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TECHNICAL ASSISTANCE TO THE ETHIOPIAN ELECTRIC AUTHORITY (EEA) ON OFF-GRID REGULATORY FRAMEWORKS

TASK 4C: REGULATORY APPROACHES FOR CONTINUED MODIFICATION OF MINI-GRID REGULATION DIRECTIVES

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REGULATORY APPROACHES FOR CONTINUED MODIFICATION OF MINI-GRID REGULATION DIRECTIVES

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Executive Summary

Globally, the mini-grid sector is nascent and benefiting from a growing amount of attention from both donors and investors. The mini-grid sector also occupies a complex market segment between solar home systems and national grid expansion. This makes the role of mini-grid ~~regulations~~ regulatory framework crucial to creating bankable operating conditions for developers and site operators alike to develop mini-grid sectors past a nascent stage. For Ethiopia, bankable operating conditions will enable its mini-grid sector to scale at a pace envisioned by its ambitious electrification goals.

Evidence from markets around the world indicates that governments who strategically modify their policies and regulations as markets and technologies evolve can maximize the growth of their mini-grid sectors.[1] The challenge for governments is how policies and regulations can be adapted over time without disrupting market certainty and investor confidence. This memo presents three options for the Ethiopian Energy Authority (EEA) to structure its regulatory review process to both respond to shifting market conditions in its mini-grid sector and achieve its energy and development targets. The three options presented in this memo are:

1) **periodic review,** where legislation or policy defines a specific set time period for each round of review;
2) **milestone-based review,** where a specific metric of the market is defined as the trigger point for the next round of review; and
3) **stakeholder-driven review,** where the regulator does not define a criterion for the next review process; instead the impetus falls on relevant public and private stakeholders to request and initiate a review.

An ideal regulatory review process will align with EEA's current implementation capacity, instill certainty in the mini-grid sector, and allow flexible adaptations to the regulations based on evolving market conditions. In addition to developing a strategy, there are other important variables that should be considered in a successful regulatory review process. These variables are presented in Table 1 at the end of this memo.

Recommendation

NARUC and Cadmus suggest EEA consider implementing a hybrid review process that incorporates both a periodic review every five years and allows EEA to select other criteria to trigger reviews of specific sections of regulations. This combination permits updating of regulations to fit the evolving context of Ethiopia's mini-grid sector as it matures past its initial stage.

EEA will first need to identify the stages of market development it projects the off-grid market will achieve by 2025. Additional information, such as an off-grid market assessment or mini-grid demand projection, will help refine this analysis. Policymakers and regulators in Ethiopia then can define a schedule for when different sections of regulations are subject to review (i.e., tariff methodology for new projects, regulatory regime, or technical standards), as well as additional milestone-based or other out-of-cycle reviews.

[1] International Renewable Energy Agency. (2016). *Policies and Regulations for Private Sector Renewable Energy Mini-Grids,* pp. 103. Retrieved from: https://irena.org/-/media/Files/IRENA/Agency/Publication/2016/IRENA_Policies_Regulations_minigrids_2016.pdf

Introduction

Off-grid connections are slated to play a significant role in Ethiopia's upcoming national electrification agenda. Ethiopia's current grid access rate is around 34% of total households.[2] Its 2019 National Electrification Program 2.0 (NEP 2.0) has an ambitious target of nearly doubling the current level of access to the grid to 65%, in order to fulfill its total electricity access rate target of 100% by 2025. Off-grid connections are expected to fill in the remaining 35% of electricity access, which will require an estimated 6 million off-grid connections. These off-grid connections are expected to be delivered mainly by a combination of stand-alone solar systems and mini-grids.[3]

In order to achieve the growth outlined in Ethiopia's NEP 2.0, the EEA must help create a supportive enabling environment for off-grid market development. A strong and well-aligned regulatory review process is an important element of such an enabling environment.

Regardless of which option EEA pursues for its regulatory review process, each process will involve similar steps. These general steps, shown below in Figure 1, help shape regulations to be an effective response to mini-grid market developments.

