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WHITE PAPER ON **OFF-GRID** **ACCESS TO** **RENEWABLE ENERGY:** 10 PRIORITY AREAS TO DO MORE, TOGETHER



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FOREWORD

The off-grid energy access market has grown by almost 30%¹ per year over the last two years, triggering investments in innovative services and financing models, and commitment from a wider variety of contributors (local authorities, local and private-sector entrepreneurs, donor agencies, etc.).

While the United Nations' goal of universal access to energy in 2030 may seem ambitious, it is nonetheless achievable in light of technological progress, the combination of energy and digitalisation and the decreasing solutions costs. In this regard, using energy access solutions that rely on renewable energy appears necessary to preserve natural resources and tackle climate change.

However, a number of obstacles remain, hindering the acceleration of these solutions' implementation, and jeopardising their long-term future.

The national working group led by the French Agency for Ecological Transition (ADEME) and the French Renewable Energy Association (SER) has identified four priority themes: the regulatory and contractual framework, collaboration between stakeholders, financing and innovation.

Furthermore, given the impact of the COVID-19 health crisis on energy access programmes and on ongoing projects, the working group has developed a specific analysis as well as recommendations, presented in a dedicated chapter.

This multi-sector working group of over 100 participants – composed of public organisations, NGOs, private sector representatives, research institutions and French regions – has produced a set of recommendations aimed at removing some of the obstacles encountered in the field while implementing energy access projects in Africa, Southeast Asia, or Latin America.

1. REN21, *Renewables 2018: Global Status Report*, 2018, www.ren21.net

This document is intended for French and international decision-makers, donor agencies, rural electrification agencies, NGOs, businesses, and any other energy access stakeholder. It sets out to provide stakeholders with an up-to-date overview of areas for improvement, innovation within the sector, new regulatory environments, collaborative models and funding instruments that will help meet Sustainable Development



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Goal n°7 to ensure access to affordable, reliable, sustainable and modern energy for all, by 2030. Off-grid energy access will facilitate the implementation of other sustainable development goals and contribute towards the overarching objective of leaving nobody behind, picked up again in the French roadmap for the 2030 Agenda.²

2. *Taking action for a fairer, more sustainable world - French stakeholders are committed to implementing the Sustainable Development Goals, 2020.*
<https://www.agenda-2030.fr/feuille-de-route-de-la-France-pour-l-Agenda-2030>

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International context

Recent trends confirm that, in recent years, the electrification rate has exceeded the pace of demographic growth in non-Organisation for Economic Co-operation and Development (OECD) regions. The global electrification rate has been constantly rising since 2010, from 83% in 2010 to 90% in 2018.³ Over the same period, the global population without access to electricity fell from 1.2 billion to 789 million people.⁴

Between 2010 and 2018, the global population without access to electricity fell from 1.2 billion to 789 million.

In 2018, 112 million people in Central and Southern Asia, and 548 million in Sub-Saharan Africa, were without access to electricity.⁵ While Latin America and the Caribbean are approaching universal energy access at 98%, the situation in Africa is more complex, due to population growth in areas that are not connected to the grid.



photo credits: Schneider Electric

3. IEA, IRENA, UNSD, World Bank, WHO, *Tracking SDG 7: The Energy Progress Report 2020*, Washington DC, 2020
4. IEA, *SDG7: Data and Projections: Access to affordable, reliable, sustainable and modern energy for all*, 2019, <https://www.iea.org/reports/sdg7-data-and-projections>
5. IEA, IRENA, UNSD, World Bank, WHO, *Op. cit.*

According to the World Bank, 650 million people (8% of the global population) will still be without access to electricity in 2030, despite the progress made in recent years and the current ambitious policies for universal access. 90% of them will be located in Sub-Saharan Africa.⁶

In 2018, 20 countries were home to around 78% of the global population without access to electricity. In most of these 20 countries, the gradual growth in access to electricity recorded between 2010 and 2018 failed to keep up with demographic growth. Moreover, in some countries where the number of people without electricity exceeded 50 million in 2018 (including the Democratic Republic of Congo, Nigeria, and Pakistan), electrification has reached less than 1% of the population per year since 2010.⁷

These data illustrate regional disparities, but there is also a very significant inequality between urban and rural areas.

The global electricity access rate in rural areas was 85% in 2018, reaching almost 668 million people, but in urban areas this figure stood at 97%.⁸ This figure does, however, belie significant differences in the quality of the service provided, with power outages of up to 8 hours in some major African cities, leading some urban users with a centralized electricity supply to acquire solar home systems that are more reliable than the local electrical grid.

Major disparities between urban and rural areas leave some 670 million people without access to electricity.

6. *Ibid.*

7. *Ibid.*

8. *Ibid.*

photo credits: ESF/Madagascar



Innovative technologies and solutions with the power to greatly accelerate growth in access to electricity already exist, and are financially viable. Off-grid renewable energy, including stand-alone systems and mini-grids, have become technologically proven and competitive options to achieve universal access to electricity. Tremendous progress has been made in recent years, driven by the falling costs of renewable energy, the development of energy storage

solutions, and synergies with the progress of digital technology.

In addition to supplying households with electricity, off-grid solutions are increasingly being used for community public services (education, access to water and healthcare) and priority income-generating sectors of the economy, like agriculture. For rural communities, off-grid renewable energy solutions present an opportunity for economic growth by slowing down the rural exodus and fostering the independence of women and younger generations.



photo credits: Moon

Continuing demographic expansion demands that these solutions play a front-line role in the social and economic development of developing countries. According to the International Renewable Energy Agency (IRENA), by 2030, renewable energy sources will supply more than 60% of new energy access facilities.⁹ Stand-alone systems and mini-grids will account for almost half of this new electricity access. The expansion of existing centralised grids is certainly an option for some rural communities, but it will be unable to reach all rural regions – especially in Africa – due to their low population density and the high cost of expanding the grid.

Given that expansion and connection costs for centralised grids can vary greatly, there is a real market for decentralised solutions, which are essential for overcoming this limitation to energy access. For example, the cost of extending centralised grids in rural areas varies from 1100 USD per user in Vietnam, to 2300 USD per user in Tanzania. Grid connections in urban areas can also vary from 570 USD to 1100 USD per connection.¹⁰

According to the World Bank, 620 million people in Sub-Saharan Africa could receive access to electricity in their current economic conditions, with centralised grids reaching 34% of them, solar home systems covering another 50%, and mini-grids the remaining 16%.¹¹ The cost of the latter two solutions should continue to fall in the future, making them even more attractive.

According to the World Bank, universal energy access in Sub-Saharan Africa could be achieved, with expansion of the grid accounting for 34%, stand-alone solar systems for 50%, and mini-grids 16%.

9. IRENA, *Off-grid renewable energy solutions to expand electricity access: An opportunity not to be missed*, 2019

10. McKinsey & Company, *Brighter Africa: The growth potential of the sub-Saharan electricity sector*, 2015

11. IEA, IRENA, UNSD, World Bank, WHO, *Op. cit.*

Every year, the use of inefficient, or even dangerous, cooking systems is responsible for 4 million deaths worldwide.

But universal energy access is not limited to electricity. According to the World Health Organisation Statistics, cooking alone causes 4 million deaths around the world every year. Some 2.8 billion people¹² – close to half of

the global population – still cook their food on inefficient open stoves, heated using fuels like wood and kerosene.

4 billion USD are required if universal access to clean cooking is to be achieved. In 2017, funding totalled just 40 million USD.

Great technological progress has been made in this sector, but there are still barely enough business models – and funding – to make a considerable difference, given the scale of the challenge. According to the Clean Cooking Alliance, the total debt, equity, and subsidies

for companies operating in this sector stood at 40 million USD in 2017. Achieving universal access to clean cooking by 2030 will require 4 billion USD every year.¹³ Key factors limiting investment include the lack of economic viability and the low replicability of business models, and the high levels of risk (macroeconomic, political, exchange rates, etc.) that investment in this market entails, as well as the limited availability of data on consumers, technology and markets.

With regard to major synergies between sectors, efforts made by governments, financial bodies and representatives of civil society must prioritise the issue of clean cooking as much as they do with access to electricity and water, not only in terms of innovative financing models but also concerning support for technical innovation and business models. The creation of businesses, and therefore income, related to energy access should promote the uptake of improved cooking systems.

12. *Ibid.*

13. Clean Cooking Alliance, *2018 Annual Report*, 2018

The different recommendations made by the working group are intended for a variety of stakeholders:



French governmental institutions
(Ministries and embassies)



Development banks



Commercial banks



Governments of project host countries



National agencies, local authorities,
regions and institutions that support innovation



Groups and consortia from the private sector



NGOs



The resilience of the energy access industry to the **global pandemic**

The energy access industry was severely affected by the global health crisis caused by the Covid-19 pandemic. The latter has jeopardised the achievement of Sustainable Development Goal 7, hampering the universal electrification process and the distribution of clean cooking systems in off-grid areas. Businesses and NGOs that want to develop new energy access projects face obstacles due to the inability to reach target regions and communities, and struggle to find funding.

Funding that is available from public and private investors risks being redirected in reaction to this crisis, leaving energy access out in the cold from international funding.

Field work has become a challenge for project operators, who are often unable to carry out maintenance on existing facilities. Economic slowdown in the countries of intervention has resulted in lower household incomes, forcing some of them to cancel their contracts with energy suppliers and associated essential services. The market for solar kits and lamps has been particularly affected, and there is a risk of a shift back towards polluting equipment that is harmful to human health.

