

Recommendations

For leveraging digitalization to achieve universal energy access

→ Part of the report: **Energy Access, Data and Digital Solutions**



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THIS DOCUMENT IS PART OF THE REPORT “ENERGY ACCESS, DATA AND DIGITAL SOLUTIONS”.

The report shows that the large-scale and often realtime collection, analysis and use of all kinds of datasets, enabled by the rapid, global technology shift called “digitalization,” is in the process of transforming the energy access industry. Companies across the energy access spectrum use digital solutions to enable their businesses and as the industry matures, there is a growing number of specialized digital solution providers.

The full report can be downloaded here ([link](#)).

RECOMMENDATIONS

Digital solutions provide data-driven, real time, precise, efficient information to enable decision-making in the energy access sector. These solutions reduce uncertainty (and, in time, risk), enable scale, and ultimately reduce costs to bring better energy to more people and faster. In the course of our research, many leading off-grid electrification companies stressed that without digital solutions their businesses would be neither viable nor scalable. A growing number of digital specialists now offer solutions tailor-made to the OGS and mini-grid markets. They complement and sometimes replace internal capacities of OGS and mini-grid companies themselves, allowing them to focus on their core business functions of delivering energy products and servicing customers in frontier markets.

Our findings show that companies that successfully deploy digital operations already benefit greatly from them.

Despite the widespread recognition of their value, the deployment of digital solutions still significantly lags behind the core businesses processes of OGS sales and mini-grid infrastructure construction and operation. And despite digital solutions being a key enabler and accelerator of the large-scale energy access we need to achieve SDG7, they are not yet sufficiently recognized by the funding community. This hampers their deployment and growth.

To date, the most impactful and established digital solution in energy access is digital payments to enable the PAYGO business model. This is increasingly complemented by the use of digital planning, digital operations and digital platforms in both the OGS and mini-grid markets.

The challenges to a faster deployment of digital solutions differ depending on the solution, but typically include the maturity of the underlying digital technologies, regulatory hurdles, customer acceptance, and availability of local, skilled labor. Figure 31 compares the solutions by their potential impact and ease of deployment in a qualitative manner and based on the research conducted for this report. In the case of digital payments, for example, the potential impact is very high, as it addresses a particularly challenging operational aspect of OGS and mini-grid companies. However, their deployment relies heavily on national regulations, interlinked with a country's larger financial ecosystem. In certain markets the challenges appear almost insurmountable. By comparison, the ease of deployment of digital operations is higher as challenges are mostly within the company itself. Our findings show that companies that successfully deploy digital operations already benefit greatly from them and have learned how to train both office and in-field staff.

In future, we expect the use of digital solutions to accelerate, driven by the growth of the electrification market, by the growth of available datasets, by the increasing capabilities of underlying data technologies,

Despite digital solutions being a key enabler and accelerator of large-scale energy access, they are not yet sufficiently recognized by the funding community.

