CHAPTER 6

Regulating Community Energy at the National Level Comparing Ethiopia, Malawi and Mozambique

Carlos Shenga, Lorraine Howe, Idalina Baptista, Getachew Bekele, and Maxon L. Chitawo

Abstract There is a generalised assumption that the development of energy policy and regulation leads to increased access to energy. This paper investigates the empirical evidence to support this assumption in Ethiopia, Malawi and Mozambique, providing a comparative assessment of the regulatory landscape of energy in the three countries and their

C. Shenga (✉) · L. Howe
Centre for Research on Governance and Development, Maputo, Mozambique
e-mail: cshenga@cpgd.org.mz

L. Howe
e-mail: lhowe@cpgd.org.mz

I. Baptista
University of Oxford, Oxford, UK
e-mail: idalina.baptista@conted.ox.ac.uk

G. Bekele
Addis Ababa University, Addis Ababa, Ethiopia
e-mail: getachew.bekele@aait.edu.et

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current status in terms of advancing towards universal energy access for both electricity and fuels. Using comparatively available data, the analysis examined the impact of extensive and dispersed bodies of regulation on energy access, as well as the extent to which pioneering community energy enhances energy access. The results are examined in the light of the current context of energy provision in the three countries. The results suggest that universal access to electricity requires an extensive body of energy policy in general and regulation of community energy in particular. However, while being a pioneer in community energy is correlated with improvements in energy access, the factors that explain such a correlation are not clear. More research needs to advance the current understanding of how regulation interacts with other drivers of infrastructure development and innovation to understand what works in a sustainable transition to provide universal access to clean energy.

Keywords Regulation · Energy access · Extensive body of legislation · Policy pioneers · Ethiopia · Malawi · Mozambique

6.1 Introduction

Does regulating community energy facilitate access to electricity? There is a general assumption that the adoption of energy policy and regulation enhances access to energy (Baumli & Jamasb, 2020; ESMAP, 2022; Huhta, 2022; Mahmood et al., 2021; To, 2015). For example, clear energy policy and regulation help to attract private investment for energy development (Howe & Shenga, 2023) as financial institutions invest on the basis of the effectiveness of the policy and regulatory framework (Baumli & Jamasb, 2020; ESMAP, 2022). This includes energy policies beyond those that specifically support access to electricity because access to electricity occurs within a broader regulatory framework. In this chapter, we analyse the extent to which having a developed regulatory framework for energy, as a whole, influences energy access, directly

M. L. Chitawo
Mzuzu University, Mzuzu, Malawi
e-mail: chitawo.m@mzuni.ac.mw

or indirectly and the extent to which pioneering policies for community energy increases access prospects.

To develop this analysis, we focus on a comparative analysis of the impact of regulations on energy access in Ethiopia, Malawi and Mozambique.The three countries belong to the Eastern Africa region, although Mozambique and Malawi are also counted geopolitically as Southern Africa countries and are members of the Southern Africa Development Community (SADC). Ethiopia has never been colonised and hosts the headquarters of the African Union. Malawi was colonised by Britain and Mozambique by Portugal, but today both belong to the Commonwealth. Mozambique joined voluntarily in 1995 (Table 6.1). All three are classified as low-income developing countries[1] and are located in the third quartile of the Human Freedom Index.[2] Ethiopia is a federal state, classified in 2022 by Freedom House as a "not free" country. Malawi and Mozambique are unitary states and rated "partly free".[3] All transitioned to a multiparty system in the early 1990s. In Ethiopia, political distress led to a violent conflict in the region of Tigray in 2021. In Malawi, multiparty elections have produced alternations of political power. In Mozambique, the revolutionary party Frelimo has ruled the country since independence in 1975. Ethiopia is the second most populated country in the continent with 115 million inhabitants while Mozambique's population is 31 million and Malawi's 19 million.[4]

6.2 Energy Policy and Access to Energy

The energy literature suggests that access to energy is enhanced when countries and their key actors advance energy policies and regulations (Huhta, 2022; To, 2015). Regulatory quality seems to correlate positively with increases in renewable and nonrenewable energy consumption

[1] As classified by the World Bank and UN. https://data.worldbank.org/income-level/low-income, retrieved January 23, 2023.

[2] The Human Freedom Index comprises measures of human freedom, personal freedom and economic freedom. https://worldpopulationreview.com/country-rankings/freedom-index-by-country, retrieved March 30, 2023.

[3] 2022 Freedom in the World. https://freedomhouse.org, retrieved March 30, 2023.

[4] Ethiopia is the second most populated in the continent after Nigeria. https://www.worldometers.info/population/countries-in-africa-by-population/, retrieved March 29, 2023.

