Transition Pathways Towards **Inclusive Climate Compatible Growth in Zambia**

Oliver Broad [1], Nancy Chama Serenje [2], Esther Chilala [3], Rebecca Clube [4], Jen Cronin [1], Yanda Hamilemba[4], Malonga Hazemba [3], Leonhard Hofbauer [5], Nick Hughes [1], Ariane Millot [6], Clement Njobvu [2], Mulima Nyambe-Mubanga [3], Steve Pye [5], Cleopas Sambo [7], Bernard Tembo [4], Meron Tesfamichael [8], Julia Tomei [1], Francis Davison Yamba[2]

Key Messages


PHOTO: ISTOCKPHOTO

Supporting Zambia's transition towards green growth will involve:

1. Fostering environments and actor networks that support transparent, strategic, forward-looking, and repeated conversations to build shared visions of possible development pathways.
2. Supporting expert conversations, across different sectors, to refine future pathway details and test them through qualitative and quantitative approaches.
3. Ensuring these futures are inclusive, reflect multi-stakeholder perspectives, and place the needs of communities within a strategic regional and national framework.
4. Maintaining analytical tools and local capacity to quantify future visions and account for their whole system implications for energy, resources, people, the environment, and the economy.
5. Streamlining ministerial coordination, policy design, and enforcement to reflect the interconnected mandates required for future national visions.

Such steps underpin an institutional framework that supports resilient, climate-compatible, and inclusive futures thinking. While derived from our research in Zambia, these steps are widely applicable to other countries and contexts on their own respective green transition journeys.

Summary

Zambia has set out a vision to transition to a green economy, which fosters sustainable and low-carbon development. This transition will focus on ensuring resilient and climate-compatible growth, enhanced resource efficiency, enhanced natural capital, and improved inclusivity as well as fostering enabling conditions for green growth. At the same time, the Government of Zambia seeks to scale up industrialisation and the economic activity of specific sectors. For example, ambitious targets have been set to scale up mining activities in the next decade, to support growth in tourism, and to bolster power and agricultural exports, among others.

These objectives present significant opportunities, but also challenges. Certainly, they will require changes to current policy or institutional arrangements, and they will require the involvement of many different stakeholders and communities across sectors and geographical regions.

To contribute to these efforts, the project "Transition Pathways towards inclusive climate compatible growth in Zambia" (TRAP-ZM) applied a mixed-methods approach to:

i. establish a multi-stakeholder process for discussing and designing sustainable development scenarios for Zambia;
ii. discuss and quantify their implications in specific sectors;
iii. build capacity for modelling whole system interactions between different sectors and the economy; and
iv. strengthen the linkages between stakeholders and policymaking.

Introduction

Zambia's Vision 2030 strategy sets out the country's ambition to become a prosperous middle-income country by 2030 [1]. However, the country continues to face diverse yet interconnected social, environmental, and economic challenges. These include high levels of poverty and inequality, a considerable debt burden, growing pressures on natural resources, and continued deep impacts from the COVID-19 pandemic. Current trends across different sectors all risk significant levels of land-use change and deforestation, whether from the continued informal collection of biomass or from the expansion of agriculture, mining, and human settlements [2].

Many facets of these interconnected challenges relate to, exacerbate, and are compounded by escalating changes in climate. Variations in rainfall patterns have highlighted particularly deep vulnerability as Zambia is heavily reliant on rainfed agriculture and hydropower-based electricity generation [3, 4].

Efforts have been made to find lasting solutions. However, low levels of stakeholder coordination and siloed thinking in policy design have limited their effectiveness, leading to continued threats to environmental quality (air, water, land), energy security, and citizen wellbeing.

Numerous national policy, legislative, and strategy documents[1] acknowledge and set out approaches to tackle these challenges, highlighting the

[1] Including, among others, the 8th National Development Plan, Nationally Determined Contribution, The Decentralisation Strategy, Integrated Resource Plan, and National Green Growth Strategy.

recognised need to transition to a more sustainable future. The Decentralisation Policy seeks to foster equity and inclusivity by devolving decision-making to local levels where appropriate [5]. The Integrated Resource Plan (IRP) describes a power sector investment plan, up until 2050, designed to support rapid and ambitious growth in mining, agriculture, industry and transport, while also achieving universal access to electricity. Most recently, the National Green Growth Strategy (NGGS) sets out a vision for sustainable economic growth that is low carbon, resilient, resource efficient, and conducive to the improved wellbeing of Zambian citizens [6].