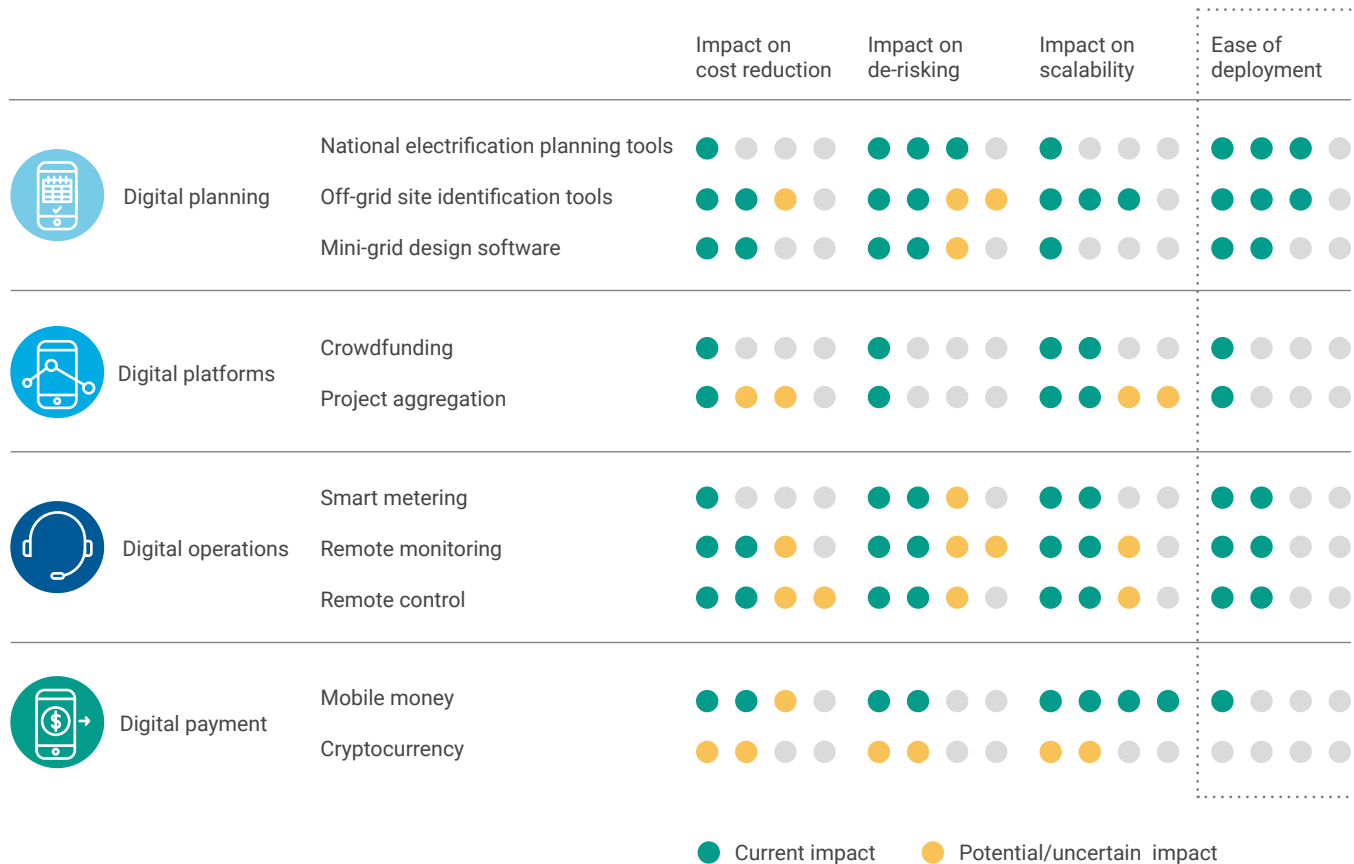
and by the growing number and experience of digital solutions providers. There is also room for growth across geographies, especially from Africa to Asia.

There is also a strong case to be made for more interconnection or even integration of different digital solutions. This is starting to happen within the digital planning tool-

chain and within digital operations. It will also increasingly happen across the four digital solutions types presented in this report. For example, digital operations and digital payments data could be connected to digital planning to further reduce the default risk of electrification companies.

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Figure 31 – The impact and challenges of digital solutions in the off-grid energy access market¹⁸¹



Taken together, digital solutions are key to achieving viable off-grid electrification business models.

The digital solutions presented in this figure are not exhaustive. Solutions were selected based on their prevalence and attention in the market. Rankings are qualitative and derived from case studies and market expert interviews. The impact of some solutions that are not sufficiently tested is still uncertain.

181 – Qualitative analysis by TFE Energy, based on market interviews and case studies

1 RECOMMENDATIONS FOR FUTURE RESEARCH

This research is one of the first assessments of how digital solutions can transform energy access. The goal was to detail the types of digital solutions and use cases, and to estimate what value they can add. There is much scope for further research. Below are three suggestions.

