Energy and Economic Growth
Applied Research Programme

EEG Policy Workshop: East Africa Outcomes Report

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List of abbreviations

EEG	Applied Research Programme on Energy and Economic Growth
EWURA	Energy and Water Utilities Regulating Authority, United Republic of Tanzania
MEM	Ministry of Energy and Minerals, United Republic of Tanzania
TANESCO	Tanzania Electric Supply Company
USAID	United States Agency for International Development

1 Introduction

The Applied Research Programme on Energy and Economic Growth (EEG) aims to transform energy policy in developing countries by generating world-class research on the linkages between energy and economic growth. EEG has two main components: first, the production of high-quality research that address key gaps in our knowledge of how energy drives economic growth in low-income countries; and second, activities to ensure that research questions are influenced by- and research outputs are accessible to- those in a position to influence energy policy and energy systems.

On July 14th 2016, EEG held a policy engagement workshop in Dar es Salaam, Tanzania. It brought together 60 participants from four East African countries to discuss the key energy challenges faced in the region, and consider how the EEG programme can help address them. To supplement learnings from the workshop, the EEG Programme Directorate had a series of private meetings with senior energy policymakers, researchers and private sector stakeholders.

This report is structured around five key themes that arose during the policy workshop and meetings:

(1) the productive and inclusive uses of electricity,

(2) the political economy of energy policy,

(3) the role of renewables,

(4) unreliable electricity systems, and

(5) data collection and analysis.

Some of the main questions that arose from each theme are presented as key takeaways throughout the report. These represent potential directions and considerations for future EEG-funded research, and are intended for consideration by EEG theme leads State of Knowledge paper authors, as well as the Programme Directorate.

Box 1 below discusses the key findings from the workshop and meetings and highlights the insights and considerations that emerged and relate to EEG's research agenda. The workshop programme, a list of meetings and a list of workshop attendees are provided in Appendices A and B.

Box 1: Key findings from the Tanzania policy engagement workshop and meetings

The policy engagement workshop and meetings in Tanzania served to introduce EEG researchers to key energy stakeholders and decision-makers in East Africa, and to identify a series of research gaps that could shape EEG's research agenda.

A number of highly relevant research questions were raised concerning the relationship between electricity and productivity: What is the causal direction between electricity consumption and economic growth? Does energy policy drive industrialisation, or vice versa? How can we promote productive uses of electricity? Which types of electricity-enabled production have the most inclusive and positive impacts on employment, poverty and gender equality?

The workshop also raised significant debates about how the political economy and governance structures shape energy policy. It was clear from these debates that EEG could offer significant value by researching how politics influences electricity tariffs, and how tariffs in turn affect the economic viability of utilities and rural electrification programmes. As energy is certainly a highly politicised space, researchers will need to confront questions about their ability to access and verify data, and the political implications of their research.

Discussions about renewable energy revolved around two common themes: the challenges of integrating large-scale renewables into the national electricity grid, and the use of off-grid solar to promote energy access. EEG can help support modelling of the costs of incorporating intermittent renewables into electricity girds, and provide more sophisticated thinking around the opportunities and limits of solar home systems and village-level micro grids in powering economic productivity.

EEG could also add significant value by conducting research on grid reliability. Pertinent research questions include: How do unreliable electricity systems affect productivity? What are the main barriers and solutions to improving reliability?

An important overall conclusion from the workshop was the consensus that there is a need for new research in this space, and that EEG can add a great deal of value by supporting improved data collection and analysis for forecasting demand, and setting tariffs, amongst other things.

2 Key themes

2.1 Productive and inclusive uses of electricity

The first common theme from both the workshop and the meetings was that an understanding of the relationship between electricity and inclusive economic growth requires a focus on the demand side as well as the supply side. In other words, how exactly is electricity used to expand production?