Table 6.1 Key features of the compared countries

Key features	*Ethiopia*	*Malawi*	*Mozambique*
Population (in 2023)	114,963,588	19,129,952	31,255,435
Politics	Political distress led to Tigray conflict in 2021	Multiparty elections led to alternations of power	Multiparty elections cemented the dominant party system
Past before independence	Never been colonised	Colonised by Britain and became a member of the Commonwealth	Colonised by Portugal and voluntarily joined the Commonwealth
System of government	Federal state	Unitary state	Unitary state
Freedom status	Not free	Partly free	Partly free

Source The authors—compiled from different sources

(Mahmood et al., 2021). This may bode well with ongoing efforts by many countries to embed new policies to improve their energy independence (ESMAP, 2022). Indeed, more than half of the world's population without access to energy live in countries with only low or intermediate levels of energy policy and regulation, while some 400 million people without access live in countries with no energy legislation or regulation (ESMAP, 2022). Moreover, the role of energy policy is crucial to manage new challenges, with increased demand for regulation and fiscal incentives on imports of energy technology (e.g. tax reductions or exemptions on solar systems) or to access large-scale energy investment (ESMAP, 2022). The primary concern for investors is whether or not they trust the effectiveness of the energy regulatory framework (Baumli & Jamasb, 2020). Adequate regulations and incentives like tax reductions may foster an enabling environment that attracts private investment (ESMAP, 2022).

While energy policy plays a fundamental role in energy access, not all energy policies are the same. In the hierarchy of laws, policies include all legislation from the first-tier legislation to lower (second, third, fourth, etc.) tiers. Included would be legislation from the constitution of a given country (first-tier) to its laws or acts, proclamations, decree-laws,

decrees, ministerial diplomas, resolutions, directives and so on.[5] Regulating community energy constitutes only one part that addresses energy policy or legislation. The other is the overall body of energy legislation and regulation. Our concern with the effect of energy policy is twofold: to test the effect of *the body of energy legislation and regulation* in general and of *community energy regulation* in particular. The former consists of general energy legislation and regulation of a given country. The latter refers to energy regulation that focuses primarily on small-scale off-grid energy systems, mostly in rural and hard-to-reach communities.

6.3 Hypotheses

We pose three hypotheses for the relationship between energy policy and access to electricity. The first two focus on the effect of the body of energy legislation and regulation, and the third on community energy regulation.

> *H1:* Having an extensive body of energy legislation and regulation increases access to electricity more than having less extensive legislation and regulation.

The assumption underlying this hypothesis is that: on the one hand, having an extensive body of energy legislation and regulation indicates over a long period of time that more policymakers are reflecting and choosing better solutions to boost access to energy and more implementers are implementing those solutions. On the other hand, a less extensive body of energy legislation and regulation suggests poor energy accomplishment.

> *H2*: Having a dispersed body of energy legislation and regulation boosts access to electricity more than having a concentrated body of legislation and regulation.

A concentration of energy policies in a few points of time places huge pressure on energy operators to understand and interpret policies quickly, which can, in turn, threaten the energy supply, especially in low-capacity

[5] Due to country differences on terminology, this list does not follow (vertical) hierarchy of law.

contexts like those that characterise many countries in Africa. Alternatively, a dispersed body of energy legislation and regulation across many points of time provides energy operators with more time to learn and adapt to the body of legislation and regulation before implementation.

H3: Being a pioneer[6] in regulating community energy increases access to electricity more than being a latecomer in regulating community energy.

On the one hand, being a pioneer in regulating community energy suggests having more time to build experience, knowledge and skills to master the delivery of electricity by and for communities. It also suggests that the regulation was approved a long time ago, and it has allowed other relevant regulations to come into effect to consolidate it. On the other hand, regulating community energy more recently indicates there is less experience in expanding access to electricity through off-grid solutions to and by communities that have been deprived of the grid system.

6.4 Country Contexts of Energy Sector Development

Before testing and examining these hypotheses quantitatively, it is important to situate the dynamics of energy access in the context of each specific country.

Ethiopia. Electricity was introduced in Ethiopia during the reign of Menilik II around 1898. Electric power supply to some towns, such as Nazareth, Dire Dawa and Dessie, began around 1929. However, in 2000, only 13% of the population had electricity access. Lack of progress in access to electricity was the norm until the late 2010s. After the successful implementation of the First National Electrification Program (NEP) in 2017, significant progress has been made in which 33% of the population was connected to the grid and 11% to off-grid pre-electrification, totalling 44% access (NEP 2.0). There has also been progress in engaging the private sector through policy. The model of Public–Private Partnerships (PPPs) has been advanced to transform energy projects' financing and implementation. The government expects that PPPs will support the

[6] Those that have adopted regulation that recognizes and facilitates community energy earlier than others.

future development of geothermal, hydro, solar and wind power generation projects by giving access to the energy sector to Independent Power Producers (IPPs) and using different project finance modalities, so that the public sector concentrates on regulatory and off-taker roles.