What effect will the pandemic have on electrification for the 789 million people still without electricity? Beyond this general concern, there is a very real risk of seeing the electrification rate fall. Many essential services depend on electricity, from refrigerating drugs in health centres to delivering drinking water using electric pumps. All of these needs are threatened by the pandemic's impact on energy access.

On the other hand, the pandemic may present an opportunity for the sector: energy access is a key factor in improving and bolstering the resilience of healthcare services, leaving scope for the creation of new jobs. Off-grid stakeholders are already expanding their product ranges to cater to the needs of the health industry. According to the International Energy Agency, if all the efforts needed to reach the target of universal energy access by 2030 are put in place, decentralised systems could create around 900,000 jobs every year for the next three years.¹⁴ Furthermore, thanks to low operating costs, renewable energy production (solar and wind particularly) seems to be the only energy source that has increased against the troubled backdrop of 2020.



photo credits: Électriciens Sans Frontières

This section will complement the White Paper with a series of recommendations to make the energy access sector more resilient. The proposed measures should enable the sector to weather serious events like the current pandemic and keep working towards the United Nations SDG 7, to guarantee access to clean, affordable energy to all by 2030. In light of this potential, the recommendations are worthy in and of themselves, and all the more essential given the current context.

14. IEA, *Sustainable Recovery*, 2020, www.iea.org/reports/sustainable-recovery

- **Promote access to sustainable energy as a priority and an essential service**, in order to ensure that sector stakeholders are not left behind during the pandemic and the eventual recovery.



- **Promote access to sustainable energy, i.e. resilient ways to produce and use energy that support sustainable development.** This means taking energy production, energy use (energy efficiency) and its environmental impact into account. The economic crisis triggered by the pandemic caused oil prices to fall to very low levels, which may ultimately result in greater recourse to fossil fuels for energy production.



- **Optimize and sustain cross-sector projects to ensure the continuity and efficiency of healthcare services, by consolidating synergies between the energy, health, and water sectors.** Work in concert with the stakeholders from these other sectors to better assess the needs and make these services and facilities more resilient.



- **Work with French Embassies on travel solutions for energy access stakeholders** so that they can, at a minimum, perform equipment maintenance and guarantee the provision of energy services. The French Ministry for Europe and Foreign Affairs, along with its counterparts in Africa, Southeast Asia, and Latin America, could work to develop a special protocol for granting work visas on a fast track procedure.



- **Encourage NGOs and businesses operating in the sector to incorporate risk management into their business plans**, to make it easier to access funding and make future projects more resilient to extraordinary events.



- **Support local production and build up buffer stock** close to the areas in which projects are delivered, to guarantee supplies of the hardware needed to install and maintain equipment in the case of international supply problems.



- **Increase French support mechanisms for small-scale energy access export projects**, both in terms of financing and guarantees to de-risk investments. The lack of funding for small projects (several hundred thousand euro to €10 million) available from public and private funding bodies is a significant obstacle to the development of French energy access projects. To do so, systems like calls for tender or grants from the French Treasury (Fund for Private-sector Aid and Studies - FASEP)¹⁵ seem the most suited to rapid action. One effect of expanding these mechanisms may be to maintain export support for French stakeholders currently facing the uncertainty of the recovery of their business abroad.



15. For more information on FASEP (in French), visit the following link <https://www.tresor.economie.gouv.fr/services-aux-entreprises/le-fasep>

- **Introduce more flexible funding criteria** for energy access projects during the pandemic: grant longer project completion deadlines or redefine milestones so that funding can be accessed earlier; provide advances upon obtaining funding contracts to ease the cash-flow of project holders; accept some flexibility in the execution of subsidised expenses (for example, allow small changes to how eligible expenditure is distributed between expense items); streamline due diligence by allowing for instance online verifications, so that project delivery is not compromised; make it easier to grant mezzanine and short-term loans at preferential rates; make it possible to always submit applications online, via a shared government portal (see recommendation 6.10, page 53); waive bank interest during the pandemic. In addition to this, improved visibility of available funding and enhanced coordination between funding bodies and the full range of stakeholders with signposted funding is more necessary than ever as the pandemic goes on.



- **Ensure that donor agencies have sufficient human resources to assess and process applications** in a timely manner. Indeed, during crises such as the pandemic, development banks and other public and private funding bodies find themselves with more funding applications to process.



- **Support the digital transformation in poor and developing countries**, to remotely guarantee the continuity of project implementation. Expand the use of digital surveying and communication tools, and even broaden the scope of the digital transformation to encompass cross-sector water/energy and healthcare/energy synergies.



- **Bolster training programmes for local stakeholders** to reduce local operators' dependency on external centres of decision-making and skills (based in capital cities or abroad). Further expand additional human resources to encompass connections between healthcare, water and energy sectors.




- **Adopt a concession or managed services model to bring electricity to non-connected dispensaries, maternity wards and other healthcare infrastructure.** Healthcare project managers often lack skills and expertise in energy. The initial provisioning and especially post-installation maintenance of facilities often pose a considerable obstacle to the long-term future of electricity generation and cold and heat production. This means that power purchasing agreements or hire purchase are the most appropriate models between renewable energy project operators/developers (who will be responsible for the maintenance), and healthcare infrastructure (which will consume the energy produced). While this model secures a long-term provision of an essential service, it may require a guarantee mechanism for the long-term purchasing contract (15 years / 20 years).



- **Use the energy needs of healthcare facilities as the basis for the implementation of energy access projects that cover other services.** This approach may encourage the emergence of energy access projects built around public health challenges in the concerned areas.





15 flagship measures to accelerate universal energy access

These flagship measures resume the recommendations of the following chapters.

Legislative & regulatory issues

- 1 Support national governments in drafting an official multi-year energy access plan** that includes the main rural electrification solutions beyond, or in addition to, extending the grid (mini-grids, solar kits, etc.). The plan must take the various existing forms of energy into account (electrical and thermal), as well as detail planned extensions and improvements to the grid. It should also focus on the creation of a Rural Electrification Master Plan.

→ *Recommendation 1.2, page 29*



- 2 Coordinate the various agencies involved in energy access, or develop a one-stop shop for the government:** ministries of energy, electrification agencies, rural economic development agencies responsible for land tenure, regulatory bodies, etc.

→ *Recommendation 1.5, page 30*



Products

- 3 Support the development of local renewable energy industries** by encouraging the development of local technical expertise and resources (testing, diagnostics, monitoring), and the broad application of quality standards for installations.

→ *Recommendation 2.2, page 35*



- 4 Promote the certification of all the products/material available within given countries and generalise the acceptance of work sites in the mandatory presence of a technical referent** (rural electrification agency, energy ministries, technical support, etc.) in an effort to guarantee the quality of equipment and comply with professional installation standards. Where they exist, support from certifying bodies may be offered.

→ *Recommendation 2.1, page 35*



Facilities' future once up-and-running and when the grid arrives

- 5 When designing a project, make sure that operations and maintenance are provided by a competent local operator.** Moreover, government concession documents for mini-grids must contain **legal and financial clauses covering the offset in case of national grid deployment in the concerned locations.**

→ *Recommendation 3.1, page 42*



→ *Recommendation 3.3, page 42*



Pricing for electricity produced by mini-grids

- 6** When electricity is supplied by mini-grids, encourage pricing that reflects **actual costs** without preventing institutional bodies from contributing financially or project developers from obtaining soft loans. This should ensure a more balanced treatment of minigrids compared to centralised solutions.

→ *Recommendation 4.1, page 44*



- 7** Consolidate a seed fund for partial CAPEX (Capital Expenditure) coverage of a country's first mini-grids. The learning curve may then gradually reduce the need for these funds.

→ *Recommendation 4.3, page 44*



Business development associated with the installation of mini-grids, nano-grids, solar kiosks, etc.

- 8** Work with financial donors, local authorities, NGOs and local stakeholders to **encourage project leaders to identify business activities that may arise when electricity reaches the area**, as well as strategies and resources to promote electricity use. Indeed, the uptake of electrical solutions to replace those currently in use is neither immediate, nor spontaneous.

→ *Recommendation 5.1, page 47*



Funding energy access projects

- 9 **De-risk equity investments** (crowdlending, crowdfunding) in energy access projects, in particular through the creation of institutional guarantee funds. These funds could be managed by bilateral or multilateral funding bodies, prioritizing agile, flexible procedures.

→ *Recommendation 6.8, page 52*



- 10 **Create a results-based funding**, to award project developers upon verified achievements.

→ *Recommendation 6.13, page 53*



Training

- 11 **Make an inventory of local skills and needs for initial training and CPD (Continuing Professional Development)**, and use this as a guide to train trainers, professionals and beneficiaries.

→ *Recommendation 7.5, page 59*



Cooperation between energy access stakeholders

- 12 **Implement long-term information and communication tools for all energy access stakeholders** to coordinate the network, encourage joint efforts and pool resources (regulatory knowledge, field contacts and surveys, on-site monitoring, exchanges, etc.).

→ *Recommendation 8.1, page 65*



- 13 Improve project coordination and uptake by encouraging collaboration between stakeholders** (northern and southern NGOs, training centres, institutions, local and international private sector, research institutes, local authorities) **and sectors** (water, sanitation, healthcare, education, agriculture, creation of economic activities, etc.), involving local communities in the planning of projects.

→ *Recommendation 8.5, page 66*



→ *Recommendation 8.6, page 66*



Support innovation in energy access solutions

- 14 Promote innovation in calls for proposals** and ensure solid coordination between organisations that support innovation.

