

REGULATORY IMPACT ASSESSEMENT OF THE KENYA NATIONAL TRANSMISSION GRID CODE AND THE KENYA NATIONAL DISTRIBUTION CODE



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This Regulatory Impact Assessment (RIA) report discusses the potential regulatory impacts of adopting the new Kenya National Transmission Grid Code (KNTGC) and the Kenya National Distribution Code (KNDC) for the operation and maintenance of Kenya's electric power generation, transmission, and distribution systems.

A grid code is a set of documents that legally establishes technical and operational requirements for the connection to and use of an electrical system in a manner that will ensure reliable, efficient and safe operation.

The concept and application a grid code in Kenya is not new. The Energy Regulatory Commission developed a draft Kenya Electricity Grid Code in 2008. Although the 2008 code was not officially gazetted, the code requirements have since been applied to all licences in the electric supply industry in Kenya by the ERC. The 2008 code is comprised of technical regulations and practices in the generation, transmission and distribution sectors.

A weakness in the draft Kenya Grid Code of 2008 is that it does not include sufficient consideration of technological advancements, international best practices in grid operation and maintenance and, in particular, the integration of renewable resources. The 2008 code is now outdated in several areas. As the penetration level of variable generation in Kenya's electric generation mix increases, the operation of the power system will become significantly more challenging. It is imperative that the Kenya system be well equipped to deal with intermittency from renewable resources, and that the Kenya grid codes include adequate performance requirements to ensure safe and reliable operations, and that the system operates efficiently and economically, thereby attracting new investments in generation and transmission infrastructure.

Another major advance since 2008 has been the development of the East Africa Power Pool and East African Community Interconnection Code (EAPP IC). The EAPP IC imposes certain minimum requirements on the Member Countries of the EAPP, which includes Kenya. The objective of the EAPP IC is to assure the reliable, safe, and efficient operation of the East African interconnected system. The EAPP IC places obligations on Kenya, and thus on the ERC, the Kenya National Transmission System Operator, and Users of the interconnected system.

Established criteria and performance standards that address connection requirements for generation, transmission and end-user facilities are crucial to avoid adverse impact on the safety, reliability, stability and security of Kenya's national electric transmission and distribution system. Without adequate performance criteria for system operations, connection, planning, scheduling, dispatch, protection, metering, communication and control, Kenya's national electric transmission and distribution system's safe, reliable, secure and economic operation cannot be ensured.

The KNTGC and the KNDC were developed during a two-year long stakeholder consultative process coordinated by the ERC and the Ministry of Energy and Petroleum that included the participation of KPLC, KenGen, KETRACO, the Geothermal Development Corporation, and thermal and renewable Independent Power Producers (IPPs). The codes are based on best practice from the EAPP IC and other regional grid codes, including the South African Grid Code (2012), grid codes from Namibia, Zambia, and Rwanda, as well as international grid codes from India, Jordan, the UK, Germany, Denmark, the U.S., and Canada. World-class best practices were reviewed and incorporated into the Kenya code as deemed appropriate. Working with the ERC, the stakeholder group reviewed proposed grid code provisions, reviewed final drafts of the codes, and submitted extensive comments, which were incorporated into the final drafts, logged for future review by the ERC, or considered as potential items for derogation to the codes.

The items of potential derogation are reflected in the RIA as indications of the impacts on the sector of compliance. The impacts are quantified in terms of the estimated length of time and the types and magnitudes of investments and organizational resources required for the entities to achieve full compliance.

The ERC will enforce and monitor compliance with the technical and operational standards of the KNTGC and the KNDC. When gazetted, the codes will allow ERC to legally enforce requirements on Kenyan entities to at least the minimum EAPP IC standards. In addition, there are specific requirements included in the codes that reflect Kenya standards or operational practices, and which may be more stringent than the EAPP standards, as judged appropriate, to maintain high system efficiency and reliability in Kenya.

Once gazetted, the KNTGC and KNDC will also form the technical basis of grid connection agreements, licences, and commercial contracts such as Power Purchase Agreements. As such, the codes will be part of every grid connection agreement, and will supplement contracts and licences with technical and organisational requirements.

The KNTGC and KNDC will become permanent, but living, documents providing technical rules encompassing all entities connected to or using the Kenya national electric power system. The grid codes will need to be updated as driven by evolving technology standards and policy considerations. The ERC will appoint a Grid Code Review Committee for each of the codes comprised of industry stakeholders to review and make recommendations on the revision and update of the codes in an on-going consultative process. The Committees will assure that the codes continue to best meet the needs of the Kenyan electric industry and electric power consumers.

