

Lessons for Decentralised Energy Planning in Zambia

AUTHORS: Mashekwa Maboshe ^{1*}, Beatrice Stockport ², Malunga Syacumpi³, Oliver Kaonga ⁴, Stephanie Hirmer ⁵

Key Messages

- Mandate the decentralisation of selected roles and responsibilities for energy planning and provision from the Ministry of Energy to local authorities, accompanied by training, funding and political support.
- Establish the role of District Energy Coordinator within local authorities, who would be responsible for overseeing energy planning within a district.
- Use community extension officers to raise awareness of the benefits of electrification, engage communities in energy projects and mobilise resources.
- Standardise district energy plans by sharing a decentralised energy planning framework,



PHOTO: ISTOCKPHOTO

- encouraging transparent data sharing and facilitating district-to-district learning.
- Develop an overarching goal for decentralised energy service provision within each district, in consultation with energy sector stakeholders, traditional leaders and marginalised groups.

Summary

Access to clean and affordable energy is key to raising living standards by facilitating basic services, including healthcare, education, water and sanitation; economic development; building social resilience; and adapting infrastructure, businesses and households to climate change [1]. However, despite the importance of having access to energy, 52.2% of individuals in Zambia do not have access to electricity, with only 87.0% of urban and 14.5% of rural populations having access [2].

To accelerate access to energy, the Government of the Republic of Zambia has set an ambitious target of 100% electrification by 2030, as announced in the *Integrated Resource Plan (2023)* [3]. To connect rural and dispersed households far from the electricity grid, decentralised (ie off-grid) energy systems will be needed. These systems must be

planned with consideration of the district's renewable (eg solar, wind, hydro, biomass) potential, transport infrastructure, land availability and community needs. Additionally, given the Government's mandate to decentralise energy planning from central government to local authorities, the steps to undertake this planning successfully must be identified, formalised and socialised [4].

Drawing on reviews of case study countries (Kenya, Malawi, Tanzania and India) and other sectors (eg the health sector) that conduct decentralised planning, as well as a workshop with 19 energy and decentralisation experts, including government ministries, the Rural Electrification Authority (REA), the state power utility (ZESCO) and local councils, this brief provides key lessons for decentralised energy planning in Zambia.

Introduction

Like many countries in sub-Saharan Africa, Zambia has a low access rate to clean energy, and electrification is heavily skewed towards urban areas [5]. In 2022, the national electrification rate was 47.8%, with 87.0% and 14.5% of the urban and rural population having access to electricity, respectively [2].

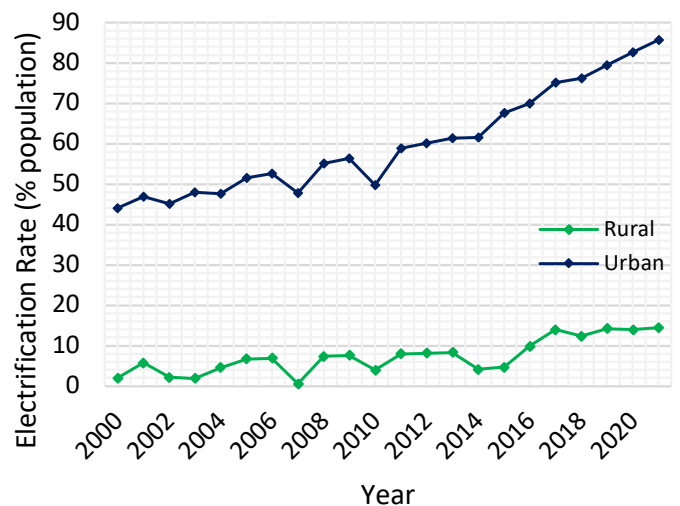
To accelerate access to clean energy across Zambia the Government of the Republic of Zambia (GRZ) has implemented various initiatives, including:

- Creating the Rural Electrification Authority (REA) to promote and oversee rural electrification projects (2003).
- Developing a *Rural Electrification Master Plan* (REMP) (2008), which is currently being updated [6].
- Developing an *Integrated Resource Plan* for the power sector (2023) [3].
- Setting the objective of 100% electrification by 2030 (2023) [3].