- **Detailed quantification of economic value and social impact of digital solutions:** This study did not systematically quantify and compare the cost and value of digital solutions. The same is true for measuring the social impact of applying digital solutions. One aspect to highlight is that the effect the application of digital solutions needs to be equally beneficial to women and men. Discussions with stakeholders indicated that there is interest in a study that builds upon the work presented here. An independent consultant could compare anonymized data and conduct a series of pilot projects to compare the value and impacts of digital solutions.
- **Creation of a global digital solutions database:** The energy access industry is fragmented and spans many different markets. At the same time, digital technologies, solutions and business models evolve rapidly. During the research, we noticed that many market participants and experts do not have an overview of what is being done elsewhere. There is a particular disconnect between companies operating in Africa and those operating in Asia. For this study, a significant effort was made to identify and cluster over 250 companies and funders, as well as around 200 market

experts. This stakeholder map could be converted into a searchable, regularly updated database. This could be initiated by industry associations such as AMDA, ARE or GOGLA.

- **Creation of a global investor database for digital solutions:** There is no good overview of the investor, grant and donor landscape for technologies that help achieve energy access. Our research shows that there is a growing and diverse pool of funding opportunities in different geographies, offering different funding options and often coming from different angles (technology, impact, regional business). Creating a searchable, regularly updated database would be useful.



Image provided by Sam Dobby, TFE Energy

2 RECOMMENDATIONS FOR DIGITAL SOLUTIONS PROVIDERS

- **Focus on immediate customer value:** Digital technologies usually have two types of value proposition: Firstly, they make an existing process cheaper, faster or better. Secondly, they offer new options and functionalities. Energy access companies work on very slim margins and have little room for experimentation. Therefore, to be successful, digital solutions need to show immediate, tangible benefits to users.
- **Improve the quality of data and predictions:** The industry needs to continue to test and improve the quality of data used and the accuracy of their models. This requires ongoing validation and a realistic assessment of what is the currently verified value proposition of a digital solution versus the medium-term plan or ambition (which are also important to communicate, but without blurring the line).
- **Establish good data practices:** Digital solution companies are usually very conscious about the data protection needs of electrification companies and their customers. However, they need to give more thought to other questions of data best practices, including ensuring that their models do not embed biases (e.g. on gender, on geography, or customer economics) and that data is secure from hackers.



Image provided by Sam Duby, TFE Energy

3 RECOMMENDATIONS FOR ELECTRIFICATION COMPANIES

- **Establish data-driven decision making:** Currently only leading energy access companies are at the scale where they regularly make data-driven decisions. Their number will increase as the market grows and matures, as debt funding becomes more prevalent, and as a secondary market for mini-grid infrastructure is established. To make data-driven decisions, companies need to systematically gather data, organize it in a functioning database, analyze it and make it available to decision-makers in a user-friendly interface. Bboxx, for example, has used economic data to more quickly access debt in Togo. In addition to economic indicators (e.g. payment rates, unit economics, risks), it is useful to measure impact indicators (e.g. growth in energy consumption, growth in household income, but also village level changes). Energy access companies should be conscious about “build or buy” decisions as the landscape of third-party solution providers grows.
- **Make proprietary digital solutions available to the wider market:** Many first movers developed proprietary digital solutions, mostly for digital operations, but

also for digital planning and even digital platforms. As there is increasing specialization in the market, it makes sense to replace in-house solutions with specialist solutions, if they are better. If the in-house solution is better, then it can be made available to the market at large, opening up a new revenue stream. This is what Mobisol has done with their mobile payment platform Paygee (supported by a USAID grant).

- **Create data and innovation partnerships:** Companies can profit from peer-to-peer data sharing in non-competitive situations. Data can be shared in an

anonymized and aggregated manner under an NDA or through data sharing platforms such as those being used by AMDA. In addition, companies can initiate joint pilot projects or joint applications for grants. The digital planning tool Village Data Analytics, for example, has benefitted from several such data exchanges. Partnerships can also be fostered through co-locating teams and opening up business or research processes to one another. Such partnerships could be additionally incentivized by donors through mechanisms such as grants.