The technical rules as stipulated in the grid codes differ on some areas from current practices, which may lead to areas of non-compliance. Each entity with grid code obligations will be responsible for identifying non-compliance issues in a self-reporting process, and must apply for a derogation, or deferral of obligations, which must be accompanied by a mitigation plan stipulating when the entity will be in compliance, and the timeline of actions required for compliance. The ERC will review each application for derogation with due consideration to alternatives, cost impacts, and consequences

for the entity and the transmission and distribution systems, and will approve such derogations and mitigation plans if deemed reasonable and appropriate.

Section 2 of this document provides a Regulatory Impact Statement that summarizes the impacts of the codes on the sector and provides an overview of the time and resources required for compliance.

Section 3 of this document contains a Regulatory Impact Assessment that provides details of the estimated time and the technology and organizational investments necessary for Kenyan entities bound by the codes to fully comply with its provisions.

Appendix A contains all comments received by Kenya electricity sector stakeholders during the consultative process, and the status response to the comments in the preparation of the final versions of the grid codes.

The evaluation conducted in this Regulatory Impact Assessment (RIA) of the Kenya National Transmission Grid Code (KNTGC) and the Kenya National Distribution Code (KNDC) indicates that the Kenyan energy sector, including KPLC, KenGen, KETRACO and Independent Power Producers (IPPs) will be able to comply with most of the provisions of the grid codes when they are gazetted.

KPLC, which currently functions as the Transmission Network Service Provider, the Distribution Network Service provider, and the Kenya National Transmission System Operator, will be in compliance with most provisions of the codes. However, there are a number of key areas in which KPLC will need to seek derogations from the ERC.

The RIA has identified twelve categories of requirements with which entities will be initially non-compliant and that will require the investment of time, staff resources, and financing in order to achieve full compliance. Among these twelve areas, Automatic Generator Control (AGC) and SCADA compatibility are the most significant issues.

KPLC should be able to achieve compliance in most areas within 3 years, with an approximated additional 2-5 years required for full compliance. Investments in information systems, equipment (including automated centralized AGC), software, and systems integration will be required, as well as the development and implementation of new business processes, operational procedures, engineering analysis and planning, power systems modelling, and training. KPLC, acting as the Kenya National Transmission System Operator, will also need to engage in inter-regional coordination activities with other EAPP member countries, which, according to KPLC estimates, may take up to 7 years to be fully integrated and functional.

In order to fully implement AGC, the Kenya National TSO will need to coordinate hardware, software, and infrastructure upgrades with KenGen and the IPPs. In some cases, generators will need to install new control equipment, and develop and integrate new business processes and operational procedures with the TSO. Additional Remote Terminal Units (RTU) placement for ensuring adequacy in SCADA system observability at the Kenya National Control Centre will be a key item for monitoring grid code compliance.

KenGen currently does not have AGC capability. Upgrades of the existing SCADA and incorporation of SCADA in other major KenGen power plants will be necessary in order to ensure AGC capability and observability of the system for the Kenya National TSO. The timeline of the KenGen SCADA Phase II implementation, currently on hold, will be critical for the overall integration of SCADA signals with the National Control Centre and KenGen's new Central Dispatch Control Centre.

Existing commercial agreements such as PPAs will need to be reviewed in order to identify any non-compliance issues with code provisions and as potential items for derogations. Any issues relating to situations where code requirements affect the income of IPPs are to be taken up separately with the ERC outside of the grid code gazetting process.

Stakeholders will need to commit time and effort to identify the non-compliances with specific sections of the grid code for derogation application. When the codes are gazetted, the ERC will need to have the capacity to review derogation applications, approve or deny the requests and the associated mitigation plans, and monitor progress towards compliance. While most non-compliance issues will be self-reported by Kenyan entities that are subject to the code, over time the ERC will need to develop monitoring and inspection capabilities and resources, particularly as the power sector grows and the number of industry participants increases. Stakeholders will also need to commit staff time to participation on the Grid Code Review Committees, in order to assure that the codes remain up to date and continue to best meet the needs of the Kenya power sector.