However, despite the urban electrification rate steadily increasing, progress in rural electrification has significantly slowed since 2017, as shown in **Figure 1**. This can be attributed to high costs, limited funding and the technical challenge of extending the electricity grid to rural and dispersed households [7]. Given the need to increase electricity access, decentralised energy planning – that is, energy planning at the regional, district or sub-district level, instead of at the national-level – can be used to better identify the most practical and viable solution for electrifying an area, whether that be via grid extension, grid densification, mini-grids or solar home systems [8].

Decentralised energy planning is already on the cards in Zambia, given that energy services have been earmarked for decentralisation in 2024 [9]. This mandate is part of the ongoing movement towards decentralisation since the 1960s.

Figure 1: Electrification Rate in Zambia [2].



Decentralisation is often divided into three interrelated dimensions: political, administrative and fiscal [10]. Political decentralisation aims to devolve decision-making away from central government to strengthen democratisation and increase citizen participation. On the other hand, administrative decentralisation transfers tasks and functions, without full decision-making power, while fiscal decentralisation delegates taxing, funding and spending responsibilities to local authorities. Decentralisation of energy services is beneficial because it enables services to be tailored to local needs, as a result of having more information on local demands and conditions. However, to ensure that each local authority is equally prepared for decentralised energy planning, it is important to draw lessons and recommendations from other countries and sectors to identify best practices and lessons learnt.

This policy brief therefore aims to present international and domestic best practices on decentralised energy planning. Drawn from country and sector case studies, workshops and stakeholder interviews, the findings in this policy brief could be used to inform the Government's *Energy Sector Devolution Plan* and help local authorities prepare for decentralised energy planning.

Methodology

This policy brief draws on two main sources of information. Firstly, selected country and sector case studies were reviewed to identify relevant lessons and recommendations for decentralised energy planning in Zambia. Kenya, Malawi, Tanzania and India were used as country case studies because they all carry out decentralised energy planning in some capacity. Zambia's health sector was also considered, having successfully decentralised operations to local government.

Secondly, the lessons drawn from the review were presented and discussed at a Climate Compatible Growth Decentralised Energy Planning workshop on 25 October 2023. The workshop drew 19 participants from local councils, central government, the Rural Electrification Authority (REA), leading research think tanks and former parliamentarians. The main aim of the workshop was to discuss and verify the applicability and validity of each lesson presented, a summary of which is presented in the next section.

Findings

Key Lessons on Energy Planning

1. Employing dedicated district energy coordinators can help to kickstart district-level energy planning.

A key lesson learnt from Malawi is that having dedicated energy officers in each district can accelerate clean energy access in rural areas. In 2017, the role of a district energy officer (DEO) was piloted by social enterprise Community Energy Malawi (CEM) in Balaka and Dedza districts with support from the University of Strathclyde [8]. The responsibilities of the DEOs included:

- **Information exchange:** baseline assessments of the district, disseminate government policies, collaborate with other sectors, source credible data.
- **Facilitating energy projects:** identify and scope community-led energy projects.
- **Review:** conduct socioeconomic impact assessments.

Impact assessments suggest that DEOs were successful in supporting local energy planning and deployment, by providing renewable energy training and ongoing support to 20 local technicians, 170 local government extension workers and 280 employees of local non-

governmental organisations (NGOs), as well as installing two solar PV microgrids [11].

Workshop participants strongly recommended introducing **district energy coordinators** to lead district-level energy planning in Zambia. This is equivalent to the appointment of community health workers across Zambia – an incredibly successful initiative [12]. In light of the recent economic challenges Zambia has faced, as an interim measure, one participant suggested training an existing local authority worker – such as those involved in engineering, water or district planning – in energy planning [13]. However, this worker must have time and be remunerated for the additional responsibility.