The plans stated in NEP 2.0 to achieve its stated goal of *universal electricity access nationwide, are to provide* 65% with grid solutions, and 35% with off-grid technologies (solar off-grid and mini-grids). The Ethiopian Electric Utility (EEU) is responsible for the implementation of on-grid projects. By 2025, EEU will connect over 15 million households by implementing a top-down approach, compared to 6.9 million in 2017 (reaching the 65% goal). Off-grid projects require a combination of public and private efforts. A complementary bottom-up approach would also be carried out alongside the top-down approach to connect the remaining 6 million rural and deep rural households to reach the 35% set goal. As of 2021, NEP 2.0 has increased the number of connected households to 51%.

Another plan for achieving 100% access by 2025 focused on *"cross-sectoral linkages with the productive and social services sectors and in support of vulnerable groups"*. The focus of this plan is social and economic infrastructures—such as primary and secondary schools, hospitals, primary health centres and productive facilities. Such collective infrastructures have priority in facilitating connections (grid or off-grid) with high economic growth potential, particularly in the agriculture sector.

Malawi. Access to electricity in Malawi is very low, estimated at 18% (12% on the national grid and 6% off-grid systems). It is the lowest rate in the SADC region and among the three countries studied in this chapter. The disparity in electrification rates between the urban and rural strata of the population is significant, estimated at 49% and 4%, respectively. The low rural electrification rate means that community energy systems in Malawi have a crucial role to play in enabling electricity access in rural areas.

The market structure of the electricity sector in Malawi is governed by energy laws enacted in 2004. The enactment of the energy law or legislation provided a legal mandate for restructuring the sector and establishing an independent energy regulator.

Since 2004, there have been several reforms that have been implemented in the sector. One of the most significant was the unbundling of the Electricity Supply Corporation of Malawi (ESCOM), a state-owned electricity utility company, in 2016 into state-owned companies

mandated to carry out specific functions in generation, transmission and distribution, Single Buyer (SB) and System Market Operator (SMO). As a result of these reforms, the electricity market in Malawi consists of several players that generate electricity at both large and small scales. Large-scale electricity generators can broadly be classified into two main groups: Major Activity Producers (MAP) and Auto Producers (AP). MAPs are companies whose main activity is to generate electricity. These include the state-owned Electricity Generation Company (Malawi) Limited (EGENCO), which was formed after the unbundling of ESCOM and IPPs. IPPs are private utility companies which own facilities to generate electric energy for sale into the national grid to the public utility and end users. APs generate electricity largely for their own use, but their main economic activity is not electricity generation. Examples include sugar mills.

At medium and small-scale levels, players in the electricity sector in Malawi can be categorised into those that generate electricity in stand-alone systems for their own use and developers of mini-grids that generate and supply electricity to community households. These community energy systems are categorised as mini-grids. A mini-grid framework was developed in 2017 to specifically guide developers of these systems in accordance with Malawi's energy legislation.

Mozambique. The development of Mozambique's electricity sector can be divided into at least three phases. The first, from independence in 1975 to c. 1994, is a phase of Formation characterised by the vertical integration into a single company, EDM, created in 1977, of the dispersed electricity infrastructure built during the colonial period.[7] During this phase, any energy policy was incipient. There were a few political pronouncements about the role energy would play in supporting the overall development strategy, but these were not followed by substantive legislation (Frelimo, 1977). Interventions towards electricity access were largely piecemeal, addressing localised needs in generation and distribution, especially in urban areas (Dava & Tamele, 2011). The decade between 1984 and 1994 was afflicted by substantive difficulties caused by the ongoing civil war and economic crisis. The structural adjustment programme initiated in 1987 anticipated the restructuring of the electricity sector that was to come. The end of the civil war in 1992, followed

[7] Decree-law 38/77.

by multiparty elections in 1994, marked the end of this first phase and augured a shift in policy for the sector.

