

REFLECTIONS

LESSONS FROM EVALUATIONS: UNDP SUPPORT TO EXPANDING ACCESS TO ENERGY WITH RENEWABLE SOURCES

Lead author: Ben Murphy

Research associate: Lucia Sobekova

INTRODUCTION

Economic growth, social inclusion and environmental protection must go hand in hand to achieve the Sustainable Development Goals (SDGs). While it is necessary to meet the growing demand for affordable energy, our reliance on fossil fuels aggravates the climate crisis. Thus, investing in solar, wind and hydropower is a vital element both in encouraging growth and protecting the environment. As a central actor in the United Nations Development System, the United Nations Development Programme (UNDP) supports access to energy with renewable sources.

To inform future initiatives, the Independent Evaluation Office (IEO) has undertaken a review of lessons from past evaluations of UNDP's initiatives for expanding energy access via renewable forms of energy production. The purpose is to provide evidence-based advice to UNDP country offices on "what works" (or doesn't) and "how" regarding the design and implementation of such programmes.

The paper considers contexts where access to electricity and/or clean forms of cooking are low, either nationally or for specific groups. It does not consider UNDP's initiatives to transition countries that have high levels of access to lower-polluting models via renewables, though the two objectives do converge in some examples from lower-middle-income countries.

METHODOLOGY

This is a rapid evidence assessment,¹ designed to provide a balanced synthesis of evaluative evidence posted to the [UNDP Evaluation Resource Centre](#) over the past decade. Country-level and thematic evaluations conducted by the IEO were an important source, given their independence and high credibility. Additionally, high-quality decentralized evaluations commissioned by country offices were considered. Within each review, the emphasis was on identifying consistent findings, conclusions and recommendations that capture relevant lessons for UNDP. The analysis seeks to offer practical

and timely insights to support effective UNDP decision-making. It is not a comprehensive study of the general and scientific literature.

The lessons draw on 43 projects in 33 countries, as well as several multi-country programmes. Independent project terminal evaluations were used as the primary source of information, and mid-term and Independent Country Programme Evaluations where these did not exist and/or to support verification. The review prioritized recent evaluations, mostly since 2017, to increase the relevance of the findings to the challenges faced in expanding access today. As the lessons are drawn from projects in which UNDP is a partner, they are relevant for various stakeholders involved in expanding energy access, unless specifically linked in the text to the organization's role.

CONTEXT

Energy access is central to the challenges of sustainable development and limiting global warming. Although significant progress has been made, a projected 660 million people globally will remain without access in 2030,² as populations grow and governments, private businesses, and households face financial challenges deepened by COVID-19. Economic development, however, is often associated with greater consumption of energy, placing more importance on increasing the proportion of renewable sources in national energy mixes as countries recover from the pandemic.

Although the private sector provides the greatest source of investment in renewable energy globally,³ many developing countries do not yet offer the conditions to attract such investment or guide it to towards sustainable and equitable development. UNDP provides both upstream support, to improve the enabling environment for expanding energy access, and downstream initiatives that provide renewable sources for electrical, thermal and mechanical power. Its approach places an emphasis on affordability, reliability and productive use of energy access for the poor.

AT A GLANCE – LESSONS LEARNED

1	Support to off-grid and remote populations is the quickest way for UNDP to establish the relevance of its offer to the national energy sector, but comes with challenges.	2	Barrier analysis can help develop a feasible plan for increasing access in stages.	3	Expanding the adoption of renewable sources requires various forms of capacity down to the local level.
4	Projects need to consider where demonstration is required, and what impact a failure to implement would have.	5	Moving away from project funding requires bringing investors along in the demonstration process.	6	Projects should consider how energy users assess the financial costs of the supply, and the contribution that communities often make to energy projects.
7	Development benefits need to be planned for rather than assumed, and projects should consider how a new form of energy would fit with existing social, economic, technological and behavioural practices.	8	Although increased access to energy may bring benefits to women, more transformational approaches are required to shift the social and sectoral obstacles.	9	Overambitious project designs are often undermined by available resources and can set energy initiatives up to miss targets.