2. Grass roots mobilisation is crucial for successful decentralised energy planning.

Community-based support structures can help to increase awareness of the benefits of electrification, as well as secure buy-in and mobilise resources for community energy projects. For example, as part of the pilot project in Malawi, frontline energy extension officers were employed to directly communicate with community members on energy matters. These workers raised awareness on the role of clean energy, highlighting the

connection between clean and reliable energy and development in sectors such as agriculture, health, education, water, forestry, community development and entrepreneurship [8]. The extension officers in Malawi engaged 318 groups on renewable energy issues, and supported 132 community groups to adopt some form of renewable energy [14].

Reflecting on the feasibility of deploying frontline extension officers in Zambia, workshop participants suggested using the existing ward development committees (WDC) to fulfil such a function. It is important, however, that WDC members are adequately trained and instructed by the district energy coordinators to engage communities on energy matters.

3. Constitutionally mandating decentralisation of the energy sector is necessary but not enough.

Constitutionally mandating the decentralisation of the energy sector from central to local government is necessary to instigate decentralised energy planning. However, it is insufficient as the only motivator. Looking at Kenya, for example, following the Constitution of Kenya 2010 and the Energy Act 2019 requiring counties in Kenya to produce county energy plans (CEPs), few have been produced to date [15]. Indeed, while mandating the decentralisation of the energy sector is a necessary first step, the Kenyan experience suggests that other barriers must also be addressed, such as the lack of technical capability and human and financial resources within counties [16].

In Zambia, despite decentralisation of the energy sector being mandated in the constitution, there is a lack of technical and financial capacity within local government for implementation, and it is unclear who is responsible for local-level energy planning and provision. The confusion arises from the fact that Annex A of the

Zambian Constitution states that energy and hydroelectricity are a national (or State) exclusive function while Annex C lists electricity as the exclusive function of local authorities [9].

Accordingly, workshop participants highlighted that decentralisation of the energy sector would not be effective in Zambia, unless it was accompanied by technical expertise, financial resources and political will, as well as clearly assigned roles and responsibilities for energy planning. The Ministry of Energy, Ministry of Local Government and Rural Development, and Ministry of Finance must all be involved to determine the conditions and functions of decentralisation.

4. There is a need for standardisation and coordination to streamline the decentralised energy planning process across local authorities.

Decentralised energy planning frameworks, which set a standard methodology and format for district energy plans, must be implemented before planning starts. In Kenya, various donor agencies and NGOs have supported different counties in developing their CEPs. This has led to CEPs which differ in scope, implementation timeframe, methodologies and format [16]. For example, the Catholic Agency for Overseas Development (CAFOD) and the International Institute for Environment and Development (IIED) used the Energy Delivery Model for developing CEPs, while the World Resources Institute (WRI) have used a GIS-based approach [15]. Uncoordinated planning can prevent subnational energy

“The Ministry of Energy, Ministry of Local Government and Rural Development, and Ministry of Finance must all be involved to determine the conditions and functions of decentralisation”

Workshop on Decentralised Energy Planning in Lusaka, Zambia



plans from effectively feeding into national energy planning, as a result of their different methodologies and formats. This makes it hard for national stakeholders to take account of district or subnational energy needs.

Workshop participants acknowledged the risks of uncoordinated donor-funded energy planning. However, they pointed out that Zambia's health sector has experience in successful coordination. In the health sector, *integrated common basket funding* is used to streamline financial and administrative procedures [17]. This involves:

- The Ministry of Finance pooling donor contributions and making regular disbursements to the Ministry of Health or provincial health officers.
- The recipients of funding making financial and progress reports.
- Donors regularly visiting the Ministry of Health.

For the energy sector, there is the *Off-Grid Energy Task Force*, which maps out areas of donor operation and planned projects to avoid duplication and conflict. However, the Task Force currently only involves national stakeholders. To support decentralisation of the energy sector, district energy coordinators should also be included in the Task Force. This will help to coordinate district-level energy planning activities, and facilitate district-to-district learning by sharing best practices and lessons learned. Additionally, workshop participants noted that not all programmes and activities from the private sector are monitored and reported. This information could be stored and publicised in a government-owned data repository.