→ *Recommendation 9.1, page 68*



Project governance methods








- 15 Advocate and mobilise the resources required for a more systematic assessment of all projects funded by international institutions** (including demonstration projects), **and their “productive” impact in particular.**

→ *Recommendation 10.8, page 74*










10 PRIORITY AREAS:
RECOMMENDATIONS
OF THE NATIONAL
WORKING GROUP








Recommendations by stakeholder profile

| |  French governmental institutions (Ministries and embassies) |  Development banks |  Commercial banks |  Governments of project host countries |  National agencies, local authorities, regions and institutions that support innovation |  Groups and consortia from the private sector |  NGOs |
|--|---|--|---|---|---|--|--|
| 1. Legislative & regulatory issues | | | | | | | |
| 1.1. Encourage the diversification of energy services | | | | • | • | | |
| 1.2. Support national governments in drafting an official multi-year energy access plan | • | | | • | • | | |
| 1.3. Provide guidance to States and government bodies in establishing a legislative framework that is consistent with the country's energy access plan | • | • | | • | | | • |
| 1.4. Promote a regulatory framework that encourages the emergence of local operators | | | | • | | | |
| 1.5. Coordinate the various agencies involved in energy access, or developing a one-stop shop for government bodies | • | • | | • | | | • |
| 1.6. Facilitate coordination between, and simultaneous involvement of, the public and private sectors, namely through public service delegation schemes | • | • | | • | | | • |
| 1.7. Compile and consolidate local regulations on land-use rights | • | | | • | • | | |
| 1.8. Disseminate template documents to facilitate drafting PPA | | • | • | • | | | |
| 1.9. Harmonise import taxes on a regional or sub-regional level | • | | | • | | | |
| 1.10. Encourage incorporating the equipment's carbon footprint into tax exemption incentives | • | | | • | | | |
| 1.11. Support national governments in creating an exhaustive, dynamic table containing information about renewable energy equipment prices and suppliers, to assist the implementation of any potential tax exemptions | • | | | • | | • | |

Recommendations by stakeholder profile

| |  French governmental institutions (Ministries and embassies) |  Development banks |  Commercial banks |  Governments of project host countries |  National agencies, local authorities, regions and institutions that support innovation |  Groups and consortia from the private sector |  NGOs |
|---|---|--|---|---|---|--|--|
| 2. Products | | | | | | | |
| 2.1. Promote the certification of all the products/material available within given countries | ● | | | ● | | ● | |
| 2.2. Support the creation of local renewable energy industries | ● | | | ● | ● | ● | ● |
| 2.3. Encourage the certification and traceability of imported products | ● | | | ● | | ● | |
| 2.4. Encourage taking the carbon footprint of equipment used in energy access or clean cooking projects into consideration in calls for proposals | ● | ● | | ● | ● | | |
| 2.5. Encourage the mainstreaming of a warranty system, with a local repair and collection service | | ● | | | | ● | ● |
| 2.6. Promote the creation of industries to manage and recycle end-of-life equipment used in sustainable energy access projects | ● | | | ● | | | |
| 2.7. Encourage an optimisation of the supply chain, as well as an obligation for distributors to maintain a stock of spare parts and be able to carry out repairs | | | | ● | | ● | |
| 2.8. Use thermal solar solutions for thermal applications | | | | ● | ● | ● | ● |
| 2.9. Encourage the provision of energy efficient equipment for electricity consumption and secure its supply chain | | ● | | ● | ● | ● | ● |
| 3. Facilities' future once up-and-running and when the grid arrives | | | | | | | |
| 3.1. Make sure that operations and maintenance are provided by a competent local operator | | | | ● | | ● | ● |
| 3.2. Bring donor agencies regulations into line with the mechanisms for providing maintenance | ● | | | ● | | | |
| 3.3. Ensure that government concession documents for mini-grids contain legal and financial clauses covering what happens if the national grid arrives | | | | ● | | ● | |
| 3.4. In the likely eventuality that the electrical grid reaches an area currently supplied by mini-grids, when designing a mini-grid project, incorporate a flexible modular strategy to facilitate its future integration into the national grid | | | | | | ● | ● |
| 3.5. Ensure that systems' end-of-life management is a clear part of the operator's remit | | ● | ● | ● | | ● | ● |








Recommendations by stakeholder profile

| |  French governmental institutions (Ministries and embassies) |  Development banks |  Commercial banks |  Governments of project host countries |  National agencies, local authorities, regions and institutions that support innovation |  Groups and consortia from the private sector |  NGOs |
|--|---|--|---|---|---|--|--|
| 4. Pricing for electricity produced by mini-grids | | | | | | | |
| 4.1. Encourage pricing for electricity supplied by mini-grids that reflects the real costs | | | | • | | | |
| 4.2. In countries where standardised tariffs are non-negotiable, set up compensatory subsidies to cover operators' amortisation and operating costs | | • | | • | | | |
| 4.3. Consolidate a seed fund for partial CAPEX coverage of a country's first mini-grids | | • | | • | | | |
| 4.4. Opt for innovative pricing models and customer interfaces | | | | • | • | • | • |
| 4.5. Raise awareness among government bodies of how to transfer fossil fuel subsidies to renewable energy for electricity production | | • | | • | | | |
| 5. Business development associated with the implementation of mini-grids, nano-grids, solar kiosks, etc. | | | | | | | |
| 5.1. Work with financial donors, local authorities, NGOs, and local stakeholders to encourage project leaders to identify business activities that may arise when electricity reaches the area | | • | | | • | • | • |
| 5.2. Document business categories that could likely emerge when electricity arrives | | | | • | • | | • |
| 5.3. In calls for tender on mini-grids projects, prioritise those that promote and support business creation and development | | • | | • | | | |
| 5.4. Organise in-country or in neighbouring countries field visits, in order to showcase successful projects and encourage stakeholders to share their experience of business creation through energy access | | | | • | • | | • |








Recommendations by stakeholder profile

| |  French governmental institutions (Ministries and embassies) |  Development banks |  Commercial banks |  Governments of project host countries |  National agencies, local authorities, regions and institutions that support innovation |  Groups and consortia from the private sector |  NGOs |
|---|---|--|---|---|---|--|--|
| 6. Funding energy access projects | | | | | | | |
| 6.1. Increase French support mechanisms for small-scale energy access export projects | ● | ● | ● | ● | ● | | |
| 6.2. Favour public calls for tenders covering several regions or territories | ● | ● | | ● | | | |
| 6.3. Facilitate and incentivise funding for projects implemented in areas with security risks | ● | ● | | | | | |
| 6.4. Develop funding tools for feasibility studies | ● | ● | | ● | | | |
| 6.5. Create funding mechanisms that include provisions for maintenance | ● | ● | | ● | | | |
| 6.6. Boost the visibility and awareness of export tools and guarantees offered by French stakeholders | ● | | | | ● | | |
| 6.7. Continue and accelerate the reflections on the conditions that development banks require upon providing guarantee mechanisms | | ● | | | | | |
| 6.8. De-risk equity investments | ● | ● | ● | ● | | | |
| 6.9. Harmonise regional best practices in supporting the French export | ● | | | | ● | | |
| 6.10. Create a one-stop project submission platform | ● | | | | | | |
| 6.11. Develop special funding instruments for each identified risk | | ● | ● | | | | |
| 6.12. Support the creation of local power purchasing centers or cooperatives | | ● | | ● | | | |
| 6.13. Create a results-based funding, to award project developers upon verified achievements | | ● | ● | | | | |
| 6.14. Research potential funding from diasporas in France | ● | | | | ● | | ● |
| 6.15. Mobilise private funding through public service delegations or a clear contractual framework | ● | | | ● | | | |
| 6.16. Inventory the French industrial know-how in the energy access sector | ● | | | | ● | ● | |
| 6.17. Adapt guarantee and funding tools linked to the amount of “French share” proposed by the French Government to the particularities of energy access projects | ● | | | | | ● | |
| 6.18. Support governments and local stakeholders in structuring and accessing sovereign funds in local currency | ● | ● | ● | | | | |

Recommendations by stakeholder profile

| |  French governmental institutions (Ministries and embassies) |  Development banks |  Commercial banks |  Governments of project host countries |  National agencies, local authorities, regions and institutions that support innovation |  Groups and consortia from the private sector |  NGOs |
|--|---|--|---|---|---|--|--|
| 7. Capacity building | | | | | | | |
| 7.1. Contribute to the capacity-building of existing local, regional or national training organisations | | | | ● | ● | | ● |
| 7.2. Provide training in the energy business | | ● | | ● | ● | ● | ● |
| 7.3. Strengthen cooperation between training providers as well as institutional, private and non-profit stakeholders in the energy access sector | | | | ● | ● | | |
| 7.4. Promote training for trainers | | ● | | ● | ● | ● | ● |
| 7.5. Make an inventory of local skills and needs for initial training and Continuing Professional Development (CPD) in the renewable energy sector | | | | ● | ● | | ● |
| 7.6. Support national governments in developing their own policies to require a minimum local content in calls for tender | ● | ● | | | ● | ● | |
| 7.7. In each country, set up a network of areas that have access to off-grid energy, to facilitate the sharing of experiences | | | | ● | ● | | |
| 7.8. Facilitate the emergence of local business incubators in each country | | | | ● | ● | | ● |
| 7.9. Deliver training in pricing | ● | | | | ● | ● | ● |
| 7.10. Facilitate access to online courses, (MOOC, etc.) | | | | ● | ● | | ● |
| 8. Cooperation between energy access stakeholders | | | | | | | |
| 8.1. Implement long-term information and communication tools for all energy access stakeholders | ● | | | ● | ● | ● | ● |
| 8.2. Inventory French stakeholders in the energy access sector, along with their products and services, and publish a document showcasing this expertise | ● | | | | ● | ● | ● |
| 8.3. Constantly update the inventory of successful French renewable energy projects abroad, compiled by ADEME and SER | ● | | | | ● | ● | ● |
| 8.4. Encourage French stakeholders to take part in international professional associations | ● | | | | ● | ● | ● |
| 8.5. Encourage stakeholders and sectors coalitions | ● | ● | | ● | | | ● |
| 8.6. Involve local communities and authorities in project planning | | | | ● | ● | ● | ● |