Professor Justin Ntalikwa, Permanent Secretary of the Ministry of Energy and Minerals (MEM), confirmed that electricity will be crucial for Tanzania to achieve its goal of becoming a middle-income country by 2025. The country needs to modernize agriculture, increase manufacturing base and export more products to international markets, and revamp its industrial economy. Growth in each of these sectors, he argued, can only be achieved with a reliable and affordable power supply.

EEG Research Director, Professor Catherine Wolfram, noted that while "we know that energy is correlated with economic growth… we don't have much evidence to unpack the relationship." Research has not yet clarified the causal direction of this relationship, either. Kenneth Mutaonga from the Tanzanian President's Delivery Bureau explained: "Does GDP growth drive energy demand, or does energy demand drive GDP growth? Do you have an energy policy that drives industrialization, or the other way around?"

Wanja Mtawazo, Director of Policy and Planning at MEM suggested that energy policy should align with a nation's specific economic development goals: "Which industries are coming online, when, and what are their energy needs?" The energy demands of different industries vary significantly – both in terms of the quantity demanded and the geographical distribution of that demand. Hence, an energy strategy aimed predominantly at powering agricultural irrigations systems will look different to a strategy aimed at powering aluminium smelters.

Michael Jordan from USAID's Tanzania Mission commented that the availability of electricity does not necessarily translate into increases in productivity. For the most part, he explained, investment in rural electricity infrastructure goes under-utilised, because complementary investments are not made in factories and productive assets. An audience member at the workshop cited an example from rural Tanzania where, six months after distribution lines had been installed, very few households had chosen to connect because they were afraid they couldn't pay the monthly bills.

Still, participants felt that electricity was a critical enabler for growth. Sophia Mgonja, Director of Distribution and Customer Service at TANESCO, gave the example that rural electrification programmes enable water pumping, which improves agriculture production and security. It also creates new opportunities to generate income. Dr. Yonas Alem, Research Director of the Environment for Development Initiative based at the University of Gothenburg, agreed. He cited an example of a survey he had undertaken on the development gains from electrification in Ethiopia, which found that not only did electrification improve quality of life in the household, but it also improved children's school performance, which has long run implications for human development. More immediately, he argued, rural electrification can encourage the expansion of small-scale enterprises, and improve access to finance and labour force participation, if properly implemented.

In light of comments about the underutilisation of rural electricity, Sisty Basil from the Energy Change Lab asked a pertinent question about managing energy use: How do you promote productive use of electricity? Or do you just let people figure out what to do with the electricity?

Mr. Jordan suggested that there were several constraints to economic growth operating in parallel, and that ensuring a reliable electricity supply would not, by itself, necessarily attract new industries to Tanzania, nor stimulate substantial new investment, especially in rural areas. To achieve real change, many other constraints to growth (e.g.: roads, investment, policy) need to be overcome in parallel to electricity provision. In this vein, some suggested that rural electrification programmes should be packaged with income-generating opportunities. Ibrahim Kasirye, Deputy Director of the Economic Policy Research Centre in Uganda, argued that to promote business in rural areas, construction of dams and other energy sources need to be accompanied by other infrastructure (water, roads, etc.).

Which begs the question, if you are going to promote productive uses of electricity, which types will lead to the most inclusive growth? Not only do different types of production have different electricity requirements, they also have different impacts on employment and poverty. Electricity-enabled industries vary in terms of the number of jobs they create and how those jobs are distributed.

Dr. Margaret Matinga, an independent consultant working on gender and energy, observed that different electricity-enabled industries also provide different employment benefits for men and women. She argued for the promotion of industries that have strong links to employment opportunities for women such as ceramics and agricultural processing. The electricity sector itself could potentially provide significant employment opportunities for women.

Household electricity access also impacts men and women differently, which could have knock-on implications for productivity. According to Dr. Matinga, evidence from India and Kenya suggests that when electricity is used for cooking, it has greater benefits for women's health by way of reducing indoor air pollution. Further, it frees up women's time previously spent collecting fuelwood, which they can now spend on other productive activities. Dr. Alem added that access to refrigeration may also have proportionately greater benefits for women than men by freeing up their time previously spent grocery shopping.