The second phase, from 1995 to 2014, is Modernisation. During this period, policy slowly moved to adopt the mainstream electricity sector approaches espoused by global entities like the World Bank. This included legislation to facilitate the unbundling of the sector, fostering privatisation and competition, alongside the creation of a regulatory agency.[8] Initial efforts at promoting competition were not very successful, and they did not seem to create significant changes in the drive for electrification. Similarly, efforts to promote investments in the renewables sector via a national renewable energy fund (FUNAE), which was created in 1997,[9] did not significantly change the pace of electrification. Until the mid-2000s, access to electricity remained at around 5–6%. A new impetus towards electrification came during the Presidency of Armando Guebuza, from 2005 to 2014. His government introduced a new electricity strategy that sought the electrification of all headquarters of district units.[10] It also implemented new legislation to facilitate large-scale infrastructure projects, including those led by IPPs.[11] Finally, the Mozambican ownership of the Cahora-Bassa hydroelectric dam (HCB) also allowed for an increase in the share of electricity generated by HCB to be made available to supply the growing internal demand. As a result, access to electricity increased to 26% by 2014 (EDM, 2017).

The third phase, in trend since 2015, is Energy for All. This phase continues to be underpinned by the logic of liberalisation of the previous period, alongside a push towards universal electricity access by 2030, in response to global sustainability agendas.[12] This tension between electricity as a commodity and electricity as a common good has been addressed by new policy strategies and legislation that attribute differentiated roles for the government and the private sector, with an expectation that the donor community will play a key role in providing access to

[8] Decree 28/95.

[9] Decree 24/97.

[10] Resolution 10/2009 and Resolution 62/2009.

[11] Law 15/2011.

[12] Law 11/2017 and Resolution 48/2018.

electricity in areas where profit levels are low.[13] A new off-grid regulation adopted in December 2021 is expected to transform electricity generation, facilitating the entry of Independent Power Producers.

6.5 Data and Research Design

Considering the different conditions for the governance of energy in Ethiopia, Malawi and Mozambique, how does improvement in regulation impact electricity access? To test the hypothesis proposed above, the analysis uses a consolidated set of data compiled by the authors from multiple sources (see below). Data on access to electricity comprises 21 points in time from 2000 to 2020 for the three countries compared. Data on energy policy spans from the period that a given country attained sovereignty to 2022. For Malawi and Mozambique, the data comprises energy policies from the period after they became independent, respectively, in 1961 and 1975. For Ethiopia, it starts in 1955—the year when the first energy legislation was approved through the establishment of the utility company. Additional inferences on governance are made with reference to the analysis of the landscape of energy governance in each country, as summarised above.

The analysis deploys a comparative technique called Most Similar System Design (MSSD), which "*seeks to compare* [cases] *that share a host of common features in an effort to neutralize some differences while highlighting others*" (Landman, 2009: p. 70, Landman & Carvalho, 2017). MSSD seeks to identify the key features that are different among similar countries and which account for the observed outcome" (Landman 2009, Landman & Carvalho, 2017). According to Przerworski and Teune (1970), MSSD is particularly suited for those engaged in area studies—countries that share geographical areas, such as Asia, Africa, Europe and Latin America, regardless of having different histories, languages, religions, politics or cultures. In this case, the three countries share the Eastern Africa geographical region.

[13] Resolution 49/2018 and Law 12/2022.

6.5.1 *Dependent Variable—Access to Electricity*

Access to electricity is the outcome to be explained—the dependent variable (DV). It is measured by the percentage of the population with electricity to power a basic bundle of energy services, using data from the World Bank Global Electrification Database "Tracking SDG 7: The Energy Progress Report" (WB SDG7).[14] Other studies have measured access to electricity using night light data calculated using satellite images of the earth (Kroth et al., 2016; Min, 2015), household surveys (World Bank, 2015) or community-level data from Afrobarometer based on observations.[15] The first two datasets measure access to electricity using objectively verifiable data as it is taken through observations. The latter measures it subjectively using people's opinions and based on their own experiences.

The focus here is on the WB SDG7 data, complemented with additional sources. The WB SDG7 data is made up of counts calculated by utility companies from each connection they make. The World Bank's custodian agencies obtain these data from governments and assemble it in their databases. However, this data tends to lack uniformity. Moreover, like any data which is submitted within political institutions, there are questions about the possible manipulation of the data. Nevertheless, the data provides a useful comparative perspective on the dependent variable.

The data in Fig. 6.1 shows that access to electricity is higher in Ethiopia and lower in Malawi and that is increasing significantly faster in Ethiopia and Mozambique than in Malawi. Mozambique and Malawi had about the same level of access to electricity in 2000, but Mozambique (12%) started significantly distancing itself from Malawi (7%) by 2005, following Ethiopia.

[14] See https://openknowledge.worldbank.org/handle/10986/33822, retrieved May 10, 2022.

[15] The Afrobarometer instructs interviewers to collect electricity data through observation: whether in the Primary Sampling Unit, there is an "electricity grid that most houses could access". www.afrobarometer.org, retrieved November 25, 2022.