5. There is need to integrate gender equality and social inclusion (GESI) into energy planning.

While GESI is being mainstreamed into national energy planning frameworks – for example, the 2022 Gender Equality Strategy and Action Plan

(GESAP) – traditional leaders and marginalised groups are often excluded from energy planning, resulting in a lack of buy-in for electrification projects [3]. For example, in rural Tanzania, a study of 600 households revealed that due to a lack of gender-focused consultations, solar companies routinely place light bulbs only in living rooms, neglecting kitchen areas where they are equally necessary [18]. Workshop participants attributed overlooking marginalised groups in Zambia to inadequate funding and the lack of effective GESI implementation strategies across the energy sector.

Decentralised energy planning allows for GESI to be integrated into energy plans. Given the bottom-up nature of decentralised energy planning, it can reflect the energy services prioritised by communities, as well as account for the different uses of electricity by different vulnerable groups, for example, women, youth, the elderly, refugees and people living with disabilities.

Workshop participants suggested using existing grass roots structures, such as WDCs, to raise awareness among community members. Additionally, to promote inclusivity, focus group meetings should be held with different marginalised groups, such as youths and women, to ensure all needs are met in the energy planning process.

6. There is a need for sustainable and effective maintenance plans for energy infrastructure in district energy plans.

Renewable energy projects frequently fail a few years after installation due to a lack of proper maintenance. In India, for example, 61 households in Barapita village of Odisha were given solar panels, LED lamps and a central solar system to power streetlamps and the community centre [19]. Although the project was initially a success, within a few years, technical issues and maintenance problems led to a decline in solar use [19].

Zambian renewable energy projects have also faced

“Given the bottom-up nature of decentralised energy planning, it can reflect the energy services prioritised by communities, as well as account for the different uses of electricity by different vulnerable groups”

maintenance challenges. In 2017, the Government purchased and installed over 100 solar milling plants in selected off-grid areas in Zambia. However, by 2021, most of the solar milling plants had stopped working due to faulty batteries and solar panels.

Workshop participants suggested that each energy project that is planned within the district energy plan must be accompanied by an effective service and maintenance plan. Training of local technicians in basic repair and maintenance of renewable energy technologies was also suggested.

7. Decentralised energy planning must consider the affordability of energy for the end-user to ensure that energy projects are financially sustainable.

Limited financial resources, high electricity costs and low appliance ownership are all barriers to electricity use, which, in turn, can affect the financial sustainability of energy projects [20]. In a study of the sustainability of major solar mini-grids in Zambia, none of the five notable solar mini-grid projects (Chibwika, Chitandika, Kaamanda, Magodi and Sinda) were found to be financially sustainable [21]. A tariff structure between USD 0.40/kWh to USD 0.57/kWh would make the mini-grids financially sustainable but this is significantly above that of the national utility, ZESCO – USD 0.017/kWh residential tariff (2024) – making the projects unaffordable [21]. However, below market tariff rates discourage potential investors from embarking on off-grid renewable energy projects in Zambia. District energy plans must therefore balance the affordability of energy

Recommendations

Effective preparation for the decentralisation of the energy sector requires sound policy design and implementation. Based on the review of country and sector case studies and expert input, the following recommendations have been made:

- **Introduce a trained group of dedicated district energy coordinators** whose main role will be to oversee energy planning and community energy projects at the district level. The efforts of the energy coordinators should be complemented and supported by **community-based energy extension officers** who promote the benefits of renewable energy among local communities.
- **Mandate decentralised energy planning within local authorities**, accompanied by training, financial resources and political support.
- **Implement gender equality and social inclusion (GESI) considerations** along the entire energy planning process, from involving marginalised groups in discussions and decision-making, to accounting for different energy uses in plans.
- **Strengthen coordination efforts and ensure district energy plans are streamlined** to avoid duplications, conflicts and energy plans which cannot be integrated into national planning.
- **Ensure viable and sustainable maintenance plans are included in district energy plans** to facilitate project success and continuity after installation.
- **Include an assessment of the affordability of energy in decentralised energy planning** to promote private sector investment in the renewable energy sub-sector.