Subject to the ERC's approval of derogation requests and mitigation plans, the time frames for compliance indicated by the stakeholders should be sufficient to develop a detailed schedule of activities, develop investment plans, identify sources of investments and donor funding, create engineering and organizational specifications for the functional requirements, and then source and procure equipment, software, and services, and finally implement and integrate the systems.

The overall cost impact, including systems and labour, is approximated to be \$38 million USD. KenGen's SCADA compatibility is the largest cost component at \$24.4 million USD, followed by KPLC's AGC capability at approximately \$5 million USD. There are plans to proceed with these, and other items.

While these required investments are necessary to comply with the grid codes, and thus may be considered to be direct cost impacts of implementing the codes, it should be understood that these major items are essential for power system reliability, safety, and security and should be in place irrespective of the grid code gazetting.

The Kenyan energy sector, including KPLC, KenGen, KETRACO, and Independent Power Producers (IPPs), will be able to comply with most of the provisions of the KNTGC and the KNDC when they are gazetted.

The Regulatory Impact Assessment has identified twelve categories of requirements with which entities will be initially non-compliant and that will require the investment of time, staff resources, and financing in order to achieve full compliance. Among these twelve areas, Automatic Generator Control (AGC) and SCADA compatibility are the most significant issues. Table 3-1 summarizes all twelve areas along with impacted entities for each area.

As indicated in Table 3-1, KPLC, currently functioning as the Transmission Network Service Provider, the Distribution Network Service Provider, and the Kenya National Transmission System Operator (TSO) will be impacted by all twelve identified areas.

Table 3-1 Impacted Areas and Functions

No.	Grid Code	Function	Current Capability	Included in RIA?	Impacted Entity	Comment
1	Transmission	Automatic Generation Control (AGC)	No	Yes	KPLC, KenGen, IPPs	
2	Transmission	SCADA Compatibility	No	Yes	KPLC, KenGen, IPPs	KenGen SCADA Phase II Required
3	Transmission	Handling of Emergency Situations	Partly	Yes	KPLC, KenGen, IPPs	
4	Transmission	Communication/Metering/Protection	Partly	Yes	KPLC, KenGen, IPPs	
5	Transmission	Operational Process Refinement	Partly	Yes	KPLC, KenGen, IPPs	
6	Transmission	N-1 Criteria for System Security	No	No	KPLC	
7	Transmission	Ancillary Services/Power Trade	Partly	Yes	KPLC	Included in AGC
8	Transmission	Cyber Security	Partly	No	KPLC, KenGen, IPPs	

No.	Grid Code	Function	Current Capability	Included in RIA?	Impacted Entity	Comment
9	Transmission	Harmonizing PPA with Grid Code	Not Applicable	No	KPLC	
10	Distribution	Grounding Requirement	No	Yes	KPLC	
11	Distribution	Application Form for Required Data Collection, Record, and Update	No	Yes	KPLC	
12	Distribution	Derogation Register and Processing	No	Yes	KPLC	

In order to fully implement AGC, which is a requirement of the KNTGC for the Kenya National TSO, KPLC needs to coordinate hardware, software, and infrastructure upgrades with KenGen and the IPPs. KPLC should be able to implement AGC at the National Control Centre (NCC) within a 4 year timeframe including project specification, implementation, testing, and training. The Kenya National TSO will also need to engage in inter-regional coordination activities with other EAPP member countries, which, according to KPLC estimates, may take up to 7 years to be fully integrated and functional. Investments in information systems, equipment (including automated centralized AGC), software, and systems integration will be required, as well as the development and implementation of new business processes, operational procedures, engineering analysis and planning, power systems modelling, and training in order to achieve compliance for all of the identified areas.

KenGen currently does not have AGC capability that is compatible with centralized NCC AGC control. KenGen SCADA infrastructure is limited to only six generating power plants, and will be obsolete within the next five years. The completion of the currently on-hold KenGen SCADA Phase II implementation is required in order to be compliant with requirements for providing AGC, Ancillary Services, General Data Acquisition Information requirements, Communication Facility and Tele-control requirements, and SCADA and Communication Infrastructure at points of supply. Upgrades of the existing SCADA and incorporation of SCADA in other major KenGen power plants will be necessary in order to ensure AGC capability and observability of the system for the Kenya National TSO. The timeline of the KenGen SCADA Phase II implementation will be critical for the overall integration of SCADA signals with the National Control Centre and KenGen's new Central Dispatch Control Centre. It is critical that KenGen ensures the SCADA Phase II project is completed on time so that the integration and testing of AGC from the NCC to KenGen's Central Dispatch Control Centre can be accomplished within the indicated timeframe.