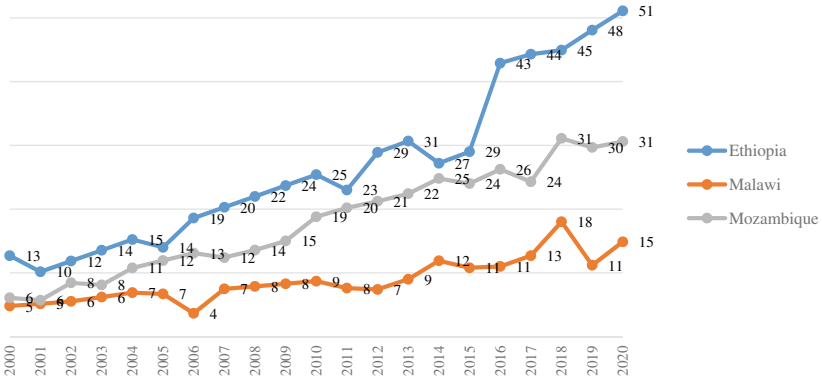

Fig. 6.1 Access to electricity by country and over time, 2000–2020 (percentage) (*Source* World Bank Global Electrification Database from "Tracking SDG 7: The Energy Progress Report" led jointly by the custodian agencies: The International Energy Agency [IEA], the International Renewable Energy Agency [IRENA], the United Nations Statistics Division [UNSD], the World Bank and the World Health Organization [WHO])

6.5.2 *Independent Variables—Regulating Community Energy and the Body of Energy Legislation and Regulation*

Energy policy is addressed by *the body of energy legislation and regulation* in general and *community energy regulation*. Its data is objectively verifiable from official government sources (government gazettes and publications), where it was gathered by the authors. Figure 6.2 shows that Mozambique has the most extensive body of energy legislation and regulation, with 32 items, while Ethiopia has moderately extensive (23 items) and Malawi is less extensive (17 items).

Malawi's body of energy legislation and regulation spans a shorter period from 2003 to 2021, indicating a more concentrated body of energy policy. With respect to Ethiopia and Mozambique, removing outliers, it can be said that Mozambique has a more dispersed body of energy policy while Ethiopia has a concentrated body in two periods: 1996–1999 and 2013–2022. Ethiopia established the utility company (Ethiopia Energy Light and Power Authority, EELPA) in 1956, while for Mozambique, it was in 1977 that the country established its utility

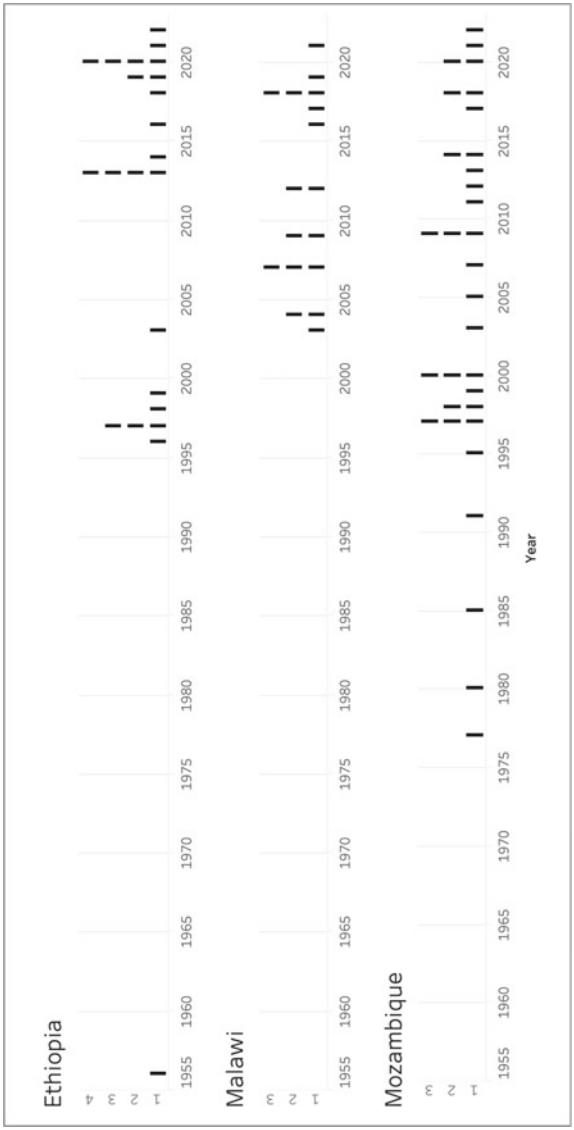

Fig. 6.2 Energy policies by country and over time, 1956–2022 (Generated by the authors from energy policies collected from the respective countries and their own expertise)

company (EDM), after which it experienced a 16-year-long civil war (1977–1992).