References

- [1] F. F. Nerini, J. Tomei, L. S. To, I. Bisaga, P. Parikh, M. Black, A. Borrion, C. Spataru, V. C. Broto, G. Anandarajah, B. Milligan and Y. Mulugetta, "Mapping Synergies and Trade-Offs Between Energy and the Sustainable Development Goals," *Nature Energy*, vol. 3, pp. 10–15, 2018. DOI: <https://doi.org/10.1038/s41560-017-0036-5>.
- [2] World Bank, "Access to Electricity, Rural (% of Rural Population) - Zambia," World Bank, 2021. [Online]. Available: <https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS?locations=ZM> [Accessed 6 June 2024].
- [3] GRZ, "Integrated Resource Plan for the Power Sector in Zambia," Ministry of Energy, Lusaka, 2023. [Online] Available: <https://www.moe.gov.zm/irp/> [Accessed 6 June 2024].
- [4] GRZ, "The National Decentralisation Policy: Realising Local Development through Citizen Participation," Office of the President, Lusaka, 2023. [Online]. Available: <https://www.cabinet.gov.zm/newsite/wp-content/uploads/2024/04/THE-NATIONAL-DECENTRALISATION-POLICY.pdf> [Accessed 2 August 2024].
- [5] IEA, "SDG7: Data and Projections," IEA, Paris, 2023. [Online]. Available: <https://www.iea.org/reports/sdg7-data-and-projections> [Accessed 6 June 2024].
- [6] GRZ, "Rural Electrification Master Plan for Zambia 2008 - 2030," Government of the Republic of Zambia, Lusaka, 2009. [Online]. Available: https://rise.esmap.org/data/files/library/zambia/Electricity%20Access/Zambia_Rural%20Electrification%20Master%20Plan%202008%20-%202030.pdf [Accessed 6 June 2024].
- [7] E. Mulenga, A. Kabanshi, H. Mupeta, M. Ndiaye, E. Nyirenda and K. Mulenga, "Techno-Economic Analysis of Off-Grid PV-Diesel Power Generation System for Rural Electrification: A Case Study of Chilubi District in Zambia," *Renewable Energy*, vol. 203, pp. 601–611, 2023. DOI: <https://doi.org/10.1016/j.renene.2022.12.112>.