Taken together, the goal is to lift living standards through an efficient, sustainable, yet competitive economy. However, these policies and strategies may present distinct views as to how to operationalise this sustainable future. The goals that each of these describe can be set by different stakeholders and may rely on different assumptions, leading, at times, to outcomes that compete or interact in ways that are either unclear or unexpected. This might imply, for example, that processes required to achieve goals outlined in Zambia's Nationally Determined Contribution (NDC) could, in fact, undermine those goals set out in the IRP.

This risk is compounded by the interconnected nature of the systems in which these plans will be implemented.

In this context, the TRAP-ZM (Transition Pathways towards inclusive climate compatible growth in Zambia) project used a systemic mixed-methods approach to explore future development pathways. Working with diverse stakeholders, the Zambian Institute for Policy Analysis and Research (ZIPAR) and CCG delivered participatory scenarios, conducted interviews, and built capacity in whole system thinking, energy modelling, economic analysis frameworks, and policy impact. By blending scenario-based approaches with explorative and quantitative methodologies, TRAP-ZM explored the implications of different futures for the energy system, land-use, and the economy, as well as opportunities to transition to a circular economy.

This policy brief, which is based on a more in-depth final report from the project [7], provides recommendations for how policymakers can build on this mixed-methods approach to develop an institutional ecosystem that could better support inclusive and effective policy formulation and implementation. Specific examples for the energy sector are highlighted.

Methodology

Interdisciplinarity is increasingly framed as an essential component in projects that seek to address complex sustainable development challenges [8]. Mixed-methods approaches respond to this through research designs that combine quantitative and qualitative methods, whether in sequence or simultaneously [9].

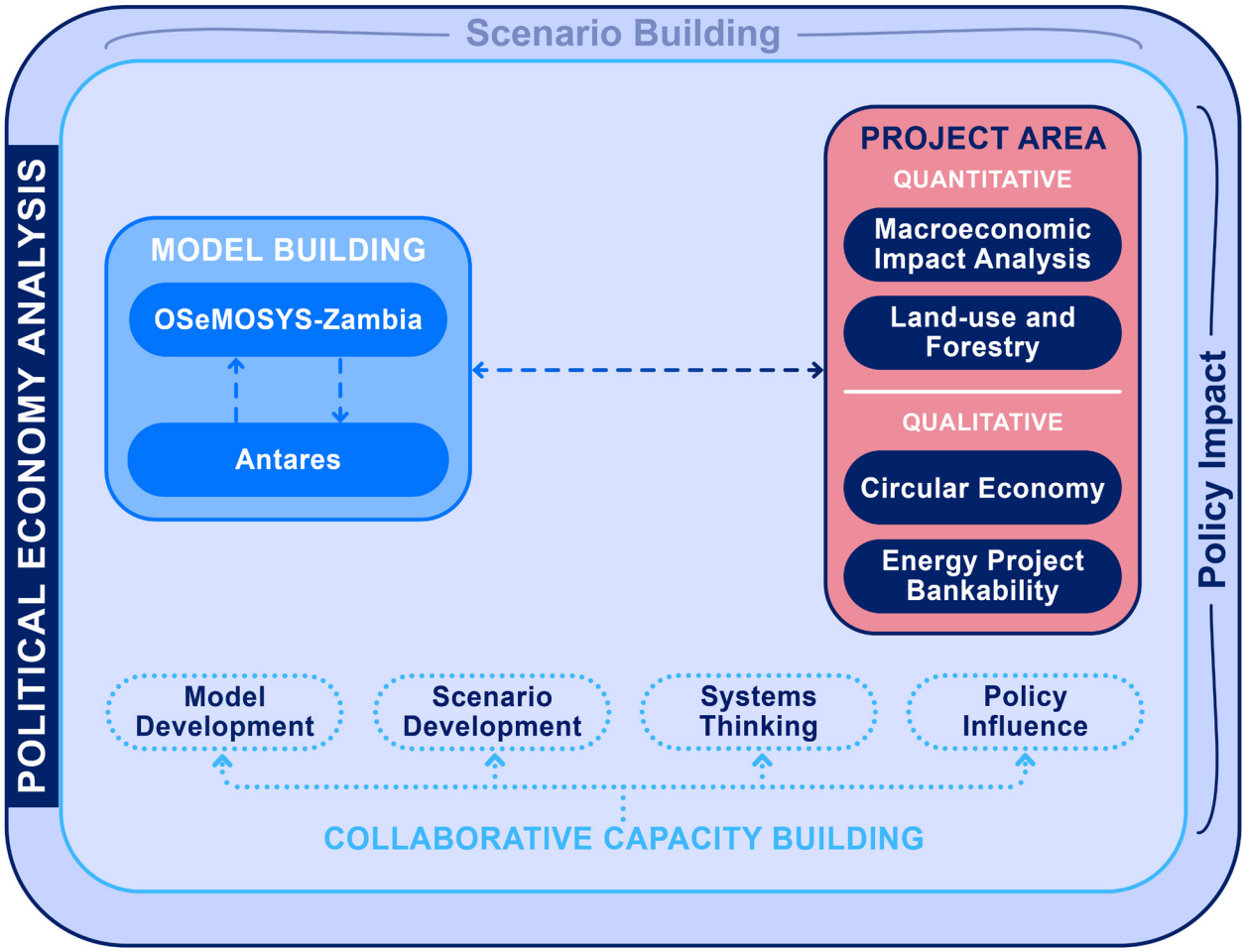
In TRAP-ZM, specific methods included whole system energy modelling, participatory scenario development, economic analysis, interviews, document and policy reviews and stakeholder workshops. These were used, in combination with various trainings, to explore the energy and climate-related topics that contribute to a future green economy in Zambia (see Figure 1)[2].

