

Towards responsive energy governance: Lessons from a holistic analysis of energy access in Uganda and Zambia

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ABSTRACT

Electrification rates in sub-Saharan Africa are low despite increasing national and international efforts. Good governance is key to translate these efforts into tangible energy access improvements. However, evaluating the quality of energy access governance is challenging due to the multitude of stakeholders involved and its dynamic institutional environment. This paper designs a novel, holistic analytical approach to assess energy access governance based on three data collection methods: Qualitative Document Analysis (QDA), semi-structured stakeholder interviews and closed surveys. It assesses energy access governance along six indicators. Applying this approach to the previously unstudied cases of energy access governance in Uganda and Zambia allows us to induce a new model of the type of interdependencies between different indicators of good governance. It suggests that while a multitude of feedback loops between indicators exist, basic rule of law and transparency standards are critical prerequisites for accountability and inclusiveness, which in turn foster efficacy and, ultimately, responsiveness of energy access governance. For Uganda and Zambia specifically, our analyses reveal shortcomings across all six governance indicators, hampering electrification efforts. Key levers include completing regulatory frameworks, improving transparency, and designing meaningful interactions between stakeholders to foster inclusiveness, and responsiveness of energy access governance.

1. Introduction

About 600 million people in sub-Saharan Africa (SSA) lack reliable access to energy; over 80% of them live in rural areas (International Energy Agency, 2019). Consequently, African governments adopted ambitious rural energy access targets and global development initiatives mobilised significant investment to increase electrification rates (USAID, 2018). Despite these efforts, lowering the absolute number of people without electricity access in SSA will be a significant challenge: While the number of people gaining access increased to from 9 million people between 2000 and 2013 to 20 million per year in SSA between 2014 and 2018 (International Energy Agency, 2019), SSA is projected to add an average of roughly 35 million people per year until 2030 (United Nations, 2015), meaning that the speed of electrification has to almost double again just to hold the total number of people without access constant. Roughly 95 per cent of the global population without access to electricity expected to be living in SSA by 2030.

The discussion of strategies and policies to enhance energy access in sub-Saharan Africa (SSA), especially in the context of off-grid

electrification in rural areas, has received significant attention over the last two decades (Brew-Hammond, 2010; Hansen et al., 2015; Karekezi, 2002). Current focus points of this debate are opportunities and constraints for private sector involvement and off-grid business models (Gregory and Sovacool, 2019; Knuckles, 2016; Muchunku et al., 2018; Nygaard et al., 2018), planning the integration of decentralised energy technology solutions (Baurzhan and Jenkins, 2016; Mandelli et al., 2016; Mentis et al., 2017), community uptake and acceptability (Holstenkamp, 2019; Muhoza and Johnson, 2018) as well as donor engagement and financing strategies (Batchelor et al., 2019; Tagliapietra and Bazilian, 2017; Trotter and Abdullah, 2018).

While the need for adequate energy policies to accelerate modern energy access in low-income settings has been widely discussed (Bazilian et al., 2014; Mandelli et al., 2014; Tawney et al., 2015), questions of how to evaluate the underlying energy access governance processes, such as policy decision-making, target setting, energy planning and implementation and how the quality of these processes impacts energy access, have received considerably less attention in the literature. The wider ongoing scientific debate created numerous definitions and

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conceptualisations of governance since the 1980s including questions of how to assess ‘good governance’, especially in the context of developmental studies (Weiss and Taylor, 2000). Recent studies have considered energy access governance either in generic terms as one of many determinants of successful electrification without providing an in-depth processual analysis (Pueyo, 2018), or have limited their analysis to specific segments of good governance such as financial misappropriation or neopatrimonialism (Gregory and Sovacool, 2019). However, governance processes are wide-ranging, multi-layered and contain different feedback links, requiring encompassing analytical approaches to assess them (Goldthau, 2014; Moynihan et al., 2011). In the case of energy access in low-income countries, these issues are specifically salient given the multitude of actors, interests and goals following the recent growing interest from both national governments and international development agencies in the topic (Ma and Urpelainen, 2018; Quitzow et al., 2016).

Consequently, this paper a methodological approach to analyse the quality of energy access governance and its implications for enabling electrification gains along a set of six good governance indicators. The complexity of governance processes warrants the usage of wide-ranging and rigorous empirical data analyses on multiple levels (Sovacool, 2014). By developing and applying an approach that reveals the interdependencies between different good governance indicators, and show their impact on critical policy outcomes, this paper aims to help transition energy governance research from its current often siloed evaluation, focused on a single specific energy governance dimension, to a more holistic approach accounting for the complexity of sectoral governance processes. Our approach enables to weigh different energy governance criteria against one another, and analyse them jointly vis-à-vis certain policy outcomes, which allows to derive more encompassing and nuanced policy implications for practitioners.

This paper combines three complementary types of qualitative data collection methods for energy access governance analysis, namely a systematic policy document analysis, semi-structured interviews and closed stakeholder surveys. It argues that these three types of data are key to holistically assess energy access governance, crucially allowing for data validation and triangulation (Patton, 1999). This approach is applied to the cases of Uganda and Zambia, which, to the best of our knowledge, have not been previously studied in terms of their energy access governance. Both countries have rural electrification rates below 10 per cent (The World Bank Group, 2017). They are intriguing cases because they have set ambitious electrification targets until 2030, aim to heavily rely on private sector investments in the off-grid space, and are subject to a complex mixture of nascent energy access policy-making and an abundance of international, national and local energy access stakeholders.

2. Background

2.1. Energy governance and energy access in low-income countries

The questions of how to conceptualize and practically evaluate sectoral governance processes have been subject to the scientific debate which created a wide range of theoretical approaches (Bennett and Satterfield, 2018). Energy governance refers to the (1) institutions, (2) actors and (3) processes that shape how (4) energy policies are agreed upon (Bazilian et al., 2014; Florini and Sovacool, 2011). The following briefly discusses these four elements in the context of energy access.

Firstly, the literature has pointed out the importance of different institutional setups for energy governance (Van de Graaf, 2013a; Van De Graaf and Colgan, 2016), for instance in the context of global energy management (Florini, 2011; Lesage et al., 2009), promoting renewable energy (RE) internationally (Van de Graaf, 2013b) or natural resource management (Sovacool et al., 2016). When assessing energy access governance in low-income countries, it is crucial to account for the different levels and ephemerality of related policies and institutions. For example, while energy policies are commonly designed within central

government (Trotter et al., 2019), the necessity of implementing them in rural areas which can be geographically and politically far removed from central government (Herbst, 2014) implies the importance of decentral institutional setups for their management. Moreover, given institutional constraints, popular pressure to provide energy access (Maclean et al., 2016) and the relative novelty of off-grid energy solutions, managing energy access in low-income countries has been highly dynamic, with new policies and regulations being drafted in quick succession.

Secondly, analysing actor perspectives is crucial to understand policy-making and implementation processes (Kuzemko et al., 2012; Rosenow and Eyre, 2016). In the context of energy access, political leaders and decision-makers have been argued more broadly to be key to design and drive energy access planning efforts and related decision-making processes (Kruger et al., 2019). Yet, energy access in SSA inherently involves a multitude of other actors on different levels, including international energy and development donor agencies, different national ministries whose primary concerns are related to energy, and sub-national actors like communities as beneficiaries, the private sector and local level government (Trotter et al., 2017).

Thirdly, energy governance processes include the definition of policy strategy and goals, operational targets, the drafting and implementation of regulations, monitoring and evaluation as well as stakeholder and sector management. While these processes are fundamental to understanding how energy services are provided, however, in the context of energy access, there is a paucity of research into the impact of different policy design, decision-making and implementation processes on the quality of energy sector governance which focuses on the agency of the different stakeholders involved (Edomah et al., 2016). This is despite the fact that in electrification governance, the type of these actors can vary significantly with different contexts.

Fourthly, the content and nuances of energy policies are outcomes of the underlying energy governance. Energy policies include both policy strategies and instruments (Rogge and Reichardt, 2016) to guide energy infrastructure development by private and public sector stakeholders (Liu, 2015). In the context of energy access, relevant policy outcomes include both electrification and rural development policies. Essential elements of energy access policies comprise legislation and regulatory frameworks, incentive, subsidy and taxation schemes, and plans relating to energy generation, transmission, distribution and consumption (Rahman et al., 2016). Assessing the quality of energy policies commonly involves different categories, namely completeness (Rosenow and Eyre, 2016; Trotter, 2019), feasibility (Schubert et al., 2015; Simon, 2020), coherence (Kurze and Lenschow, 2018; Makkonen et al., 2015) and, ultimately, the degree to which they achieved their objectives (Lenz et al., 2017; Pegels and Lütkenhorst, 2014; Solangi et al., 2011; Yoon and Sim, 2015).

In summary, studying energy access governance requires a focus on institutions, actors and processes, and their respective interactions, to analyse their impact on shaping concrete policy strategy and instrument outcomes (see Table 1 for a summary). This rationale directly informs the methodological approach this paper uses to evaluate energy access governance (see section 3).

2.2. Assessing ‘good governance’ in the context of energy access

Questions of how to assess ‘good governance’ have long been crucial to understanding a country’s performance with regards to achieving specific development goals (Weiss and Taylor, 2000). A review of recent approaches related to energy access and governance (Bazilian et al., 2014; Gregory and Sovacool, 2019; Van De Graaf and Colgan, 2016; Zaman and Brudermann, 2017) revealed a multitude of analyses focused on different aspects of governance, but without using a set of encompassing governance indicators, and without offering a specific methodological data evaluation approach in order to holistically analyse the different institutions, actors and processes which constitute energy

Table 1
Key elements of energy access governance analyses.

Energy governance analysis element	Type	Exemplary manifestation in the energy access realm
Institutions	Governance element	Political organisations such as energy ministries, specific electrification agencies, sector regulator along with their underlying legal constitutive framework required for energy access governance
Actors	Governance element	International, national and sub-national energy access policy-makers, funders, advocates, private companies, and community beneficiaries
Processes	Governance element	Definition of policy strategy and goals, inter-agency alignment, budgeting, definition of operational energy access targets, drafting and implementation of energy access regulations, project and progress monitoring and evaluation, stakeholder and sector management
Policies	Governance outcome	Electrification masterplans, sector composition strategy, energy access legislation and regulatory frameworks, incentive, subsidy and taxation schemes, and plans

governance.

The overall correlation between good governance, institutional quality and national well-being in relation to energy access has been indicated in empirical research (Ahlborg et al., 2015; Helliwell et al., 2018). Different quantitative measures of ‘good governance’ exist, such as the World Bank’s World Governance Indicators, yet they are cross-sectoral in scope, assessing the quality of governance in a country-year on a single two-dimensional scale.

