy for progress, given that it encompasses a wide range of indicators

particular, requires the most immediate attention. Only 10 out of 54 utilities in the energy access–deficit countries (see footnote 2) were considered creditworthy in the 2020 RISE report, while 12 countries' utilities were moderately creditworthy (ESMAP, 2020a).

with utilities that are considered at least moderately creditworthy (medium and advanced framework) must increase to 100% from the current 41%. Achieving the 2025 milestones would require all utilities to be raised to at least a moderate creditworthiness status. Strong, financially viable utilities are required in order to play their part in the delivery of the ambitious national electrification plans adopted by the governments. This will require specific policy and regulatory measures to support the financial viability of utilities and also innovative partnerships with the private sector.

In addition, governments need to pay more attention to the actual implementation of enabling measures, for example, efficient and consistent implementation of mini-grid regulations, consistent application of customs duty waivers, enforcement of quality standards etc., in order to stimulate the regulatory stability needed for attracting private investment. This also requires governments to engage proactively in dialogue with industry associations, to ensure that measures are, and remain, targeted, effective, and efficient, given how, so often, 'the devil is in the detail'. The efficiency of government processes needs to improve, particularly in terms of streamlining and reducing the time of regulatory approvals, and of improving the efficiency and transparency of subsidy allocation.

Achieving the targets stated below will therefore require development partners to step up their technical assistance to governments, ensuring that this assistance is prioritized in energy access–funding allocations. This is a necessary step. Without continued significant improvements in enacting, implementing, and enforcing enabling frameworks, it will be impossible to utilize financing for energy access investments in an efficient and sustainable manner, no matter how much the financing increases.

Private-sector and development partners should also support the creation of national renewable energy associations to facilitate dialogue between government and the priv6 ⊖t3de tion.

BOX 2. IMMEDIATE ACTIONS TO SUPPORT DELIVERY OF THE 2025 MILESTONES FOR REINFORCED ENABLING POLICY AND

- To assign champions to support intergovernmental coordination for clean cooking and consider establishing 'clean cooking delivery units' with the expertise required to drive multi-sectoral clean cooking interventions.
- To design and implement innovations to improve business environments, such as e-government initiatives and online platforms to manage electrification and cooking programs both efficiently and transparently.
- Civil society organizations to promote public access to energy-access strategies and plans and to monitor accountability of governments for their implementation.

- **Fiscal policies**
  -
  - To align their fiscal policies to ensure that these are not constraining the affordability of clean energy access for the poor
  - To assess the economic costs and benefits of fiscal exemptions for clean cooking and distributed renewable-energy products and components.
  - To reorient fossil fuel subsidies, where they exist, towards supporting renewable energy and clean cooking solutions.

- **National electricity utilities**
  -
  - To empower and incentivize the national electricity utilities to improve their technical and financial performance through cost-effective tariffs, reduction of losses, digitizing their networks, supporting investments in lower-cost, climate-friendly generation, and promoting ã e] ά tnanciag t]f%le and bqn] ˜ iipnccti o

BUILDING BLOCK 2: INCREASED SOCIAL-ECONOMIC INCLUSIVENESS OF ENERGY ACCESS

Inclusive energy access—equitable and fair for everybody—is central to SDG 7.1 and needs to be mainstreamed throughout all energy-access interventions in order to leave no one behind, as is already being achieved by many organizations.

Pro-poor and vulnerable approaches and subsidies. Across the board, there is an urgent need to demonstrate and scale up approaches aimed at reaching poor and vulnerable communities and households (including female-headed households and women beneficiaries, as well as displaced persons and host communities). Governments, development partners, and financiers should adapt their approaches to prioritize support to local entrepreneurs, last-mile distributors, and non-profit and other organizations that are specifically targeting these population segments. Considering that off-grid solar solutions, due to their costs and modularity, tend to be the main technology reaching the poor, remote, and vulnerable consumer groups, **by 2025, the number of active off-grid solar markets in energy**

Income remains a fundamental driver of both fuel and stove demand, with the lowest quintiles most dependent on the historically most affordable fuels—primarily wood and charcoal. (ESMAP, 2020b). For

electricity, it has been estimated that at least 100 million households will not be able to afford even a Tier 1 off-grid solar system, the lowest-cost electrification option, even offered with a financing package, such as PAYG. (World Bank, 2020; DFID ACE 2020). Achieving universal access, will require end-user subsidies, including in sectors that have shied away from them in the past, such as off-grid solar. **By**

to 25 from the current 2.