[2] These specific methods were chosen in relation to the strands of work developed under TRAP-ZM, which highlights one example of the mixed-methods approach we suggest can strengthen long-term planning and decision-making in Zambia. While these were appropriate in this instance of the approach, others may prove just as useful in repeated and / or expanded iterations.

The strands of work developed under TRAP-ZM to exemplify this mixed-methods approach included:

i. **Participatory scenario development** used stakeholder workshops and semi-structured interviews to co-design different visions of sustainable futures in Zambia, considering the whole energy system and their deeper implications for land-use.
ii. **Whole energy system modelling,** through repeated capacity building and expert workshops, co-developed a quantitative tool to assess the system implications of such futures[3].
iii. **Sectoral quantitative modelling** focused on understanding the deeper implications for the economy, land-use, and biomass availability.
iv. **A circular economy case study** qualitatively explored the opportunities and challenges of changes to waste management through policy review and local expert engagement.
v. **Policy influence training** responded to the need for diverse technical experts to engage with the policy process; a bespoke training course was designed and delivered.

Figure 1: *Components of the TRAP-ZM project. For full details see the Final Report [7]*



[2] Participants attended from the Ministry of Energy, the Ministry of Finance, the Ministry of Infrastructure, Housing and Urban Development, the national power utility ZESCO, the University of Zambia, and others.

Project Outcomes and Discussion

The different strands of TRAP-ZM were used to explore how to combine qualitative and quantitative methods in ways that can best support inclusive, informed, and robust policymaking. This has provided insights into what an appropriate knowledge and institutional policymaking ecosystem might look like, and what tools and processes it might require. The topics and subject areas examined during TRAP-ZM were diverse and so, for brevity, we choose here to focus on the energy sector as an example of this process. Salient outcomes are highlighted below under three headers. Further detail on the full scope, contents, and outcomes of TRAP-ZM can be found in the project's Final Report [7].