Recommendations by stakeholder profile

| |  French governmental institutions (Ministries and embassies) |  Development banks |  Commercial banks |  Governments of project host countries |  National agencies, local authorities, regions and institutions that support innovation |  Groups and consortia from the private sector |  NGOs |
|---|---|--|---|---|---|--|--|
| 9. Support innovation in energy access solutions | | | | | | | |
| 9.1. Promote innovation in calls for proposals | • | • | | • | • | | |
| 9.2. Ensure solid coordination between organisations that support innovation | • | | | • | • | | |
| 9.3. Enhance compatibility between existing funding programmes, as well as their additional nature | • | • | | | • | | |
| 9.4. Facilitate awareness of European calls for proposals and encourage French stakeholders to join international consortia to submit a bid | • | | | | • | | |
| 9.5. Facilitate the joint development of research and innovation projects between Europe and developing countries | • | • | | • | • | | |
| 9.6. Identify and disseminate available French academic resources pertaining to energy access | • | | | | • | | • |
| 9.7. Finance innovative demonstration projects over the long term | | • | | | • | | |
| 10. Project governance methods | | | | | | | |
| 10.1. With the involvement of target communities, always examine local necessities | | | | | | • | • |
| 10.2. Carry out a review, as exhaustive as possible, of local institutions | | | | • | | | • |
| 10.3. Involve local stakeholders in every step of the creation and implementation of energy access projects | | | | | | • | • |
| 10.4. Set up energy access mechanisms specifically targeting women, to improve gender equality | | • | • | • | • | • | • |
| 10.5. Encourage management/handover of energy production, storage and distribution systems to local operators | | | | • | | • | • |
| 10.6. Analyse interactions between stakeholders in energy production, distribution and local institutions | • | | | • | • | | |
| 10.7. Set up a virtual knowledge platform for off-grid energy access | • | • | | | | | • |
| 10.8. Advocate and mobilise the resources required for a more systematic assessment of all projects funded by international institutions | • | • | | • | • | • | • |

1.

Legislative & regulatory issues

While some countries have clearly identified the essential role that decentralised facilities have to play (mini-grids, solar home systems, solar cookers) in delivering energy access policies to achieve universal energy access by 2030, very few of them have created an implementation plan covering all of their territory. This planning must be accompanied by a legislative framework that facilitates the implementation of investments and the involvement of private stakeholders.

1. Legislative & regulatory issues

- 1.1 Encourage the diversification of energy services**, including energy efficiency (off-grid electrification solutions, thermal solar solutions, etc.) to meet the full range of needs. Implement regulatory measures or energy efficiency certifications to encourage the installation of efficient systems.



- 1.2 Support national governments in drafting an official multi-year energy access plan** that includes the main rural electrification solutions beyond extending the grid (mini-grids, solar kits, etc.), or in addition to extending the grid (solar hot water, solar cookers, etc.). The plan must take the various existing forms of energy into account (electrical and thermal), as well as detailing planned extensions and improvements to the grid. It should also focus on the creation of a Rural Electrification Master Plan.

→ *Best Practices: OEAMP in Benin, page 32*



- 1.3 Provide guidance to States and government bodies in establishing a legislative framework that is consistent with the country's energy access plan**, specifying which authorities are responsible for granting the permits of concessions required for energy access investments, and defining the main technical and financial data.

→ *Best Practices: The Togolese universal energy access strategy, page 33*



- 1.4 Promote a regulatory framework that encourages the emergence of a local operator** (electrical cooperative, municipal management, management committee, private sector entrepreneur) who can take ownership of the facilities once they are built, and oversee their operation and maintenance.



1. Legislative & regulatory issues

- 1.5 Coordinate the various agencies involved in energy access, or develop a one-stop shop for the government:** ministries of energy, electrification agencies, rural economic development agencies responsible for land tenure, regulatory bodies, etc.



- 1.6 Facilitate coordination and simultaneous involvement of the public and private sectors, namely through public service delegation guidelines.** With regard to the above, always try to find synergies between the public and private sectors and NGOs. NGOs often have close relationships with ministries of energy and rural electrification agencies, and help promoting lessons learned from experience in the field without ulterior financial motive.



- 1.7 Compile and consolidate local regulations on land-use rights** in each country (ownership, long-term leasing with real rights, public service concessions, easement, road permissions). Promote the implementation of reforms to land laws that encourage the installation of energy infrastructures.



- 1.8 Disseminate template documents to facilitate drafting PPA** (Power Purchase Agreement) for stakeholders in remote locations (industry, local authorities, etc.) who would like to switch to a renewable energy supply. This also includes supporting national governments in making sure that their regulations accept or do not prevent these kinds of contracts.



1. Legislative & regulatory issues

- 1.9** **Harmonise, at a regional or sub-regional level, import tariffs** and customs duties for the equipment used in electricity access and clean cooking projects (PV generators, batteries, energy efficient homes, etc.). Clearly inform project developers of the terms of exemption for equipment that includes renewable energy or clean cooking technologies.



- 1.10** **Encourage incorporating the equipment's carbon footprint** into tax exemption incentives.



- 1.11** **Support national governments in creating an exhaustive, dynamic table containing information about renewable energy equipment prices and suppliers, to assist the implementation of any potential tax exemptions.** If possible, adjust exemptions according to product quality. Promote harmonised customs duties in different countries, and clearly state the conditions for the exemption of equipment containing renewable technologies.



Benin's Off-Grid Electricity Access Master Plan (OEAMP)

In 2018 the government of the Republic of Benin adopted an Off-Grid Electricity Access Master Plan (OEAMP), with the aim of creating a framework that would encourage the private sector to support electricity supply for its population. This document was followed by other texts, including in particular the decree on regulations governing off-grid electrification (No. 2018-415 of 12 September 2018). This decree established a regulatory framework that was suitable for private investment in rural electrification in Benin.

The OEAMP is a tool for implementing Benin's off-grid electrification policy. It provides reassurance regarding certain concerns, such as: the country's electrical landscape and extensions scheduled for the near future; communities eligible for rural electrification; priority communities (known as Development Hubs); the scale of the systems that need to be installed to deliver electrical services to target communities, and the best renewable resource for each of them. The first mini-grids built as part of OEAMP, the concessions for which are currently being negotiated between the authorities (including the licensing authority, namely the Rural Electrification and Energy Management Agency of Benin – REEMAB) and private developers will be completed in late 2020/early 2021. This will bring electricity to more than 100 communities within two years, through photovoltaic solar mini-grids delivered by the private sector and NGOs.

Learn more (in French):

<https://www.benin-energie.org/presentation-pdher.html>

The Togolese universal energy access strategy

In 2016, having seen the limitations of an electrification policy based on the extension of existing grids and public funding (which brought electricity to around 40% of the Togolese population by 2017), the Togolese government decided to modify its electrification strategy by enacting a renewable energy bill to deliver electricity to all Togolese citizens by 2030. In addition to creating a dedicated rural electrification agency (AT2R), the new strategy is built around renewable energy and combines an extension of the existing electrical grid with the selection of mini-grid and solar kit operators.

Learn more (in French):

<https://at2er.tg/>



photo credits: Schneider Electric - Nabil Zorkot

2.

Products

Solar Home Systems (SHS), solar generators, batteries, electrical equipment, mini-grid components, management systems, metering...

Reliable, quality components are essential to securing facilities' durability. Low-cost and poor-quality products, as well as inadequately provisioned or defective facilities, all cause below-average performance and can affect how users perceive decentralised solutions. The provision of raw materials, the carbon footprint of product manufacturing and equipment's end-of-

life management are increasingly pressing issues as well, due to the lack, or inadequacy, of a recycling and recovery industry.



photo credits: Lagazel

2. Products

- 2.1 Promote the certification of all the products/material available within given countries** and generalise the acceptance of worksites in the mandatory presence of a technical referent (rural electrification agency, energy ministries, technical support, etc.) in an effort to guarantee the quality of equipment and comply with professional installation standards. Where they exist, support from certifying bodies may be offered.

→ *Best Practices: The Lighting Global initiative, focusing on the quality of solar products, page 38*



- 2.2 Support the development of local renewable energy industries** by encouraging the development of local technical expertise and resources (testing, diagnostics, monitoring), and the broad application of quality standards for installations.

→ *Best Practices: Solar System Test Centre (CT2S) in Dakar, Senegal, page 39*



- 2.3 Promote the certification and traceability of imported products** within different countries, and the rejection of products and raw materials stemmed from slavery, child labour and mining operations whose environmental and social impact fails to comply with international regulations.