Moving to community energy regulation, Ethiopia is the earlier adopter, while Malawi and Mozambique commenced regulating community energy more recently. Ethiopia started regulating community energy two decades ago and continued to do so in the following years. In 1997, the Government of Ethiopia opened up to domestic investors the possibility to invest in plant capacities of up to 25 MW.[16] In the following year, it introduced attractive package incentives and tax reliefs for private investment.[17] In 2020, it issued licenses for electricity supply in the national grid, regulated investments in any sector, including energy, and set out the areas in which foreign investors could invest.[18] In 2019, the Government of Malawi regulated mini-grid energy systems (MERA, 2020).[19] Mozambique lags behind as it only approved its regulatory framework for off-grid energy systems in December 2021, when it established the norms and principles for communities to invest in off-grid energy systems through mini-grids up to 10 MW.[20] The Government of Mozambique has yet to publish all of the related accessory instruments (Howe & Shenga, 2023[21]).

These findings are similar to those from ESMAP's Regulatory Indicators for Sustainable Energy (RISE), where Ethiopia ranks ahead on frameworks for mini-grids (with a score of 73), followed by Malawi (66) and Mozambique (61) (ESMAP, 2022). On frameworks for off-grid systems, Mozambique ranks ahead (with a score of 95) but then follows Ethiopia (83) and Malawi (48) (ESMAP, 2022). This advance of Mozambique over Ethiopia and Malawi may be explained by the role played by Mozambique's National Fund for Energy (FUNAE),[22] a state agency established in 1997 to fund and implement energy projects funded by donors to increase rural access to electricity.

[16] Proclamation 37/1997.

[17] Regulation 36/1998.

[18] Regulation 474/2020.

[19] Government of Malawi, 2019.

[20] Decree 93/2021.

[21] Since publication, 5 of the 27 outstanding accessory instruments were published in the Government Gazette in May 2023.

[22] Decree 24/97.

Based on the different data sources referred to above, the authors consolidated an original dataset on Ethiopia, Malawi and Mozambique's energy policies, access to electricity and other related aspects covering 22 years from 2000 to 2021 and including 66 observations (n). Due to data availability for certain years in each country, the number of observations is lower on certain variables.

6.5.3 Model

To test the effect of regulating community energy on access to electricity, this study uses an ordinal logistic regression model since our dependent variable (DV)—*access to electricity* is measured at the ordinal level with a three-point scale: high access (coded 2), medium access (1) and low access (0). One or more independent variables are ordinal or categorical and dichotomous. *Regulating community energy* is a dichotomous variable categorised by advanced (coded 1) and less advanced (0). *Body of energy legislation and regulation* is categorised first by extensive (2), moderately extensive (1) and less extensive (0); and second by dispersed (2), concentrated (1) and highly concentrated (0).

6.6 Empirical Results

Table 6.2 reports the ordinal multiple regression model that tests the effect of energy policy on access to electricity. The results show, overall, that the model is fit since it is significant, it reveals goodness-of-fit as its significance levels are greater than 0.05, and it meets the proportional odds assumption as the test of parallel lines reveals significance greater than 0.05 (Table 6.2). The verification criteria to un/confirm the hypotheses are: first, the level of significance (Sig.), which has to be less than 0.05 for the independent variable (IV) to have an effect on the dependent variable (DV). Second, the magnitude (high/low) and direction (−/+) of IV (seen from B coefficient). The former tells us which IV has high or strong explanatory power on DV and the latter how the IV affects the DV.[23]

The results reveal more specifically that, of the three IVs addressing energy policy, two are statistically significant (that is, relevant) and one

[23] The first criterion is necessary to assess the second and not other way around.

Table 6.2 The impact of energy policy on access to electricity

	B	*Std. Error*		*Exp (B)*	*95% Wald Confidence Interval for Exp (B)*	
			Sig		*Lower*	*Upper*
Access to electricity = 0	0.8	0.45	0.09	2.15	0.88	5.24
Access to electricity = 1	3	0.63	0	20.1	5.89	68.51
Extensive body of energy legislation and regulation	1.3	0.35	0	3.81	1.93	7.53
Dispersed body of energy legislation and regulation	0	–	–	1	–	–
Community energy regulation	2.2	0.59	0	8.76	2.79	27.56
Model Fitting (sig.)	0					
Goodness-of-Fit, Pearson (sig.)	0.315					
Goodness-of-Fit, Deviance (sig.)	0.196					
Nagelkerke R square	0.429					
Test of Parallel Lines (sig.)	0.196					
Number of observations (n)	66					

is not. They confirm that having an extensive body of energy legislation and regulation expands access to electricity more than having a less extensive body (*H*1). For example, Mozambique has both an extensive body of energy legislation and regulation and has seen access to electricity progressing mainly from 2010. The results also confirm that being a pioneer in regulating community energy contributes to increased access to electricity more than being a lagger in regulating community energy (*H3*). This reflects the case of Ethiopia, which is the pioneer in regulating community energy and ranks first in access to electricity.