LESSONS LEARNED

1 Support to off-grid and remote populations is the quickest way for UNDP to establish the relevance of its offer to the national energy sector, but comes with significant challenges.

In several countries, UNDP projects are credited with demonstrating that it is possible to use renewables to reach remote areas beyond the grid (Cuba, Turkey, Barbados, Bangladesh, Mauritius, Nepal).⁴ These are contexts in which the energy sector is advanced or advancing, and where there is limited need for UNDP to support a centralized roll-out of the grid to improve access. In Bangladesh, a redesign to support off-grid communities saved the relevance of UNDP's project when grid expansion and other donors activities reduced the need for the activities that UNDP had initially planned. However, when the national energy sector is under-developed, 'reaching the last first' comes with significant sustainability challenges. In Somalia, Guinea Bissau, Burkina Faso, and older initiatives in Ghana, small-scale projects struggled to provide a source of sustainable electricity supply by themselves, and could not convince or capacitate the Government or private sector to sustain their model.⁵ In Guinea Bissau, for example, the projects are geographically beyond the Government's ability to maintain them, and there is no private-sector interest. A key lesson from Malawi, where fewer than 4 percent of the rural population have access, is that "off-grid generally, and mini-grids specifically, require active and constant championing to reduce uncertainty and facilitate progress and investment."⁶

2 Barrier analysis can help develop a feasible plan for increasing access in stages.

Several evaluations recognize that achieving the conditions for sustained access to energy has been a cumulative process, spanning many years and often decades. Downstream renewable technologies may offer connection sooner than grid expansion, but the project examples show that creating a surrounding pro-poor enabling environment requires time to establish the model and build the confidence for the public and private sector to join. (See Finding 6, 7 and 8). Projects in Mauritius and the Philippines show how assessing the hurdles for greater adoption of renewable energy allows a project to focus on a manageable number of foundational changes, and, crucially, also provide investors with a clear map for future progress.⁷ One of the outcomes of the 'Removal of Barriers' project in Mauritius was its ability to attract new donors to a subsequent, much larger, project with a combined spending of US\$85 million (US\$40 million of which came from the private sector, over double the target). When the enabling environment for pro-poor access is under-developed, an in-depth barrier analysis may unearth many aspects that need to be considered (from awareness levels, basic operating capacities, incentives and disincentives, and ways to regulate new energy initiatives) and projects have been encouraged to be judicious in their selection and sequencing of elements to target (Uganda).⁸

Several other projects are critiqued for their lack of barrier analysis, which is associated with activities that are too advanced for the context (Tuvalu, Botswana),⁹ missed opportunities to create synergies between activities (Lebanon, Tuvalu),¹⁰ and incomplete project logic (Barbados). In a similar vein, projects have also been critiqued for overlooking enablers in the context, such as partnerships with other national energy initiatives (Egypt, Barbados, Zambia),¹¹ though Nepal demonstrates the successful role UNDP can play in facilitating partnerships to secure future funding to a programme.¹²

3 Expanding the adoption of renewable sources requires various forms of capacity down to the local level.

Public and private entities from the national down to the local level may be involved in plans to expand access to renewable energy, and the capacities required include project, pipeline and financial management, technical expertise, and community liaison, among others. Where national training institutions can absorb the programme, some projects (Nigeria, Mauritius, Egypt)¹³ have worked with them to develop a cadre of students and a programme for renewing capacities locally. In Nigeria, for example, the project worked with the Lagos Energy Academy on a course that gave an “end-to-end overview of the process of developing, financing, administering, installing, operating and decommissioning utility-scale solar PV plants”, and plans to provide specific skills once the solar market becomes more mature. These approaches seem a sensible complement to directly capacitating government staff, which is more common but can suffer from high staff-turnover rates (Lebanon, Sierra Leone, Somalia, Egypt).¹⁴ Given the complexity of the topic, other evaluations highlight the need to match national institutions with expertise from other countries (Papua New Guinea, Nigeria)¹⁵ or national private entities (the Grenadines)¹⁶ to offer guidance and quality assurance.