IPPs that operate generating units with significant capacity will also be required to have AGC functionality and/or upgraded communications technology to be integrated with the Kenya National TSO. IPPs will need to: (i) identify grid compatibility issues and mitigation measures, (ii) install new

control equipment and generation forecasting software as appropriate; and (iii) develop as well as integrate new business processes and operational procedures with the TSO. No non-compliance issues have been reported by the IPPs so far. Therefore, no assessment of impacts for IPP can be done at this stage.

Existing commercial agreements such as PPAs will need to be reviewed in order to identify any non-compliance issues with code provisions and as potential items for derogations. Any issues relating to situations where code requirements affect the income of IPPs are to be taken up separately with the ERC outside of the grid code gazetting process.

Stakeholders will need to commit time and effort to identify non-compliance with specific sections of the grid code for derogation applications. When the codes are gazetted, the ERC will need to have the capacity to review derogation applications, approve or deny the requests and the associated mitigation plans, and monitor progress towards compliance. While most non-compliance issues will be self-reported by Kenyan entities that are subject to the code, the ERC will need to develop monitoring and inspection capabilities and resources, particularly as the power sector grows and the number of industry participants increases. Stakeholders will also need to commit staff time to participation on the Grid Code Review Committees, in order to assure that the codes remain up to date and continue to best meet the needs of the Kenya power sector.

Subject to the ERC's approval of derogation requests and mitigation plans, the timeframes for compliance that were provided by the stakeholders for the RIA should be sufficient to develop detailed scopes and schedules of activities, develop investment plans, identify sources of investments and donor funding, create engineering and organizational specifications for the functional requirements, source and procure equipment, software, and services, and finally implement, conduct training, and integrate the systems.

Based on the input received from KPLC and KenGen on the areas of non-compliance, the schedule of activities, resource needs, as well as labour and system costs have been developed and presented in Table 3-2.

The overall cost impact, including systems and labour, is approximately \$38 million USD. KenGen's SCADA compatibility is the largest cost component at \$24.4 million USD, followed by KPLC's AGC capability at approximately \$5 million USD.

While these required investments are necessary to comply with the grid codes, and thus may be considered to be direct cost impacts of implementing the codes, it should be understood that these major items are essential for power system reliability, safety, and security and should be in place irrespective of the grid code gazetting.

Table 3-2 Resources and Cost Impacts

Function	Y1		Y2		Y3		Y4		Total	Total Cost
	Person-days	Labor Cost	Person-days	Labor Cost	Person-days	Labor Cost	Person-days	Labor Cost	Person-days	\$
AGC Labor	120	19,200	145	23,200	350	56,000	310	49,600	925	148,000
AGC System										5,000,000
SCADA Compatibility										24,400,000
DLC Labor	57	9,120	285	45,600	190	30,400	100	16,000	632	101,120
DLC System										2,000,000
FACTS Labor	46	7,360	250	40,000	150	24,000			446	71,360
FACTS System										2,000,000
UVLS Labor	62	9,920	125	20,000					187	29,920
UVLS System										2,000,000
Operational Process	60	9,600								9,600
Grounding Requirement Documentation	600	96,000								96,000
Application Form Redesign	100	16,000								16,000
Derogation Register	4,000	640,000	2,000	320,000	1,000	160,000	500	80,000	7,500	1,200,000
Total	5,045	807,200	2,805	448,800	1,690	270,400	910	145,600	10,450	37,072,000

Notes:

1. Labour cost calculated at \$20/hour , 8 hours a day, 5 days a week
2. Labour cost does not include technical assistance from third party
3. Labour cost is estimated based on stakeholder's in-house resource participation
4. AGC system cost is based on System Operational Gap Analysis (SOGA) under GMSP Task 2 as donor project
5. Estimate of SCADA compatibility project is obtained from KenGen, and it includes KenGen's Central Dispatch Control Centre (new), three RCC, engineering management, administrative and all infrastructure costs
6. Level of effort in person days excludes the timeline required for obtaining funding and only includes involvement of the stakeholder in developing: Technical Specification; RFP; Vendor Selection; Factory Acceptance Testing; Site Acceptance Testing; and Training.
7. System cost for DLC, FACTS, and UVLS are third party estimates
8. Labour costs for DLC, FACTS,UVLS, Operational Process, Grounding Requirement Documentation, Application Form Redesign, and Derogation Register are as per KPLC
9. Due to uncertainties in scope and timeline, the estimates may have up to $\pm 25\%$ variances.