Gender equity and jobs. Energy access–expansion efforts open job opportunities in newly created supply chains and productive uses. Off-grid decentralized renewables already account for increasing numbers of direct jobs, especially in Africa, as well as boosting employment in agro-processing, health care, communications, local commerce, and productive uses. (IRENA, 2020). **By 2025, the productivity of female farmers and business owners, as a result of productive uses of electricity in energy**

This broader emphasis on improved livelihoods and jobs in energy access–expansion programs also provides an opportunity to further advance gender-equality goals. Compared to the average gender wage gap of 14.6% in low-income countries, the distributed renewable energy sector in particular already seems to have greater gender parity in its compensation policies, which these efforts can build on (Power for All, 2019). To leverage the new opportunities, however, countries will need to invest in more vocational training, stronger curricula, more teacher training, and expanded use of information and communications technology for remote learning (IRENA, 2020). Special efforts are needed to increase the share of women employed in energy-access companies and energy-related supply chains, as well as the share of those engaged in productive uses of energy. **By 2025, the share of women entrepreneurs and employees in the energy-access sector (energy-access companies and value chains) must increase to 50%.**

There should be support for gender-transformative strategies that leverage opportunities, instruments, and new business models and solutions to enhance the inclusion of women in the energy sector, with a

In this context, displaced persons, including youth and host communities lacking basic energy access, require special attention. Accordingly, they should have priority energy-access support programmes that particularly ensure basic health, education, water pumping, cooking, and street lighting services. These can be achieved by (i) dedicated energy-access programs for displaced people and their host communities, for instance, as part of humanitarian processes and/or (ii) integrating energy-access provision for this target group into national energy-access plans. The goal of the humanitarian sector, namely, to decarbonize its own fossil fuel–powered infrastructure using a private-sector delivery model, also provides it with an opportunity to extend sustainable energy access to displaced persons and host communities that are supported by the humanitarian sector (UNHCR, 2021).

TABLE 3. SOCIAL ECONOMIC INCLUSIVENESS OF ENERGY ACCESS TO BE ACHIEVED BY 2025

Social-Economic Inclusiveness of Energy Access	2020	2025
Average RISE scores for countries experiencing fragility and conflict for clean cooking access	21[38]	67 or greater
Average RISE scores for countries experiencing fragility and conflict for electricity access	40[39]	67 or greater
Share of access-deficit countries with integrated national plans/programs including productive uses, public institutions, and support for poor and vulnerable households, with RISE scores above 67 (advanced frameworks)	30%[40]	100%
Number of active off-grid solar markets in energy access–deficit countries[41]		

BOX 3. IMMEDIATE ACTIONS TO SUPPORT DELIVERY OF THE 2025 MILESTONES FOR INCREASING SOCIAL-ECONOMIC INCLUSIVENESS OF ENERGY ACCESS

- **End-user subsidies**
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  - To design, demonstrate, and scale up sustainable, e f cient, and targeted end-user subsidies, in particular for the off-grid solar and clean-cooking sectors to bridge the affordability constraints related to poor, remote, and vulnerable households, including displaced persons.
  - Provide data and facilitate and encourage knowledge exchange on emerging best practices and lessons from **subsidy designs and implementation**.
- **Support business models delivering services to poor, remote, and vulnerable households**
  - *Development partners and f nanciers*
  - To adapt their approaches to integrate speci f c f nancing and technical assistance (TA) windows and/or other targeted support for local businesses, last mile distributors, non-pro f ts, community, and other organizations speci f cally serving remote, poor, and vulnerable population segments at risk of being left behind.
- **Gender equity**
  -
  -