One of the clearest results in the countries reviewed is that UNDP is directly contributing to the national capacity and knowledge base on renewable energy by developing a suite of frameworks, guidelines, feasibility studies, market assessments, policies and regulations, and in some cases, through exchange visits (Bangladesh, Barbados, Benin, Ethiopia, Cuba, Nepal, Sierra Leone).¹⁷ Evaluations have recognized the practical and catalytic value of these outputs, especially when embedded with practical demonstration and focused on pro-poor access (Malawi, Uganda).¹⁸ In Mauritania, the targeting of such output to weaknesses in the enabling environment allowed UNDP to provide tangible policy achievements despite the project’s downstream components being critically delayed.¹⁹ Only in one reviewed country does the relevance of this knowledge contribution seem ambiguous, though, as the Malawi evaluation points out, the value of such resources extends only to the extent that they are reliably applied.

4 Projects need to consider where demonstration is required, and what impact a failure to implement would have.

Many of UNDP’s downstream energy project are intended to demonstrate the viability of adopting renewable forms of energy. The falling price of solar photo-voltaic equipment raises questions about when and where demonstration is needed, and certain projects have been encouraged to consider a shift to household benefits (Nigeria, Tajikistan)²⁰ rather than a demonstration model. However, the cost of biomass and hydro equipment remains high, and these projects have been encouraged to pursue further demonstration before assuming the market is ready (Botswana, India).²¹ Beyond the technology, UNDP is often trying to prove that access via renewables can also lead to equitable and lasting development benefits, which is not guaranteed solely by the introduction of low-cost equipment (See Lesson 8). Where a project wants to prove a viable model of greenhouse gas avoidance, the need to replicate appears even more urgent. UNDP’s demonstration sites are rarely large enough to make a meaningful contribution to greenhouse gas (GHG) avoidance or to the share of renewables in the national system on their own (Philippines, Bangladesh, Tuvalu),²² especially where demand for energy is outstripping the pace of renewable uptake (Mauritius, Tuvalu, Serbia, Zambia).²³

Successful examples of demonstration appear to indicate that the project sites played an important role in encouraging replication because they took place within, and offered a solution to, an existing objective and strategy to which the Government was committed (Mauritius, Ethiopia, Cuba, Barbados, Benin).²⁴ These examples also mobilized alternative

funding over time, which distinguish them from Egypt, where the initial scale-up was cut short for this reason. Aside from the cases (mentioned above) where demonstration has been too remote, there remains a set of countries where the link to a national imperative appears to have been weaker, and where the project has increased access but, at the time of their latest evaluation, had not catalysed the intended demonstration effect (Bangladesh, Haiti).²⁵ Previous projects in Lebanon fell into this category, but the national challenges in supplying energy since the last evaluations are said to have greatly increased government demand for their replication, if not the private-sector confidence.

Demonstration sites also come with risks. In several countries, the inability to deliver a downstream example is directly linked to the delay and even failure of other project components, such as upstream work on policy and regulatory frameworks (India, Nigeria, Mauritania).²⁶ In India, the ACE project started with much enthusiasm for its targets to use renewable energy to enhance rural livelihoods of marginal landholders (with less than one hectare of land). However, the inability to provide demonstration sites meant that the project could not influence other government energy programmes to consider their connections to rural livelihoods and financial investors could not be encouraged to scale or sustain the model. The project also had a model of extension support for helping villages use renewable energy in their livelihoods. In Tuvalu, the eventual implementation of the demonstration sites is considered critical for avoiding a negative socio-economic impact, noting that, if the sites fail, local civil society organizations and private sector actors would have justifiable complaints about the project's effect. Common reasons for a lack of or slow implementation are: procurement delays (Nepal, the Grenadines),²⁷ unclear financial arrangements (Nigeria, Papua New Guinea),²⁸ unsatisfactory project management (Tanzania),²⁹ dependency on a policy approval (Botswana, Nigeria), appropriate site selection (Benin, Nigeria, Papua New Guinea)³⁰ and implementing partner issues (India, Mauritania, Burkina Faso).³¹

