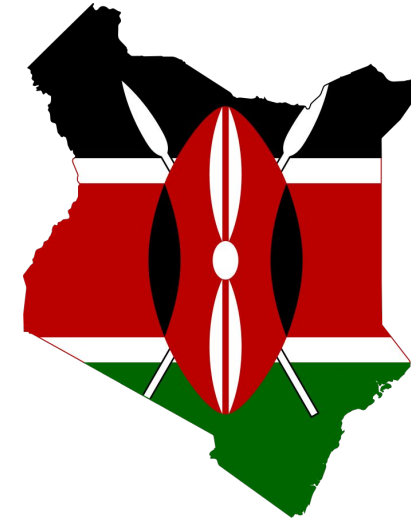


ENERGY DEMAND ANALYSIS FOR ELECTRIFYING THE STANDARD GAUGE RAILWAY (SGR) IN KENYA



Martin Mutembei: mmutembei@strathmore.edu

Anne Nganga: anganga@strathmore.edu

Energy Modelling Platform for Africa (EMP-A)

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Outline (for reference – do not include in final presentation)

- Context, challenges & Research Question
- [Country name] Reference Energy System
- Scenarios
- Results
- Conclusions, Policy insights, & Future Work

Context, Challenges, and Main Findings

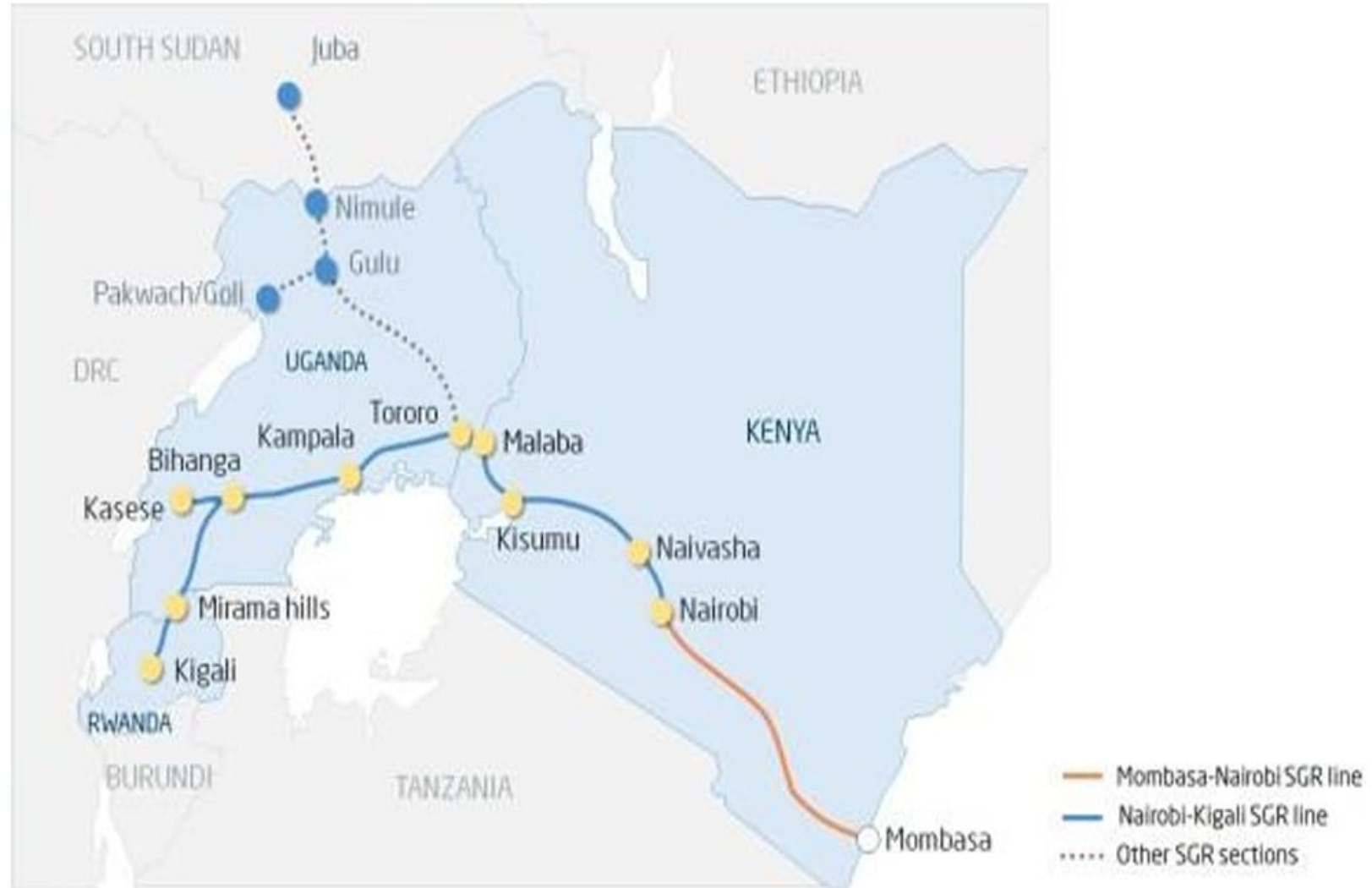
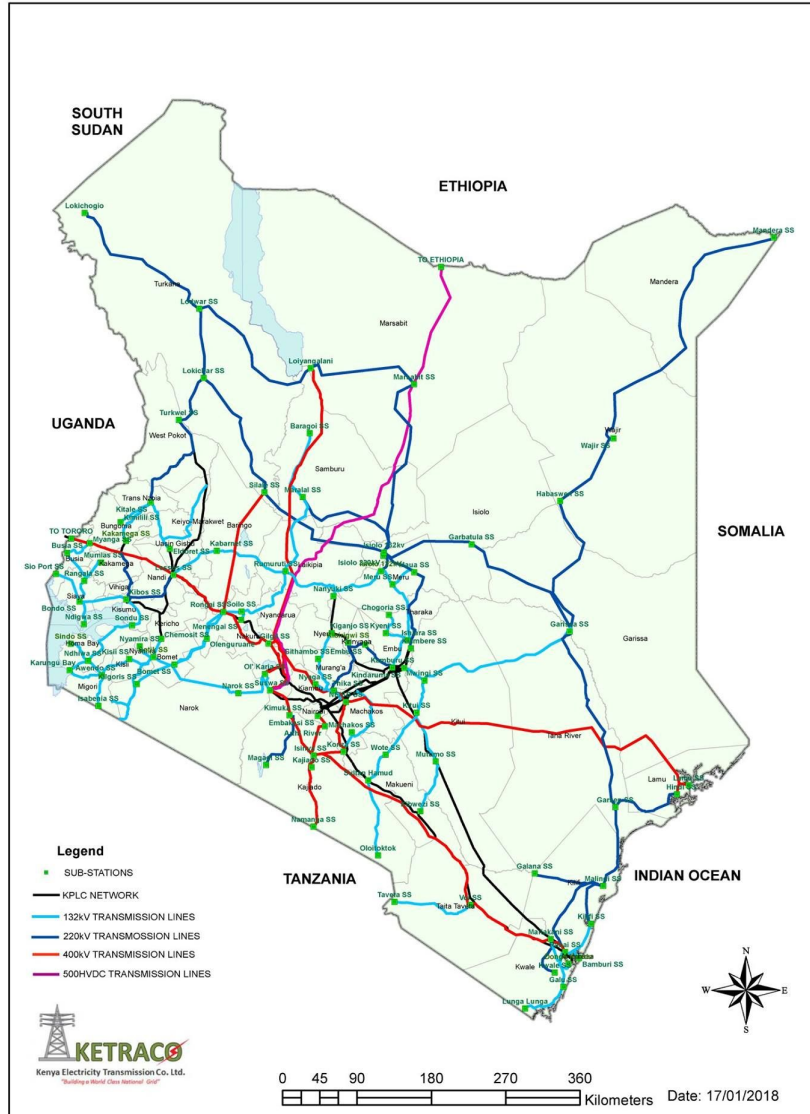
Electrifying the Standard Gauge Railway (SGR) in Kenya represents a strategic move towards enhancing operational efficiency, reducing greenhouse gas emissions, and aligning with global sustainability goal.



Context, Challenges, and Main Findings

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NATIONAL GRID NETWORK BY 2030



Source: ALG Newsletter, 2017

Context, Challenges, and Main Findings

Challenges:

1. Decarbonization of long haul freight and passenger mode of transport,
2. Reduce the trade deficit by reducing fuel import bill.

Questions:

1. How would the energy demand change if there was an improvement in the diesel engine efficiency?
2. What would be the energy demand to electrify the diesel SGR train for both freight and passenger?