Table 3-3 provides details on the KNTGC and the KNDC provisions for which Kenyan entities will potentially need to apply for derogations with the ERC, along with an estimate of the time required to fully mitigate the non-compliance. The entities that will potentially request derogations, and the functional areas and investments required to achieve compliance are indicated in the table as well. Table 3-3 captures the significant areas that may have non-compliance issues as noted by KPLC, KenGen, KETRACO, and Thika Power.

In Table 3-3, the “Grid Code Provision” column references the relevant section of each code. The column “Impacted Code Requirements” shows comments from an entity with respect to non-compliance for a particular section of the grid code. “Estimated Time to Comply” provides the timeframe estimated by the commenting entity for compliance (except for Items 6, 20, and 21 for which third party estimates have been used). The “Entity” column reports the entity that provided the comment. The “Functional Areas Impacted” column shows corporate or engineering functional areas that will be impacted by the non-compliance. There are 11 impacted functional areas that will require time/resource/financial investment for grid code compliance. These areas are:

1. Business Processes
2. Information System
3. Commercial Agreement
4. Equipment
5. Software
6. System Integration
7. Operational Procedure
8. Training
9. Power System Modeling
10. Inter-regional Coordination
11. Engineering Planning and Analysis

Each of these functional areas is described in Table 3-4.

Table 3-3 Code Provisions – Potential Derogations and Time and Resources Required for Compliance

Item	Grid Code Provisions	Impacted Code Requirements	Estimated Time to Comply	Entity	Functional Requirements for Compliance
1	KNDC, General Provisions: Section 3.12.4	<u>Derogation Registers</u> “Not currently compliant. An appropriate register needs to be developed and maintained.” (KPLC – 3.12.4)	3 years	KPLC	Business Processes, Information Systems, Commercial Agreements

Item	Grid Code Provisions	Impacted Code Requirements	Estimated Time to Comply	Entity	Functional Requirements for Compliance
2	KNDC, Connections: Sections 5.1.5, 5.1.10, 5.2.7, 5.2.8, 5.2.9, 5.1.6	<p>a) <u>Supply Application for Medium Connection</u> “Current KPLC Supply application form requires a revision to capture additional customer data as per KNDGC. IT Systems like ICS and DCS may require modifications” (KPLC 5.1.5)</p> <p>b) <u>Application Approval</u> “KPLC to establish a reporting structure to ERC of such exceptions, across all the Counties” (KPLC 5.1.10)</p> <p>c) <u>Harmonics</u> KPLC “would have to invest in equipment that monitor harmonics. Monitoring may be impractical for all customers but it is suggested that focus be on large consumers, with sampled Audits for the other Customers.” (KPLC – 5.2.7)</p> <p>d) <u>Flicker</u> “Time required to determine the means of monitoring, cost implications” (KPLC – 5.2.8)</p> <p>e) <u>Grounding</u>: “Develop a document detailing the grounding requirements to be available to all applicants.” (KPLC – 5.2.9)</p> <p>f) <u>Customer Education</u>: “Many customers may not present that depth of information. Customer education required” (KPLC 5.1.6)</p>	3 years all items	KPLC	Business Process, Business Information Systems, Engineering Planning and Analysis, Equipment, Training
3	KNDC, Planning: Section 6.1.4	<p><u>Customer Education</u> “Not being done currently. Customers to be sensitized and compliance enforced (for the needed data)” (KPLC 6.1.4)</p>	3 years	KPLC	Training

Item	Grid Code Provisions	Impacted Code Requirements	Estimated Time to Comply	Entity	Functional Requirements for Compliance
4	KNDC, Metering: Section 8.1.2	<u>Distribution Metering</u> “KPLC does not yet have a policy guideline on net metering. A policy to be developed first then be implemented” (KPLC – 8.1.2)	3 years	KPLC	Business Processes
5	KNTGC, Planning: Sections 5.1.5(b),(c), 5.1.7, 5.1.8	<p><u>a) Reliability Criteria</u> “Completion of Interconnectivity within EAPP and implementation of AGC with automated demand control needed for the criteria to be fully achievable. Improve and harmonize SCADA across the interconnected region.” (KPLC – 5.1.5 b,c)</p> <p><u>b) EAPP Power System Modelling</u> “Collection of data/Specifications should be on-going for continuous update of Kenya n Network and EAPP IC Model for dynamic analysis. Steady state analysis can, however, be conducted on the Kenya System.” (KPLC – 5.1.7)</p> <p><u>c) Responsibilities</u> “EAPP planning sub-committee is currently putting the required data together.” (KPLC – 5.1.8)</p>	5 years 1 year 1 year	KPLC	Equipment, Software, Power System, Modelling