→ *Best Practices: The Responsible Minerals Initiative, page 40*



- 2.4 Encourage taking the carbon footprint of equipment used in energy access or clean cooking projects into consideration in calls for proposals.** Incorporate support for life-cycle analysis into bilateral or multilateral technical aid, in order to consolidate local skills in this field, or to provide benchmarks.



2. Products

- 2.5 Encourage the mainstreaming of a warranty system, with a local repair and collection service**, fostering consumer confidence and providing a solution to the matter of recycling. This mainstreaming may be accompanied by steady satisfaction surveys conducted by the regulating body, which would enrich the definition of quality labels.



- 2.6 Promote the creation of industries to manage and recycle end-of-life equipment** used in sustainable energy access projects (solar panels, batteries, power inverters, electrical and electronic equipment, etc.), following the example of Extended Producer Responsibility (ERP) sectors, which have been set up in France for various product types.



- Through application of a regulatory framework or calls for tender, **encourage an optimisation of the supply chain, as well as an obligation for distributors to maintain a stock of spare parts and be able to carry out repairs.**



2. Products

- 2.8 Use thermal solar solutions** (solar thermal collectors, solar concentrators, solar ovens and cookers, solar air-conditioners, etc.) **for thermal applications**, thereby avoiding wasting electricity, as solar energy is directly converted into usable heat or cooling. A lack of familiarity with renewable thermal technologies means that energy access solutions are too often reduced to electrification. It is important to use electricity for its specific purposes such as street lighting, computers, washing machines, telephones and any other use that rely solely on electricity. However, many applications can be covered by other forms of energy, such as thermal solar energy. For example, 74% of industrial energy demands are in fact a need for thermal energy. Examples of these applications include the production of hot water, cooling (air-conditioning, food storage), agri-food processing (cooking, drying, pasteurisation, etc.), and the production of fresh water through desalination. Furthermore, this energy is easy to store (hot water tanks, stored in rocks or sand).



- 2.9 Encourage the provision of energy efficient equipment for electricity consumption and secure its supply chain.**



The Lighting Global initiative, focusing on the quality of solar products

The off-grid energy market is characterised by products of inconsistent quality. Some are well-designed and well-made, while others fail to meet expectations in terms of safety, durability and performance. Lighting Global has tested the best-selling pico-solar products in the main markets, and found that 94%¹⁶ of them presented one or more defects that affected product durability. Poor-quality products can discourage people from using renewable solutions, as consumers lose confidence in all similar technology due to their own or their neighbour's negative experience. For low-income consumers, buying a solar product may be a major decision and a major investment; spending limited funds on a poor-quality product can be devastating. Many off-grid solar product markets do not have a robust consumer protection framework in place, meaning that warranties are difficult to obtain, while regulations are lacking or inconsistently applied, and there is little recourse for defective products. Without effective quality assurance measures, consumers will remain exposed to the financial risks engendered by poor quality products. In this context, product tests and standards provide quality assurance for the market and improve access to good quality products for consumers. Over the past ten years, the World Bank's Lighting Global project has developed and upheld a quality assurance framework based on standards that stipulate the minimum requirements for pico-solar and SHS products.

This effort to ensure quality is broadly applauded by businesses and NGOs. However, a few doubts must be expressed regarding the cost of accessing this certification and the level of requirements to be met and technical details that must be provided (labelling, level of information required in manuals, etc.).

Learn more: <https://www.lightingglobal.org/>

16. World Bank, *Lighting Global, Technical Note, Issue 27, 2018*

Solar System Test Centre (2STC) in Dakar, Senegal

As the only test laboratory for photovoltaic panels and solar equipment in Senegal, 2STC's objective is to assist the full range of renewable energy industry stakeholders with quality control for solar equipment and facilities. The centre's work encompasses testing and quality control procedures for PV modules, batteries, regulators and power inverters. These services can be provided in the laboratory or on-site (solar power plants or mini-grids in remote locations). The 2STC's role also includes consulting and guidance services for sector stakeholders, as well as training and capacity building for installation technicians and other concerned actors. The centre is equipped to work as a laboratory, as well as to carry out testing and maintenance on-site.

- Labelling checks
- Visual inspections
- Electrical performance measurement
- Infrared imaging
- Electroluminescence imaging
- Electrical insulation and leakage current
- Battery testing
- Power inverter and regulator testing
- Performance testing for entire facilities in remote or grid-connected locations

Thanks to these technical diagnostic tools and expertise, 2STC is a major player in the development of a sustainable solar power industry in West Africa, featuring the production of quality components.

Learn more (in French): <https://ct2s.org.sn>

The Responsible Minerals Initiative

The Responsible Minerals Initiative (RMI) was founded in 2008 by cutting edge electronics companies members of the Electronic Industry Emissaries Coalition (EICC) and the Global e-Sustainability Initiative (GeSI), under the banner of the Conflict Free Sourcing Initiative (CFSI). The RMI sets out to implement a series of “reasonable diligence” measures for “conflict minerals” and minerals from high-risk areas. It provides its members with tools to train in best practices.

The initiative stipulates a duty of care with regard to the supply chain, similar to EU regulation EU 2017/821, setting requirements for the source of imported metals, most notably tin, tantalum and tungsten from conflict zones or high-risk areas.

Sourcing recycled raw materials:

Another way to reduce dependency on raw materials whose source cannot be properly traced is to obtain recycled raw materials.

Sector stakeholders, industry and developers of energy access technology and solutions that intervene throughout the entire value chain can be encouraged to join the initiative and commit to meeting its requirements.

Learn more: www.responsiblemineralsinitiative.org

Facilities' future once up-and-running and when the grid arrives

Some projects, particularly those in the demonstration phase, receive funding for their implementation, but long-term operation of facilities implies a need to identify the body responsible for production and maintenance in the operational phase. In some cases, project leaders were able to create this body, or at the very least a mechanism for the provision of maintenance.

Moreover, extending the electrical grid into areas where it was not planned to go gives rise to issues around the future of decentralised energy production equipment (mini-grids). A number of options can be envisioned and are already in place, from abandoning the mini-grid (with financial compensation for the investor) to incorporating the mini-grid into the centralised grid as the producer and/or distributor, if the mini-grid's technical standards enable this.

3. The future of facilities once up-and-running and when the grid arrives

- 3.1 **When designing a project, make sure that operations and maintenance are provided by a competent local operator** for a minimum 5 to 10-year period.



- 3.2 **Bring donor agencies regulations into line with the mechanisms for providing maintenance.** In business plans presented to institutional funders, take into account the amount that has been spent on maintenance over several years since the facility was put into service.



- 3.3 Ensure that government concession documents for mini-grids contain **legal and financial clauses covering what happens if the national grid arrives.** For example, a financial clause stipulating that the grid operator will buy back the infrastructure under acceptable conditions.



- 3.4 In the likely eventuality that the electrical grid reaches an area currently supplied by mini-grids, **when designing a mini-grid project, incorporate a flexible modular strategy to facilitate its future integration into the national grid.**



- 3.5 Ensure that **systems' end-of-life management** is a clear part of the operator's remit, who may run the system as a concession.



Pricing for electricity produced by mini-grids

4.

According to IRENA, over the past ten years the cost of solar systems has plummeted, leading to increased competition in mini-grid produced electricity with storage. The observed prices stand at around 0.55 USD/kWh. Storage technologies are following the same downwards trend, and a 25% reduction in production costs is still on the horizon, notably by developing productive uses for electricity (agriculture, crafts, trade, etc.), the diurnal capacity factor, and the promotion of digital technology (smart meters, status monitoring, etc.). This means that by 2030 the cost per kWh could fall to 0.20 USD/kWh.¹⁷

However, comparisons with users of the centralised electrical grid are often biased. Most of the time, they get subsidised kWh that does not reflect production costs. In about fifteen African countries surveyed by IRENA, centralised grids' electricity cost stood at over 0.30 USD/kWh, but the tariffs offered to consumers were subsidised by 40% to 80%.¹⁸ Under a standardised tariffs policy, while these tariffs are imposed on the developers of mini-grid projects, their economic viability is called into question.

17. IEA, IRENA, UNSD, World Bank, WHO, *Op. cit.*

18. *Ibid.*

4. Pricing for electricity produced by mini-grids

- 4.1 When **electricity is supplied by mini-grids, encourage pricing that reflects the real costs** without preventing institutional bodies from contributing financially or project developers from obtaining soft loans. This should ensure a more balanced treatment of minigrids compared to centralised solutions.



- 4.2 In countries where standardised tariffs are non-negotiable, **set up compensatory subsidies** to cover operators' amortisation and operating costs which are higher in rural areas. Permanent grants or mechanisms for accessing standardised national tariffs may enable these subsidies to be paid. As this overfunding should remain a low proportion of total funding for the national electricity sector, the development of new digital tools could facilitate the implementation of these targeted subsidy mechanisms.



- 4.3 **Consolidate a seed fund for partial CAPEX (Capital Expenditure) coverage** of a country's first mini-grids. The learning curve may then gradually reduce the need for these funds.



4. Pricing for electricity produced by mini-grids

- 4.4 Opt for innovative pricing models and customer interfaces** (power outage management, consumption monitoring and training), encouraging users to manage their own energy use and expenditure. **Making energy affordable for rural communities** will mean implementing **innovative pricing models that are tailored to local economies**. Rural households are frequently faced with inconsistent income, including long periods without any access to cash. With the constraints of regular electricity fees, there may be a high risk of unpaid bills, which would destabilise the model.