A common shortcoming of energy access governance studies is its selective focus on what entails ‘good governance’ (Gregory and Sovacool, 2019; Pueyo, 2018). Governance issues are known to manifest themselves in broad terms. To capture these effects, governance assessments can be guided along a set of different governance indicators which cover a wide range of potential governance-related issues. Importantly, governance indicators do not possess a claim of universal applicability (Kaufmann and Kraay, 2007; Knoll and Zloczynski, 2012), with a meaningful conceptualisation of ‘good governance’ indicators strongly depending on the empirical context (Andrews, 2008). Consequently, this paper builds on previous works of (Dunu, 2013; United Nations, 2000) to define an encompassing set of six different ‘good governance’ indicators, which are specifically related to the context of energy access in this sub-section. The six indicators are (1) the rule of law, (2) transparency, (3) inclusiveness, (4) efficacy, (5) accountability and (6) responsiveness (see Table 2 for a summary). It is crucial to note that any governance analysis has to be calibrated by the country and region-specific environment.

First, in the context of energy access, this paper understands the broad concept of the rule of law (Rachel Kleinfeld, 2006) as the existence of a consistent legal framework that regulates licensing and permission processes in the energy sector. The private sector has assumed a dominant role in rural electrification over the last decade in numerous low-income countries (Ma and Urpelainen, 2018), suggesting the importance of licensing and permission regulations. Rule of law deficiencies can repel private sector investment and increase project costs as well as implementation periods (Kruger et al., 2019; Stritzke, 2018).

Second, transparency as a feature of good energy governance means the disclosure and accessibility of information from governing institutions to stakeholders who will be directly or indirectly affected by the governance processes and its outcomes (Ginsberg, W. R. et al., 2012). Given the high dynamics and relative nascence of the off-grid sector, transparency in energy access governance is crucial for private sector companies related to the administration of licenses and

provisions, across Ministries in government to developing mutually aligned cross-sectoral development policies which depend on energy-enabled services, and for eventual beneficiaries of energy access programmes.

Third, energy governance processes affect different government departments, international stakeholders, the private sector and communities. Inclusive consultation and participation are crucial to create an understanding and consensus of various interests (Miller et al., 2015), as well as feasible implementation strategies (United Nations, 2000).

Fourth, efficacy can be understood as the effectiveness and efficiency of public service governance, providing a certain level of service quality (Mehta, 1999; Oyugi, 2000). This paper studies energy access governance efficacy in the context of electrification target setting as well as the implementation strategies of these targets.

Fifth, accountability refers to public control over government actions and the ability and right to scrutinise policies and processes (Mulgan, 2003; Szulecki, 2018). To ensure accountability, the public needs to be able to attribute energy access decision to specific entities within either national or local government, requiring clear mandates (central governments versus community leadership). In the case of energy access, accountability is enabled by transparency of governance processes, providing beneficiaries with sufficient knowledge to attribute outcomes to actions. Furthermore, the existence of binding checks and balances for government is key for the ability to attribute responsibility to translate into the ability to hold specific actors accountable for their actions.

Sixth, responsiveness in the context of ‘good governance’ processes means that related institutions and stakeholder interactions are capable of understanding, institutionalising and ultimately meeting the needs of the sectoral stakeholders involved in a reasonable timeframe (Eglin and Ngamlana, 2015). Unresponsive governance can lead to a longer-term erosion of political stability and democratic value (Petach et al., 2017; Stritzke, 2017), and, in the case of electrification, increase sub-national energy access inequality (Avila and Kammen, 2018; Trotter, 2016).

3. Methods: operationalising the Governance Analytical Framework (GAF) to assess the quality of energy governance processes

The complexity of energy access governance (see section 2.1) implies the necessity of an encompassing approach when operationalising its critical assessment. To address this challenge, this paper suggests an operationalisation of Hufty’s broader Governance Analytical

Table 2
Contextualisation of the six good governance indicators for energy access.

1. Rule of law	2. Transparency	3. Inclusiveness	4. Efficacy	5. Accountability	6. Responsiveness
Existence and consistent application of a clear legal framework for the private sector to invest and operate in energy access	Disclosure and accessibility of relevant information for the wider public sector, private companies and beneficiaries	Affected stakeholders are included in energy access decision-making, and clear efforts of balancing interests between the public sector, the private sector and beneficiaries	Efficiency and effectiveness of energy access target setting and implementation	Public control over government actions on energy access - includes clear mandates, monitoring and evaluation	Understanding, institutionalising and, ultimately, meeting the energy access-related needs of sectoral stakeholders in a reasonable timeframe

Framework (GAF) (Hufty, 2011). Following a definition of the specific governance problem at hand, the GAF breaks down governance processes into four interlinked elements: Regulatory context, actors, nodal points (which define interactions of actors), and the substance of these interactions. Critically, the analytical operationalisation suggested in this paper relies on multiple data collection methods and sources in order to enable vital validation and triangulation between different data (Patton, 1999). Given the dynamic nature of the comparably nascent area of energy access governance and the prevalence of informality within institutions governing development in sub-Saharan Africa (Meagher, 2007), this paper argues that data validation and triangulation are essential to allow for a rigorous evaluation of energy access governance. Hence, three distinct types of data collection methods are deployed to operationalise the GAF, namely policy document analyses, semi-structured interviews and closed stakeholder surveys. Table 3 shows that combining these methods is necessary to allow for a direct assessment as well as data validation and triangulation of all four GAF elements for energy access governance. To further increase the robustness of the findings, this paper applies these methods to two different cases, further increasing the variety of data sources. To begin with, a Qualitative Document Analysis (QDA) (Altheide et al., 2010) relies on primary energy policy documents to examine regulations within the specific institutional and policy context of the governance issue at hand. In the case of energy access governance, it studies key energy policies and their targets, energy planning and strategy documents, multilateral donor policy strategies, as well as local-level development and implementation plans. A QDA allows to evaluate energy policies in terms of the policy assessment categories completeness, feasibility, coherence and, target fulfilment (see section 2.1).

Semi-structured interviews are a crucial method to understand the nuances of governance processes in a specific setting. They allow capturing the dynamics of electrification governance, the type of nodal points between actors, the degree with which official policy documents translate into actual sector management, differences between formal institutional setup and real-world interactions. Semi-structured interviews can also shed light on governance-related enablers and barriers to rural electrification. They can validate or add to the structural findings from the QDA revealing new documents to include in the QDA, suggesting the inductive and iterative nature of these three tools in evaluating governance.

Finally, closed stakeholder survey data are collected to yield a detailed map of stakeholder types and their relative importance for governance processes (Aligica, 2006). Stakeholder mapping depicts different stakeholder interests, influence and power in specific policy areas (Brugha and Varvasovszky, 2000). In the case of this paper, they encompass international, national and local actors involved in energy planning and decision-making, financiers and technical advisors, project implementation organisations and the perceived beneficiaries of electrification. To generate the stakeholder map, the relevant actors are identified inductively through both the QDA and the semi-structured interviews. In a next step, relevant stakeholders are asked to evaluate all off-grid energy sector actors via a closed survey using a discrete scale (1 = low, 2 = medium, 3 = high) along three categories: The degree of authority (which refers to the actor's decision-making power on national level), the level of the actor's interest in the energy governance processes (due to formal mandate or potential impact of energy access), and actual involvement in energy governance processes on a national level.

Table 3
Type of links of different qualitative analysis tools for evaluating Governance Analytical Framework components.

Qualitative analysis tool	Governance Analytical Framework components			
	Regulatory context	Mapping of actors	Nodal points	Interaction substance
Qualitative Document Analysis	Direct	Indirect	Indirect	Indirect
Semi-structured interviews	Indirect	Indirect	Direct	Direct
Stakeholder survey	Indirect	Direct	Indirect	Indirect

Aggregating this data then allows drawing a map of all stakeholders with their level of authority, interest and actual involvement in energy access governance.

Consequentially, a combination of QDA, interviews and stakeholder surveys to analyse energy access governance along the six indicators discussed in section 2.2 enables a holistic evaluation of different characteristics of good energy access governance in accordance to the GAF (see section 4 for a brief explanation of the data sources, and section 5 for the empirical results of evaluating the off-grid energy governance in Uganda and Zambia along the six good governance indicators).

4. Data

4.1. Number and type of policy documents for QDA

This paper applies the analytical approach discussed in section 3 to the case of energy access governance in Uganda and Zambia. The energy sectors in both countries are highly dynamic, hosting several electrification programmes as well as legislative and regulatory review processes. The policy and regulatory documents for the QDA have been selected according to their relevance for enhancing energy access in both countries: They either contain specific energy sector targets, or strategies or instruments relevant for achieving these targets. Key documents included are national-level and energy sector policies, sub-sector focus plans, on-grid and off-grid regulations, as well as technological innovation policies. An indicative list of relevant policy documents is provided by the Electricity Regulatory Authority in Uganda (ERA), and as part of the 2018 'Scaling-Up Renewable Energy Programme (SREP) Investment Plan' (Ministry of Energy and Water Development Zambia, 2018) in Zambia. A total of 32 documents have been chosen for the QDA, 18 for Uganda and 14 for Zambia. The documents have been published between 2006 and 2018. The document selection was validated as part of the semi-structured interviews in both countries (section 4.3).

4.2. Semi-structured interviews

Based on QDA and stakeholder mapping, qualitative data has been collected via 48 semi-structured interviews with stakeholders from the public and private sectors in Uganda and Zambia (see Table 5). The questionnaires were clustered into eight sections as illustrated in Table 4 and slightly modified for each stakeholder group. The main structure of the questionnaires based on regulatory frameworks, strategic energy targets and planning and energy project implementation. They included both senior politicians and bureaucrats in Ministries, Rural Electrification Agencies and Regulation Boards, NGOs, local government officials and chiefs, foreign donors as well as various off-grid energy companies. Key focus questions of the interviews covered institutional nodal points and the actual interaction between stakeholders with regard to energy governance processes, energy planning, strategy and policy implementation, the relationship between domestic and foreign actors in energy governance processes as well as sectoral challenges and opportunities. To ensure a systematic evaluation, the interview data were coded along the six good governance indicators (section 2.2), and in relation to their impact on the overall problem.

Table 4
Structure and examples of stakeholder questionnaire.

