

Mission Energy Access for a Just and Sustainable Future for All

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Access to clean energy access is essential to sustainable human development. We thus have a responsibility and an opportunity to meet the global goal of ending energy poverty by 2030. We propose the creation of a new Mission Energy Access programme to support this aim.

Despite efforts to enhance energy access, there were about 675 million people worldwide who didn't have access to electricity and about 2.3 billion people who didn't have access to clean cooking facilities in 2021.¹ Further, in the absence of additional efforts and measures, as many as 660 million people (mostly in Least Developed Countries (LDCs) and in sub-Saharan Africa) will remain without electricity access and 1.9 billion people will still be dependent on polluting fuels and technologies (mostly biomass used in traditional cookstoves) for cooking in 2030.² This is a betrayal of the global commitment to ending energy poverty by 2030.

Access to clean energy, while an end in itself, also has several knock-on benefits across the development spectrum. The lack of access to clean energy adversely impacts health, availability of decent work, access to education, gender equity and the ability to move away from poverty. For example, household air pollution, mostly from smoke resulting from combustion of biomass, kerosene or coal for cooking, is linked to as many as 3.2 million premature deaths a year.³ Unfortunately, most improved biomass cookstoves do not reduce emissions sufficiently in practice to eliminate these health impacts.⁴⁵ Women and children, typically responsible for the collection of firewood and cooking, bear the greatest burden. Thus provision of clean household cooking energy has implications for Sustainable

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Development Goals (SDGs) 1, 3-5. Similarly, enhancing electricity access contributes to the achievement of SDGs 1-6 and 8.

Access to clean and modern energy also enables countries and peoples to reduce – and eliminate – greenhouse gas (GHG) emissions. Biomass used for cooking is estimated to contribute to 1.9-2.3% of global GHG emissions,⁶ and therefore replacing such traditional sources of household cooking energy by modern and clean sources would make a useful contribution to climate mitigation,⁷ even when replaced by liquefied petroleum gas (LPG).⁸ At the same time, the revolution in modern and clean energy technologies, especially the performance gains and cost reductions in renewable energy and energy storage, can also substantially advance electricity access goals while also delivering gains in the form of avoided emissions. For example, of the 21,500 mini-grids that serve 48 million people worldwide, half are solar photovoltaic (PV) based; and of the almost 30,000 mini-grids that are planned, 99% will be solar PV.⁹ A recent study by the International Solar Alliance (ISA) indicates that solar PV and battery based mini-grids provide cheaper electricity than from the grid, when the grid has to be extended by more than 10km.¹⁰

This alignment of development and climate benefits through energy access highlights that action to enable universal access to clean and modern energy needs to be accelerated, so that it is achieved as soon as possible, and certainly by 2030.

In fact, enhancing access to clean and modern energy should rightly be seen as an integral part of the efforts to incorporate justice considerations in the ongoing clean-energy transition. This transition is ramping up globally, driven mainly by a recognition of the urgent need to address the climate change problem. But this acceleration has also brought into sharp relief the concept of “just transitions”, resulting from the understanding that in order to continue to receive political support and be socially acceptable, we will need to address the needs and concerns of those adversely impacted by the transition.

Much of the focus in the just transition discussions currently has been on mitigating the impacts of the shift away from fossil fuels. However, a just transition is meant to “leave no one behind”¹¹ and therefore cannot ignore the enormous swathes of humanity that

continue to live without access to electricity or clean cooking energy and had little role to play in the warming of the planet, even as the impacts of climate change affect them most severely. Notably, the poorest 30% of the global population is estimated to be responsible for less than 2% of the global energy-related carbon emissions.¹² Furthermore, the cost of infrastructure and equipment needed to achieve universal access to electricity and clean cooking fuels by 2030 is around 1% of overall clean-energy spending required in this period, in a scenario consistent with limiting global temperature rise to 1.5 degrees C.¹³ In comparison, the estimated costs of the lack of clean cooking energy by itself are USD 2.4 trillion a year.¹⁴

A transformative approach

We believe that a Mission Energy Access is urgently required now to accelerate our efforts to ensure universal energy access to all by 2030. In order to achieve this objective, this Mission would need to (a) significantly enhance the development of innovative and affordable solutions for enabling access to clean and modern energy and its productive uses, and (b) drive the accelerated large-scale deployment of these solutions. This, in turn, will require not just strengthening innovation relating to clean energy access but also other activities that support these clean-energy-access programs. This also will necessitate paying attention to the technology, finance, policy, and socio-economic dimensions and their interplay. A successful Mission Energy Access would help deliver a triple dividend of increased energy access, enhancing social and economic benefits, and advancing climate goals.