will boost the development, selection, and promotion of quality clean-cooking products to meet end users' cooking needs. Governments should play a key role in localizing international clean cooking standards through close coordination with international standard-setters, strong domestic monitoring and enforcement, and it should engage critical players, where needed, to strengthen capabilities. **By 2025, the number of countries that have adopted standards and labelling for clean cooking technologies and fuels with RISE scores above 67 (advanced frameworks) must increase to 30 from the current 6.** In the off-grid solar sector, governments should continue the adoption (and the implementation and enforcement) of international quality standards. **By 2025, the number of countries that have adopted off-grid solar international standards must increase to 45 from the current 26.** In addition, continued support to quality assurance by both the off-grid solar industry and development partners is required.

must improve to 50% from the current 32%.[51]

The reliability and quality of grid electricity need to improve as a matter of urgency. Based on the available MTF surveys from electricity access–deficit countries, grid users are typically concentrated in Tiers 3 and 4 (and even lower tiers in some countries). This means that users suffer frequent interruptions and voltage fluctuations, whicg Ã]

TABLE 4. COSTS, RELIABILITY, QUALITY AND AFFORDABILITY OF ENERGY SERVICES TO BE ACHIEVED BY 2025

Costs, Reliability, Quality and Affordability of Energy Services	2020	2025
Average MTF tier of grid electricity in energy access-de f cit countries	3-4[52]	4 or greater
Mini-grid service uptime on average	90[53]	97[54]
Share of quality veri f ed off-grid systems on the market (in Tier 1 product category)	32%[55]	50%
Number of countries that have adopted international quality standards for stand-alone systems with RISE scores above 67 (advanced frameworks)	26[56]	45
Number of countries that have adopted standards and labelling for clean cooking technologies and fuels with RISE scores above 67 (advanced frameworks)	6[57]	30
Average unit tariff from grid supply in the top 20 impact countries.	USD 0.10/ kWh[58]	USD 0.08/ kWh
Consumer price of 40 kWh of mini-grid consumption at unsubsidized LCOE	USD 16-20[59]	USD 10[60]
Number of new customers purchasing off-grid solar through PAYG per year	2.2 million[61]	6.7 million
Number of access-de f cit countries, where PAYG is operating at scale[62]	8[63]	20

BOX 4. IMMEDIATE ACTIONS TO SUPPORT DELIVERY OF THE 2025 MILESTONES FOR ALIGNING THE COSTS, RELIABILITY,

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  -
    - To lead clean cooking transitions that reflect diverse user needs, local market conditions, and national comparative advantages on energy resources, while addressing inequalities.
    - To advance user-centred innovation to drive down costs, improve performance, and improve service delivery to achieve long-term business sustainability and scalability. For example, development partners could consider setting up a user insight lab, a focused initiative to invest in generating stronger user insights by supporting enterprises and entrepreneurs in conducting deeper user research, as well as more coordinated research and analysis on user needs and behaviours, in particular related to cooking and fuel/solutions stacking.
-

As LDCs account for the majority of the de f cit,
electricity access should be directed to LDCs. The main obstacles regarding f nancing for sustainable energy in LDCs include the high costs inherent to the energy sector (starting from project preparation to high initial investment costs), limited access to funding due to poor or non-existent credit ratings, and a lack of understanding by domestic and foreign private-sector partners of the business case that exists in LDC energy sector.[65]

for demand-side subsidies for off-grid solar to bridge the affordability gap must increase to USD 0.34 billion, up from the current less than USD 0.01 billion. These funds should be allocated for end-user subsidies to close the affordability gap for the poorest population segments, as described in the Building Block 2 (World Bank, 2020).[66]

Closing the f nancing gap will require both public and private resources to be leveraged, including through increased and sustained commitments from DFIs and philanthropies. It will also require the private-sector arms of DFIs to be willing to take higher risks in order to channel larger f nancial resources to private-sector enterprises involved in energy access expansion, in the mini-grid, off-grid solar, and clean-cooking sectors. Philanthropies can play a critical role in de-risking the sector, while further enhancing the focus on impacts.