Section & type	Overall topic of the section	No. of questions	GAF component & coding categories	Example questions
1 Open questions	Organisation and job title/position	3	Mapping of actors Formal role & mandate (QDA) vs. reported role Seniority level	<i>Can you briefly describe your organisation? (What is its mission? How does it accomplish its objectives?)</i>
2 Open & closed questions (Ranking)	Goals/values regulatory framework decision-making process	6	Regulatory context Mapping of actors Strategic priorities Perceived sectoral challenges Formal vs. actual priorities	<i>Where do you see the strategic priorities for Zambia's/Uganda's energy sector? (off-grid vs. on-grid)? What do you think needs to be done in order to enhance energy access and security in Zambia/Uganda?</i>
3 Open & closed questions (Y/N)	Strategic Decision-making: Regulatory framework	19	Nodal points & Interaction (cooperation/conflict) Regulatory context Sectoral alignment Formulation & implementation of targets Evaluation of existing & needed regulatory mechanisms Challenges & opportunities	<i>Which type of stakeholders do you involve or consult in these regulatory framework decision-making processes? (governmental/non-governmental/private investors)? What are your personal/departmental challenges with regard to energy planning/regulatory decision-making?</i>
4 Open questions	Strategic decision-making: Energy planning	9	Nodal points & Interaction (cooperation/conflict) Regulatory context Cross-check sections 1,2,3 Genesis of planning & implementation strategies Relevance of formal targets (in relation to QDA)	<i>Who do you see as the central/leading entity for the development of a coherent electrification strategy? (Who has the lead/who should have the lead)? Which measures does the government takes in order to achieve 50% off-grid electrification by 2030? What are the strategic steps according to your perspective? What are the concrete strategic steps?</i>
5 Open questions	Implementation of RE projects	11	Nodal points & Interaction (cooperation/conflict) Efficacy Project implementation (efficacy)	<i>Which general challenges do you think developers might face when they develop or implement small- & medium scale RE projects in Zambia/Uganda? How long do you think is the current timeline for a developer to complete the application process/obtain all permissions? Do you think this timeline is adequate? If not, what can be done to shorten this timeline?</i>
6 Closed questions	Closed questions	6	Nodal points & Interaction (cooperation/conflict) Efficacy Cross-check 1-5	<i>Who is responsible for solving Zambia's/Uganda's energy problems in the future? (multiple answers possible) The government has been consistent in its views on Zambia's/Uganda's energy future.</i>
7 Actor-specific questions Open & closed questions (Y/N)	Specific questions according to type of stakeholders	10–16	Nodal points & Interaction (cooperation/conflict) Regulatory context Role & perception of the individual actor Challenges & opportunities Policy implications	<i>Example Parliamentarian: How is parliament/your committee involved in energy planning & policy processes? How does the Zambian/Ugandan Parliament contribute to ensure accountability in the energy sector? Where are the challenges?</i>
8	Next steps	3	n/A	<i>Would you be interested in receiving updates on the research progress & -results?</i>

4.3. Closed stakeholder survey

The stakeholder analysis generated a multi-level map illustrating interest, influence and power of public and private sector stakeholders of Uganda and Zambia's off-grid energy sector on national and local level and was generated through closed survey data from 25 stakeholders in total, 12 from Uganda and 13 from Zambia. In a simplified closed questionnaire illustrated in Table 6, the respondents were asked to rate the central institutions identified through the QDA and displayed in Figs. 1 and 2 with regard to their decision-making power, their interests in energy policy and their actual involvement in energy policy-making. In Uganda, local-level institutions included are Local Council Chairmen and Resident District Commissioners, while in Zambia, local governance is complemented through the assessment of the chiefs' role. The closed surveys were administered and evaluated for each country independently, thus yielding a separate stakeholder map for Uganda and Zambia.

5. Results

This section presents the results of the QDA, semi-structured interviews and closed stakeholder surveys with regard to the quality of governance in Uganda's and Zambia's off-grid energy sector, and its implications for rural electrification. The section devotes one subsection to the six governance indicators, with each first pointing to the specific merits and shortfalls of energy access governance before analysing the impact of the respective governance aspect on the type and quality of energy access service delivery. The analysis shows that similar root causes such as unclear roles and responsibilities and weak horizontal and vertical governance linkages can cause different governance

challenges and potential adverse impact for electrification efforts across several good governance indicators. Table 7 presents a sample summary of the QDA results with five policy documents for Uganda and Zambia each. Based on an inductive and iterative process between the QDA, the semi-structured interviews and the grey literature, Figs. 1 and 2 present a graphical summary of stakeholder mapping for Uganda and Zambia, respectively. Finally, Table 8 summarises the results of each sub-section in one table, abstracting the main, cross-cutting governance issue for each indicator before giving country-specific details grouped by main analytical source.

5.1. Rule of law

The analyses suggest that regulatory frameworks governing off-grid energy exist in both Uganda and Zambia with considerable levels of independent oversight but omit several critical issues to foster private sector involvement. The legal basis for the existence of regulations in Uganda and Zambia is primary legislation (the 1999 Electricity Act Uganda; Energy Regulation Act of 1995 Chapter 436 Zambia) (Government of Uganda, 1999; The Republic of Zambia, 1995). It provides a clear legal mandate for the ERA in Uganda and the Energy Regulation Board (ERB) in Zambia to draft regulations for their respective energy sectors. ERA enjoys a high level of independence, with no formal provisions under which a government body can overturn any of its decisions (Government of Uganda, 1999). In Zambia, the authority and independence of the ERB are somewhat limited, as some of its decisions require ministerial approval and have been reversed by the President in the past which also reflects the high degree of politicization of energy sector politics. As one respondent, who holds a senior position at institutional level in Zambia formulated it, "a lot of energy planning decisions are

Table 5
Number and Type of Respondents (RS) for semi-structured interviews in Uganda and Zambia.

No. of interviews	Country	Type of respondent (RS)	Level of seniority/years of experience	Category of Respondent
4	Uganda	Electricity Regulatory Authority	1 RS more than 8 years	
3 RS more than 10 years	Institutional			
3	Uganda	Ministry of Energy	2 RS more than 20 years	
1 RS between 5 and 10 years	Institutional			
2	Uganda	Rural Electrification Agency	2 RS more than 17 years	Institutional
2	Uganda	World Bank and KfW	2 RS more than 5 years	Donors/DFIs
2	Uganda	Ministry of Finance, UECCC	2 RS more than 15 years	Institutional
6	Uganda	LC 5 Chairmen,		
Resident District Commissioners	4 RS more than 20 years			
2 RS more than 10 years	Local representatives			
1	Uganda	WWF	1 RS more than 5 years	NGO
1	Uganda	KIS	1 RS more than 10 years	Mini-grid operator
1	Uganda	Consultant	1 RS more than 15 years	Consultant
4	Zambia	Chief	4 RS more than 15yrs	Local representatives
4	Zambia	Ministry of Energy	2 RS more than 5yrs; 2 RS more than 10yrs	Institutional
1	Zambia	House of Chiefs	More than 10yrs	Institutional
1	Zambia	District Commissioner	More than 5yrs	Institutional
6	Zambia	Government Parasiticals (incl. Zambia Electricity Supply Corporation (ZESCO), Rural Electrification Authority (REA), Energy Regulation Board (ERB), Zambia Bureau of Statistics (ZABS & Zambia Development Agency (ZDA)	3 RS more than 5yrs; 3 RS more than 10yrs	Institutional
1	Zambia	Ministry of Finance	More than 10yrs	Institutional
2	Zambia	Ministry of Local Government & Housing	1 RS more than 5yrs; 1 RS more than 10yrs	Institutional
4	Zambia	Business Sector	2 RS more than 5yrs; 2 RS more than 10yrs	Private Sector
1	Zambia	Civil Society Organisation	More than 10yrs	NGO
1	Zambia	Parliamentarian	More than 5yrs	Institutional
3	Zambia/ International	Foreign Donor	All more than 5yrs	Donor/Foreign Institutional)

political, the whole sector is very political, and decisions can change quite quickly". Nonetheless, both countries provide for legally established processes to allow challenges or appeals against regulator decisions.

The QDA and private sector interview partners suggest several existing legal uncertainties in Uganda and Zambia. Frequent mentions included inconsistencies within the application of electricity generation licenses and potential legal challenges for land acquisition. In both countries, compensating mini-grid companies when the national grid arrives in a village (grid encroachment) has furthermore not been resolved legally. Being left in legal limbo is particularly challenging for project developers who, according to interview data, need one to two decades to recover the mini-grid investment cost. In addition, businesses identified highly volatile import duty regulations in Uganda and Zambia as a constraint to plan and deliver projects.

These legal issues have led to an increase in off-grid project risks and costs, negatively impacting the prospects of rural electrification in several instances in both Uganda and Zambia. In Zambia, this impact on long-term risks for off-grid systems is aggravated by the country's energy tariff system which entails subsidies for the on-grid sector while off-grid energy tariffs are required to be cost-reflective.

Acknowledging some of these shortcomings, both Uganda and Zambia have been updating their regulatory framework. Interviewees have expressed optimism of rule of law-improvements, anticipating the potential to attracting more private investments in mini-grids especially in Uganda. Zambia recently approved a regulatory framework for the off-grid sector by the ERB ([Energy Regulation Board Zambia, 2018](#)) which, as the QDA revealed, has been driven by the EU in consultation with Zambian stakeholders. The technical requirements for mini-grids

Table 6
Closed stakeholder survey - Example question and responses from Zambia.

Institution	Type	Decision-making Power/Authority	Interest/stake in energy policy	Involvement in energy policy/strategy
Chiefs	Advisor	1	3	1
District/local government	Receiver	1	2	1
Energy Regulation Board (ERB)	Regulator	2	2	2
External Donors	Donor
House of Chiefs	Facilitator			
Ministry of Agriculture	Policy Maker			

Table 7
Example of the QDA of energy policy attributes in Uganda and Zambia.