The Mission would continue to build on the innovation and performance enhancement of solar PV, wind energy, and energy storage technologies to drive innovations in mini-grids and solar home systems. Equally importantly, it also would help support and enhance research and development (R&D) to underpin the further advances needed to develop suitable technologies and products not only for enhancing clean energy supply but also for enabling more efficient and productive uses of this energy that can help improve human development and contribute to achievement of the SDGs.

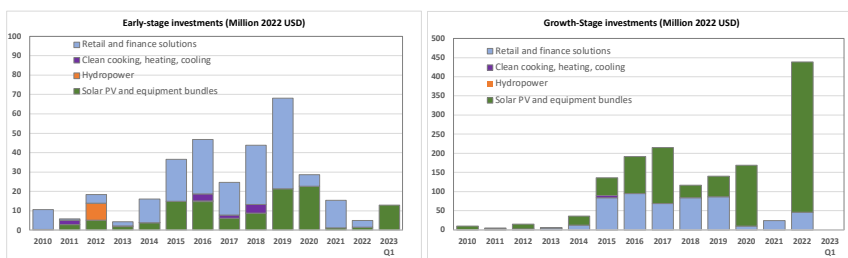
In fact, it has become increasingly clear that while clean-energy access can directly provide high-quality energy services (such as lighting and cooking), it also can enable the provision of

other basic services (such as health through, for example, expanding the availability of health diagnostic technologies) as well as livelihoods (through, for example, solar-powered cold storages and other food processing technologies, textile technologies and so on).¹⁵ At the same time, it is also important for the innovation requirements to be driven by an understanding of the energy requirements for decent living standards¹⁶¹⁷ as well as socio-cultural context. Therefore the Mission has to take a broad perspective on innovation by supporting efforts that both enhance energy access as well as broader well-being enabled by clean-energy provision.

Suitable public policy support is required to stimulate the scale of private investments required to enhance innovation through provision of public R&D that stimulates private R&D¹⁸ and robust entrepreneurship¹⁹ and policies that send a clear signal to investors about market opportunities. As Figure 1 shows venture capital funding for energy-access start-ups has been uneven and broadly stagnant, with notable activity related mostly to solar PV and associated equipment bundles. Almost no investment has been directed to start-ups developing clean cooking technologies around the world – in fact, there was no funding at all in many years for the early stage and almost all years for the growth stage. . These data indicate clearly that increasing public policy support for energy-access-related innovation would be a critical role for the Mission.

Figure 1: Venture Capital investment in energy start-ups in energy access-related areas. The figure shows data for (a) early-stage and (b) growth-stage deals, 2010-2023. Data from ref. ²⁰

Commented [ND1]: Perhaps interesting to indicate that there was **no** funding in almost all years in the growth stage data, lest people just assume it was too small to read (as I did before I opened the Excel file)?



At the same time, since the eventual goal is deployment at scale, the Mission would also need to draw on other tools from the innovation toolkit such as standardization and advanced market commitments could enable widespread deployment through cost reductions. This would be very helpful since the cost of distributed renewable energy (DRE) technologies (e.g. mini-grids) in developing countries remains much higher than in the global North, even though such technologies have the transformative potential to offer clean energy to millions of people without reliable grid access. Similarly, the Mission could leverage the potential of the expansion of the availability of clean electricity to enable clean cooking through induction and modern electric cookstoves.²¹ There also is an opportunity for collaboration between countries on issues such as technology and expertise sharing; twinning of practitioners; and consolidation of demand so that developing countries become price makers rather than price takers.