Figure 1. Illustrative Overview of Regulatory Review Process

Overarching Principle: Providing a Coherent, Market-Aware Regulatory Review Process

A coherent and market-aware regulatory review is essential to maintaining an effective and bankable regulatory framework in the face of a rapidly changing mini-grid market. Most nascent mini-grid markets undergo a range of "growing pains";[4] as a result, it is not uncommon for regulations to be adapted more frequently, particularly early on. Due to this potential need for more frequent adaptation, EEA should review the regulation review process timeline and adjust accordingly. A clear and effective review process provides the information needed to understand changing market dynamics and make appropriate decisions for both developers, and the market as a whole.[5]

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[2] Bellini, Emiliano. *Ethiopia's Plans for Solar Mini-Grids Moving Forward.* PV Magazine. Retrieved from: https://www.pv-magazine.com/2019/09/25/ethiopias-plans-for-solar-mini-grids-move-forward/

[3] Ministry of Water, Irrigation, and Electricity. (2019). *National Electrification Program 2.0*, pp.45. Retrieved from https://minigrids.org/wp-content/uploads/2019/04/Ethiopia-2.0.pdf

[4] Schnitzer et al. (2016). *Microgrids for Rural Electrification,* pp.83. Retrieved from: https://rael.berkeley.edu/wp-content/uploads/2015/04/MicrogridsReportEDS.pdf

To ensure the review process supports progress toward Ethiopia's development goals, the EEA should consider the following:

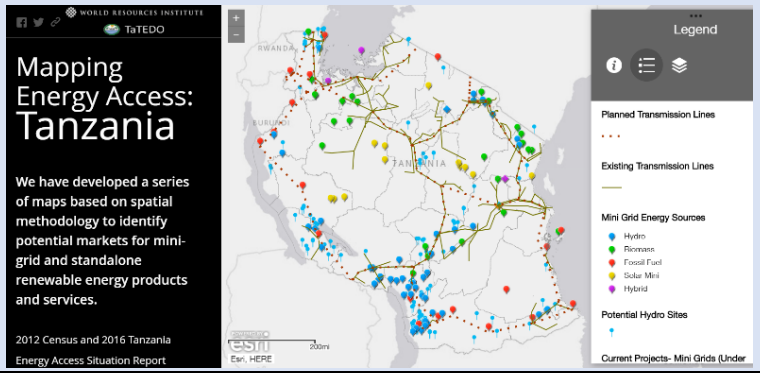
1. **Align the policy changes with Ethiopia's NEP 2.0 Targets.** Ensuring that the proposed changes are consistent with achieving Ethiopia's targets should be the priority. If the country is falling short of its target on mini-grids, and on electrification more broadly, the review process provides recourse.

2. **Establish a Bankability Impact Assessment.** During the evaluation phase of the proposed policy and regulatory changes, the EEA should have a dedicated process for evaluating the impacts of the proposed changes on project bankability, both for existing and new mini-grid sites. This Bankability Impact Assessment should include a dedicated phase for stakeholder input to ensure that adjustments do not unintentionally negatively impact the viability of existing mini-grids or future sites. Without such a bankability assessment, changes to future regulations are likely to be more disruptive to market activity, and could make it more difficult to mobilize future financing and achieve Ethiopia's NEP 2.0 targets.

3. **Develop a Monitoring Evaluation and Learning System.** Mini-grid policy is only as good as the progress it drives, and that progress can only be tracked if effective Monitoring, Evaluation, and Learning systems are put in place. A monitoring tool should be developed to track progress against Key Performance Indicators (KPI) for each mini-grid in the country.