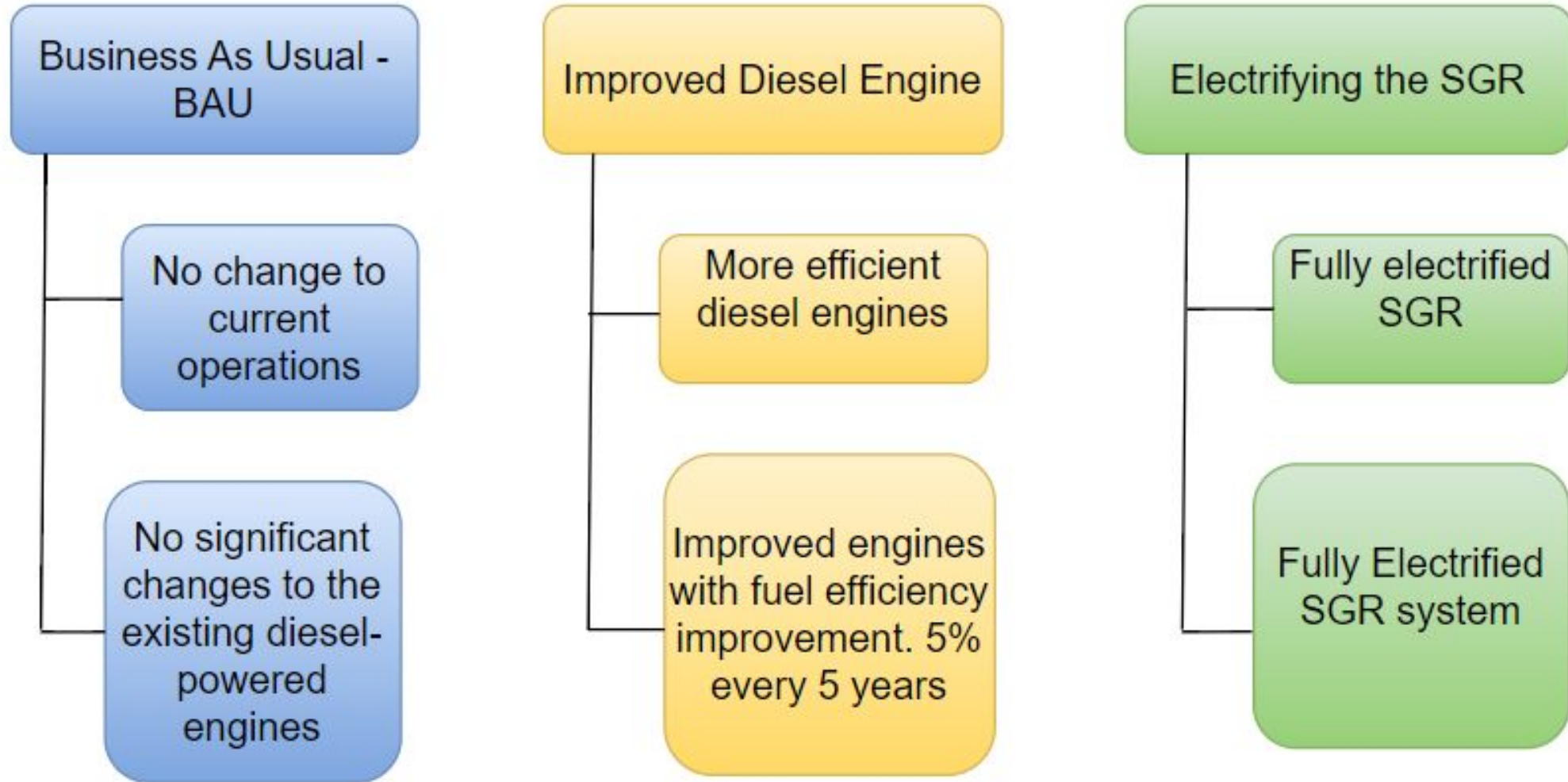


Scenarios

Using the Model for Analysis of Energy Demand (MAED) the following scenarios were investigated:

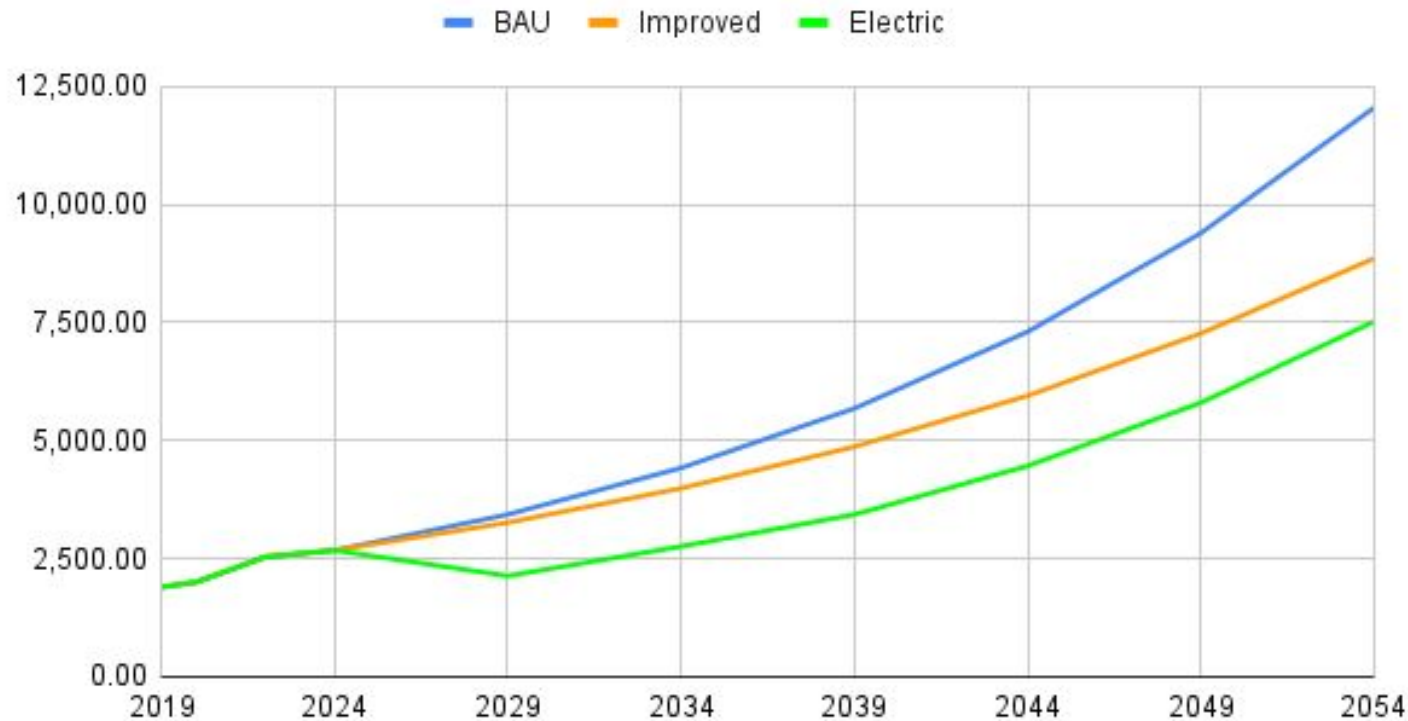
Scenario Label	Scenario Description	Key Assumptions
BAU	Continuation of the current operations	No significant changes or upgrades to the existing diesel-powered SGR
Improved Diesel Engine	Implementation of more efficient diesel engines,	Enhanced diesel engines that achieve a fuel efficiency improvement of 5% every 5 years, reducing the diesel consumption
Electrifying the SGR	Electrification of the SGR, transitioning from diesel-powered locomotives to electric ones	Fully electrified SGR freight and passenger train system.

Scenarios



Results

Energy Demand per Scenario



The energy demand for electric scenarios in the context of railway operations is lower than that of diesel-based scenarios, such as Business As Usual (BAU) and Improved Diesel Engine scenarios.

Electric engines are typically more energy-efficient than diesel trains.

Conclusions and Policy Insights

Based on the model analysis

1. Adoption of electric train will also reduce Kenya's balance of trade imbalance due to shift from importation of motor fuels.
2. The switch to electric powered trains will help flatten the demand curve. Cost of production will be taken by the train service and not passed on to the public for off-peak idle capacity.
3. The government could assist in fast tracking of projects like the High-Grand Falls Dam, a 700 MW project to meet the energy demand growth from the transport sector considering the government e-mobility agenda
4. The Technical Working Group on Demand Stimulation in the Energy Policy 2018 review process, could capture the aspect of not only developing demand stimulation strategies for the public, but also by government through initiatives like electrifying the SGR and government vehicles.

Future Work

- ❖ Kenya National Bureau of Statistics to develop a public accessible database that captures data for the disaggregated transportation industry in Kenya.
- ❖ To enhanced data accuracy, there is a recommendation to Incorporate real-time operational data and more granular energy consumption metrics to refine the model's accuracy.
- ❖ Extending the analysis and model to capture the Uganda - Malaba - Kampala SGR extension and then the East Africa Region looking at the East African power pool
- ❖ Grid analysis for the electrification plan requirements