Having an extensive body of energy legislation and regulation (Mozambique) contributes to increasing access to electricity, but the effect of pioneering community energy regulation (Ethiopia) is of a greater magnitude. Having a dispersed or concentrated body of energy legislation and regulation has no impact at all on access to electricity (*H2*) as it is not significant. The model could not produce a meaningful B coefficient and significance. While the small number of observations may have affected the analysis, the results suggest that the key variables are extension and being a groundbreaker in energy policy rather than concentrating efforts at a particular point in time.

6.7 Discussion

Reflecting on Ethiopia being the pioneer in regulating community energy, its share of access to electricity through off-grid systems still remains low (11%) compared to on-grid (33%).[24] More than three-quarters of Ethiopians are rural dwellers,[25] and rural access to electricity is limited (26%).[26] Establishing small-scale off-grid systems in rural and hard-to-reach communities is still a challenge, regardless of Ethiopia being the first to regulate community energy through the legal arrangements mentioned above. The Government of Ethiopia is committed to increasing off-grid electricity access to 35% by 2025,[27] but most of Ethiopia's *public investment in energy* is concentrated on on-grid hydroelectric plants. While Ethiopia has introduced attractive package incentives and tax reliefs for private investment, issued licenses for electricity supply to the grid, regulated energy investments,[28] and set out the areas that foreign investors can invest in,[29] one might expect that the government would place more effort in attracting private and foreign investment in the energy sector. An influx of investment in energy projects enhances access to energy (Chirambo, 2016; ESMAP, 2022; McCollum et al., 2018; Menyeh, 2021; Pueyo, 2018; Sovacool, 2013). Access to energy requires improved not only financial mechanisms, such as a pro-poor public–private partnership model (Sovacool, 2013), but also substantial volumes of financing to provide energy for all by 2030 (Chirambo, 2016; Menyeh, 2021). In Africa, while private and public investments are insufficient to finance energy projects, public funding remains the primary source of investment in the energy sector (Baumli & Jamasb, 2020). This is the case of Ethiopia. Ethiopia leads in *public investment in energy*, followed by

[24] https://www.trade.gov/country-commercial-guides/ethiopia-energy#:~:text=According%20to%20the%20GOE's%20recently,achieve%20100%25%20electrification%20in%202025, retrieved June 29, 2023.

[25] https://tradingeconomics.com/ethiopia/rural-population-percent-of-total-population-wb-data.html, retrieved June 29, 2023.

[26] https://www.se4all-africa.org/seforall-in-africa/country-data/ethiopia/#:~:text=Ethiopia%20has%20a%20rich%20endowment,very%20limited%20throughout%20the%20country, retrieved June 29, 2023.

[27] https://tradingeconomics.com/ethiopia/rural-population-percent-of-total-population-wb-data.html, retrieved June 29, 2023.

[28] Proclamation 1180/2020.

[29] Regulation 474/2020.

Mozambique. Mozambique leads in *energy investment with private participation*.[30] However, the impulse of early adoption of off-grid regulations may have created confidence for investors and facilitated a wide range of interventions that translated indirectly into increased electricity access, even though this is not reflected in the rapid growth of community energy or other off-grid alternatives.

Malawi commenced regulating community energy two years earlier than Mozambique in 2019. This included the solicitation process and requirement for approval of mini-grid projects, grid-connection, tariff guidelines, system design, standard of compliance, licensing requirement and application of less onerous regulation (MERA, 2020). Yet Malawi lags on access to electricity, as it is lower on both public and private investment in energy. It might be expected that the Government of Malawi would allocate more public finance to energy access and would make efforts to attract more private and foreign investment in energy. The existing off-grid systems are challenged by a lack of affordability of electricity. About 62% of Malawi's population is multidimensionally poor (NSO, 2021), suggesting that where off-grid systems exist, poor rural Malawians tend not to make a connection.