- 4.5 Raise awareness among government bodies of how to transfer fossil fuel subsidies to renewable energy for electricity production.** As of now, work on the impact and acceptability of a gradual removal of subsidies for electricity produced using fossil fuels, along with a regular and acceptable increase in the price of electricity over ten years through social tariffs. As renewable energy becomes more competitive, this increase should be manageable.



5.

Business development associated with the implementation of mini-grids, nano-grids, solar kiosks, etc.

Developing business activities tangibly improves the quality of life of communities having access to energy, by staunching rural exodus and creating spaces for social and economic interaction. These businesses, sources of income, secure investments in mini-grids and guarantee minimum consumption. French stakeholders have adopted this combined approach, which is a source of added value. For energy access projects based on mini-grids, nano-grids, or solar kiosks, the choice of the technology should always be accompanied by a reflection, with local stakeholders, on the kinds of businesses that could emerge with the arrival of electricity. The development of emerging countries and rural areas is made possible through the creation of businesses. Social innovation is also a crucial element: synergies are to be developed with NGOs, government bodies and other local stakeholders, who can help support the arrival of electricity and the creation or development of economic activities. Given that expansion and connection costs of centralised grids are extremely variable, there is a real market for decentralised solutions, which are essential for overcoming this limitation to energy access. For example, the cost of extending centralised grids in rural areas varies from 1100 USD per user in Vietnam, to 2300 USD per user in Tanzania. Grid connections in urban areas can also vary from 570 USD to 1100 USD per connection.¹⁹

19. McKinsey & Company, *Op. cit.*

5. Business development

- 5.1 Work with financial donors, local authorities, NGOs, and local stakeholders to encourage project leaders to **identify business activities that may arise when electricity reaches the area**, as well as strategies and resources to promote electricity use. Indeed, the uptake of electrical solutions to replace those currently in use is neither immediate, nor spontaneous.



photo credits: Le Partenariat

→ *Best Practices: Methodology for supporting business development linked with electricity in Sub-Saharan Africa (PAMELA), page 49*



- 5.2 **Document business categories that could likely emerge when electricity arrives** in areas that were previously deprived of such an access. Following the example of associations like GOGLA (<https://www.gogla.org/>), provide effective business development tools via an international platform that could be hosted, for instance, by UNIDO (United Nations Industrial Development Organization) or by multilateral donor agencies.



- 5.3 **In calls for tender on mini-grids projects, prioritise those that promote and support business creation and development.** The weighting of this component may be increased so that it is a deciding factor in the selection process.



5. Business development

- 5.4 **Organise** in-country or in neighbouring countries **field visits, in order to showcase successful projects** and encourage stakeholders to share their experience of business creation through energy access.



photo credits: Electriciens Sans Frontières France

Methodology for supporting business development linked with electricity in Sub-Saharan Africa (PAMELA)

Alone, domestic and social users of a mini-grid are not enough to guarantee local economic development and financial viability for operators. This observation led to a reflection on productive uses of electricity. This may seem like a simple concept, but its realisation was not smooth sailing. Fondation Energies pour le Monde used this observation to inspire its PAMELA methodology.

Its aim is to make a contribution to local economic development by supporting the emergence of productive activities relating to electricity. It is the result of a research initiative carried out in collaboration with different partners: the Pacte research laboratory, rural electrification agencies in Madagascar and Senegal, along with two local associations, Fimifa in Madagascar and Grdr in Senegal.

The strategy is as follows: after an in-depth survey of the local production industry – be that agricultural or artisan – local entrepreneurs, selected through a call for expressions of interest, are supported in setting up their production business, in terms of both procuring electrical equipment and developing their technical and business skills. In parallel, the local operator of the mini-grid is assisted in delivering his expertise to support these new customers.

Since rural entrepreneurship can only be grasped holistically, this methodology contains a broad and in-depth analysis of the challenges facing local employment, women and young people.

As the result of almost four years of work, a methodological guide to this methodology has now been published. Practical, evolving and available online, it provides a toolkit to support the development of income-generating businesses linked with electricity.

Download the guide (in French) here:

<http://www.fondem.org/programmes/publications/methodologie-pamela/>

6.

Funding energy access projects

The funding tools available for traditional projects are poorly suited to energy access projects. Paradoxically, these projects require smaller funding than traditional large-scale energy infrastructure projects (from a few hundred thousand euros to a few million euros per project, for example), which makes transaction costs (financial modelling, national risk coverage and analysis, exchange rates, loan documentation, etc.) dissuasive, or even resulting in a lack of offers. Donor agencies and commercial banks often require projects to group together until they reach a critical mass of over €20 million. This threshold is very difficult for energy access projects to reach, and energy access projects are also difficult to group together due to the unique nature of each project and the need to be fine-tuned to meet the needs of local beneficiaries. Moreover, the unsystematic risk of end clients' defaulting is not restricted to a single stakeholder, but rather a large group of consumers. This plural insolvency risk comes in addition to the "standard" risks that financial organisations identify and cover in international infrastructure projects, but often leads to a lack of offers in light of the small sums in question.

The strong growth recorded in the energy access industry in recent years – 37% per annum between 2016 and 2017, with record investment of \$500 million in 2018²⁰ – coupled with the existence of an innovative and competitive offering from French organisations, means that existing funding tools should be adapted, and new, innovative mechanisms that are tailored to the intrinsic characteristics of these projects should be created.

20. IEA, IRENA, UNSD, World Bank, WHO, *Op. cit.* Cit.

6. Funding energy access projects

6.1 Increase French support mechanisms for small-scale energy access export projects, both in terms of financing and guarantees to de-risk investments. Structurally, energy access projects clash with the logic of “project finance” that incurs fixed transaction costs (due diligence or analysis of the different risks inherent to the project), which makes securing funding a costly, unviable endeavour. The lack of public or private financing for small projects (several hundred thousand euro to €10 million) is a significant obstacle to the development of French energy access projects. To remedy this, systems like calls for proposals or grants from the French Treasury (FASEP) seem the most suitable to provide a quick access to funding. Furthermore, supranational guarantee mechanisms, like the one currently developed by the World Bank and AFD as part of the International Solar Alliance’s Affordable Finance at Scale programme, could help to reduce the risks perceived by financial partners and optimise funding conditions and access for energy access projects.



6.2 Favour public calls for tenders covering several regions or territories, so that projects can be grouped together to reach a sufficient financial volume that is compatible with development banks criteria. This approach would also be effective as part of national universal energy access policies.



6.3 Facilitate and incentivise funding for projects implemented in areas with security risks (in the Sahel region, for example), so that local communities are not excluded from energy access – and therefore development – actions, which have a significant impact on the stabilization of a country’s situation.



6.4 Develop funding tools for feasibility studies that are not part of the project’s business model and cannot be passed on to users through pricing strategies.



6. Funding energy access projects

- 6.5 Create funding mechanisms that include provisions for maintenance** to secure the systems' long-term future. Indeed, subsidies from main institutional funding providers cannot cover the sums spent on maintenance over a period of several years since the facility was put into service.



- 6.6 Boost the visibility and awareness of export tools and guarantees** offered by French stakeholders. If required, work with BpiFrance to develop guarantee tools tailored to the characteristics of energy access projects (abundance of consumers, risk of unpaid bills, country risks, relatively low initial investment, etc.).



- 6.7 Continue and accelerate the reflections on the conditions that development banks require upon providing guarantee mechanisms.** The existence of suitable institutional guarantees is a factor facilitating the emergence of commercial loans at acceptable rates.



- 6.8 De-risk equity investments** (crowdlending, crowdfunding) in energy access projects, in particular through the creation of institutional guarantee funds. These funds could be managed by bilateral or multilateral funding bodies, prioritizing agile, flexible procedures.



- 6.9 Harmonise regional best practices in supporting the French export:** funding for the International Volunteers in Business Program (VIE), attending international trade fairs, subsidizing project.



6. Funding energy access projects

- 6.10 Create a one-stop project submission platform** by simplifying the procedure for submitting, selecting and appraising projects, in order to reduce the cost for project leaders and accelerate the process of identifying viable projects.



- 6.11 Develop special funding instruments for each identified risk:** project development and operation risks.



- 6.12 Support the creation of local power purchasing centers or cooperatives** to facilitate funding for energy access facilities (solar home systems or mini-grids).



- 6.13 Create a results-based funding, to award project developers upon verified achievements.** Leverage existing impact investment funds to take positive externalities into account (local economic development, local job creation, gender equality impact, etc.). International donor agencies may help to provide seed funding for such funds, whose longevity will be secured through standardised prices within or across sectors.



- 6.14 Research potential funding from diasporas in France** and their potential interest in energy access projects.



6. Funding energy access projects

- 6.15 Mobilise private funding through public service delegations or a clear contractual framework** defining the respective responsibilities of public and private stakeholders, as well as the expected performance.

→ *Best Practices: Universal Access to Services Fund (UASF) in Mauritania for mini-grids' economic sustainability, page 55*



- 6.16 Inventory the French industrial know-how** in the energy access sector in order to optimise the suitability of fundings requiring parts of the offered equipment or services to be made in France or by a French stakeholder (“part française” or “French share”). The required “French share” has to be realistically achievable. Such an approach could encourage companies to group together for combined tenders.



- 6.17 Adapt guarantee and funding tools linked to the amount of “French share” proposed by the French Government to the particularities of energy access projects.** Stipulate a minimum, but realistic, “French share” to grant funding or subsidised warranties.