First, scenario-based approaches can form a solid basis for strategy development. Transition pathways to climate-compatible futures and the policies needed to support them involve complex dynamics, diverse stakeholders, and varying geographical and temporal contexts. Sustainable transition pathways seek to shift different parts of an interconnected whole; therefore, they must avoid siloed and oversimplistic thinking and instead embrace holistic and whole system solutions that bring sectors, knowledge domains, and actors together. Scenario-based approaches provide this flexible yet inclusive and systemic discussion framework within which future transitions can be examined and designed collaboratively using narratives. Taking this view, TRAP-ZM used workshops and interviews to co-develop three alternative future scenarios with stakeholders, including representatives of local and national government, NGOs, industry and private sector, finance, academia, and traditional leadership. The iterative and inclusive approach generated buy-in and learning, highlighting areas of important trade-off, synergy, and connection between sectors, actors, and institutions when aiming to reach common future goals.

The result described three scenarios: Centralised, Decentralised, and Hybrid future states of the world. This characterisation recognised the prominence of "decentralisation" in local political discourse, responded to stakeholder interest, and built on previous work by Nyambe-Mubanga which established these three possible futures [10]. Centralised governance was seen to support heavy industrialisation and large-scale development of electricity and agricultural export capabilities, whereas local governance would see value-added activities and energy hubs developing at a community level where skills and knowledge are built. The preferred hybrid approach considered whether elements of the two could be combined. Establishing a scenario-based approach accomplished three things. First, opening the discussion to wide participation brought forward common and key characteristics that stakeholders wanted future pathways to include, such as resilience, climate compatibility, and multi-scale economic opportunities. Second, applying a whole system lens changed the focus, highlighting how different perspectives may yet interact and support each other towards a common goal. Finally, iteratively bringing similar groups of stakeholders together over two years initiated a community of practice for framing future policy design under a common, internally consistent, and connected view of future national development. While limited to three scenarios in this first iteration, future developments could go further and characterise new pathways to reflect diverse policy and stakeholder interests.

Second, qualitative methods provide essential context, insights, and framing to analytical approaches. TRAP-ZM's research design used various quantitative, qualitative, and mixed-methods approaches, including modelling,

economic analysis, stakeholder interviews, policy review, and workshop co-creation activities. These were adopted and combined differently to suit different research questions, subject matters, data availability, and other needs. Focusing on flexibility, reflexivity, and iteration, the activities ensured the research was relevant and continually developed based on local needs. Qualitative methods provided the essential nuance and context for the quantitative analysis.

In the context of the energy sector, this mixed-methods approach involved co-developing a whole energy system model, OSeMOSYS-ZM, and using it to analyse certain technical implications of the project's scenario narratives. The narratives and energy modelling were then used to drive macroeconomic analysis using an extended Social Accounting Matrix to explore how future green transition pathways may translate in terms of socioeconomic and employment outcomes.

The outcome demonstrated the significant macroeconomic benefits of clean energy investment across both the Centralised and Decentralised scenarios, and showed that the choice of specific renewable energy technology investments over others did not lead to significantly different benefits. Specifically, the analysis showed that while the total capital investment varied across scenarios, the impact on macroeconomic indicators per unit of investment effects was similar. This suggests a level of confidence that future transition investments can and should open the scope of their decision-making beyond economic benefit to include other desirable outcomes, for example increased inclusivity.

The project demonstrated how rich, context-specific knowledge that only qualitative methods produce, can be used to frame and direct quantitative approaches that can offer elements of scale and perspective across deeply complex and interconnected systems. The combination of both these approaches is essential for sound policy development.

Third, mixed-methods and scenario-based approaches can help to structure institutional arrangements and support effective policymaking. Best practice recommendations for supporting inclusive sustainable development agendas involve embracing diversity and broadening engagement. Using participatory scenario discussions to frame decision-making can bring together a wide diversity of participants and perspectives, thus fitting best-practice recommendations by default. During TRAP-ZM, we applied this approach in the context of whole system and land-use discussions, and found that it provided a framework for understanding and exploring interconnected issues, organising information in ways that helped stakeholders to make sense of this complex reality. In parallel, using exploratory mixed-methods can build a better picture of important yet under-examined topics where data and knowledge may be scarce, making contextual information on complex sectors visible [11].