Key takeaways for EEG

- In what ways can investments in electricity infrastructure drive economic growth?
- Should energy policy drive industrialisation, or the other way around?
- What are the most *productive* uses of electricity, and how can governments promote these uses?
- How does household electrification affect women's wellbeing and children's school outcomes and aspirations (especially as compared to men)?
- How does electrification affect entrepreneurship and small business outcomes?
- Which types of electricity-enabled production have the most inclusive and positive impacts on employment, poverty and gender equality?

2.2 The political economy of energy policy

The policy workshop and meetings raised significant debates about how the political economy and governance structures shape energy policy.

Patrick Rutabanzibwa – former Permanent Secretary of the Ministry of Energy and Minerals, and Chairman of PanAfrican Energy, a natural gas producer – explained that policy-making is a costly exercise with incentives for short-termism. Policymakers often lack both financial resources for investment and the capacity to use evidence in the policy process, and, hence, to make 'good' policy. Political incentives may conflict with best practice for financial sustainability.

Many conversations and comments focused upon the governance structures and financial management of TANESCO, a parastatal utility. The current government has stated that it would like to see TANESCO's tariffs lowered to make electricity more affordable for consumers. However, TANESCO is currently under substantial financial pressure, with significant unpaid debts to its suppliers. An important area of debate concerns electricity tariffs in Tanzania, and whether the tariffs levied by TANESCO are reflective of the necessary inputs- which might include the costs of producing electricity and repaying debts. Answers to this question depend on a variety of considerations, particularly the methodology used to calculate costs and the timeframe of repayment. EEG could provide useful research on the best practice of developing tariff structures.

A further significant matter for discussion was the institutional arrangements and relationships governing TANESCO, MEM and the Energy and Water Utilities Regulating Authority (EWURA), which is in charge of the tariff structure in Tanzania. A key consideration is the extent of political influence in the management of the utility and regulator.

It was remarked that perceived financial difficulties associated with TANESCO could make it difficult to attract private investment into the energy sector. This is given that the utility ultimately underpins all revenues for the private sector, It was further observed that low electricity tariffs provide little incentive for TANESCO to connect rural communities to the grid, as the expense of connecting exceeds the revenue they will provide from energy usage, at least in the short-term.

Bengiel Msofe, Director of Technical Services at the Rural Energy Agency, United Republic of Tanzania, argued that political leadership has produced an opportunity to expand energy access. The government has set the goals of reaching all villages in Tanzania with electricity infrastructure by 2021, and connecting all households and social and business establishments by 2030. The broad strategic objective has been given further momentum by Members of Parliaments' urging the government to allocate more budget to rural electrification.

EEG can clearly offer significant value by researching the role that political economy plays in shaping energy policies and outcomes. Energy is certainly a highly politicised space in Tanzania, and researchers must be ready to confront questions about their ability to access and verify data, and the political implications of their research.

Key takeaways for EEG

- Where are the entry points for research in the policymaking process?
- What factors influence policymakers in their selection and use of information/research?
- By what methodologies, and with what degree and type of political influence, are tariffs calculated?
- What is the relationship between institutional arrangements and the incentive structure faced by regulators, policymakers and state-owned utilities?
- What would an effective enabling environment for private investment in the energy sector look like, and what type of policy and regulation would it require?
- How are commercial decisions relating to the location and type of energy investments made?

2.3 The role of renewables

Discussions about renewable energy revolved around two themes: the challenges of integrating large-scale renewables into the national electricity grid, and the use of off-grid solar to promote energy access.

The main challenge associated with integrating large-scale wind and solar power into the grid, argued Michael Jordan of USAID, is not the cost of generation but rather of building the necessary infrastructure. Cost estimates for integrating intermittent renewables into the grid need to reflect the cost of meeting demand when renewable sources are insufficient. Regional energy planning is required to balance the grid when wind and solar is providing either an over or under supply. Regional governments are pursuing an 'East African Power Pool' , which is similar in many respects to the one in Southern Africa. The East Africa Power Pool is in its early stages, and requires further infrastructure development.