	Document type	Year	Rural access target	Definition of access?	Approach to achieve the target	Issued by	Main financier	Focus	Links to other policy documents and coherence	Status of implementation and target achievement
I. Uganda										
The Electricity Act, 1999	Legal	1999	N/A	No	Grid	Parliament	Government of Uganda	Legal framework for institutional framework and mandates - currently under review	Links exist to several electrification programmes, update required to capture needs for off-grid electrification models which feature in latest Rural Electrification Strategy Plan	Allowed for establishment of Rural Electrification Authority (REA), Operationalisation of the Rural Electrification Fund. Adequate legislation in place.
Rural Electrification Strategy and Plan 2013–2022	Strategy and Plan	2013	26% by 2022, 51% by 2030, and 100% by 2040	No	Mainly grid, also mini-grids and Solar Home Systems (SHS)	Ministry of Energy	Government of Uganda	Model & strategies for rural electrification planning & implementation	Lacks linkages to Regulatory provisions; Rural Electrification Master Plan for Uganda (REMPU) mentioned but no translation of the plan into specific regional policy instruments	Introduced a change in business model from purely public financed to concessional model approach for demarcated Service Territories, so as to reach many people as well as attract private capital with good incentives.
Draft Uganda Mini-grid Regulations	Regulations	2019	100% by 2040	No	Mini-grids	ERA	ERA/USAID	Focuses on requirements for regulating off-grid systems and projects in Uganda of capacity between 0 and 2 MW	Links to previous mini-grid regulation	Introduces criteria for multiple tendering and procurement options, economic and financial incentives, Interconnection requirements, operation and compliance requirements for mini-grids.
The Energy Policy, 2002	Policy	2002	N/A	No	Mainly Grid and Off-grids (SHS)	Ministry of Energy	Government of Uganda	Policy framework for on- and off-grid sectors – no addressing of issues of access, disruptive business models and integration	Limited links to other energy sector strategies, different energy generation and consumption targets, conflicts in coordination and planning mandates of sector institutions	Previously mainly focused on increasing the country's generation capacity and less focus on access and rural electrification
The Draft National Energy Policy, 2019	Policy	2019	100%	Multi-Tier framework	Mainly Grid, mini-grids and SHS	Ministry of Energy	Government of Uganda/ GIZ	Target: Achievement of SDGs and Vision 2040 but not concise funding sources to meet targets	Integrates crucial Ugandan energy sector policies, and revises rural electrification target	Target: universal access by adopting a proportional share of all energy sources with visible consideration of mini-grids and SHS, for hard to reach areas + to incentivise demand growth for excess generation capacity currently experienced
II. Zambia										
Rural Electrification Act	Legal	2003	51% by 2030	No	Off-grid systems and grid expansion	Government (GRZ)	GRZ	Mandate & structure of REA & financial implications (rural electrification fund-REF); no implementation/ strategic implications	No linkages	Act is currently under revision; REA & REF established – formally leaders of the rural electrification processes; Interviews revealed: Implementation gap: REF underutilized and divergence between actual and formal mandate of REA limited
REMPZ (Rural Electrification)	Strategy	2009	51% by 2030	No	Mainly grid-expansion;	Rural Electrification		Main focus on grid-expansion; no financing	Limited links to other policy strategies	REMPZ formally adopted but limited practical relevance due <i>(continued on next page)</i>

Table 7 (continued)

	Document type	Year	Rural access target	Definition of access?	Approach to achieve the target	Issued by	Main financier	Focus	Links to other policy documents and coherence	Status of implementation and target achievement
	Master Plan for Zambia, 2008–2030)				few mini-hydro off-grid systems	Authority (REA)	Foreign Donor (JICA)	or strategic implementation approach; no least-cost analysis		to high cost of approach and lack financing strategy
	Power System Development Master Plan (PSDMP) for Zambia (2010–2030)	2010	51% by 2030	No	Mainly grid-expansion	Ministry of Energy	Foreign Donor (JICA)	Assessment of 2010 energy sector including off-grid generation via diesel generators; mainly on-grid focus; no implementation strategy for enhancing energy access	Shares the same sector targets as other documents but no linkages to relevant documents such as REMPZ or Rural Electrification Act	Limited practical relevance Most projects remain unimplemented due to ZESCO's inability to mobilise private sector funding; projects that are supposed to be completed by 2020 (e.g. Kafue Gorge) are still incomplete and currently on hold
	Zambian Distribution Grid Code	2016	n/A	n/A	On-grid sector	ERB	GRZ	N/A	N/A	Currently being applied but not relevant for off-grid sector
8	Scaling-Up Renewable Energy Programme (SREP) Investment Plan	2018	Reiterates various targets (51% by 2030; universal access; 8% by 20,201)	Access to the national grid and off-grid but no specification	Off-grid systems and grid expansion	Ministry of Energy	Foreign Donors	Focus on setting ambitious targets, enumeration of existing and planned donor programmes, and provides an implementation strategy to increase access for approx. 300,000 people	Comprehensive linkages/ references to existing sectoral documents and donor programmes which leads to the fragmentation of the SREP and reveals inconsistencies due to the fragmentation/ inconsistencies between the documents	SREP still not fully adopted and at draft stage since 2018; Part of the donor programs implemented but not all financial allocations and planned programmes/projects especially from donors that are listed in the SREP can actually be verified or considered to be binding; lack of integrated overall planning and implementation strategy; SREP more an overview of existing donor driven approaches than a management tool

have been substantially specified under the new framework which is supposed to be road-tested in the next years. Some developers have warned over an over-regulation of mini-grids applying technical standards that cannot be applied to rather small systems during the public consultations but the framework has been rated positively by private sector stakeholders in the interviews due to its 'light-handed approach' for off-grid energy systems up to 100 kW installed capacity. Important issues however like grid encroachment still remain unsolved which was criticised among the private sector stakeholders but are currently under consideration by the ERB. In Uganda technical standards for interconnection of an off-grid system with the primary grid have been specified for purposes of safety, network stability, power quality and compliance with the grid code. Exceptions have been made for 'registered micro-grids' that are not ready for interconnection to be upgraded at the cost of the distribution licensee upon grid arrival – an incentive for acceleration and incubation of off-grids. In contrast, off-grid systems qualifying for the 'certificate of exemption' category are required to adhere to technical codes for design, construction, operation and maintenance, and more specifically to the distribution line construction guidelines.

5.2. Transparency

Both interview and QDA evidence suggest that the key transparency issue in energy access governance in both Uganda and Zambia is an abundance of different and in part conflicting policy and strategy documents without guidance on which one of these strategies is actually relevant. Crucially, key roles and responsibilities in the sector are either not clearly defined, or existing definitions not universally accepted, with considerable gaps in information sharing and feedback mechanisms both within government and to external stakeholders. Notably, and in contrast to the rule of law findings, these good governance gaps are only apparent in policy strategies and not in regulatory instruments: Both Uganda and Zambia have published their regulatory frameworks in a widely transparent manner. Especially ERA in Uganda ensures a transparent model of regulatory requirements which, according to off-grid businesses in Uganda, has helped with building long-term security of

market access. A respondent from the ERA reiterated that “the development of the new off-grid regulations is meant to streamline the licensing and competition for the off-grid market in a transparent manner”.

In terms of policy strategies, however, several crucial transparency gaps exist in both countries. Table 9 illustrates associated examples along three strategic energy access governance activities, namely defining overarching energy access policies, fixing an electrification budget, and deciding on areas of external technical assistance. Firstly, in the Ugandan case, the unbundling of its energy sector in the early 2000s has significantly increased the number of governmental agencies and parastatal entities in Uganda’s energy sector. This fragmentation has led to unclear strategic roles as well as an apparent overlap of responsibilities. The lack of one transparent energy access strategy plan is a salient example, with several institutions such as the Ministry of Energy, the Rural Electrification Agency, parastatal companies (generation company UEGCL and transmission company UETCL), and private distribution company UMEME developing their own and often conflicting approaches (see also section 5.4). Some of these plans are publicly available, some, like those from the parastatal companies, are not. No binding hierarchy of these plans has been issued.

Secondly, this multitude of plans has contributed to largely non-transparent budgetary allocation processes for energy access in both Uganda and Zambia. The QDA and the interviews were unable to identify clear budgeting ownership roles, with the Ministry of Energy, Ministry of Finance, National Planning Authority and foreign donor entities such as the World Bank all being involved.

In addition, formal, transparent budget allocations do not necessarily translate into actual budgets: In Zambia, less than half of the formally approved budget for rural electrification in 2018 was actually received by the Rural Electrification Agency. Thirdly, while foreign donor engagement has generally been rated helpful by interviewees, duplications of donor efforts have been identified by roughly two-thirds of the interviewees. For example, some donor agencies are advocating a rapid spread of low-tier electrification across the country, while others are more focused on high-quality energy access which can help drive economic development. Several interviewees point to a crucial implication

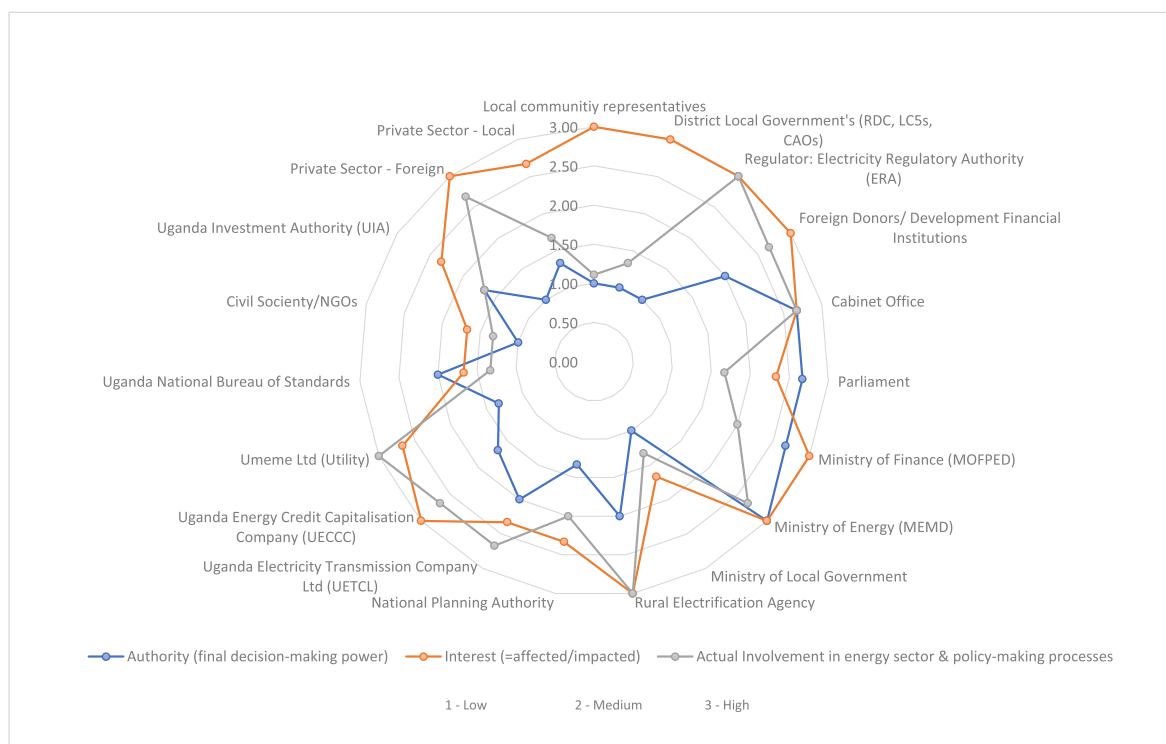


Fig. 1. Energy sector stakeholder map in Uganda (results from stakeholder surveys).



Fig. 2. Energy-Sector Stakeholder Relations in Zambia (results from stakeholder surveys).

of non-transparency in energy access governance: Where the strategic direction is unclear, electrification efforts tend to become fragmented, and investments in rural electrification cannot be bundled in any specific direction. The limited prioritisation is slowing down learning curve effects and limiting positive yields.