Providing renewable supply to government and public buildings appears to be an area where UNDP has relatively unique form of demonstration. As a recommendation from Botswana's mid-term review recognizes, installations on school sites are "a great opportunity for government to demonstrate their commitment to biogas, to facilitate the development and gain traction in the medium-scale market, and to showcase the technology in a high-traffic and important community asset." This form of demonstration is very common in UNDP's portfolio, and appears to be a benefit of its relationship with the Government, which may span many departments. In Uganda, a project is trialling the use of solar on courthouses, the national early warning system, and government hospitals.³² In Lebanon and Iraq solar panels were provided to administrative buildings, whereas Barbados takes a more comprehensive approach, providing access to public schools, airports, correctional facilities, sports pavilions, schools, polyclinics, community centres and farms.³³ Although these forms of uptake may be more immediately useful for transitioning to renewables rather than increasing access and livelihood benefits, they offer a leverage point to increase awareness and confidence, which could encourage their replication in remote or poorer areas. As the examples from Somalia and elsewhere point out, however, demonstration equipment requires a plan for maintenance and sourcing replacement parts.³⁴

5 Moving away from project funding requires bringing investors along in the demonstration process.

It is generally expected that renewable sources will result in lower energy costs than coal and oil over the long term. The projects reviewed demonstrate various considerations for overcoming the initial cost hurdle for adoption, and finding a sustainable source of funding beyond project contributions. The successful examples listed above involved public and private investors in the demonstration planning, and less successful examples are advised to do so (Botswana). In some

cases, projects developed new investment services in development financial institutions (Ethiopia, Barbados, Saint Vincent, Saint Lucia and the Grenadines),³⁵ or brought in further donor funding (Malawi, Mauritius).³⁶

However, further investment, especially from commercial lenders, has challenged projects in other countries (Vietnam, Egypt, Zambia, Sierra Leone, Botswana, Malawi).³⁷ In these countries investors could not be convinced of a viable business opportunity either because of the nascent nature of the technology market (Botswana, Malawi)³⁸ or because of the risk of lending to local stakeholders, who may be remote or considered informal enterprises (Egypt, Sierra Leone, Ethiopia, Bangladesh, Malawi).³⁹

Projects in Malawi, Nepal and Uganda are trialing the use of public-private-partnerships, in which ownership of an energy scheme is held jointly by the government, businesses and local organizations, in an agreement which reduces the risks to each stakeholder. These were early-stage initiatives at the time of their last evaluations, but their future progress and results should be considered in project designs as a way of avoiding a drop in investment once UNDP's project funding ceases.

6

Projects should consider how energy users assess the financial costs of the supply, and the contribution that communities often make to energy projects.

At some point in the uptake model, community and household energy users may be expected to pay for the renewable energy, the maintenance of the system, and any loans taken for the installation. The evaluations provide several considerations for this payment model.⁴⁰ Firstly, energy users compare alternative sources, and may continue with unclean sources until the prices are advantageous (Tajikistan)⁴¹ or even abandon micro schemes when the grid reaches them (Nepal).⁴² In Malawi, people were initially reluctant to use the additional power capacity installed by a project because their existing mini-grids provided electricity for free. Examples in Nigeria, however, suggest that consumers of mini-grids energy may be willing to pay more for a reliable system, which offers the possibility, in some countries, of marketing renewables as an improved service to the grid.