Mary Susan Abbo, Managing Director of the Centre for Research in Energy and Energy Conservation at Makerere University, has conducted research on the Southern and East African Power Pools, examining how the 21 countries decide on large-scale renewable energy generation to meet increasing demand. One study generated a multi-criteria analysis tool—which can generate interactive maps with supply curves—to identify and comprehensively value high-quality renewable energy resources.

Additionally, Ms. Abbo explained that sourcing the data needed to plan for renewables projects presents a major challenge. EEG could add significant value in producing data and research on planning for large-scale renewable energy.

One widely recognised advantage of renewables over other sources of power is that they are less damaging to the environment. However, there is a question of how significant a consideration this is- and should be- in the context of developing countries which are prioritising economic growth and poverty reduction. Samson Ondiek of Kenya Power raised the question of how industrialisation should be balanced with environmental protection, in policy and investment decisions.

Erica Mackey, Chief Operating Officer of Off-Grid Electric, highlighted the potential of promoting electricity access through distributed solar home systems. Off-Grid Electric allows households in Tanzania and Rwanda to finance solar system purchases through micro-payments via mobile money transfers. The solar systems power lighting, mobile phone charging, TVs and radios, and sell for $15 per month. In Tanzania, Off-Grid Electric has a 50% saturation rate in areas where sales officers are working, and is installing 10,000 new systems each month.

Michael Jordan of USAID argued that even where there is an electricity grid, there is likely to remain a robust market for residential solar for reasons of reliability and cost. Ali Mufuruki, CEO of Infotech Investment Group, argued that renewables should be default for households (not necessarily for industry), and that governments should adopt policies that mainstream renewable energy usage: “Every roof should be built for solar installation.”

However, some participants exclaimed scepticism about the transformative capacity of solar home systems. Jay Taneja, from IBM Research, questioned how off-grid systems can power productive uses of electricity given their small size. Solar home systems are valuable, he argued, because they provide the first access to charge phones and use lights, but unlike grid connections, they create a ceiling of energy consumption.

Ms. Mackey explained that Off-Grid Electric sees itself working alongside the grid, not as a replacement for it. Its products are just a starter kit, and it will continue to add products in the pipeline as customer’s usage increases. She pointed out that Off-Grid Electric’s pay-as-you-go model promotes financial inclusion, which some would argue is another key ingredient for growth. The information collected by Off-Grid Electric provides a credit history for customers who were previously unbanked.

Key takeaways for EEG

- What types of technology and policy are needed to integrate renewables into national electricity grids? What examples are there of progress in this respect?
- What have been the lessons from regional power pools, including the political and institutional factors that condition their success?
- In developing nations, can interconnected grids help integrate intermittent renewable sources, such as solar and wind, by electricity from one place to another as needed?
- How can developing country governments weigh up benefits such as environmental protection alongside policy commitments such as economic growth and poverty reduction? How should they deal with perceived trade-offs between these objectives?
- What are the opportunities and limitations of village-level micro grids and solar home systems in powering economic productivity?
- Can micro grids and solar home systems be developed in a manner that reflects the possibility of their eventual connection to a national electricity grid? What additional costs are associated with developing micro grids and solar home systems in this way?

2.4 Unreliable electricity systems

Throughout the workshop and meetings, reference was made to the unreliability of electricity systems in East Africa. It was observed that blackouts significantly undermine the productivity of firms- indeed, Dr. Alem predicted that in Ethiopia, a more reliable power supply would increase GDP by 4 to 5%.

While load shedding is responsible for many disruptions, Jay Taneja explained that unreliability is not only due to lack of supply: “In Kenya, you would think that with enough supply, you wouldn’t have outages, but this isn’t true.” Instead, he explained that the nature of the grid is that small maintenance issues and old equipment can cause local grid failures that have big economic costs. He is working to identify opportunities for predictive maintenance of electricity systems.