Tanzania Monitoring Example:

The World Resources Institute deployed an interactive mapping tool which the Tanzanian government utilizes in its regulatory review process. The online mapping tool applies a centralized data collection system, leveraging GIS mapping superimposed on images of villages around the country. This series of maps also provides data for potential mini-grid markets at a detailed level, including regional analysis of viable areas for private sector investment. Maps also include regional and district KPI data, such as ability to pay, solar resources, mobile phone penetration, iron sheet roofing, and population density.[6]



Ethiopia can use existing geo-spatial mapping tools, such as the National Geospatial Information System developed by the Ministry of Water, Irrigation, and Energy (MoWIE) and the World Bank, to incorporate something similar in its review process. The monitoring tool should be widely available online, and a plan for disseminating knowledge to access, review, and understand the data should be developed. Data collected through the tool should also be regularly

[6] World Resources Institute. (2016). *Mapping Energy Access: Tanzania.* https://gfw.maps.arcgis.com/apps/MapJournal/index.html?appid=5e060dc63172439abae54bbed8a283fb#

evaluated, and findings should be reported on a regular schedule. EEA should consider the additional staffing required to manage the monitoring of mini-grids throughout the review process. Following the reporting, EEA should engage with stakeholders on any course-corrections being considered. This type of transparency and commitment to sector-wide capacity development and communication will increase investor confidence in the sector.

4. **Codify the regulatory review process.** To ensure compliance and cohesion, the review process should be clearly written into legislation or policy with detailed implementation instructions (including a budget and hiring plan).

Options to Structure Regulatory Review Process

Three options EEA can consider for structuring a regulatory review process for its mini-grid market include:

1. Periodic review;
2. Milestone-based review; and
3. Stakeholder-driven review.

Option 1: Periodic Review

A periodic review process means that the policy includes an agreed-upon timeframe after which the policy will be assessed and potentially revised. The best practice timeframe for a review and approval system around the world is generally every two to three years.[7] Another important consideration is whether the length of the review process itself is bounded (e.g., to within six months or one year).

Benefits: Creating a periodic regulatory review process would allow EEA to eliminate one potential source of uncertainty for developers interested in the mini-grid market: namely, the sudden and unpredictable introduction (or proposal) of new rules. The regularity of this review process also allows the regulator to develop a clear schedule for review which enables a more efficient strategic planning process. Adopting a periodic review schedule also builds flexibility for adapting to changes in the market as it develops and broader global trends unfold. If Ethiopia's mini-grid market develops at the pace required to meet NEP 2.0 goals by 2025, the focus of the regulatory framework may fundamentally evolve from needing to attract firms to enter the market to having a multitude of operators that need to be regulated to ensure quality of service. Aligning the time between regulatory reviews and the projected evolution of the mini-grid market can allow the focus of regulations to evolve in tandem with the growth of the market.

When deciding on what timeframe is best, EEA should consider, for example, that a shorter timeframe provides additional responsiveness to a rapidly growing market, changing technology and investment environment. A longer timeframe provides predictability and reduces regulatory risk, which is crucial for the market to become more established and for developers to become familiar with the rules. In addition, a longer review timeframe can also save on administrative resources, freeing up capacity for other tasks and priorities. More broadly, if global trends impact the market—for example if capital costs decrease due to innovations in solar or storage technologies—a periodic review can allow regulations to reflect new market realities and ensure fairness to customers. Finally, EEA can tailor different schedules

[7] United States Agency for International Development. (2017). *Practical Guide to the Regulatory Treatment of Mini-Grids*, pp. 76. Retrieved from:https://pubs.naruc.org/pub/E1A6363A-A51D-0046-C341-DADE9EBAA6E3%20

to update regulations, such as updating tariff methodologies for new mini-grid projects more frequently than updating overall mini-grid technical standards. This differentiation can make the review process less burdensome and most responsive to market needs.

Challenges: Among the challenges of a fixed periodic review is that if the market has changed rapidly over a period, the review may lag behind market development. However, this challenge is mitigated by having a more frequent review process (e.g., every three years instead of every five years).