- 6.18 Support governments and local stakeholders in structuring and accessing sovereign funds in local currency,** because exchange rate risks and the inability to offer funding in local currency have both been identified by stakeholders as major obstacles (GOGLA, Bloomberg, McKenzie).



Universal Access to Services Fund (UASF) in Mauritania for mini-grids' economic sustainability

In Mauritania, the French Development Agency (AFD), in partnership with the European Union and the World Bank, is supporting the RIMDIR project²¹ for rural electrification in three provinces in the south-east of the country, by promoting a new public service delegation model and electrification through mini-grids. Nevertheless, the business model for private service providers remains unprofitable, because Mauritanian authorities want to align tariffs with those applied nationally by SOMELEC, the Mauritanian Electricity Company. As a result, a subsidies mechanism is needed to make the proposed delegation an appealing prospect. To that end, it is considered to pay a subsidy covering part of the initial investments, as well as a regular balancing contribution. The latter will be financed by UASF and obtained mainly through license fees from operators in the water, energy and telecommunications sectors. This fund, created in 2005 and endowed with 500 million Ouguiya every year, has for several years now been used to subsidise operating losses of remote power plants managed by private operators.

21. Consolidating investments in production and energy in Mauritania, for the sustainable development of rural areas.

7.

Capacity building

Capacity-building for local stakeholders is a crucial element and must cover a wide range of aspects: technological, social and economic issues, but also funding and the sustainability of energy access systems – be they home systems or mini-grids – used to produce electricity or provide clean cookstoves. Government officials (ministries, electrification agencies, regulators) must acquire the skills needed for energy planning and the provision of public policy mechanisms. On a local level, this means training project leaders, local and regional authorities, as well as other stakeholders who oversee operations and maintenance. Not to mention

support for business development, which is vital to secure the future of energy facilities and their acceptance by the community.



photo credits: Le Partenariat

7. Capacity building

7.1 Contribute to the capacity-building of existing local, regional or national training organisations. Renewable energy and energy efficiency training centres already exist under the aegis of UNIDO, for example: the regional centres of ECREEE for West Africa and EACREEE for East Africa. An equivalent organisation for Central Africa is currently under development. These training centres need an update and regular skills development as technologies and business models evolve. The development or updating of energy access training modules should be carried out in close collaboration with the private sector and NGOs that work in the field. Furthermore, some public electricity companies also have training centres which could be strengthened.

→ *Best Practices: The Solar Mama initiative, page 61*



7.2 Provide training in the energy business (electricity and thermal energy): the industry's structuring must be supported by the development of technological resource centres, to expand professional and technical training courses spanning the entire value chain. These courses should target different stakeholders (senior managers, technicians, engineers, local companies, etc.), and be tailored to real market needs in line with targets set by the government, calls for tender, or energy access programmes already underway. Courses must include local businesses, source of potential employers. Awareness-raising modules covering renewable energy's distinctive features (environmentally friendly, intermittent nature, etc.) need to be developed for local communities and decision-makers.

→ *Best Practices: The Solar Mama initiative, page 61*
The NLEWA-CAM initiative, page 62
Electrification of refugee camps, page 63



- 7.3 Strengthen cooperation between training providers (technical and academic)** as well as institutional, private and non-profit stakeholders in the energy access sector in order to ensure a consistency between training/innovation/research programmes and the realities of the field.



AN INDUSTRY THAT CREATES JOBS

Through a universal access to energy, 20,000 companies and 4.5 million jobs could be created in the decentralised renewable energy industry, in distribution, installation, services, etc. At the time of writing, most of these jobs are not located where there is the highest need (less than 1% of the 10.3 million jobs worldwide are in Africa), because these countries are experiencing a significant shortage of technical, financial and managerial competencies in this field.²² Local skills development is a prerequisite for a sustainable, inclusive local development, especially with regard to women.

- 7.4 Promote training for trainers** in order to spread skills more widely by, for example, setting up standardised and certified national or regional training courses, leveraging existing regional bodies like the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ERCREEE), the East African Centre for Renewable Energy and Energy Efficiency (EACREEE), etc.



22. World Bank, *State of Electricity Access Report 2017*

7. Capacity building

- 7.5 Make an inventory of local skills and needs** for initial training and Continuing Professional Development (CPD) in the renewable energy sector, and predict future training needs by setting up strategic workforce planning.



- 7.6 Support national governments in developing their own policies to require a minimum local content in calls for tender**, based on an inventory of local skills and industries able to work on energy access projects.



- 7.7 In each country, set up a network of areas that have access to off-grid energy, to facilitate the sharing of experiences** on setting up, running and maintaining energy systems, as well as on social, economic and technological innovation. Deliver training as part of this network.



- 7.8 Facilitate the emergence of local business incubators** in each country to stimulate regions who have, or will have, access to energy, with a special focus on projects led by women.



7. Capacity building

7.9 Deliver training in pricing: to set tariffs that reflect actual costs, learn from the example of countries in which regulatory authorities have set up training programmes to develop pricing skills. This upskilling is particularly relevant to economic and econometric analysis, as well as tariff and financial modelling.



7.10 In addition to classroom-based training, **facilitate access to online courses**, like MOOC (Massive Open Online Course), by providing teachers and students with suitable digital infrastructure.



The Solar Mama initiative, training for solar technicians

The Barefoot College launched a solar energy course for underprivileged women, some of whom are illiterate. Since 2008, some 2200 “Solar Mamas” from 92 different countries have received training in solar engineering, learning to install facilities that deliver electricity to almost one million people.

Students from developing countries in Africa, South America, Asia, and the Pacific Islands complete a six-month course at the Barefoot College in Tilonia, Rajasthan. During the course, women build solar electrification systems (LED lamps, charge controllers, domestic lighting systems, solar lanterns, etc.). The equipment they build is then shipped back to their home villages, where it is used to bring electricity to homes in their community. They also learn how to set up Rural Electricity Workshops (REW) in their own villages, to store the components and equipment they need to maintain and repair their solar power units. The Barefoot College’s approach is 100% practical and contains no theory, meaning that students do not need to have educational qualifications. Moreover, solar engineers learn by seeing and doing, removing language barriers apart from learning the name of essential parts in English.

In Africa, the idea is to train older women, who are more likely to stay in their villages and share their knowledge over the long-term. Feedback reveals that once they have been trained and have installed a few facilities, young men have a tendency to move to bigger cities where they can earn more.



photo credits: Barefoot College International

The NLEWA-CAM Initiative - Women and Sustainable Energy: Supporting the Network of Local Elected Women of Cameroon

The “Women and Sustainable Energy: Supporting the Network of Local Elected Women of Cameroon” programme sets out to sustainably consolidate communal energy systems in seven Cameroonian towns and cities (pilot projects for public lighting and improved electricity supplies for public buildings and infrastructures), as well as to develop the skills of the NLEWA-CAM (Network of Local Elected Women of Cameroon). It is delivered in partnership with ADEME, the International Association of Francophone Mayors (AIMF), the Veolia Foundation and FEICOM (Special Fund for Equipment and Inter Municipal Intervention). As part of the programme, special training sessions are held for mayors and technicians from the towns and cities that are part of the network, including:

- Training on local energy governance (energy concepts, municipal mandates and responsibilities, equipment maintenance skills, etc.) is provided to female elected officials.
- Training on the challenges of developing renewable energy projects, technical maintenance of solar equipment, etc. is delivered to technicians.



photo credits: Georges Dongmo

Electrification of refugee camps by Électriciens Sans Frontières: light for the Rohingya

Persecuted in Myanmar, the Rohingya were forced to flee their homeland. Today, almost one million Rohingya live in a refugee camp near Cox's Bazar in southern Bangladesh. Électriciens Sans Frontières was called in to help improve the alarming social and sanitary conditions endured by the Rohingya refugees: women and children, in particular, felt very unsafe visiting wells and latrines at night. Plenty of lighting equipment had been installed but was no longer working due to a lack of local maintenance and repair skills.

Électriciens Sans Frontières, working closely with Schneider Electric and the NGO Friendship, organised a renewable electricity training programme. Twenty Rohingya and Bangladeshi apprentices were trained in the installation, maintenance and repair of lighting and power supply equipment, skills that were immediately put into practice. The course was an opportunity for the apprentices to acquire the skills they need to work in the renewable energy sector, as well as to gain independence. The apprentices were trained in the basics of starting a business, so that they could launch their own.

The strategy adopted by Électriciens Sans Frontières in this project could be replicated in other refugee camps or camps for displaced peoples, anywhere a lasting source of light is required.

This project was delivered with support from: Ville de Paris, French Ministry of Foreign Affairs (Crisis and Support Centre), the Schneider Electric Foundation, Fondation de France, Fondation Bruneau and Sunna Design. In early 2020, it won the Zayed award for sustainable development.



photo credits: Électriciens Sans Frontières



8.

Cooperation between energy access stakeholders

Businesses (SMB, start-ups or big corporations), NGOs, institutions (government ministries, regional councils, agencies, local authorities), banks and investors (public and private), financial brokers, investors and fund managers, academic institutions, and more, are all working to improve energy access. Sharing experiences and information about target countries and implemented projects is essential if we are to consolidate the French offering and accelerate the delivery of solutions. The implementation of comprehensive strategies encompassing different sectors and approaches will encourage local ownership of the development of energy access solutions, and teach stakeholders from different fields to work together.

8. Cooperation between energy access stakeholders

- 8.1 Implement long-term information and communication tools for all energy access stakeholders** to coordinate the network, encourage joint efforts, and pool resources (regulatory knowledge, field contacts and surveys, on-site monitoring, exchanges, etc.).