Mike Gratwicke, Managing Director of Rift Valley Energy, a generation and distribution company, suggested that isolated distributed generation offered one practical solution to maintaining grid reliability. When there is a grid failure, the region with isolated generation can run in island mode. He reported that distributed generation has had significant positive outcomes in areas where Rift Valley Energy operates. Once it ran a grid in island mode for four months after catastrophic grid failure.

Key takeaways for EEG

- How do unreliable electricity systems affect productivity? Which industries are most affected?
- What are the main barriers and solutions to improving reliability?

2.5 Data collection and analysis

Throughout the workshop and meetings there was a cry for more accurate data and forecasting on both electricity supply and demand.

Stephen Mabada, an engineer on TANESCO’s Board, outlined the different systems through which data is collected in Tanzania. He said that 80% of connected households in Tanzania are on pre-paid meters, and industrial customers are connected via smart meters that are read remotely. These data could be valuable to EEG researchers in terms of understanding demand for electricity and the impacts of changes in tariffs over time.

Additionally, TANESCO’s Systems Control Centre collects data on power outages to enable preventive system maintenance. An industrial survey (currently being implemented) could provide useful information for future EEG research. Eng. Mabada clarified that the Planning Unit within TANESCO is in charge of demand forecasting, while EWURA, the energy regulatory authority, collects information on electricity and petrol tariffs (studies, rates, etc.).

Despite these systems, there was some concern about the accuracy of the data collected, and whether the data is being used sufficiently and appropriately to make decisions. It was noted that household meters are not read regularly, which means that bills may not be reflective of actual usage. Mr. Gratwicke noted that the substantial data generated by pre-paid meters is also under-analysed.

It was also suggested that politics may act as a barrier to improved data collection and use. There are some people within institutions that do not want a high level of transparency.

Mr. Taneja questioned how technology can be used to improve data collection with the energy sector. Some technological solutions were suggested that could improve data accuracy and prevent power theft, which remains a big challenge in Tanzania. Smartphones, for example, can be used as sensors to detect non-technical losses.

Mr. Taneja further asked how we can use existing data for better planning in the energy sector, and to study the impacts of pre-paid meters on power theft? How can we use it to understand electricity demand, and how demand will change over time?

Michael Jordan observed that demand forecasting is difficult when there is such a high level of suppressed demand. This point was echoed by both Hussein Kamote from the Confederation of Tanzania Industries, and Ali Mufuruki from Infotech Investment Group. Compared to other countries in the region, which consume 500 kWh per person per year, Mr. Kamote said that Tanzanians consumes on average only 150 kWh per year.

Ali Mufuruki predicted that these consumption levels are likely to evolve in unpredictable ways. Mobility has caused the profile of people to become dynamic. Rural people are beginning to demand the same lifestyle as people in developed regions and cities, and as a result begin to demand more electricity.

Mr. Kamote explained that 80% of TANESCO's revenue comes from only 1700 power users, 8% of which are industry users. Modelling the future power consumption of industrial consumers must be a central part of overall demand forecasting.

Beyond the challenge of predicting how average households and industrial consumption levels will increase, energy demand forecasting in Tanzania is complicated further by a high population growth rate of 8% per year and an expected increase in energy access of 10% per year.

Despite these challenges, Michael Jordan emphasised that accurate forecasting is needed to prevent having to repeatedly replace transformers to handle increased load. A confident estimate of future demand is also important for convincing investors to bet on increased capacity, explained Kenneth Mutaonga from the President's Delivery Bureau, United Republic of Tanzania.

One solution suggested was that pricing experiments could be piloted to more accurately understand how different tariff structures affect demand. Even so, Jay Taneja argued that there is ultimately a need to work some uncertainty into the planning processes

Participants felt that EEG could add a great deal of value by supporting improved data collection and analysis. Ms. Mtawazo of MEM commented that a useful research output would be the

Key takeaways for EEG

- To what extent, and with what accuracy, does there exist data and forecasting capabilities on energy supply and demand in developing countries?
- How can forecasting be improved, and responsive to the needs of public and private investors?
- How can data be used to improve energy sector planning?

provision of evidence to the Ministry regarding the ways in which electricity is likely to have the greatest impact on economic growth.