Example Periodic Review Process

When designing a review process that is determined based on a predetermined number of years, there are four key steps to take:

- **Select the Review Process Timeline.** Determine the number of years for the review cycle based on mini-grid market conditions and anticipated changes in market and technology.
- **Define Government Stakeholder Roles** (Central, Provincial, District). Determine capacity constraints at all levels. Consider any possible overlapping or conflicting roles between institutions and agencies.
- **Gather External Stakeholder Input.** Collect input from non-governmental stakeholders to incorporate relevant external feedback in review processes.
- **Prepare for Review.** Build institutional and technical capacity for conducting reviews. Continue monitoring advancements and market developments.
- **Complete Review and Update Regulations.** Consider relevant questions regarding the appropriateness of the review process, such as: Does the timeline for review need to be altered? Is the market maturing at the expected rate? Adjust the regulation as necessary to reflect market realities.[8]

Figure 2. Key Steps for a Periodic Regulatory Review Process

An example of an effective periodic review process is presented in the technical standards setting process of the Mexican Official Standards. Technical standards are reviewed every five years and amendments must be finalized within a one-year timeframe. Figure 3 demonstrates the key stages for the review.

[8] This process is not exhaustive but rather demonstrates the types of considerations that should be made during this timeline review.

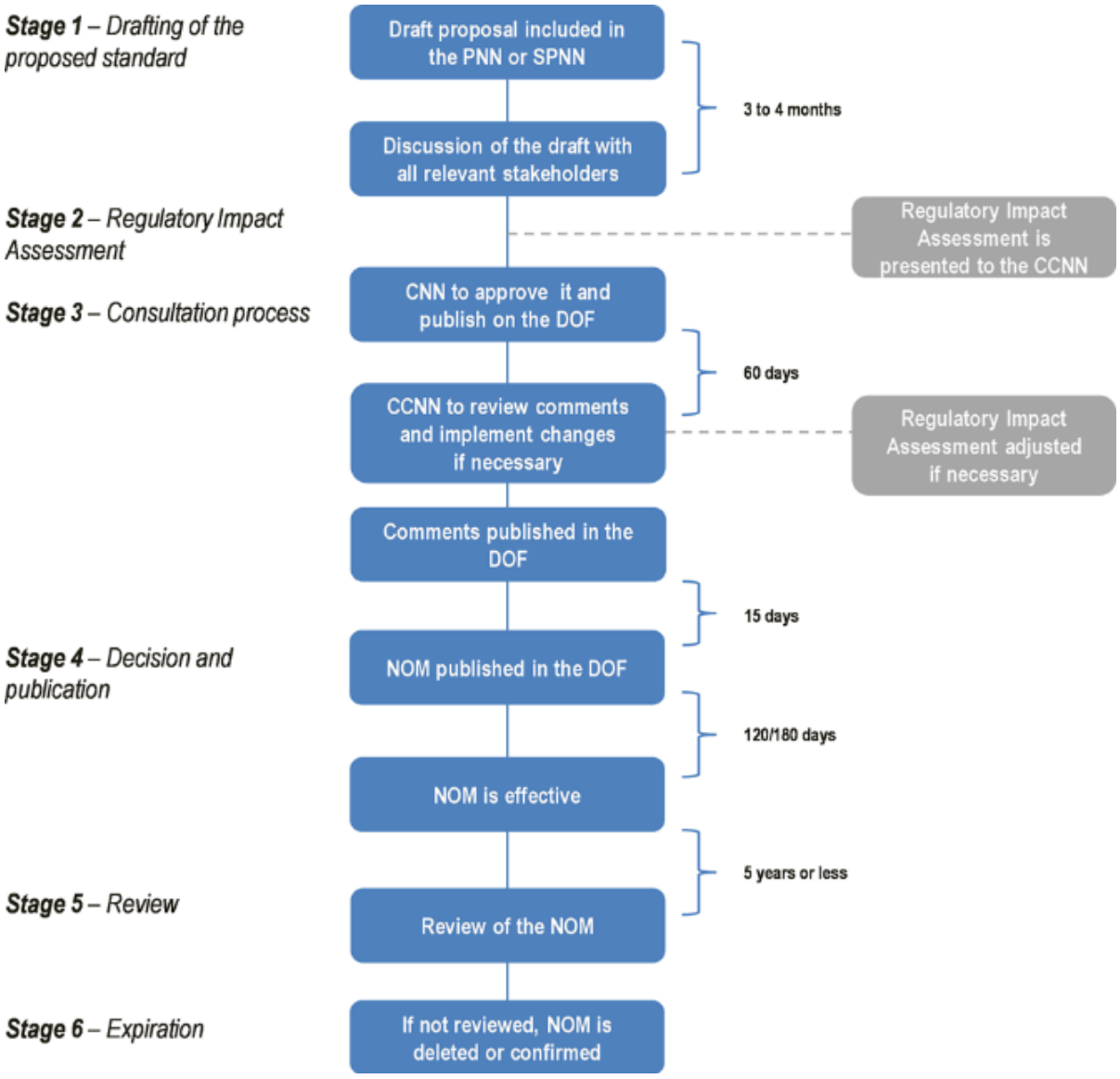


Figure 3. Mexican NOM Lifecycle Review Process[9]

[9] Ministry of Economy of Mexico-OECD Co-operation to Strengthen Competitiveness in Mexico. (2018). *Standard Setting and Competition in Mexico,* pp.33.https://www.oecd.org/daf/competition/WEB-Standard-setting-Mexico-2018.pdf.

Acronyms: PNN (National Standardization Programme);
SPNN (Supplemental National Standardization Programme);
CNN (National Standardization Commission);
DOF (Federal Official Gazette);
CCNN (National Advisory Committees for Standardization);
NOM (Mexican Official Standards (known as technical regulations))

Periodic Review Process Example: Peru

Peru follows a consistent periodic review process for its rural electrification regulation, which has successfully allowed the regulator to reflect changing market conditions and adapt its strategy accordingly. The National Rural Electrification Master Plan (PNER) was created by the government's 2007 comprehensive Rural Electrification Law to cover a period of ten years and includes all mini-grid regulation. The first PNER covered 2008-2017[10] and updates were originally intended to occur annually.