- [8] C. Zalengera, L. S. To, R. Sieff, A. Mohr, A. Eales, J. Cloke, H. Buckland, E. Brown, R. Blanchard and S. Batchelor, "Decentralisation: The Key to Accelerating Access to Distributed Energy Services in sub-Saharan Africa?," *Journal of Environmental Studies and Sciences*, vol. 10, pp. 270–289, 2020. DOI: <https://doi.org/10.1007/s13412-020-00608-7>.
- [9] M. Maboshe, A. Leonard, S. Bickersteth, N. McCulloch and S. A. Hirmer, "The Status of Power Sector Decentralisation in Zambia," Climate Compatible Growth Programme Policy Brief Series, 2023. [Online]. Available: <https://climatecompatiblegrowth.com/wp-content/uploads/The-Status-of-Power-Sector-Decentralisation-in-Zambia.pdf> [Accessed 6 June 2024].
- [10] Organisation for Economic Co-operation and Development (OECD), "Making Decentralisation Work: A Handbook for Policy-Makers," OECD Publishing, Paris, 2019. [Online]. Available: https://www.oecd.org/en/publications/2019/03/making-decentralisation-work_g1g9faa7.html [Accessed 2 August 2024]
- [11] The Scottish Government, "Contribution to International Development Report 2021-2023," The Scottish Government, Edinburgh, 2024. [Online]. Available: <https://www.gov.scot/publications/contribution-international-development-report-20212023/> [Accessed 2 August 2024].
- [12] Ministry of Health, "National Community Health Worker Strategy in Zambia," Government of the Republic of Zambia, Lusaka, 2010. [Online]. Available: https://www.advancingpartners.org/sites/default/files/cadres/policies/zambia_nchw_strategy-august-_2010_final.pdf [Accessed 6 June 2024].
- [13] H. Mpuku and I. Masilokwa, "Zambia's 2023 Macroeconomic Performance," Zambia Institute for Policy Analysis & Research, 4 January 2024. [Online]. Available: <https://www.zipar.org.zm/2024/01/04/zambias-2023-macroeconomic-performance/> [Accessed 2 August 2024].
- [14] D. Frame, L. Yona, E. Nyirenda, A. Eales and E. Bayani, "District Energy Officers: Mainstreaming Energy in Malawi's Local Governance Structures," University of Strathclyde, Glasgow, 2022. [Online]. Available: <https://pure.strath.ac.uk/ws/portalfiles/portal/199954229/Frame-et-al-2022-District-energy-officers-mainstreaming-energy-in-Malawis.pdf> [Accessed 6 June 2024].
- [15] D. M. Mwendwa, A. Leonard and S. Hirmer, "Review and Comparison of Nakuru, Kitui and Narok County Energy Plans," Zenodo, 2023. [Online]. Available: <https://doi.org/10.5281/zenodo.7818865>.
- [16] M. Barasa, S. Bickersteth and S. Hirmer, "Supporting Integrated Energy Planning at the Sub-National Level - The Case of Kenya," Climate Compatible Growth Programme Policy Brief Series, 2022. [Online]. Available: https://climatecompatiblegrowth.com/wp-content/uploads/Energy-planning-at-the-sub-national-level_The-Case-of-Kenya_COP27-Policy-Brief.pdf [Accessed 6 June 2024].
- [17] K. Kalumba and V. Musowe, "Effective Coordination and Use of Donor Funding in Zambia," Economic Development Institute of the World Bank, Johannesburg, 1996. [Online]. Available: https://documents1.worldbank.org/curated/zh/608111468758973303/930107812_201408248015327/additional/multi0page.pdf [Accessed 6 June 2024].
- [18] Ashden, "Gender and Energy Report: Is Clean Energy Shutting Out Women?," Ashden, London, 2019. [Online]. Available: <https://ashden.org/storage/2021/08/Ashden-gender-and-solar-access-study-Tanzania.pdf> [Accessed 6 June 2024].
- [19] C. Mishra, "Decentralised Renewable Energy and Rural Development: Lessons from Odisha's First Solar Village," *Journal of Land and Rural Studies*, vol. 9, no. 1, pp. 178–192, 2021. DOI: <https://doi.org/10.1177/2321024920967842>.
- [20] I. Bisaga, J. Tomei and M. Tesfamichael, "Why aren't they consuming? Exploring Barriers to Electricity Demand in sub-Saharan Africa," CCG Knowledge Brief Series, 2024. [Online]. Available: <https://climatecompatiblegrowth.com/wp-content/uploads/CCG-Knowledge-Brief-1.pdf> [Accessed 6 June 2024].
- [21] F. Kapole, S. Mudenda and P. Jain, "Study of Major Solar Energy Mini-Grid Initiatives in Zambia," *Results in Engineering*, vol. 18, 2023. DOI: <https://doi.org/10.1016/j.rineng.2023.101095>.

Author information

¹***Mashekwa Maboshe** (University of Zambia): *Conceptualisation, Methodology, Investigation, Writing – Original Draft.*

² **Beatrice Stockport** (University of Oxford): *Writing – Original Draft.*

³ **Malunga Syacumpi** (University of Zambia): *Writing – Original Draft.*

⁴ **Oliver Kaonga** (University of Zambia): *Writing – Original Draft*

⁵ **Stephanie Hirmer** (University of Oxford): *Conceptualisation, Writing – Review & Editing, Supervision.*

*Corresponding Author: mashekwa.maboshe@gmail.com

Acknowledgements

This material has been produced under the Climate Compatible Growth programme, which is funded by UK aid from the UK government. However, the views expressed herein do not necessarily reflect the UK government's official policies.