Within this framing, modelling methods can reveal clear and relevant insights into the synergies and trade-offs between future options in ways that can support clear decision-making. This is being observed as models are applied to issues in the energy sector such as clean cooking and energy sector electrification. Further, the co-production of these quantitative tools and their embedding within institutions in Zambia, as with OSeMOSYS-ZM, is helping to build and strengthen skillsets that can be applied in future planning. As an institutional approach to futures thinking, this combination of mixed-methods, scenario-based approaches, and quantitative modelling, ensures resilience of outcomes, coherent and integrated policies, and objectives that align with needs and opportunities of different geographies, sectors and stakeholders.

Conclusions and recommendations

This policy brief has combined research outputs with experience from running the TRAP-ZM project [7] to offer reflections on how to build an institutional framework that can support green growth through resilient, climate-compatible, and inclusive futures in Zambia. These reflections are directed at decision makers in line ministries responsible for sustainable energy, economic, environmental, and social development.

- **Break down silos and ensuring inclusive decision-making by bringing together diverse groups of stakeholders.** Including multiple perspectives, offering space for diverging views and experiences to be considered, and ensuring that different mandates and objectives work together all help to avoid inappropriate, simplistic, competing, or unimplementable solutions.
- **Take a whole systems view to further help overcome oversimplification and siloed thinking in policy design**. Mutually reinforcing and sound policy design can be supported by recognising that the challenges of reaching sustainable futures will cross traditional sectoral and geographical borders and considering instead the interconnectedness of issues. The strong linkages between land, energy, and water in Zambia – and the prospects of increasing climate impacts – make this whole system approach critical.
- **Adopt mixed-methods approaches to decision-making as a means of embracing complexity.** Building a sustainable future for Zambia will mean transforming interconnected and interdependent socio-technical systems. Combining the rich and context specific detail that qualitative approaches provide with quantitative assessments of different options is an important way to adequately account for the complexity of this shift towards more sustainable pathways.
- **Foster the development of an institutional framework for futures thinking and analysis.** Iterative scenario-based approaches can create a collective understanding of the different ways in which desirable futures could unfold. Having a national framework that sustains this conversation, holds qualitative and quantitative analysis capabilities, and a clear view of important policy needs or questions, can support transparent and evidence-based decision-making. The ongoing development of an energy planning unit will hopefully help promote this in the context of energy scenario modelling and analysis in Zambia.

References

[1] Government of the Republic of Zambia (GRZ) (2006). *Vision 2030: A prosperous Middle-income Nation by 2030.* Lusaka, Zambia. Available at: https://www.nor.gov.zm/?wpfb_dl=44.

[2] Ministry of Finance and National Planning, (MoFNP) (2022). *Eighth National Development Plan (8NDP) 2022-2026.* Lusaka, Zambia. Available at: https://www.mofnp.gov.zm/?wpdmpro=8ndp-2022-2026.

[3] International Monetary Fund (IMF) African Department (2023). *Boosting Productivity and Enhancing Climate Resilience in Zambia's Agriculture Sector.* Available at: https://doi.org/10.5089/9798400249839.002.

[4] Ministry of Energy (MoE) (2022). *Strategic plan 2022-2026.* Lusaka, Zambia. Ministry of Energy. Available at: https://www.moe.gov.zm/wp-content/uploads/2024/05/Final-Ministry-of-Energy-2022-to-2026-Strategic-Plan.pdf.

[5] Government of the Republic of Zambia (GRZ) (2023). *The National Decentralisation Policy.* Lusaka, Zambia. Available at: https://www.mlgrd.gov.zm/wp-content/uploads/2023/06/National-Decentralisation-Policy-2023.pdf.

[6] Ministry of Green Economy and the Environment (MGEE) (2024). *National Green Growth Strategy 2024 – 2030.* Lusaka, Zambia. Available at: https://www.mgee.gov.zm/wp-content/uploads/2024/04/2NATIONAL-GREEN-GROWTH-STRATEGY-2024-2030-6.pdf.