Mozambique's 2021 community energy regulation has not been put to the test yet. Potential barriers include "the transparency of roles and responsibilities of key government institutions and having appropriate resource mechanisms in place—e.g., financial incentives or human capital, to facilitate the regulation's implementation" (Howe & Shenga, 2023). There are also 27 accessory instruments associated with the regulation to be published by the Government of Mozambique (Howe & Shenga, 2023), of which only five have been published in the Government Gazette. Delays in putting the regulation into practice and/or providing fiscal incentives to community energy operators may prevent rural access to electricity as investors may shift to invest in other countries or operators may find the energy business not profitable (see Baumli & Jamasb, 2020; ESMAP, 2022). Yet, Mozambique ranks first on investment in energy with private participation and second on public investment in energy. The extensive body of energy legislation and regulation, in general, is equally

[30] The World Bank Governance Indicators, https://databank.worldbank.org/source/world-development-indicators, retrieved November 14, 2022.

important in the Mozambique case, which seems to be paying off as electricity access increases in the country despite the late adoption of clearly beneficial alternatives.

Besides discussing the effect of investment on access to electricity, it is also important to reflect on technology, as investment is positively associated with technology, which also enhances access to electricity (Sovacool, 2012, 2013). Investment creates and transfers general knowledge and technologies in production and distribution (Osano & Koine, 2016). This suggests that countries that have high public (Ethiopia) and private (Mozambique) investments in energy may attract energy technologies. The World Economic Forum data indicates that the *technological readiness* and *innovation* of the three countries analysed are low, falling below the mid-point of 3.5.[31] Energy investment may be wasted and/or diverted to private gains in poor governance systems, undermining the impact of energy policies.

Strong governance is vital for developing policies to promote renewable energy consumption (Mahmood et al., 2021). In Africa, where governance systems are weak, corrupt, unstable and lacking in accountability and transparency, governance has been ineffective in improving access to electricity (Acheampong et al., 2022), irrespective of the adoption of energy policies. In the three countries, *government effectiveness* is very weak.[32]

In sum, universal access to electricity requires an extensive body of energy policy in general and regulation of community energy. Nonetheless, attracting private and public investments in energy, developing energy technologies and having an effective government system are equally important. Regulation alone will not be effective in articulating a just transition.

[31] World Economic Forum data.

[32] The Worldwide Governance Indicators, 2022 update. Aggregate governance indicators 1996–2021, *government effectiveness* "reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies". www.govindicators.org, retrieved January 16, 2024.

6.8 Conclusion

This chapter probed the effects of energy policies on access to electricity, comparing Ethiopia, Malawi and Mozambique by using longitudinal quantitative data tested through ordinal multiple regression analysis. The analysis suggests that, in general, more regulation results in increased rates of energy access, but this conclusion must be moderated by specifying that more regulation alone is not sufficient. Moreover, pioneering community energy correlates with increasing energy access, but this access is not necessarily due to off-grid energy. Thus, there is a need to investigate the causal links that explain these correlations. For example, a pioneering off-grid policy may be an indication of a proactive energy policy communities advancing off-grid proposals among other efforts, rather than pointing to an increase of off-grid of infrastructures alone.

The analysis confirms that regulating community energy and having an extensive body of energy legislation and regulation enhances access to electricity. The adoption of community energy and off-grid legislation may be simply a marker of a dynamic institutional context. However, there are challenges in promoting access to electricity through community energy regulation. Putting all the countries together, political governance is critical. Irrespective of being the pioneer regulating community energy (Ethiopia), having an extensive body of energy legislation and regulation (Mozambique), having community energy regulation approved fully (Malawi) and high public (Ethiopia) and private (Mozambique) investment in energy, all these have limited effect on access to electricity if governance systems are not improved. Money can be simply wasted and/or diverted to other ends, resulting in poor creation and transference of energy technologies.

In the case of Ethiopia, regardless of being a pioneer in regulating community energy, its huge public investment in energy has been primarily directed to on-grid energy systems rather than off-grid to a population that is more than three-quarters rural with very limited access to electricity. The rural communities where the grid system hardly reaches will continue to lack access to electricity in the coming years regardless of the Government's commitment.

In Malawi, although the Government has regulated community energy and introduced respective accessory instruments in 2019, the country lags on the public and private investment in energy that is necessary to create and transfer energy technologies to boost access to electricity. The few

existing rural off-grid initiatives struggle to survive due to poverty, which inhibits most rural Malawians from affording electricity.

Mozambique leads in investment in energy with private participation, has an extensive body of energy legislation and regulation and comes second in public investment in energy. However, the country has not yet completed regulating community energy. Its community energy regulation was only recently adopted in December 2021, and as of May 2023, the Government has only published 5 out of 27 accessory instruments of the regulation. This suggests that there will be delays in creating and transferring general knowledge and technologies on off-grid systems consequently reducing energy poverty.

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