5.3. Inclusiveness

The empirical data for both countries indicates highly centralised, ‘top-down’ energy access decision-making power structures with limited scope for meaningful inclusion of community-level stakeholders and different Ministries. The stakeholder mapping results illustrated in Fig. 1 show that in Uganda, the authority for energy decision-making is highly centralised at the national level with top decision-makers being the Ministry of Energy and Mineral Development, ERA, Ministry of Finance, Parliament and the Cabinet of Uganda. While the first four entities exercise authority within their statutory mandate, Parliament and Cabinet provide oversight roles in legislating and approving budgetary votes for the energy sector. By contrast, institutions with low authority include the Ministry of Local Government, decentralised District Local Governments (community representatives), NGOs/Civil Society and foreign private sector. While the District Local Governments have the highest interest because they are directly affected, they are the least involved in decision making. An Ugandan local council chairman commented “I do not have electricity in my house yet as a leader, I am expected to coordinate development in the district, yet I am excluded in energy planning processes”. In terms of interest, the Ministry of Energy, Ministry of Finance, the Rural Electrification Agency, the foreign private sector, ERA and District Local Governments have high interest because of the various opportunities associated with off-grid electrification. Concerning the actual involvement, the QDA reveals that the Ministry of Local Government,

District Local Governments and Civil society/NGOs are not involved in energy policy making. However, comparing these findings with interview data and stakeholder surveys suggests that these interactions usually do not lead to meaningful energy policy impact, suggesting a salient top-down mindset of energy access policy-making.

The analysis for Zambia, as shown in Fig. 2, reveals similar power-interest-influence patterns and illustrates that the decision-making power in national energy governance processes is concentrated among national governmental stakeholders. Involvement in energy governance processes notably includes foreign donors, who have often initiated energy policy revisions in Zambia. Similarly to Uganda, the private sector’s involvement is limited to the participation in public hearings and the submission of comments to government initiatives or drafts of regulatory frameworks. Several companies have mentioned in the interviews, their de-facto influence on governance is low, but can increase if donors drive a governance process and ask for private sector consultation (REEEP, 2019).

This centralisation of authority presents risks of missing community needs for electrification, and, as the results suggest, can lead to centrally designing electrification strategies which are not tailored to realities on the ground. In Zambia, the Rural Electrification Masterplan for Zambia (REMPZ) was developed in 2008 with significant financial support from the Japan International Cooperation Agency (JICA) but without the inclusion of local stakeholders. QDA and interview data suggest that this led to a strategic mismatch between connection targets and local demand. Similarly, both public and private sector interview partners mentioned that in Uganda, an inadequate consultative process in preparation of the Rural Electrification Master Plan contributed to the plan’s impracticability, with stakeholders calling for wide-ranging revisions.

Table 8
Summary of the energy access governance assessment Uganda and Zambia.

Good governance indicator						
	1. Rule of Law	2. Transparency	3. Inclusiveness	4. Efficacy	5. Accountability	6. Responsiveness
Summary: Key issues across cases	Incomplete regulations for off-grid energy projects	Non-transparent roles and responsibilities in defining energy access policy strategies	Top-down policy-making with low levels of meaningfully including decentralised stakeholders	Inefficient electrification target setting and ineffective, misaligned implementation	Limited institutional ability to respond to rural electrification needs on the ground	Limited institutional ability to respond to rural electrification needs on the ground
I. Uganda						
QDA	Detailed legal regulatory framework for off-grid energy exists; On-going review to update Electricity Act, the National Energy Policy and off-grid Regulations; Several legal issues unresolved, such as financial compensation when the grid arrives in a mini-grid area, land acquisition and import duty regimes	Regulations are available to the public, but policy strategies are largely non-transparent: Unclear roles and responsibilities, Multiple different rural electrification master plans exist from different organisations, not easily accessible, policy strategies suffer from limited transparency	Regulations require formal institutional stakeholders, the public and government to be included in decision making processes	Energy access not clearly defined; Conflicting electrification targets; Electrification targets do not translate into consistent implementation measures; Policies heavily prioritise on-grid electrification over off-grid solutions despite higher costs of the former	Formal regulatory monitoring and supervision of licensed grid/off-grid electrification and tariffs are robust; Parliament reviews, approves loans and budgets of public energy projects (REA) and scrutinises central elements of energy governance processes and exerts a comprehensive controlling function	Lack of region-specific, need-specific or income-specific approach towards electrification; Absence of a comprehensive decentralised implementation strategy (no integrated resource plan)
Semi-structured interviews	High independence of Electricity Regulatory Authority; Private sector view legal regulations for licensing and permission as too complex and partly unresolved; Public sector accepts some of these legal challenges and is amending the Electricity Act to cater for integration of off-grid energy	Comprehensive stakeholder consultations in regulatory processes, but conflicting information on roles and responsibilities regarding decision-making power for national energy access policy strategies; Low information sharing between different government and parastatal companies; Budgeting process is non-transparent	Where inclusion is part of policy design, these interactions have not had a significant impact on final energy access policies; Top-down approach rated as being highly exclusive by local government (Local Council members) and communal leaders; External donors fund and heavily influence procurement, in some instances in a non-inclusive way	Current implementation approach (REMPU, grid-extension) likely to not be feasible; On- and off-grid electrification strategies are not aligned; Rural Electrification Agency is highly involved in high cost grid-infrastructure construction; High bureaucracy in procurement and licensing are significant challenges for low cost mini-grids	Accountability of energy access actions lies with the public sector, but unclear overall responsibility for overall outcomes; Public sector interviewees blame heavy donor involvement for several challenges, further complicating accountability	Limited amount of formal vertical and horizontal touch points between international, national and local public sector stakeholders; Limited awareness of specific needs and demands in rural areas; Low levels of centralised and decentralised staff in key energy access agencies to ensure responsiveness (REA only has five full-time members of staff)
Stakeholder surveys	The lead formal institutions exercising rule of law for energy include the Parliament, ERA and Electricity Disputes Tribunal (EDT) and provide framework for legal security, implementing renewable energy projects and dispute resolution	n/a	Energy policy- and decision-making highly centralised, mainly driven by central government institutions, foreign donors and the private sector; Multiple stakeholders involved on consultative basis on national level but limited to no involvement of local representatives; Non-governmental stakeholders often formally consulted	n/a	Power and influence structures blurred due to lack of clear mandates	High interest but limited awareness among local level stakeholders such as communal leaders
II. Zambia						
QDA	Legislative framework under development - very dynamic; Newly established comprehensive regulatory framework that takes specific requirements for off-grid energy systems into account but continuing lack of legal certainty with regard to grid arrival; Focus on on-grid largely	Most public documents accessible to the public online; limited transparency of ongoing review processes and consultations	Central policy attributes have been developed with very limited or no local stakeholder involvement (e.g. REMPZ); Documents mainly driven by Ministry of Energy and/or foreign donors; Non-governmental stakeholders formally consulted; Local stakeholders/representatives and	Energy access not clearly defined; Energy target setting inconsistent; Gap between electrification targets and implementation measures (strategy, budget, resources, timeline); Current implementation approach strategy (REMPZ, grid-extension) not feasible;	Parliament reviews and scrutinises central elements of energy governance processes and exerts a comprehensive controlling function but limited legal instruments to enforce findings; Ambiguity with regard to formal roles and mandates; Clear mandate for REA to drive electrification	Limited reference to rural electrification (e.g. none in Ministerial Statements); Lack of region-specific, need-specific or income-specific approach towards electrification; Absence of a comprehensive decentralised implementation strategy (no integrated resource plan)

(continued on next page)

Table 8 (continued)

Good governance indicator						
	1. Rule of Law	2. Transparency	3. Inclusiveness	4. Efficacy	5. Accountability	6. Responsiveness
Interviews	remains as new Energy/Electricity bills does not take specifications for off-grid systems into account; Independence of ERB formally limited	No transparent, unique and formal definition of roles and responsibilities for energy access policy-making; Information exchange between Ministries on informal basis; Gaps between openly allocated and non-disclosed actual payments for rural electrification; Low transparency of foreign donor activities	local structures for implementation are not mentioned in the documents Non-governmental stakeholders often formally consulted but perception that their opinions are not fully taken into account; Limited awareness of the necessity to involve local representatives among governmental stakeholders; Frustration among local level stakeholders about their limited inclusion on national level	On- and off-grid electrification strategies not aligned; New energy policy under review but does not include off-grid sector significantly On- and off-grid electrification planning is isolated from each other; No valid implementation strategy; "Outsourcing" of rural electrification to private sector (donor funded/cost reflective tariffs); Rising off-grid electrification but uneven regional distribution and low levels of productive use	Parliament is constrained to demand actionable results based on committee findings due to lack of resources; Limited monitoring and evaluation of policies and projects due to lack of resources; Limited clarity of roles and mandates limits accountability; Actual role of REA limited due to financial constraints and dominant donor engagement; Strategic Plan to enhance M&E is under development	Virtually no interaction between local and national stakeholders in energy governance processes; Limited awareness of specific needs and demands in rural areas
Stakeholder surveys	Key rule of law decision makers in Zambia are the Ministry of Energy and the regulator, also state-owned utility ZESCO and environmental agency ZEMA; Donors are highly involved in drafting policies but have no decision-making power themselves	n/a	Highly centralised Energy policy- and decision-making; Multiple stakeholders involved on consultative basis on national level but limited to no involvement of local representatives; Non-governmental stakeholders often formally consulted	n/a	Parliament with regard to its oversight function involved at medium level; Power and influence structures blurred due to lack of clear mandates	Limited awareness of national energy governance processes among local level stakeholders
Potential impact on enabling energy access	Increased project risks and costs; Longer project development times; Danger of higher off-grid tariffs and reduced investment appetite	No clear definition of priority areas can lead to fragmentation and make bundling of investments/learning curve effects difficult to realise	Reduced local acceptance and buy-in for electrification projects	Low efficacy implies a waste of limited resources to enhance energy access; Absence of a clear implementation strategy can lead to insecurities and ineffective ad-hoc measures	Low accountability reduces the pressure to deliver on public service tasks; Challenging process to address the root cause of previous flaws in electrification programmes	Danger of rural electrification efforts not meeting local needs and requirements

5.4. Efficacy

Effectiveness and efficiency issues in Uganda's and Zambia's off-grid energy sectors are most salient in electrification target setting and policy implementation. Firstly, the QDA reveals nine different policy documents in Uganda and 13 documents in Zambia, which either set or contain electrification targets. Notably, different governmental and external stakeholders have produced a highly inconsistent range of targets. For example, in Uganda, Vision 2040 included an electrification target of 80% by 2040. The rural electrification taskforce which designed the RESP 2013–2022 set electricity access targets of 26% by 2022, 51% by 2030, and 100% by 2040. In 2012, the Government further engaged in a United Nations Sustainable Energy for All programme, which aimed, among other things, to ensure universal access (>98%) to modern energy services by 2030, and to promote cheaper and cleaner off-grid technologies. In Zambia, eight out of 13 documents mention a rural electrification target of 51% by 2030 and two documents refer to a general increase in energy access without setting a specific target. The 'Vision 2030 of Zambia' (Republic of Zambia, 2006),

the document most documents claim to derive the energy target from, actually sets a goal of universal energy access by 2030. The Ministry of Energy's Strategic Plan aims at eight per cent rural electrification by 2021. Interviewees similarly provided different electrification targets and associated timelines, validating the notion of absent conciliation of targets.