Uptake of renewables sources has been successful when they displaced the cost of locally used diesel, which can occur shortly after installation. This is highlighted in the difference between three demonstration sites in Papua New Guinea, one of which has managed to displace the cost of diesel with solar and secure ownership and commitment to the mini-grid, and two mini-hydro demonstrations which face feasibility issues because, amongst other factors, of the co-financing arrangements. Providing a cheaper option to diesel was achieved at the institutional level for hospitals in Yemen, though, as in the case of Tuvalu, the switch is said to be dependent on finding a suitable battery replacement scheme to avoid a revert to diesel.

An under-considered area in project designs is the non-financial contributions communities make, and several evaluations highlight this as a key element of success for both uptake and sustainability (Benin, Egypt, Sierra Leone, Tuvalu, Bangladesh).⁴³ In Egypt, community contribution of materials and labour to a biogas unit enabled the project to reduce its grant from 100 percent to 60 percent of cost and expand to new areas in line with a government request. In Sierra Leone, the community management of woodlots is projected to deliver a significant GHG avoidance over time, and is considered a best practice to be shared to other countries. Communities may also provide land for solar (Nigeria) or biofuels (Benin),⁴⁴ and these contributions require sensitive handling, especially where the area is used for food-production, livelihoods, or has ancestral linkages.

7 Development benefits need to be planned for rather than assumed, and projects should consider how a new form of energy would fit with existing social, economic, technological and behavioural practices.

Providing or improving access to energy is considered inherently good; however, the terminal evaluations indicate that it can be a challenge to ensure energy contributes to sustainable development (Barbados, Burkina Faso, Haiti, India, Lebanon, Malawi, Somalia).⁴⁵ Where challenges occur, projects appear to be consumed by the technical difficulties of establishing viable energy connections, and/or are simultaneously trying to establish access and novel economic activities.

An example of the latter is the introduction of new equipment for drinking water and ice-making in the coastal areas of Mauritania, where it is signalled that the “installation of technical infrastructure in an environment which does not know them is not sufficient to induce the local development dynamics intended by the project”.⁴⁶ Burkina Faso points to the challenge of creating new socio-economic infrastructure whilst maintaining sufficient focus on developing the source of renewable energy. Projects in middle-income countries (MICs) have linked renewable forms of energy into established livelihood infrastructure, such as the municipal beans and milk production chains in Cuba. However, projects in other MICs have not factored in critical considerations, such level of consumption, type of functionality and/or the cost model (India, Barbados, Egypt).⁴⁷ More surprising are the missed opportunities to link access into initiatives where UNDP has a strong offer, such as climate and disaster risk reduction programmes (Barbados, Haiti).⁴⁸

With limited time and resources, projects have also found it challenging to balance support for household access, which may serve poorer groups but has lower productive use, with support for community access, which is generally more expensive but can add value to local production (Malawi, Tajikistan).⁴⁹ In this regard, cookstove initiatives appear to have a quicker link to economic benefits because they can often be produced by household or local enterprises. Projects in Ethiopia and Sierra Leone show that it is possible to support local enterprises through training and incubation, and can be contrasted with Somalia, where women were provided cookstoves to sell but did not have the required accounting and business skills. Ethiopia, Sierra Leone, and Uganda signal the need to develop lending arrangements for the small and medium enterprises involved in cookstove production, and national regulation to ensure the availability and use of quality cookstove designs, as these can hold back business expansion and replication.

There is insufficient evidence to say whether cookstoves are leading to their other intended benefits of reducing indoor air-pollution, discouraging deforestation, and lightening the domestic burden faced by women (See Lesson 9). It is clear, however, that achieving these results is subject to complex social, economic, policy and behavioural drivers. In Zambia, for example, “while local communities produce the charcoal, most [...] households sell the majority to urban centres, such as Lusaka, rather than using it sustainably for cooking and heating.”⁵⁰ Projects in Ethiopia and Somalia have coupled large-scale public awareness campaigns with national regulation to overcome these challenges.⁵¹

8 Although increased access to energy may bring benefits to women, more transformational approaches are required to shift the social and sectoral obstacles.