[7] Broad, O., Serenje, N. C., Chilala, E., Clube, R., Cronin, J., Hamilemba, Y., Hazemba, M., Hofbauer, L., Hughes, N., Millot, A., Njobvu, C., Nyambe-Mubanga, M., Pye, S., Sambo, C., Tembo, B., Tesfamichael, M., Tomei, J., and Yanda, F. D. (2024). *Transition pathways towards inclusive climate-compatible growth: modelling, futures, and decision-making in Zambia – TRAP-ZM.* Climate Compatible Growth Programme. Available at: https://climatecompatiblegrowth.com/wp-content/uploads/Transition-pathways-towards-inclusive-CCG-in-Zambia-%E2%80%93-TRAP-ZM_241020.pdf.

[8] Leal Filho, W., Azeiteiro, U., Alves, F., Pace, P., Mifsud, M., Brandli, L., Caeiro, S. S., and Disterheft, A. (2017). 'Reinvigorating the sustainable development research agenda: the role of the sustainable development goals (SDG)'. *International Journal of Sustainable Development & World Ecology,* 25(2), 131–142. https://doi.org/10.1080/13504509.2017.1342103.

[9] Harris, J. (2022). 'Mixed Methods Research in Developing Country Contexts: Lessons From Field Research in Six Countries Across Africa and the Caribbean'. *Journal of Mixed Methods Research,* 16(2), 165–182. https://doi.org/10.1177/15586898211032825.

[10] Nyambe-Mubanga, M., Mapulanga, W., Hazemba, M., Chileshe, S., Tembo, B., Cronin, J., Hughes, N., Mulugetta, Y., Pye, S., Tesfamichael, M., Tomei, J., Watson, J., Bawakyillenuo, S., and Crentsi, A. O. (2023). *Greening the Recovery in Zambia.* Zambia Institute for Policy Analysis, University College London (Institute for Sustainable Resources) and Institute of Statistical Social and Economic Research and Research. Available at: https://www.ucl.ac.uk/bartlett/sustainable/sites/bartlett_sustainable/files/ucl_greeningtherecoveryzambia_final91.pdf.

[11] Hazemba, M. and Clube, R. (2024). *From Waste to Resource: Creating an Enabling Policy Environment for a Circular Economy in Zambia.* CCG Policy Brief Series. [Online] Available at: https://climatecompatiblegrowth.com/wp-content/uploads/From-Waste-to-Resource-Zambia.pdf.

ACKNOWLEDGEMENTS

The funding for this work was granted by the UK Foreign, Commonwealth and Development Office (FCDO) via the Climate Compatible Growth research programme. The authors declare no competing financial interests in producing this work. The views expressed herein do not necessarily reflect the UK government's official policies. This was designed by Sarel Greyling (Sarel Greyling Creative).

AUTHOR INFORMATION:

[1]**Oliver Broad, Rebecca Clube, Jen Cronin, Nick Hughes, Julia Tomei** *(University College London: Institute for Sustainable Resources)*

[2]**Nancy Chama Serenje, Clement Njobvu, Francis Davison Yamba** *(Centre for Energy, Environment and Engineering of Zambia (CEEEZ)*

[3]**Esther Chilala, Malonga Hazemba, Mulima Nyambe-Mubanga** *(Zambian Institute for Policy Analysis and Research)*

[4]**Yanda Hamilemba, Bernard Tembo** *(Tec Analytics)*

[5]**Leonhard Hofbauer, Steve Pye** *(University College London: Energy Institute)*

[6]**Ariane Millot** *(Imperial College London: Department of Chemical Engineering)*

[7]**Cleopas Sambo** *(University of Zambia: Department of Social Work and Sociology)*

[8]**Meron Tesfamichael** *(University College London: Department of Science, Engineering, Technology & Public Policy)*

CITATION: Broad, O., Serenje, N. C., Chilala, E., Clube, R., Cronin, J., Hamilemba, Y., Hazemba, M., Hofbauer, L., Hughes, N., Millot, A., Njobvu, C., Nyambe-Mubanga, M., Pye, S., Sambo, C., Tembo, B., Tesfamichael, M., Tomei, J., and Yanda, F. D. (2024). *Transition Pathways Towards Inclusive Climate Compatible Growth In Zambia.* Climate Compatible Growth Programme Policy Brief Series.