Secondly, the efficacy of electrification implementation strategies in Uganda and Zambia is found to suffer from being technologically biased, incomplete and difficult to navigate. In semi-structured interviews, donors and the private sector expressed a uniform belief that off-grid solutions are a necessary part of efficient electrification implementation. However, both countries have prioritised on-grid electrification and associated energy access finance over off-grid electrification in the past. The QDA reveals that in Zambia, three out of then ten documents that contain energy access targets specifically define it as access to the national grid, the other seven documents do not contain any access definition. Zambia's most detailed electrification plan, the REMP (Japan International Cooperation Agency (JICA), 2008), heavily focuses on grid expansion but lacks associated finance implications. None of the

Table 9
Exemplary transparency issues in energy access governance processes in Uganda and Zambia.

Country	Governance activity	Stakeholders involved	Transparency 'gap'	Result/Impact
Uganda	Energy access policy-making and planning	Ministry of Energy and Mineral Development, Rural Electrification Agency, parastatal entities, Electricity Regulatory Authority, National Planning Authority, donors	Existence of multiple conflicting energy access policies and plans, with unclear definition of policy ownership and policy-making responsibilities	Difficult adequate monitoring and evaluation of progress, Lack of information and security for the private sector and beneficiaries
	National budgeting and energy sector budget appropriation	Ministry of Finance Planning and Economic Development, Ministry of Energy, National Planning Authority	Non-transparent budgeting process with limited and varying level of stakeholder consultation and unclear decision-making power	Underfunding for electrification projects and poor prioritisation of rural electrification needs; Over-priced risk premiums and inadequate investment de-risking frameworks for mini-grids
	Provision of external assistance in policy-making and planning	Donors (GIZ, DFID, USAID, World Bank and others), Ministry of Energy	Low information sharing between donors in terms of their strategic priorities and specific engagements; Limited coordination and focus of electrification efforts	Lack of buy-in and support from national institutional stakeholders; Contradictory priorities, limited ability to bundle efforts
Zambia	Energy access policy-making and planning	Ministry of Energy, parastatal companies, Rural Electrification Agency	Lack of transparent policy-making roles, mandates and guidelines, mostly an informal process; public largely unaware of policy-making processes	Fragmentation of the strategic documents and implementation plans; Limited coherence of sector policies
	National budgeting and energy sector budget appropriation	Ministries of Energy (MoE) and Finance (MoF)	Limited exchange between Ministries during budgeting (especially challenging as MoF has limited knowledge about the energy sector); Discrepancy of formal budget allocation and de-facto payment received	Inconsistencies in final energy budget and non-alignment of investment in the on- vs. off-grid sectors; Budget at risk of being informed by a political agenda;
	Provision of external assistance in policy-making and planning	Foreign Donors; Ministry of Energy, parastatals	Lack of coordination and communication between foreign donors; National stakeholders feel partially disempowered in the agenda-setting of programs	Duplications of efforts; Limited national-level buy-in

documents in Uganda or Zambia quantifies the share between on- and off-grid solutions, discusses different sizes of and types of generation technologies, or assesses financing implications.

Uganda and Zambia have realised this bias and have started a process of integrating off-grid measures into their policy strategies. However, these efforts are incomplete (see Table 10), inconsistent between public sector stakeholders and many of their activities are not aligned as the semi-structured interviews indicate. A respondent representing the Rural Electrification Agency (REA) in Zambia for example stated with regard to the cooperation with the national utility ZESCO that “ZESCO usually cooperates at planning stage when they are asking for grid extension, but it is no straightforward process. We [REA] agree things with ZESCO but other things happen in reality as many departments at ZESCO are involved which makes it very difficult for us”. Uganda has started promoting off-grid electrification through the Draft National Energy Policy (Government of Uganda, 2019) and the Draft Off-grid Regulations (Electricity Regulatory Authority (ERA), 2019). The current RESP aims to build on holistic integration of both on-grid and off-grid technologies and financing to increase access in rural areas. The plan increases government participation by publicly financing grid extensions to lease to licensed operators, formally drawing concession zones (service territories) for auction. At the time of writing this paper, REA Uganda with support from GIZ and KfW was in advanced stages of tendering 40 mini-grid sites to private developers in rural areas and had lined up over 400 mini-grid sites (100 by KfW and 300 by GIZ) for auction.

Zambia has combined its recent shift towards combining off- and on-grid electrification strategies with incorporating external financing (donor grants and loans) as the main basis of rural electrification in its “Scaling-Up Renewable Energy Programme (SREP) Investment Plan” (Ministry of Energy and Water Development Zambia, 2018). However, neither the SREP nor any other policy document in Zambia provide an effective strategy for achieving Zambia’s targets. The SREP reiterates the electrification target of 51% for rural areas by 2030, but merely provides an overview of ongoing or planned various donor programmes with a financing volume of roughly USD 88 million. Table A1 in the appendix provides a rough estimation of requirements and costs to achieve 51% rural energy access in Uganda and Zambia until 2030. While no more than indicative, it suggests a finance need of over seven times the 88

million USD figure for Zambia.

Finally, semi-structured interviews with developers in Uganda consistently suggest inefficiencies in the implementation of policy strategies due to overly complicated regulations for small mini-grid projects, where only the process of obtaining a regulatory permit to build a small mini-grid has reportedly taken between 12 and 24 months. Challenges are compounded by conflicting donor interests. An interviewee from an international donor organisation pointed out for example that “if donors find no policy or strategy for electrification, they will experiment on you since they control the grants”. These practices do not only seem to exclude local decision-makers from being significantly involved and creating capacity in strategy energy governance processes, it also creates competitive disadvantages for local companies and prevents a sustainable development of a local energy market as the response of a private sector interviewee from Zambia illustrates: “local companies are obliterated from these [foreign donor] programs. They are all focused on, and designed for, foreign companies. It is very difficult for us to participate here.”

The semi-structured interviews point to significant implications of these various efficacy issues of target-setting and implementation strategy in terms of enabling electrification delivery on the ground. There is a widespread sense among project developers that critical resources are wasted in the quest of significantly increasing electricity access. The inconsistent targets identified through the QDA have created uncertainties among project developers with regards to the degree of commitment both Uganda and Zambia have to actually address rural energy access gaps. This is especially salient with respect to the unclear role off-grid energy will play in relation to grid-extension. Interview data imply that wide-ranging alignment within the energy sector and across affected Ministries is key to improve the efficacy of energy access governance.

5.5. Accountability

In Uganda and Zambia, energy access governance structures imply that the national public energy sector is mainly accountable for energy access outcomes. However, due to low independent reporting and monitoring structures in Zambia (section 5.1), non-transparent responsibilities in both countries (section 5.2), and the heavy involvement

Table 10
Examples of energy access implementation strategies - Results Uganda and Zambia.

Country	Document(s)	Strategic objective	Financing	Implementation Strategy
Uganda	REMP	Grid expansion	Public; No concrete budget as plan is still under development	No concrete targets, still under development
	Draft National Energy Policy and Off-grid Strategy	Off-grid electrification	Private Investment; No concrete budget, as policy is still under development	No concrete targets, still under development
	Electricity Connections Policy	Grid expansion and some off-grids (31%)	558 million of Government revenues, grants and loans from development partners	60% connection rate by 2027 = 6,300,000 connections (on grid and off-grid); 2% (130,000 connections through mini-grid connections; 31% of the connection target equivalent to = 2,000,000 connections through off-grid standalone solar systems; 67% = 4,200,000 connections through on the grid expansion (Government of Uganda, 2017); Derived from the SE4ALL Action Agenda
	RESP II (2013–2022)	Largely grid based No specifics for mini-grids, but plan outlines objectives to utilise mini-grid technologies utilising a zonal concession model	USD 951.6 million for RESP II, of which USD 55.4 million is for off-grids; Financing from the Treasury, Donor financing and concessional grants/loans.	Objective of accelerating electricity access to 26% by 2022, 51% by 2030, and 100% by 2040 - 40 mini-grid sites being tendered - 400 sites lined up for tendering
Zambia	Rural Electrification Masterplan (REMPZ)	On-Grid extension; mini-hydro; SHS	35% of household electrification rate (50% in urban area and 15% in rural area) by 2010; electrification target until 2030: 66.0% countrywide, 50.6% access for rural areas	Electrification of 1217 rural growth centres which are clustered into 180 project packages mainly through grid extension and estimates an annual financing requirement: USD 50 million a year between 2008 and 2030 = total of USD 1103 million; 241 RGCs are identified as Solar Home System Market. 7)
	“Scaling-Up Renewable Energy Programme (SREP) Investment Plan”	Universal access until 2030; Integration of various programmes on- and off-grid sector	USD 170.5 million for electricity access in rural and peri-urban Areas during an unspecified timeframe of which USD 0,8 million are to be provided by the Government of Zambia (GRZ) while the remaining USD169,5 million estimated to be sourced from external funders; this sum also contains an estimated loan from the World Bank ESAP program for which only USD 36,8 million are currently under concrete review by the World Bank (The World Bank, 2017); Development of a financing strategy for US\$120 million of investment in mini-grids and US\$280 million in standalone systems	Increase number of connections from 67,000 to 333,000 per year (on- vs off-grid ratio unspecified)

of external donors in both policy strategy definition and implementation (section 5.3), attributing outcomes to specific actors is challenging for the public.

The QDA shows that for Uganda, the Rural Electrification Agency is accountable for rural electrification as a supervisory agency. This agency also manages the Rural Electrification Fund and all public resources provided by both the Ministry of Energy and Ministry of Finance for implementation of rural electrification (Government of Uganda, 1999). Accountability in Uganda’s energy access sector is critically enabled by the Electricity Regulatory Authority for monitoring and evaluation of electrification programmes executed by licensees. At times notably critically, ERA reports on the performance of government, the public, private sector and media. The closed survey results, however, reveal a considerable level of duplication among energy sector institutions in terms of decision-making power, exacerbating the attribution of rural electrification actions to a specific entity. The analysis for Zambia indicates that while the Ministry of Energy and the Rural Electrification Agency are accountable for energy access decisions, inadequate financial resources to perform monitoring and evaluation, as well as ambiguously defined mandates, make it more difficult to identify the exact actors who are accountable for the country’s energy access governance.