Powered mechanization and technologies that reduce wood consumption are often considered to have automatic gender benefits because of the time and effort women expend, and the risks they take, when these are absent. Projects have included activities that target these assumptions (Sierra Leone, Malawi, Egypt, Uganda, Ethiopia),⁵² and others go beyond

to support women-led enterprises (Burkina Faso, Bangladesh, Ethiopia, Sierra Leone, Somalia).⁵³ Results have been achieved in line with these expectations, such as income generation (Yemen),⁵⁴ improved food security through solar irrigation schemes (Malawi, Yemen),⁵⁵ and increased safety and security of women by solar lightening options (Ethiopia, Bangladesh),⁵⁶ which in Egypt is said to have reduced the number of women standing in long queues to purchase gas cylinders during the Arab Spring.

These are more advanced approaches to gender than the many other projects that only focus on disaggregating data by gender in their targeting (Barbados, Lebanon, Haiti, the Grenadines).⁵⁷ However, neither approach sheds light on the experience of women in the project, as pointed out in Bangladesh, or challenges the conditions that keep women in roles of hardship (Tanzania).⁵⁸ As noted in Egypt, and experience from gender targeting initiatives in other sectors, time saved for women can be filled with more domestic work or unpaid care, and profits from female enterprises can be captured by males or absorbed into the household budget. Generally, UNDP's projects have not sought to understand and alter these dynamics, and improved strategies are required to address the economic and public participation of women (Bangladesh, Somalia, Zambia or Ethiopia).⁵⁹ Yemen appears to be a partially positive example, because having a female-operated solar grid contributed to increased participation of women in local governance structures.

Some projects have deployed initiatives to promote women's equality through policy and institutional changes, which have the potential to achieve outcomes on a wider scale. In Malawi, the project integrates a gender framework within future mini-grid programmes run by the Government. There, as in Mauritius, the projects are part of a gender-energy collaboration with other ministries, rights groups and representatives of women enterprises, pushing for systemic change. However, it is clear that most projects operate in male-dominated energy sectors, and this has undermined gender approaches that rely purely on disaggregated participant numbers for capacity-building and similar activities. Demands for proactive approaches to including women at managerial and decision-making tables have been expressed in Uganda, Tanzania, Cuba, Haiti, and Barbados.⁶⁰

9

Overambitious project designs set unrealistic targets and are often undermined by available resources

Although energy access, climate mitigation and gender equality all require significant and concerted efforts, UNDP's project designs are routinely described in their terminal evaluations as trying to do too much in time periods that are too short (Bangladesh, Barbados, Botswana, Burkina Faso, Guinea Bissau, Papua New Guinea, Somalia, Sierra Leone, Zambia)⁶¹ and with too few personnel (India, Burkina Faso, Ghana, Iraq, Eswatini, Ethiopia, Zambia, Tuvalu).⁶² Projects have been critiqued for setting national-level targets – either in the numbers of people who will receive energy access, the percentage of renewable production in national energy mixes, and the projected avoidance of greenhouse gas emissions – that could only be achieved with much larger programmes. Evaluations are mostly complimentary about the commitment of UNDP staff to project management, and the organization's hiring of technical consultants is often considered a strength. An exception to the trend of under capacitated projects is in the Grenadines,⁶³ where the staffing arrangements are considered a key success factor and contrasted to other projects in the region.

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ABOUT THE INDEPENDENT EVALUATION OFFICE

By generating objective evidence, the Independent Evaluation Office (IEO) supports UNDP to achieve greater accountability and facilitates improved learning from experience. The IEO enhances UNDP's development effectiveness through its programmatic and thematic evaluations and contributes to organizational transparency.

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The IEO's *Reflections* series looks into past evaluations and captures lessons learned from UNDP's work across its programmes. It mobilizes evaluative knowledge to provide valuable insights for improved decision-making and better development results. This edition highlights lessons from evaluations of UNDP response towards keeping people out of poverty.