Closing the f nancial gap will also require scaling up instruments that are proven to work, such as results-based f nancing (RBF), tapping into new potential sources of funding, such as innovative forms of blended f nance, unlocking local debt f nance (which remains a major challenge for energy-access f nancing), developing more innovative instruments for risk mitigation (including f rst-loss portfolio guarantees, securitization, credit management), and attracting more early-stage equity into the sector.

Financing to achieve universal electricity access will be needed across the entire spectrum of the value chain. End users require credit or f exible payment methods to be able to afford the connection costs, as well as the upfront investments in systems and appliances. Service providers require access to low-cost working capital to f nance the systems over long repayment periods. The capital also needs to be made available in both local and foreign currency to e f ciently manage currency f uctuation risks, as is evident from the external shocks of the past.

Grant funding will be needed to support innovation and help scale up promising business models for both decentralized electri f cation and clean cooking. In particular, in the clean- cooking sector, grant funding will need to increase drastically to play the catalytic role of (i) correcting a temporary market failure by monetizing the full co-bene f ts of access to clean cooking fuels and stoves that are not currently priced in by the market, (ii) subsidize the costs of market actors to build customer awareness and market adoption, and (iii) improve the viability of clean cooking businesses to attract private-sector ,

Results-Based Funding, in particular, has proved to be an effective instrument for scaling up mini-grid, off-grid solar, and clean-cooking access. It is versatile in the sense that it can be structured and targeted to fulfil specific program objectives for example, by accelerating market scale up, reaching underserved

TABLE 5. ENERGY ACCESS FINANCING TO BE ACHIEVED BY 2025

Energy Access Financing	2020	2025
Annual financing (public/ private) flows to clean cooking access	Tens of millions[67]	USD 25 billion[68]
Share of annual financing flows to clean energy access going to Least Developed Countries (LDCs)		15% of total financing

- **Electricity funding priorities**
  -
  - To reassess and ensure that the packages are consistent with country energy-access strategies and plans.
  - To signi f cantly increase the volume and share of funding f owing to mini-grid and off-grid technologies.
- **Scale up proven and develop new innovative instruments for electricity and clean-cooking funding instruments**
  - *Governments and f nanciers, with help of development partners*
  - To construct and scale up comprehensive and innovative f nancial packages that consist of equity, debt (including impact bonds), and grants (including RBF/performance-based grants), scale up proven instruments, especially RBF.
  - Explore further f nancial innovation and put in place new guarantees, and securitization credit-management instruments focused on risk mitigation to leverage private-sector investments, including leveraging lending from local commercial banks.
  - Explore innovations for f nancing affordability gaps such as through social safety nets for energy access, supporting by sustainable sources of f nance, such as impact bonds
  - Scale up digitally enabled consumer f nancing schemes, such as PAYG, on-bill f nancing, and other innovations to make electricity connections/systems and appliances more affordable.
-
  - *Industry associations, with inputs from f nanciers, development partners and service providers*
  - Help investors better assess and manage risks of investing in energy-access service providers
  - Help governments and development partners better understand the need for grants and subsidies to help scale up the market.

In implementing these building blocks, synergies with other SDGs must be supported through a set of interlinked actions, including (i) elevating the priority and drastically scaling up f nancial resources for clean-cooking access (SDGs 3, 5,10, and 13); (ii) setting up policies, business models, and f nancing mechanisms targeting the poor and vulnerable populations, improving livelihoods, and building human capital (SDGs 1 and 10); (iii) integrating electri f cation of healthcare and education facilities in the national energy-access strategies and plans, including enhancing sustainability of these efforts (SDGs 3 and 4);0 0 0 1n6 (en0 0 0 1 (4);)1.8lc/500004≥169.5p450005900480hessainability)3.5 (of these)2.2 (efforc3

Affordable, reliable, and modern energy services are prerequisites and catalysts for many aspects of sustainable development. Their use conveys benefits for poverty reduction, economic growth, human development, and environmental protection.