- 8.2 Inventory French stakeholders** (businesses, NGOs, regional councils, public bodies, research centres, etc.) **in the energy access sector, along with their products and services, and publish a document showcasing this expertise** through the lens of innovation. Then promote this document to ordering institutions, donor agencies and French diplomatic networks.



- 8.3 Constantly update the inventory of successful French renewable energy projects abroad**, compiled by ADEME and SER (www.savoirfairefrancais-enr.fr), including a section on **energy access projects**.



- 8.4 Encourage French stakeholders to take part in international professional associations** that promote off-grid solutions, such as GOGLA, the African Minigrad Developers Association (AMDA), the Alliance for Rural Electrification (ARE) and any others.



8. Cooperation between energy access stakeholders

8.5 Encourage stakeholders (northern and southern NGOs, training centres, institutions, local and international private sector, research institutes, local authorities) **and sectors** (water, sanitation, healthcare, education, agriculture, business creation, etc.) **coalitions**, through the issuing of specific or “bonus” calls for proposals, to encourage stakeholders from different sectors and organisations to work together. In the healthcare sector, for example, energy access projects linked to the construction or electrification of dispensaries, maternity wards, community clinics, etc. require close coordination of stakeholders in both sectors, to optimise the provisioning and smooth operation of the facilities. When projects are delivered in a given region, be they industrial or agricultural projects, or about implementing services, incorporate decarbonation targets into their design, so as to avoid increasing greenhouse gas emissions in the region.



8.6 Involve local communities and authorities in project planning, to encourage their ownership and the development of productive activities that may emerge with the arrival of electricity.



photo credits: Barefoot College International

Support innovation in energy access solutions

9.

There are a number of French instruments to support innovation in energy access. These include the French Facility for Global Environment (FFEM), the French Development Agency (AFD), the French Agency for Ecological Transition (ADEME), the French Treasury (Ministry of Economy and Finance) and Regional Councils, who all provide support for innovative projects. Other international and European institutions support and fund projects and project leaders with specific tools (International Cooperation and Development at the European Commission, the ElectriFI facility, Private Financing Advisory Network - PFAN, and more besides).

Public and private research centres have already been enlisted, but their role could be expanded in light of the various disciplines that touch on the different challenges facing energy access. These latter can be technical for energy generation equipment as well as energy use and management; microeconomic for the design of business plans; macroeconomic for the creation of supportive public policies through subsidies and tariffs; but also financial for the creation of tailored instruments (guarantee mechanisms, results-based funding, etc.).

Another conveyor that could produce a great deal of innovation is the creation of competitions to encourage partnerships between innovative companies and public electrical businesses, or between businesses and NGOs.

Innovation must go beyond technology to focus on ownership, finance, supply and service provider models, which can produce lasting positive impact on the design, delivery and durability of technological solutions. It must be subject to approval before being implemented on the ground, so that it does not have a negative impact on the beneficiaries.

9. Support innovation in energy access solutions

9.1 Promote innovation in calls for proposals in the following fields, amongst others:

- Improvement and optimisation of existing systems and strategies;
- Social inclusion and closure of the energy divide;
- Technological innovation: storage systems, cooking systems like efficient micro-gasifiers, refrigeration system for the preservation of foodstuffs (crops, fish), and all other kinds of innovation that caters to basic energy needs other than electricity;
- Associated services, particularly the development of indoor electrical systems, the provision of everyday and productive equipment, and support in creating productive businesses;
- Educational innovation in initial training or CPD (Continuing Professional Development);
- Funding tools and mechanisms;
- Tariffs and business models;
- Frugal innovation;
- Intervention procedures, in conflict zones, for example;
- Monitoring and maintenance of facilities, especially for abandoned sites;
- Involving women in project implementation;
- Collection and recycling of waste.



9.2 Ensure solid coordination between organisations that support innovation in terms of the content of calls for proposals, phasing, and complementarity, encouraging cooperation and stakeholder consortia (companies, NGOs, academia, etc.).



9. Support innovation in energy access solutions

- 9.3 Enhance compatibility between existing funding programmes, as well as their additional nature**, to make it easier for leaders of innovative demonstration projects to complete their funding plans. Indeed, subsidies for innovative pilot projects are generally capped at 50%, and project owners are not always able to cover the remainder with their own capital.



- 9.4 Facilitate awareness of European calls for proposals and encourage** French stakeholders to join international consortia **to submit** a bid. As answering to these calls is seen as being quite complicated and labour-intensive, it is also important to set up a **plan to support project owners** (by providing specialist consultants, for example) to make calls for proposals accessible to all (including small organisations).



- 9.5 Facilitate the joint development of research and innovation projects between Europe and developing countries**, to involve beneficiary countries in the development process.



- 9.6 Identify and disseminate available French academic resources pertaining to energy access. A multi-stakeholder platform** enabling discussion between companies, NGOs and regional councils could also incorporate an innovation section, intended specifically to share research and facilitate the formation of consortia to answer calls for proposal.



9. Support innovation in energy access solutions

9.7 Finance innovative demonstration projects over the long term, enabling innovative and coherent investment, operations and organisational schemes to be put into place. Funding tools and mechanisms should also include an awareness raising component on the inclusion of regional dimensions, and the connection between energy and economic and social development. They will strive to encompass skills development and support for stakeholders, notably by extending the eligibility period for expenditures related to monitoring projects and impact studies, to cover *at least* a 24 month period after the electrical infrastructure (home systems, mini-grids, etc.) is put into service.



photo credits: Lagazel

Project governance methods

10.

Local governance of community or public services should make it possible for a decentralised electrification system to be implemented, in an effort to ensure the community's optimal uptake, long-term consent and solvency. Depending on the model, the management and maintenance of infrastructures could be taken over by a local operator, for example through public service delegation schemes or the monetization of energy services. Doing so makes it crucial to build local capacity to define, implement, negotiate and monitor the concession contracts in place for the duration of the service provision. This stage is vital if the projects are to have a long-term future. In the spirit of Elinor Ostrom's governance of the commons, this goes beyond decentralised access to energy to encompass all collective solutions in remote communities.

This chapter contains a few observations made in the above chapters.



photo credits: Barefoot College International

10. Project governance methods

- 10.1 With the involvement of target communities, always examine local necessities**, in order to choose the solution that best meets local needs and realities. Consulting women, in particular, is vital, as they are often the main users of domestic energy.



- 10.2 Carry out a review, as exhaustive as possible, of local institutions** involved in managing or assisting in the governance of mini-grids.



- 10.3 Involve local stakeholders** (professionals, local authorities, energy bodies, regional authorities and their rural development officers, project beneficiaries) **in every step of the creation and implementation of energy access projects.**



- 10.4 Set up energy access mechanisms specifically targeting women, to improve gender equality.** Overrepresented in poor communities, the lack of energy access adds to the load of domestic tasks carried out by women, and stifles their independence. **Include women in the decision-making process throughout a project's duration, and involve them in funding mechanisms and training so that they have access to the businesses and income linked to energy access.**



10. Project governance methods

- 10.5 Encourage management/handover of energy production, storage and distribution systems to local operators.** Make sure that these latter are able to provide associated energy services, in particular maintenance and repairs of energy infrastructure. Encourage small operators to group together to achieve the minimum scale needed to gather up the necessary skills to work effectively and operate new facilities.



- 10.6 Analyse interactions between stakeholders in energy production, distribution and local institutions,** in order to identify governance synergies and adaptations in terms of needs, offer, and customs. “Institutions” cover both government bodies and traditional structures that fulfil an organisational role within the community.



- 10.7 Set up a virtual knowledge platform for off-grid energy access.** This platform could, for example, be added to the <https://www.savoirfairefrancais-enr.fr/> website and receive inputs from an expert group of stakeholders.



- 10.8 Advocate and mobilise the resources required for a more systematic assessment of all projects funded by international institutions (including demonstration projects), and their “productive” impact in particular,** using available sources and minimising implementation costs. Impact assessment must be based on data collected ex-ante so that it takes baseline local situations into account. Digital tools may be of use for remote monitoring. The data provided by stakeholders working according to this white paper could be used to formulate a streamlined, yet robust, methodology.



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Here at ADEME - The French Agency for Ecological Transition - we are firmly committed to fighting global warming and the depletion of our natural resources. On all fronts, we mobilise citizens, economic actors and territories, giving them the means to move towards a fairer, more harmonious, low carbon and resource-efficient society. Whatever the field - energy, food, mobility, air quality, adaptation to climate change, soils, etc. - we advise, facilitate and help finance many projects, from research to solutions sharing. At every level, our expertise and forecasting capacities serve to guide and inform public policies.

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The Syndicat des énergies renouvelables (French Renewable Energy Trade Association) was founded in 1993 and comprises, whether directly or indirectly, several thousand businesses, resource producers, manufacturers and installers, power plant developers and operators, and specialist professional organisations, representing the different sectors. Its members include world leading energy companies as well as local groups and stakeholders in the renewable energy sector, but above all it comprises a large number of SME's. Its mission is to increase renewable energy's share of the energy produced in France, and to promote the interests of the industrialists and professionals operating in the sector, in both the domestic and foreign markets. As a key contact for the public authorities and a proactive representative of the whole sector, the SER works with French, European and worldwide institutional bodies to help draft and implement renewable energy development programmes, and also serves as a catalyst in efforts to structure French export streams.

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