This also will require addressing the skew in the global investments for deployment of renewables: over 50% of the world's population (mostly in developing and emerging economies) received only 15% of these investments in 2022 (down from 27% in 2017); furthermore, LDCs received less than 1% of the global renewable energy investments between 2013 and 2020.²²

Since innovation would be a central pillar of a Mission Energy Access, many of its elements should be included in the portfolio of Mission Innovation (MI). Being part of MI would enable a systematic and coordinated approach to development and deployment of appropriate technologies and products for clean energy access, drawing on the strength of the MI approach. At the same time, it also allows MI to be true to the mission statement of MI 2.0 'to accelerate the implementation of the Paris Agreement including pathways to net zero by making clean energy affordable, attractive and accessible to all.'²³ Finally, linking Mission Energy Access to MI also allows MI to ensure that its activities contribute to the advancement of multiple clean-energy related global public goods, thereby enhancing its relevance to the broader SDG landscape.

In addition to making technologies available with the suitable configurations and performance specifications, the Mission would also need to undertake additional activities to

underpin the acceleration and effectiveness of clean-energy-access programs.²⁴ These include at least five aspects. First, ensuring access to capital through enhancing the availability of, and delivery networks for, sufficient and low-cost finance; the development of fit-for-purpose business models and innovative financing mechanisms to support deployment of these technologies; and training and capacity building of financiers. A second activity is the formulation and implementation of policies and regulatory frameworks to support deployment through improved investor confidence and mobilize public and private finance. Third, the development of knowledge networks that promote sharing of effective practices across contexts and strengthening of synergies between different kinds of actors. Fourth, the development of the appropriate capacity to help develop, guide, and implement programs as well as coordinate activities at the national level; training of the next generation of innovators and leaders to drive energy access efforts, especially in regions, such as Africa, which hold of most of the world's youngest population. Finally, further strengthening of coordination between international actors interested in addressing the energy-access problem as well as between these and national and private entities.

In the end, programs for enhancing energy access have to be implemented in national contexts and therefore have to be tailored to the specific circumstances, needs, and capabilities of those countries.²⁵ Such large-scale customization is tricky, yet absolutely necessary for success. A Mission of the kind we are suggesting, by taking a bird's eye view, will be successful at enabling such customization not only in the design but also resourcing of national programs.

All together now

A number of international agencies such as United Nations Development Programme (UNDP), International Energy Agency (IEA), Sustainable Energy for All (SEforALL), Energy Sector Management Assistance Program (ESMAP), International Solar Alliance (ISA), and International Renewable Energy Agency (IRENA) are already involved in enhancing energy access in a multiplicity of ways. A Mission Energy Access could start with each of them strengthening our work plan to enable energy access and enhancing coordination to support countries initiatives and efforts. Such coordination amongst agencies regarding their respective roles, their activities in specific countries, and their own comparative advantages

will help energy-access goals being met in each country with each agency carrying out the activities that it does best. The UN-Energy led Energy Compact Action Network²⁶ provides the framework to do so under the aegis of the United Nations and the UN General Assembly mandated High Level Dialogue on Energy.

This coordinated approach would also further raise the profile of the Mission and hopefully lead to the sustained political commitment that is absolutely necessary to enable the policy and financial support for fully addressing this issue, and therefore allowing these agencies and others to further expand their efforts and deepen their impact through enhanced coordination and harmonization. If the Mission is to succeed, developing-country institutions also have a key role to play in spearheading these efforts domestically, which means enhancing their agency and breaking down silos.

We suggest that this Mission be inclusive – any agency or country would be welcome to join. The G20 could be a suitable platform for both reporting on such a Mission, as well as for providing it political support, since the G20 is a connector between the rich countries and emerging and developing economies.

We reaffirm our commitment to meeting the universal energy access goal by 2030. We urge other key actors – national governments, donor agencies, civil society, and private firms – to do the same.

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Competing Interests

Please add here a statement confirming whether or not you have any competing interests as defined at <https://www.nature.com/nature-research/editorial-policies/competing-interests>.

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