According to interview data, this is further exacerbated by the significant involvement of different external donors during key steps of drafting energy access policies and implementation programmes which provides an avenue for the national public sector to feel lower levels of accountability. As a foreign donor for Zambia observed “*the problem is*

that nobody has an overview of what’s going on or who is doing what. Donors are just adding each other up and create risks for other programmes. Nobody looks at capacity building at REA, ERB or the Ministry [of Energy] and it is frustrating to see always new programmes that ignore existing structures. The problem is the government can’t say ‘No’.”

Challenges to identify entities accountable for electrification outcomes reduce the pressure on public servants to deliver on their tasks. Furthermore, as one private sector company indicated, limited accountability makes it difficult to intervene where electrification programmes or single systems have not been working well. One example mentioned concerned the imperfect utilisation of a mini-grid which produced an operational deficit and caused frustrations among consumers in Zambia.

5.6. Responsiveness

Both Uganda and Zambia have identified increasing electrification in rural areas as a policy objective and responded by putting in place a range of sector-specific development plans and instruments. However, the analyses reveal a limited institutional ability to quickly respond to consumer needs due to the prevalence of generic implementation approaches, weak vertical and horizontal links between central policy-makers and local-level stakeholders, as well as salient finance and staff shortages.

The QDA suggests that Uganda has prioritised rural electrification goals through committing to universal access to energy by 2040. At a national level, a ‘top-down’ policy and planning approach has been

designed through the formulation of a ‘National Development Plan’ code-named Vision 2040 that prioritises energy as a driver of socio-economic transformation. Vision 2040 is cascaded through policies and implementation plans that capture rural electrification and community needs via the Rural Electrification Master Plans and Rural Electrification Strategy and Plan (RESP, 2013–2022). However, semi-structured interviews with several local-level politicians suggest that the complexity of communal energy needs is not reflected in these plans. Indeed, both local-level public servants and central politicians in the government stated in interviews that there are no strong, institutionalised links between central and district-level governments which could function to quickly implement policies and feedback learning lessons from communities. One local council chairman in Uganda wondered, “*why doesn’t the Ministry of Energy set up decentralised electrification structures for district energy engineers to conduct community needs planning for the centre?*”.

A salient example of a consequence of this low level of interactions between central and decentral stakeholders is the government’s focus on on-grid electrification, whereas local decision-makers are advocating for the use of low-tier and quick-to-deploy off-grid energy as an important first step to meet basic needs.

It is important to note that the number of nodal points between local and central government bodies is furthermore constrained by low staff numbers in Uganda. None of Uganda’s 112 districts has a designated energy officer, instead of relying on one technocrat per district to handle a variety of central government interactions and policies.

In Zambia, the QDA suggests a disconnection between ambitious rural electrification targets and the implementation strategy. Public investment plans, either based on government spending or foreign donor support, are insufficient to achieve the published rural electrification targets (The Government of Zambia, 2019). Table 11 evaluates Ministerial statements by the Ministry of Energy presented in the National Assembly of Zambia and indicates the limited actual political significance of off-grid electrification: Out of 21 Ministerial Statements given between 2011 and 2019, only one included a reference to rural electrification (The National Assembly of Zambia, 2019).

District-level politicians in Uganda and the chiefs in Zambia are the most direct link between rural beneficiaries of energy access and central policy-makers. In Zambia, the Chiefs are an important local authority for rural communities and “*nothing happens in Zambia on local level without the Chiefs*” as a senior Chief from Zambia responded.

The limited formalised interactions between central and this local leadership however (see stakeholder map in Figs. 1 and 2, see also section 5.3) limit the sector’s ability to be responsive to local energy needs and implement energy projects efficiently. A Zambian Chief noted with this regard: “*Most projects are centralised and come from the central government. A lot of costs are added, and the true costs of the project explode. If people on local level were more involved in the project planning, they would be less costly*”. The interview responses point to significant interest from

the local authorities to be involved in energy planning and project implementation initiatives as a Zambian Chief pointed out: “*Of course we want to be involved [in strategic energy planning]. We are consulted on early marriages but not on energy. Why?*”

6. Discussion

6.1. A model of reciprocal interdependencies between good energy governance indicators

Our encompassing methodological approach to evaluating energy governance reveals the underlying interdependencies of governance characteristics, operationalised via our set of six governance indicators. Synthesising our results allows to induce a conceptual model that suggests the types and strengths of each potential interdependence (Table 12, see also Table A2 in the appendix for the underlying rationale of each of Table 12’s interdependence assessments).

Our evidence suggests that rule of law and transparency are both necessary, albeit not sufficient conditions, for accountability as transparent processes and unambiguous laws and regulations are required for holding responsible actors accountable. A basic level of rule of law, manifested in the existence and application of coherent policy and regulatory frameworks, furthermore strongly enhances transparency, inclusiveness, efficacy and responsiveness of governance. Transparency is a necessary condition for inclusiveness as no meaningful inclusion of different private sector and community stakeholders would be possible if decision-making processes were not comprehensible. It also fosters efficacy by enabling actors to understand and focus on their specific roles and responsibilities, and responsiveness due to a clear and open communication of strategic and operative priority areas. Our evidence suggests the importance of rule of law and transparency as a basis of good energy access governance.

Our results furthermore suggest that both inclusiveness and efficacy of governance are a sine-qua-non for energy access governance to be responsive to needs on the grounds: Needs can be highly localised and are unlikely to be captured and met swiftly if decentral stakeholders are not involved in planning or decision making, and if governance processes are not efficacious. Notably, inclusiveness is strongly linked to efficacy of governance, albeit with an unclear direction: On the one hand, it facilitates rapid implementation through local ownership, but complicates efficient policy making through the requirement of additional feedback loops and alignment processes. It furthermore facilitates accountability by allowing effective monitoring and controlling on all levels.

Accountability aids rule of law and responsiveness by acting as an incentive for policy makers to improve the rule of law in order to limit chances of having to be held accountable for energy access failures. Responsiveness is a highly desirable governance attribute from an end-user perspective. In the context of energy access, it appears to require

Table 11

Evaluation of Ministerial Statements (Ministry of Energy, Zambia) to the National Assembly of Zambia (2011)–2019 and references to rural electrification.

Year/Session No./Assembly	No. of Ministerial Statements (MoE)	Mentioning off-grid electrification, or energy access in rural areas
09/2018–03/2019	1	0
September 2017–August 2018 2nd/12th	2	0
09/16–09/17 21st/12th	4	0 (mainly supply/capacity)
09/15–09/16 5th/11 ^{th a}	6 ^a	1 but grid extension of specific constituencies but no specific access data or national electrification or energy access mentioned
09/14–07/2015 (4th/11th)	2	0
09/13–07/14 (3rd/11th)	2	0
09/12–07/13 (2nd/22nd)	2	0
09/11–07/12 (1st/11th)	2	0
Total	21	1

^a During the session, the Ministry of Energy also covered responsibility for the water sector. The table only reflects on Ministerial Statements with a clear focus on the energy sector.

Table 12

A model of reciprocal interdependencies of good governance indicators induced from empirical case evidence (see Table A2 and section 5 for underlying rationale).

Independent variable	Dependent variable					
	Rule of Law	Transparency	Inclusiveness	Efficacy	Accountability	Responsiveness
Rule of Law	x	Directly enhanced	Directly enhanced	Required	Required	Directly enhanced
Transparency	Indirectly enhanced	x	Required	Directly enhanced	Required	Directly enhanced
Inclusiveness	Indirectly enhanced	Indirectly enhanced	x	Directly influenced	Directly enhanced	Required
Efficacy	Indirectly enhanced	(no evidence of link)	Indirectly enhanced	x	Indirectly enhanced	Required
Accountability	Directly enhanced	Indirectly enhanced	(no evidence of link)	Indirectly enhanced	x	Directly enhanced
Responsiveness	(no evidence of link)	(no evidence of link)	Indirectly enhanced	Directly enhanced	Indirectly enhanced	x

inclusiveness and efficacy, while benefitting from rule of law, transparency and accountability. Responsiveness in turn can further enhance efficacy by institutionalising the capture of local needs and swiftly funnelling them into the public energy access discourse.

These results show that multiple direct and indirect feedback and mutually reinforcing loops exist, implying that designing good governance is a complex endeavour which requires to address several aspects at the same time. However, they also suggest the existence of a sequential pattern for implementing good energy governance when focusing on necessary conditions specifically: A basic level of rule of law and transparency of governance appear to be required for inclusiveness, efficacy and accountability, with the former two in turn being prerequisites for energy access governance being responsive. While this sequential pattern of necessary conditions for good governance is noteworthy, it is critical to mention that none of these conditions are sufficient. Our empirical evidence strongly suggests that agency, apparent in the definition of roles and responsibilities and the actors involved, plays a fundamental role in determining whether the structural conditions translate into de-facto good governance.

6.2. Specific implications for Uganda and Zambia

The systematic analysis of policy documents, stakeholder interviews and surveys relating to energy access governance in Uganda and Zambia in this paper reveals the complexity of energy access governance. In order to derive implications for Uganda and Zambia, this section discusses policy implications along the four core building blocks of the GAF, namely regulatory norms, actors, nodal points and processes (see section 3) informed by the analytical results in section 5.

Firstly, the results reveal that the type, credibility and level of consistency of regulatory norms impact energy access efforts (see also Ahlborg and Hammar, 2014; Haanyika, 2013; Mahama, 2012). Ensuring the completeness of the energy access regulatory framework strengthens governance in terms of the rule of law and efficacy. While regulations of off-grid systems are comparably comprehensive regarding the primary off-grid solutions per se, uncertainties have arisen in several areas concerning their enabling environment (e.g. grid encroachment, land rights and import regulations). Regulatory norms are thus likely to benefit from a shift towards a more encompassing view of energy access. In the cases of grid encroachment, securing land rights and import regulations, such a shift would require closer linkages within the Energy Ministry (i.e. between the Rural Electrification Agency and other departments) as well as between different Ministries. Furthermore, regulatory norms need to be carefully assessed in terms of the degrees of freedom they grant to implementing bodies. In Uganda, there is considerable tension between the government's focus on private sector investment and its regulatory imperative for highly detailed regulations which has led to threat for private sector investment due to complicated and time-consuming licensing and permission processes. In Zambia, private- and donor-driven electrification initiatives such as the 'Beyond the Grid Fund Zambia' (BGFZ) have been effective in increasing energy access in some regions, but since some areas are less attractive for the

private sector to reach than others (Boamah, 2020; Trotter and Abdulah, 2018), inequalities may arise which are at odds with the country's overarching approach to equitable development.

Secondly, the results suggest that actor-centric shortcomings such as unclear definitions of roles and responsibilities, as well as discrepancies between their authority, interest and actual involvement in energy access decision-making have had adverse consequences for governance transparency, inclusiveness and accountability. To overcome these issues, key roles in energy access governance need to be defined transparently, and assigned unambiguously for process ownership, decision-making, producing policy outputs, regulatory design, local-level representation, and finance management. The noteworthy case of Uganda's regulator ERA suggests the merits of an independent actor to monitor and evaluate governance processes.