[11] This review period was later reevaluated and changed to occur every two years, with the most recent completed update for 2016-2025. Peru's latest review resulted in the introduction of new subsidies and tariff policies, allowing the regulator to address the growing market of solar standards and testing laboratories (e.g., adding investment incentives for mini-grid distribution and ending a spot market price cap). As of 2016, rural electrification had risen to 83%,[12] the majority relying on solar and mini-grid systems. Peru is currently ranked fifth in the world for number of mini-grid developers, with 96 developers.[13]

Roles: The PNER review process follows a decentralized model which enables more efficient and accurate review. The review process is carried out by both the national government authority and local authorities. The National Rural Electrification Office (DGER) under the Ministry of Energy and Mines is responsible for managing programs and projects identified at the national level.[14] Regional and local governments are responsible for developing and managing their specific energy plans and policies, including the evaluation and monitoring of those policies.

Lessons Learned for Ethiopia

The flexibility created through Peru's periodic process allowed the regulator to adjust priority levels and introduce new projects or programs by shifting levels of financing.[15] Peru's review process demonstrates the benefits of regularly adapting to changing circumstances to maintain a favorable environment for deploying mini-grids. It is noteworthy that the latest review included the introduction of new subsidies to support market development, as the government recognized that in order to achieve its own targets, further support would be needed. This indicates that despite the presence of a dynamic domestic mini-grid market, further support measures are often needed to keep national electrification targets on track.

EEA should ensure the core framework of the regulation remains constant to provide certainty but change targets and details to reflect market realities. EEA can also consider replicating Peru's decentralized regulatory framework and review process by delegating on-the-ground activities to regional authorities under their oversight to improve resource efficiency.

[10] Republic of Peru Ministry of Energy and Minerals. (2008). *National Electrification Plan 2008-2017.* Retrieved from: http://dger.minem.gob.pe/ArchivosDger/PNER-2008-2017-00.pdf

[11] Republic of Peru Ministry of Energy and Minerals. (2009). *National Electrification Plan 2009-2018.* Retrieved from: http://spij.minjus.gob.pe/graficos/Peru/2009/diciembre/24/RM-540-2009-MEM-DM.pdf

[12] Data retrieved from: https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS?locations=PE.