The many synergies of SDG 7.1 and other SDGs highlight the crucial roles of energy access. They also reveal how beneficial and important collaboration among the stakeholders working in energy, health, climate, industry, and finance is to rural and urban development, gender, and social protection, among others.

Access to both electricity and clean cooking solutions are crucial to meeting the other SDGs. While contributing similarly to reducing poverty, each furthers different SDGs in different ways. **Access to electricity services access** works to provide convenient, affordable, life-enhancing amenities and to strengthen economic opportunities. Besides improving basic living standards, it mainly affects the economy, employment, and the quality of health and education services. **Access to clean cooking solutions** aims to avoid the adverse impacts—the human health and environmental costs—of traditional cooking and fuel-gathering systems. While it, too, raises living standards, it primarily affects health, climate, and environmental conditions, and the time-poverty of women and children.

Impact on Poverty and Livelihoods, with ETEMC

It is a form of poverty because it restricts human beings' capabilities of meeting their needs and realizing

Studies investigating the effects of increased energy on GDP show that the size of the power sector determines the growth and level of GDP, but that increases in the quantity and quality of transmission and distribution infrastructure were associated with reductions in inequality. There is consensus that is a key contributor to economic growth (Alam, M.S., M.D. Miah, S. Hammoudeh, and A.K. Tiwari (2018)).

The energy sector creates job opportunities. Youth are well suited to benefit from the emerging opportunities in the renewable energy sector, especially upskilling and employment.

As business models for providing energy access spread and mature, the expansion of off-grid renewable energy solutions creates growing employment. Information remains relatively sparse, but a number of reports are shedding light on this fast-evolving situation. A 2017 study (Hystra, 2017, cited in UN DESA , 2019) compiled information on direct employment provided by companies operating in the energy access field. A 2018 study by the organization GOGLA regarding direct employment in the off-grid solar sector (looking at sales data and information from close to 40 companies), estimated that direct employment in the off-grid solar sector in sub-Saharan Africa and South Asia runs to about 450,000 full-time equivalent jobs and could rise to 1.5 million by 2022. This estimate covers the sales and distribution, installation and maintenance, and customer-support segments of the value chain, but excludes manufacturing and assembly, which takes place primarily in countries like China (photovoltaic [PV] panels) and Germany (batteries). Depending on the business model, there are employment opportunities in sales and distribution (cash-based transactions) or in technical jobs such as software design, logistics, and customer service (pay-as-you-go model). Improved energy access enables productive uses of energy and catalyses local economic activity, creating income streams and additional employment (GOGLA, 2018, cited in UN DESA , 2019).

The provision of **clean-cooking solutions** enhances employment opportunities and economic growth by freeing up time, primarily that of women and children, from cooking and related fuel-gathering. A number of studies have demonstrated measurable benefits for health from cleaner cooking solutions (Smith , 2011); Alexander , 2018). A study of improved cook stoves in Kenya showed their use not only led to reduced fuel consumption and symptoms associated with exposure to HAP, but also to more household time for income-generating activities, childcare, and leisure activities (Samad and Portale, 2019b).

Impact on Human Capital

Good Health and Well-Being (SDG 3)—Clean cooking solutions are the key intervention needed to address the adverse health impacts from household air pollution. Cooking with clean fuels and technologies could help avert close to 4 million premature deaths a year from HAP-related pneumonia

Electricity

Impact on Environment

Climate Action (SDG 13) Universal use of **clean cooking solutions** would avoid an estimated 1 gigaton of carbon dioxide (CO_2) emissions per year—about 1.9–2.3% of global emissions—caused by burning non-renewable woodfuels for cooking (Bailis , 2015). It would also avoid up to 58% of global carbon black emissions. Avoiding these adverse climate and other environmental degradation impacts would save an estimated USD 0.2 trillion per year (ESMAP, 2020b). Universal access to **electricity** is estimated to cause a negligible increase in greenhouse gas (GHG) emissions if the energy demand of the affected population remains low. According to the Energy Access Outlook 2017 of the International Energy Agency (IEA), providing energy for all generally does not have a signifcant impact on energy demand. The 'Energy for All' case accounts for an additional increase of just 0.23% in global energy demand in 2030. Accordingly, at frst glance, achieving universal energy access is not in confict with achieving climate objectives.