4 RECOMMENDATIONS FOR INVESTORS AND BANKS

- **Adopt and drive digital solutions:** Investors and banks financing either companies or infrastructure portfolios should themselves adopt digital tools. In the market assessment and due diligence process, they can, for example, make use of independent digital planning solutions to assess the areas of operations or sites of energy access companies. Once an investment is made, they can link up to the company's operational data. In addition, investors and banks can encourage their portfolio companies to establish data-driven decision-making processes and fund the testing and piloting of new solutions. The Shell Foundation, for example, funds innovation pilots for portfolio companies.
- **Strategic investors – discover opportunities:** While utilities like Engie, energy companies like Shell, or mobile network companies like Orange or Digicel invest into energy access products and companies,

there is room for new strategic investors to specifically look at digital solutions. Digital solutions could be attractive strategic investments for multinational engineering companies such as Mitsubishi, GE, ABB or Siemens. Their own solutions are typically not a fit for the off-grid electrification market, and they are driving digitalization in grids already. Schneider Electric, with its energy access fund, is an example. Digital solutions for energy access could also be interesting strategic investments for companies seeking to expand internet or mobile coverage or working on agricultural value chains. Strategic investors can also look for digital solutions than can be spun out of OGS or mini-grid companies as own products or companies.

- **VCs – complement know-how:** As the off-grid energy market scales, digital solutions will become highly investible. To assess them requires an understanding

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of the dynamics of both digital technologies and frontier markets. This combination of know-how is rarely found. Factor(e), Gaia Impact Fund or Kupanda Capital are examples. Understanding how to scale technology solutions to other frontier, developing or industrialized markets will also be important.

- **Impact investors – broaden approach:** Impact investors often look for measurable impact results. In the

case of energy access, these can be the number of households electrified or the kWh supplied. When it comes to digital enablers, the impact is very substantial, but indirect and more difficult to measure. Developing impact metrics for enablers will be key to the future development of the sector as a whole.

5 RECOMMENDATIONS FOR GOVERNMENTS

- **Create data guidelines:** Governments need to protect the data rights of users of electrification services and products by establishing clear guidelines for good practices. However, this needs to be done in a way that does not place undue burdens on the companies working with the data, nor should it suffocate data collection and usage for industry-wide learning and de-risking.
- **Create enabling financial regulations:** Both digital payments and crowdfunding platforms require conducive financial regulations to operate. This is covered well in other reports (for examples, refer to the chapter on digital payments).
- **Use digital planning tools for electrification:** Governments planning electrification in their countries should make best use of available digital solutions themselves. One example is the use of digital planning tools to support electrification strategies, providing clear planning metrics on least cost/ highest service electrification planning, as well as structures to de-risk tenders

for mini-grids. Another example is the use of digital platforms to monitor the status and performance of the national off-grid sector. It is important that these tools are very user-friendly and regularly updated.

- **Use digital solutions to link subsidies to measurable performance and quality assurance indicators:** Governments can demand that energy access companies that receive public funding adhere to certain reporting standards. This can be supported by digital solutions, such as smart meters. The case for digital solutions becomes even stronger as several governments contemplate the introduction of results-based subsidy schemes that require monitoring and verification methods. Digital solutions can also support traditional utilities in managing their customer base and provide valuable service and consumer information that will improve service delivery and maximize planning efficiencies.

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6 RECOMMENDATIONS FOR DONORS