Thirdly, the results imply that poorly and adequately designed nodal points, i.e. which actors interact with each other how frequently, has significantly broad adverse consequences for energy access governance in Uganda and Zambia: Appropriate nodal point design is a prerequisite for ensuring transparency, inclusiveness, efficacy and, critically, responsiveness of energy access governance. This paper finds a salient shortage of touchpoints in Uganda's and Zambia's off-grid energy access governance systems which negatively affects information flow, both horizontally (between different Ministries) and vertically (between international, national and local stakeholders). Information asymmetries have arisen as a consequence, which have manifested themselves in the publication of multiple energy policy guidelines, setting contradictory targets and a limited ability to respond to communal needs. These are likely to be especially problematic where there is a salient institutional gap between central government and rural constituencies geopolitically far removed from the governmental power (Herbst, 2014). Still, there is a notable lack of awareness of the importance of integrative governance approaches in Uganda's and Zambia's off-grid sector, an issue which calls for the necessity to raise awareness and underline the merits of inclusive policy-making. Such integrative approaches have been argued to have the potential to decrease some of the disparities salient in Uganda and Zambia (Carlisle and Gruby, 2017; Goldthau, 2014; Sovacool, 2014), and are likely to be particularly important given the multitude of energy access stakeholders. Associated instruments include a stronger institutionalisation of cross-sectoral governance (Bugaje, 2006; Oliver and Hussey, 2015), donor coordination (Lawson, 2013) and formalised community engagement (Poncian, 2019). With respect to the latter, critically, the Ugandan and Zambian cases suggest that the institutional vehicles for local representation can vary: In Uganda, the government has a comparably tight grip on most local areas through its hierarchical system of local councils (LCs), while in Zambia, government would have to rely on the non-governmental House of Chiefs organisation.

Fourthly, adequate process design is important to ensure the efficacy and responsiveness of energy access governance. Where no clear process for electrification target setting exists, both government and private sector resources are likely to be used inefficiently and ineffectively. Moreover, where obtaining a license to generate electricity in a small-

scale mini-grid takes up to 18 months alone such as in Uganda, the response to urgent communal needs is markedly hampered, implying the benefits of streamlining target setting and licensing processes, and openly communicating associated process requirements for the private sector and communities.

7. Conclusion and policy implications

The scale of the energy access problem in sub-Saharan Africa combined with the multitude of actors and interests involved warrants an in-depth understanding of energy access governance. This paper has suggested a holistic approach to operationalise Hufty's Governance Analytical Framework (Hufty, 2011) based on three different data collection methods, namely policy documents, semi-structured interviews and closed stakeholder surveys, to rigorously evaluate the quality of energy access governance. Analysing these types of empirical data for the case of off-grid energy governance in Uganda and Zambia, this paper evaluates the quality of governance along a broad set of indicators to yield a richer understanding of potential governance intervention and their impact. This approach yields two key types of implications, namely (1) an inductively derived way forward for good energy access governance, and (2) specific governance design insights for Uganda and Zambia.

Firstly, our paper suggests a governance model that illustrates the interdependencies of governance indicators. While a multitude of feedback loops exist, we find an emerging pattern of how good governance can be designed, namely by building on rule of law and transparency as necessary conditions. This enables greater inclusiveness and efficacy, which both in turn being requirements for governance responsiveness. It is critical to mention, however, that designing 'good' governance is not an automatism – the mechanisms uncovered here are necessary but not sufficient. Even if energy access regulations, specific roles and decision-making processes themselves are well and transparently designed, they are unlikely to be able to remedy governance issues such as a lack of inclusiveness, efficacy and responsiveness to people's needs without designing regular and meaningful interactions of centralised energy governance institutions with other Ministries such as those for finance, water and agriculture, as well as with international donors and local community leaders and implementing organisations.

Secondly, our analyses yield a number of specific practical policy implications to enhance energy governance in Uganda and Zambia:

1. The existing gaps between planning targets and implementation strategies should be acknowledged within the Ministries of Energy and their affiliated agencies and addressed via developing an integrated energy strategy. Important examples concern the expansion of regulatory norms beyond technical solutions, a stronger focus on

- efficient regulations to allow for quick responses to electrification needs, and closer integrating off- and on-grid electrification planning and implementation via close cooperation between the utilities, the regulator, rural electrification agencies and the Ministries of Energy
2. Actor roles and responsibilities should be clearly and transparently defined to avoid duplication of energy access policies and plans which undermine a coordinated and bundled effort to rapidly increase energy access. Streamlining and standardising strategic electrification target setting and sector planning, tactical licensing and monitoring, as well as operational stakeholder consultation processes in Uganda and Zambia would help to improve governance efficacy and inclusiveness.
3. A stronger inclusion of local stakeholders such as District-Level representatives in Uganda and the Chiefs in Zambia could enhance identifying and capturing local needs as well as aid efficient implementation of electrification interventions. Our research has shown that there is a great interest of local level representatives to being strategically included (Haney et al., 2019).

CRedit authorship contribution statement

Susann Stritzke: Conceptualization, Methodology, Supervision, Investigation, Verification, Data curation, Visualization, Tables & Stakeholder-map, Writing - original draft, Writing - review & editing, Project administration, Funding acquisition. **Philipp A. Trotter:** Writing - review & editing, Methodology, Writing - original draft, Visualization, Tables, Investigation, Support Verification, Data curation, Project administration, Funding acquisition. **Peter Twesigye:** Investigation, Data curation, Writing - original draft, Project administration, Writing - review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Table A1

Estimating costs for rural electrification targets until 2030 for Uganda and Zambia.

Energy planning scenarios 2020–2030	Uganda	Zambia
Total population 2018 in million ¹	4272	1735
Rural population 2018 in million ¹	3257	980
Energy access rate in rural areas (2019) estimated ²	19%	4%
Number of people without access in rural areas in million 2019	2638	941
Number of people with energy access in rural areas in million	6.19	0.39
Annual Rural Population Growth (2018) ¹	297%	195%
Energy access target 2030 for rural areas ³	51%	51%
Total rural population 2030 in million (estimated) ⁴	4627	1236
Number of people in rural areas with energy access if target achieved in million.	2360	630
Additional no of people to be electrified until 2030 in million	1741	591

(continued on next page)

Table A1 (continued)

Energy planning scenarios 2020–2030	Uganda	Zambia
Total number of additional required connections until 2030 in million (on- or off-grid) based on an average household size of 5 people ⁵	348	118
Number of new connections annually required to reach 2030 target (on- and off-grid) (2020–2030)	316,581	107,273
Additional capacity required for 70% of new connections implemented through SHS with average connection size of 25 W in MW	6094	188
Additional capacity required for 20% of new connections implemented through MGs with average connection size of 500 W in MW	34,824	11,816
Additional capacity required for 10% of new connections implemented through on-grid extension with average connection size of 3,2 kW in MW	111,436	3433
Total additional installed capacity requirement under inclusion of the diversity factor of 0,3 = requirement of additional production capacity for on-grid connections	33,431	3,218,190
Total additional installed capacity requirement (on- and off-grid in MW)	74,349	3,230,194
Cost SHS connection (250 USD per connection); 70% of all connections	60,942	20,678
Cost of MG connections (USD 1200 per connection) ⁶	83,577	28,358
Cost of grid connection (USD 1200 per connection) ⁶	41,789	14,179
Total investment required in million USD	186,308	63,216
Total annual investment requirement in Mio USD 2020–2030	16,937	5747

1("The Worldbank," n.d.).

2(USAID, 2019).

3Based on QDA findings.

4Does not consider migration movements rural > urban.

5(Ministry of Finance and National Planning Zambia, 2011).

6(Herscowitz, 2017).

Table A2

Rationale for good governance indicator interdependencies (relates to Table 12).

Independent variable	Dependent variable					
	Rule of Law	Transparency	Inclusiveness	Efficacy	Accountability	Responsiveness
Rule of Law	x	Specific regulations can enhance transparency (e.g. through reporting/Information sharing requirements)	Binding legal requirements of multi-level stakeholder participation and consultation enhances inclusiveness	Incomplete or inconsistent regulations imply significant processual voids which greatly exacerbate efficacious governance through unclear processes and duplication	Rule of law is required to assign accountability to responsible agents, and to include processes to hold them accountable legally	Regulations set a common and binding frame how to respond to different region-specific needs
Transparency	Ensures stakeholders understand on-going policy strategy and/or regulatory shifts, refinements or additions and can plan accordingly	x	Making energy access governance transparent is a requirement for meaningful inclusion of different private sector and community stakeholders	Enables all responsible actors to understand their roles and responsibilities according to a common, shared plan to improve efficiency	Transparent structures and processes (e.g. through information sharing/clear roles and mandates) are required for the public to hold actors accountable	Limited transparency of roles and responsibilities for energy access planning and implementation, as well as of current regulations exacerbate responsiveness
Inclusiveness	Is likely to increase the meaningfulness of rules and regulations by ensuring a sense of decentralised ownership of these regulations	Implementing multilevel stakeholder inclusion with continuous provision of feedback and controlling can create a push for more transparency	x	Facilitates implementation through local ownership, but complicates efficient policy making through the requirement of additional feedback loops and alignment processes	Increases the number of actors involved which enhances effective multilevel monitoring and controlling to improve accountability	Including relevant stakeholders is required to understanding and integrating local needs into policy-making in order to respond to them
Efficacy	Effective and efficient target setting and planning contribute to consistent regulatory frameworks	(no evidence of link)	Efficacious governance structures and processes eases the inclusion of different stakeholders	x	Efficient structures and processes make monitoring and evaluation more straight-forward which helps to hold actors accountable	Being able to quickly respond to local needs requires efficient and effective governance processes
Accountability	Accountability is a critical mechanism and incentive for policy-makers to maintain/improve the rule of law	Indirectly promotes transparency through transparency/disclosure requirements (e.g. committee hearings)	(no evidence of link)	High levels of accountability enhance governance efficacy as it can serve as a mechanism for designing clear roles and responsibilities	x	Stakeholders being held accountable are likely to design policies based on the demands of the recipients (in order to be re-elected etc.)
Responsiveness	(no evidence of link)	(no evidence of link)	In the realm of energy access, high levels of responsiveness involve close decentral links to react to changing needs on the ground, with the necessity for these links	For energy governance to be effective, it needs to be designed to quickly respond to local requirements and demands	Quick reaction to pressing needs can make the identification of those responsible for inaction easier compared to when	x

(continued on next page)

Table A2 (continued)

Independent variable	Dependent variable					
	Rule of Law	Transparency	Inclusiveness	Efficacy	Accountability	Responsiveness
			creating opportunities for inclusiveness		reaction processes are greatly delayed	

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