However, energy and cooking access in this sense refers principally to very basic energy services, such as the provision of lighting. At the same time, productive uses of electricity that go beyond the consumption required for private household applications, for example, in a small family-run workshop or larger commercial energy uses, are expected to catalyse an increase in economic development across all sectors. Systematic encouragement of productive uses, as well as their adequate monitoring, leads to exorbitantly higher energy demand and consequently to correspondingly higher GHG emissions, if not met exclusively by renewable energy (UN DESA , (2019).

Life on Land (SDG 15) Clean cooking solutions would avoid the forest degradation and localized deforestation caused by biomass-fuelled cooking. However, the current consensus view is that the collection of frewood for energy is not a major contributor to deforestation in comparison with land clearing for agriculture, timber harvesting, road building, commercial and residential development, and

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ENDNOTES

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55 access-de f cit countries), energy e f ciency, and renewable energy. RISE provides a reference point to help policymakers benchmark their sector policy and regulatory framework against those of regional and global peers, and it is a powerful tool to help develop policies and regulations that advance sustainable energy goals. Electricity Access is assessed by performance on (i) electri f cation planning, (ii) scope of o f cially approved electri f cation plan, (iii) framework for grid electri f cation, (iv) framework for mini-grids, (v) framework for stand-alone systems, (vi) consumer affordability of electricity, (vii) utility transparency and monitoring, and (viii) utility creditworthiness. Clean Cooking is assessed by progress on (i) planning, (ii) scope of planning, (iii) standards and labelling, and (iv) incentives and attributes. RISE indicators are scored on a 0–100 scale and grouped into three categories based on a 'tra f c light' system: green indicating a relatively mature policy environment though in some cases still with room for improvement (for the highest third of scores, 67–100, these are the 'advanced frameworks'); yellow indicating that the country has begun to make serious efforts tofor the highest tl

[17] Tier 1 and higher

[18] ESMAP estimates of financing needs that include the cost of clean stove, subsidies needed to fill the affordability gap on fuel expenditures, and downstream infrastructure essential to the functioning of clean cooking market. The amount is higher than the USD 6 billion estimated by Tracking SDG7 (2021) which only considers stove costs, but lower than USD 150 billion needed to achieve universal access to MECS by 2030, as it does not account for additional investments needed to fully eliminate stove/fuel stacking (ESMAP, 2020b).

[19] The 6 billion USD only includes costs of clean cookstoves and does not factor in the additional costs for clean fuels and other necessary infrastructure arrangements

[20] This scenario also assumes that access to improved cooking services (MTF tiers 2 and 3) need to increase from 16% to 25% by 2025 and to 35% by 2030.

[21] Assuming linear progress, the annual rate of electricity access expansion would need to increase from 1.5 percentage point to 1.7 percentage points. Considering, however, that electrification efforts are likely

[37] ESMAP, GOGLA, ACE and Shell Foundation, for example, are jointly working on establishing the End-User Subsidy Lab, as the key resource center for Governments, development partners and private sector, supporting design and implementation of end-user subsidies in the off-grid solar sector

[38] ESMAP (2020a). The target is the minimum score needed to achieve on average an advanced framework for the group of FCV countries. This score is considered indicative of developing framework required of attracting required public and private financing.

[39] ESMAP (2020a). The target is the minimum score needed to achieve on average an advanced framework for the group of FCV countries. This score is considered indicative of developing framework required of attracting required public and private financing.

[40] ESMAP (2020a). To drive the needed progress in pro-poor electrification (including displaced persons), productive use stimulation and electrification of public institutions, it is considered essential that these three

[59] ESMAP (2019), Mini Grids for Half A Billion People

[60] ESMAP (2019), Mini Grids for Half A Billion People

[61] GOGLA (2021b). The target is based on assumption of a year-on-year growth rate of 25%

[62]