- **Adapt procurement processes:** Donors increasingly use digital solutions, especially platforms and planning tools, for their own work. This is positive. Often, however, their traditional procurement process emphasizes past experience and track-record. This places unrealistic constraints on innovative solutions. A better way of assessing digital innovations is through deeper technology vetting. Setting aside a percentage of total program contract value for new solutions could change the procurement structure, too. This could be used for pilots.
- **Create more funding windows for digital innovation:** Overall, while there are many programs that support energy access businesses directly, there is little support for the enabling technologies behind them. Private donors (such as foundations) can usually fund innovations directly and easily (examples are the Good Energies, DOEN or Rockefeller Foundations). Public sector technical and financial assistance programs, however, typically work through tenders for pre-defined challenges and programs. Since they are the largest financial contributor to the energy access sector, designing more effective funding windows for innovation would have a catalytic impact. Below are two suggestions:
 - **Raise the threshold for direct awards** (sole sourcing) for innovative private companies from the current ca. \$50,000 to the \$200,000 to \$500,000 required for pilots. This could be linked to deeper technological vetting and requires an adjusted approach to risk.
 - **Create regular innovation challenges** for digital solutions that support energy access, comparable to the

World Food Program's accelerator, the European Space Program's business applications program or the Google Impact Challenge. USAID runs an innovation challenge for energy access, the Development Innovation Venture, however, it focuses on the end-consumer impact, not on digital enablers. Such programs could actively design partnering opportunities between digital enablers and electrification companies.

- **Increase technology know-how:** Donors traditionally have deep expertise in fields such as infrastructure, finance, regulations, development and energy access markets. Their expertise with different digital technologies, by comparison, often lags behind the sector. This has multiple effects, not the least of which is slow adoption of tools that improve internal efficiencies. The lack of expertise in the digital space also impacts the kinds of investments promoted through different grant schemes slowing down digital innovation.
- **Incentivize data sharing:** Donors can support existing data sharing initiatives by companies and incentivize the ethical sharing of data. This could be done, for example, by giving the companies that have the data a financial incentive to share it in an anonymized, aggregated and quality-checked manner. From this, an "energy access data pool" could be created. Interested parties (such as those developing new digital solutions for the sector or university researchers) could interact with this data pool. Interaction could be just query-based (i.e. data does not leave the pool), as is done with