3 Summary

EEG Deputy Research Director Paul Gertler explained in his closing remarks at the workshop that it had been a useful platform to, “hear from people that know more than the literature to fill in gaps”, given that “literature is always behind what’s happening on the ground.”

The policy workshop and meetings in Tanzania revealed a series of research gaps, and this knowledge should contribute to the designing of EEG’s research agenda. The workshop raised significant debates about how electricity shapes and drives growth, and how productive uses of electricity can be promoted that have the most inclusive and positive impacts on employment, poverty and gender equality. Questions were advanced about how politics and governance structures influence electricity tariffs, and how tariffs in turn affect the economic viability of utilities and rural electrification programmes.

Participants highlighted the challenges of integrating large-scale renewables into the national electricity grid, and the great potential to use of off-grid solar systems to promote energy access, though they questioned their usefulness for powering economically productive uses. They revealed the detrimental effect that unreliable electricity systems have had on business productivity, and barriers and solutions to improving supply. Lastly, the workshop and meetings highlighted the inadequacies of data collection and analysis in East Africa, and the importance of more accurate demand forecasting.

Ultimately, EEG’s goal is to generate high-quality evidence that influences energy policy and drives sustainable and inclusive economic growth in developing countries. To this end, the Tanzania policy engagement workshop and meetings succeeded in bringing researchers together with energy stakeholders and decision-makers in East Africa, and identifying key research gaps for EEG to address going forward.

Annex A Workshop programme

Energy for Economic Growth Policy Workshop

14th July
Zanzibar Room, Hyatt Regency, Kivukoni Front, Dar es Salaam

Programme

Time	Activity
9:00	**Welcome** Prof. Dr. Samuel Wangwe, Chairman of Daima Associates Ltd.
9:15	**Keynote: Energy policy in Tanzania: opportunities and challenges** Prof. Justin Ntalikwa, Permanent Secretary of the Ministry of Energy and Mineral Resources on behalf of H.E. Prof. Sospeter Muhongo, Minister of Energy and Minerals, Government of Tanzania
10.00	**Addressing energy policy challenges in East Africa through EEG** Professor Catherine Wolfram, University of California, Berkeley
10.30	**Coffee break**
11.00	**Session #1:** Energy access & supply *This session will discuss barriers to electrification faced by households and businesses, as well as electrification's development gains.* Moderator: Professor Samuel Wangwe, Chairman of Daima Associates Ltd. Panelists: 1. Sophia Mgonja, Deputy Managing Director- Distribution and Customer Services, TANESCO 2. Samson Ondiek, Chief Officer- Corporate Planning, Kenya Power 3. Margaret Matinga, Independent Consultant 4. Ian Shanghvi, Head- Natural Resource Management Portfolio, Economic and Social Research Foundation, Tanzania 5. Erica Mackey, Chief Operating Officer, Off-Grid Electric *6.* Yonas Alem, Research Director of Environment for Development Initiative, Researcher at the University of Gothenburg
13.00	**Lunch**
14.00	**Session #2:** Extractives & generation *This section will discuss the factors that influence decisions relating to the expansion of generation and which energy sources to use to meet demand.* Moderator: Dr. Donald Mmari, Executive Director, REPOA Panelists: 1. Kenneth Mutaonga, Manager for Energy, President's Delivery Bureau, Tanzania 2. Yosef Abramowitz, President, Gigawatt Global 3. Mary Susan Abbo, Managing Director, Centre for Research in Energy and Energy Conservation, Makarere University