[13] Knuckles, James. (2019). *State of the Mini-Grid Market Globally*, *pp.9*. https://atainsights.com/wp-content/uploads/2019/06/2.B.James_.Knuckles.World-Bank-notes.pdf

[14] International Renewable Energy Agency. (2018). *Policies and Regulations for Renewable Energy Mini-Grids,* pp.77. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Oct/IRENA_mini-grid_policies_2018.pdf

[15] Ibid.

Option 2: Milestone-Based Review

Another option for modifying regulation directives is to design periods of review by defined milestones, bounding the validity of a policy or law up to a certain cap or capacity target. As the market approaches these milestones, the next round of regulatory reviews is initiated. For example, a regulation could specify that the review process would be triggered once a target number of people or households are connected to mini-grids. Milestone-based reviews can be merged with periodic reviews by setting both a target year and milestone and having the review triggered by whichever occurs first.

Benefits: Selecting a metric indicative of market conditions, such as megawatts (MW) of capacity installed, can mitigate the risks of a regulatory lag that may occur in a periodic regulatory review process where a significant change in market conditions occurs early in the review cycle. However, if implemented in hybrid form in addition to a shorter two to three-year review cycle, such a lag is highly unlikely. As stakeholders monitor progress towards an upcoming milestone, they can update their monitoring strategy to keep pace with the maturing market. This preparation allows the government to update regulations to be responsive to market conditions after its solar market had reached a critical capacity.

Challenges: One of the challenges of a milestones-based approach is that mini-grid developers and operators have no way of knowing how close the market is to achieving a specific milestone: such an approach therefore arguably increases uncertainty. If relevant government data is published regularly this uncertainty can be somewhat mitigated. However, such an approach increases uncertainty not only for developers but also for the government and its agencies, which must be prepared to initiate a review and mobilize administrative resources in an ad hoc manner, rather than according to a fixed schedule. Furthermore, unforeseen disruptive or significant changes in market conditions may not be captured by metrics, which can limit the effectiveness of a milestone-based review.

Example milestone-based review process

The following four steps are key to designing a milestone-based regulatory review process.

- **Conduct Market Assessment.** Analyze mini-grid market conditions and anticipate changes
- **Select Target Criteria.** Select the indicator and threshold to trigger review process. Prepare monitoring capacity to measure the selected indicator
- **Monitor and Build Capacity.** Monitor progress towards the threshold. Conduct or commission mini-grid market studies. Build logistical and technical capacity to complete the regulatory review
- **Complete Review and Update Regulations.** Once the threshold is reached, trigger the regulatory review process

Figure 4. Key steps for a Milestone-based Review Process

Option 3: Stakeholder-driven review

The third option for a regulatory review process is a stakeholder-driven approach. In this approach, the regulator specifies a process for key stakeholders to request a regulatory review when they deem it necessary. Key stakeholders may include the regulator, utilities, private developers that operate in the market, or other groups identified by the regulator. Once identified, the regulator issues detailed requirements for stakeholders submitting a request and defines the institution responsible for processing.

A stakeholder-driven approach is not recommended in the Ethiopian context for two main reasons: 1) the process signals a lack of certainty to the market since there is no pre-defined trigger for review; and 2) relying on the capabilities of external stakeholders in a nascent market is risky and may compromise the quality of the mini-grid regulatory review process.

Benefits: This approach allows for increased collaboration with key stakeholders which may improve buy-in, can streamline the review processes with market conditions, and enable more efficient compliance.

Challenges: This approach increases uncertainty for market participants and for investors, as it is unclear when the next review will take place and what the potential changes might be. Regulators also run the risk being overburdened by multiple stakeholders requests if they do not have the capacity to process requests efficiently.