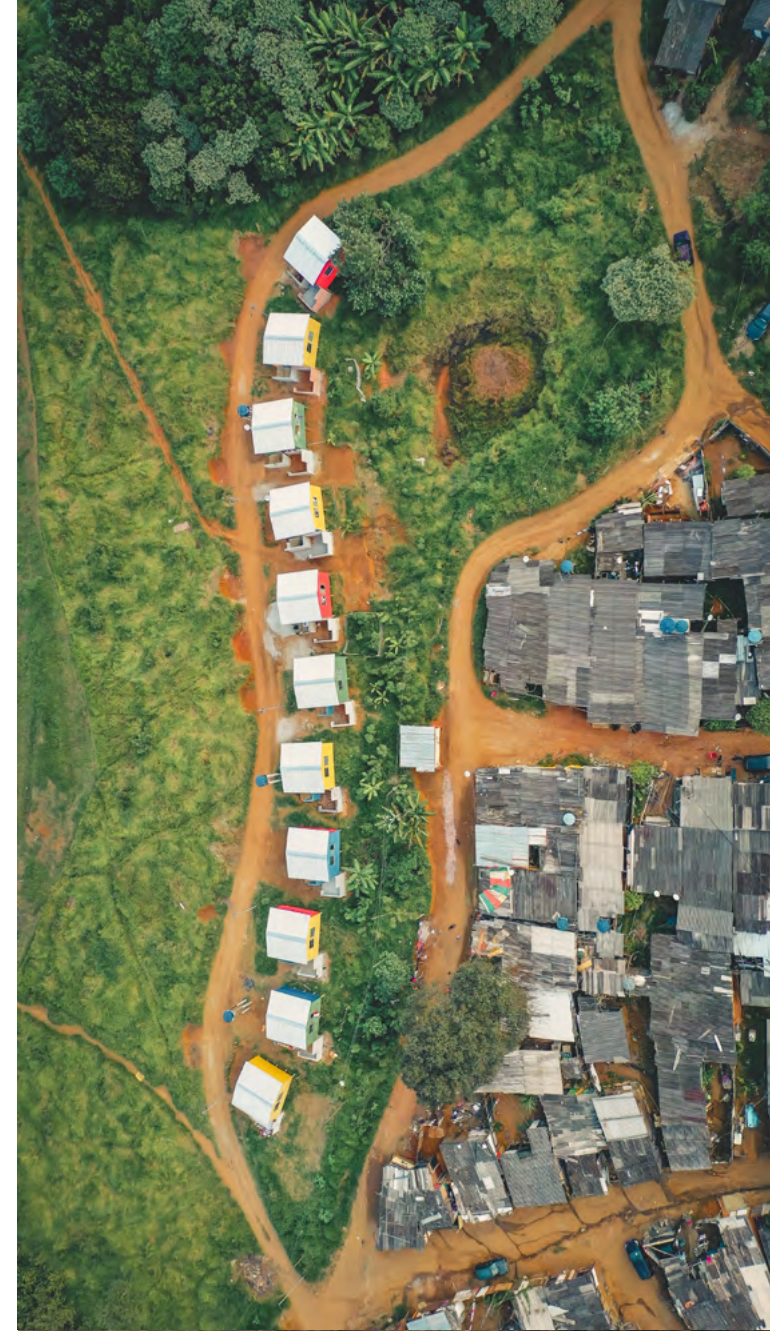


Photo by Sergio Souza from Pexels

USAID's DHS data set. It could also be shared in specified formats for specified uses. Or it could be made available in useful user interfaces (as the World Bank does with its country data).

- **Support standardization in the industry:** Donors are well placed to encourage standardization in the energy access industry (an example is the QAF for mini-

grids). Standardization and digitalization are mutually enforcing. A standardized set of metrics can help design digital solutions. Inversely, the technical capabilities of digital solutions (such as smart meters) can define what metrics can be collected in an automated manner.

7 LOOKING BEYOND THE OFF-GRID ELECTRIFICATION MARKET

The off-grid energy access market has been a testbed for digital solutions, utilizing cutting edge digital technologies to enable business with remote customers in challenging geographies. The social impact of off-grid electrification has attracted global talent and resources to this field. The learnings can be used to cross-pollinate other markets.

- **On-grid in developing countries:** Traditional utilities in developing countries can learn from the off-grid solutions presented here. For example, digital planning tools can be used to plan for grid-extension as much as for mini-grid site selection. Similarly, many of the payment and operating technologies can help to more efficiently run a power grid.
- **Off-grid in industrialized countries:** The much larger off-grid market in industrialized countries can be attractive for the digital solutions companies mentioned here. Companies, such as SparkMeter, PowerGen and Ferntech, are already exploring this opportunity. However, energy access companies have

limited resources to commit to developing these relationships. A workshop or study could help to investigate the potential of cross learnings.

- **Other off-grid markets:** There are other data-driven industries working in the same off-grid markets. This includes telecoms and internet service providers. They have similar challenges (e.g. when it comes to building network infrastructure) and have driven important solutions (e.g. PAYGO). There is room for more collaboration across these industries, as electrification provides the basis for many others.
- **Diesel replacement:** According to a recent IFC study,¹⁸² about 20 to 30 million sites in developing countries use diesel generators, at a fuel spend of around \$50 billion per year. Replacing diesel with solar and batteries is increasingly economical. Digital solutions, especially digital operations, are key to making this alternative work effectively.

Traditional utilities in developing countries can learn from the off-grid solutions presented here. For example, digital planning tools can be used to plan for grid-extension as much as for mini-grid site selection.

182 – International Finance Corporation, "The Dirty Footprint of the Broken Grid", 2019 ([link](#))

ABOUT TFE ENERGY

TFE is dedicated to achieving universal energy access and to improving investments into remote infrastructure. Our team consists of data technology experts on the one side and village electrification experts on the other. This breadth allows us to continuously test and validate new data technologies in the field and work towards specific solutions – such as Village Data Analytics – that create tangible value to the electrification ecosystem. We are always looking for passionate, talented people to join our teams in Munich/Germany and Cape Town/South Africa (for open positions see [here](#)).

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