	4. Ibrahim Kasirye, Deputy Director, Economic Policy Research Centre, Uganda 5. Hussein Kamote, Director of Policy and Research, Confederation of Tanzania Industries
15.30	**Session #3**: New technologies for enhancing grid performance and energy sector planning *This session will discuss the main barriers to improving reliability, the role of technology in assisting energy sector planning, and the degree of system knowledge of distribution companies.* Moderator: Professor Paul Gertler, University of California, Berkeley Panelists: 1. Moses Murengezi, Advisor to the Permanent Secretary, Ministry of Energy and Minerals Development, Uganda 2. Ali Mufuruki, Chairman of the Tanzania CEO Roundtable & Chairman and CEO of Infotech Investment Group Ltd. 3. Jay Taneja, IBM Research Africa 4. Carlo Papa, ENEL Foundation 5. Mike Gratwicke, Technical Director, Rift Valley Energy
17.00	**Closing Remarks**

Background & Objective

The Energy for Economic Growth (EEG) programme is an exciting new research initiative led by Oxford Policy Management and the Center for Effective Global Action at the University of California, Berkeley. EEG is funded by the UK Government, through UK Aid.

EEG brings together world-class academics to produce new evidence on the links between energy and economic growth in low-income countries. This new evidence will be specifically geared to meet the needs of policymakers, filling in the knowledge gaps that obstruct their ability to develop of sustainable, reliable and inclusive energy systems. Find more information about EEG here.

In its first year, EEG will hold a policy workshop in Dar es Salaam. Participants will include senior energy policy-makers, researchers and representatives from the private sector from several East African countries. The workshop will enable a discussion on the energy challenges facing those countries, and consider how new research may contribute to addressing those challenges. The lessons learned from this workshop will shape the EEG research agenda and help the programme to deliver its objective of policy impact.

Format

The workshop will focus around three sessions, in which panellists will deliver 6-minute speeches and then engage in facilitated Q&A and discussion with the audience. The three panel sessions will focus on the following topics:

1) **Expanding access to electricity**: what are the key barriers to electrification for households and small businesses, and what are the known costs and socio-economic benefits associated with different electrification approaches?

2) **Meeting energy demand**: what factors go into decisions about whether and by how much to expand generation capacity in a given country? How do policymakers decide which energy sources to leverage in order to meet growing demand? What should the role be for extractive and renewable sources, respectively, in generation?

3) **Technologies for energy sector planning and grid optimization**: what level of visibility do distribution companies currently have in their systems, and how can technology help us improve both reliability and efficiency moving forward?

Logistical information

- **Venue:** the venue of the workshop is the Zanzibar Room, Hyatt Regency Hotel, Kivukoni Front, Dar es Salaam
- **Timings:** the workshop will start at 9am and finish at 5pm
- **Catering:** lunch and refreshments will be provided.

Annex B List of meetings

Table 1: Meetings between EEG Research Director and/or Deputy Research Director and senior energy policymakers, researchers and private sector stakeholders

Date	Stakeholder(s)	Organisation
13/07/2016	Patrick Rutabanzibwa	Former Permanent Secretary of the Tanzanian Ministry of Energy and Minerals (MEM), and Chairman of PanAfrican Energy
15/07/2016	Mr. Bengiel Msofe, Mr. Proper Msellemand Mr. Mohamed A. Sauko	Director of Technical Services, Director of Policy and Planning and Project Engineer, Tanzanian Rural Energy Agency
15/07/2016	Ali Mufuruki	CEO, Infotech Investment Group
15/07/2016	Kenneth Mutaonga and Ramadhan Milinga	Manager of Energy & Director of Infrastructure, President's Delivery Bureau
15/07/2016	Leanne Jones	Climate and Energy Advisor, UK Department of International Development - Tanzania
15/07/2016	Stephen Mabada, Engineer	TANESCO Board Member
18/07/2016	Michael Jordan	United States Agency for International Development - Tanzania
18/07/2016	Florentina Mutafungwa	Programme Officer, World Bank
18/07/2016	Wanja Mtawazo	Director of Policy and Planning, Tanzanian Ministry of Energy