Example stakeholder-driven review process

The following four steps are key for designing a stakeholder-driven review process.

1. **Develop Parameters for Review Requests.** Defines roles and responsibilities for managing all levels of the process.
2. **Select Criteria for Review Requests.** Determines in what cases or situations can be justified by a stakeholder requiring a review. The process for accepting a case is also defined, such as via approval of a dedicated office or board.
3. **Submit a Request for Review.** Define and follow the institutional processes for the request.
4. **If Criteria is Met, Begin Regulatory Review Process.** Focus on the information or issues raised in the submission. Implement necessary regulatory adjustments in response to the issue.

Figure 5. Key Steps for a Stakeholder-driven Review Process

Overarching Design Variables for all Regulatory Review Process Options

An optimal regulatory review process requires consideration of three key variables, shown in Table 1 below, regardless of which regulatory review option is selected. It is important to understand these design components to ensure that the implementation of a regulatory review is well executed.

First, regulators should determine the scope of review. For example, should the review process include a comprehensive assessment of technical standards, along with licensing and tariff regulations? Second, regulators should determine who has the authority to manage or oversee the review process. For example, does the parliament or another independent stakeholder have the authority to begin the process? Third, regulators should consider how best to engage stakeholders throughout the review process to secure buy-in, to ensure the appropriateness of the regulations, and to build capacity.

Process Design Component	Examples of Design Options	Description	Best Practices
Scope of Review	▪ Tariff Rules ▪ Licensing Rules ▪ Technical Standards ▪ *Any mix of these*	Determining what aspects should be reviewed (e.g., selective: only reviews one aspect of the policy, such as tariffs; or comprehensive: reviews all aspects).	Tariff and Licensing only. Technical regulatory framework should stay stable, though incremental changes can be stipulated for future projects.
Authority to Trigger and Manage Review Process	▪ Electricity Regulator ▪ Parliament ▪ Cabinet ▪ Key Stakeholders	Determining who will trigger the review process, (e.g., Electricity Regulator, Parliament, Cabinet, External Consultant, Independent Umpire).	Energy Authorities should be *legally required* to commence the process.
Stakeholder Engagement	▪ Core participants ▪ Level of engagement	Convening relevant groups to engage with (i.e., developers, customers, local governments). Determining what level of engagement is appropriate for each group (e.g., drafting issue papers or attending public meetings). Incorporating capacity building efforts for stakeholders as necessary.	Two public consultations, one at the issues stage and one at the draft stage.

Table 1. Key overarching design components for a regulatory review process

Conclusion

This memo has presented three regulatory review processes for EEA's consideration as they develop a mini-grid regulatory framework: periodic, milestone-based, and stakeholder-driven. Periodic reviews provide the most certainty for regulators and stakeholders, but the interval at which they are assigned to occur may not be reflective of changes in market conditions. Milestone-based reviews can align the timing of reviews with market indicators, but they require extensive regulator coordination and management. Stakeholder-driven reviews are the least certain due to the lack of concrete rules triggering a review, but these reviews can respond faster to unexpected developments. This method also relies on the capacity and competency of stakeholders to initiate and manage a timely review process.

After a preliminary assessment of EEA's current goals and capacity, NARUC and Cadmus suggest EEA adopt a hybrid strategy, to include a periodic review process every five years to facilitate a favorable pathway to more bankable, scalable mini-grid projects.[16] EEA should complement the five-year period with out of period review protocols that trigger a regulatory review inside of scheduled timeframes to account for market disruptions. This strategy is informed by the milestone-based and stakeholder-drive review models as potential guidance mechanisms. By incorporating these triggers, the primary drawback of periodic reviews (the potential for dramatic shifts in market conditions early in a review period) can be mitigated. Furthermore, EEA can consider adopting a differentiating schedule to review parts of its regulations that require more frequent updates; for example, updating tariff methodologies to respond to evolving market conditions.

[16] Given the status of the draft directive as of the writing of this report, the entirety of this review strategy may not be able to be adopted immediately and can be built in over time through updates and amendments.