Item	Grid Code Provisions	Impacted Code Requirements	Estimated Time to Comply	Entity	Functional Requirements for Compliance
6	KNTGC, Connections: Section 6.2.5	<p><u>Restart after Power Station Black-out</u> “Provide provision for restarting diesel power plants with steam turbine. It would be prudent to define power station black out time (e.g., 10 or 20 hours, etc.). Note that if the grid failure lasted more than 8 hours, the steam system would have cooled down hence requiring more than 6 hours for restarting after the engine has been started. This will avoid start- up of turbine been classified as unreasonable delay due to limited time set in the grid code. To avoid thermal stress on the boiler and steam turbine, it is recommended that the steam turbine shall be operated continuously unless there is a grid problem or fault on the turbine. Steam turbine shall be a priority equipment to maintain in operation due to long start up time unlike diesel engines.”</p>	Third Party Estimate: 2 – 5 years	Thika Power	Operational Procedures, Engineering Planning and Analysis, Equipment

Item	Grid Code Provisions	Impacted Code Requirements	Estimated Time to Comply	Entity	Functional Requirements for Compliance
7	KNTGC, Operational Planning: 8.1, 8.2, 8.2.4	<p>a) <u>Automatic Generation Control</u> “Automatic generation control to be implemented with entire Network visible at EACC.” (KPLC – 8)</p> <p>b) “Subject to the establishments of EAPP CC” (KPLC – 8.1)</p> <p>c) “To build capacity” (KPLC – 8.2)</p> <p>d) <u>Safety Coordination</u>: “Add a clause stating that TSO will be responsible for training, testing and certify personnel for the various classes of switching Authorization in the transmission networks.” (KenGen – 8.2.4)</p>	3 years 5 years 2 years Unknown	KPLC and KenGen	Software, Equipment, Training, Inter-Regional Coordination, Operational Procedures
8	KNTGC, Operational Security: Sections 9.1,9.2	<p>a) <u>SCADA and AGC</u> “Not ready. Requires AGC and also a system where all Breakers at Transmission stations can be switched remotely. SCADA system need to be compatible across the Region, communication systems and harmonised protection schemes are necessary.” (KPLC – 9.1)</p> <p>b) <u>N-1 Security</u> “Achievement on N-1 criteria with the interconnected system plus anticipated large wind & solar component requires AGC for faster response for system to realize system security. Harmonised SCADA systems and automation that allows remote switching at Key Substations, coupled with HR capacity building is necessary.” (KPLC – 9.2)</p>	5 years 5 years	KPLC	Equipment, Software, Training, Power System Modelling

Item	Grid Code Provisions	Impacted Code Requirements	Estimated Time to Comply	Entity	Functional Requirements for Compliance
9	KNTGC, Emergency Operations: Sections 10.1, 10.2	<u>AGC</u> “AGC will be important. Handling of the Emergency Situations as prescribed could be compliant with about 3 years. However commissioning of the intermittent wind and solar impacts compliance.” (KPLC – 10.1, 10.2)	4 years	KPLC	Equipment, Software, Operational Procedures
10	KNTGC, Demand Control: Section 12.1, 12.2	a) <u>Load Shedding</u> “Load Shedding: Under frequency management scheme is in place (see attachment). Also dependent on the establishment of EAPP CC and will require operational AGC in the different control areas for effective demand control.” (KPLC – 12.1) b) <u>AGC and SCADA</u> “Dependent on system automation, harmonization of SCADA systems, and AGC implementation.” (KPLC – 12.2)	5 years 5 years	KPLC	Equipment, Software, Systems Integration , Operational Procedures, Inter-Regional Coordination
11	KNTGC, System Tests: Sections 13.1, 13.2	a) <u>EAPP</u> : “Kenya System Ok. Implementable under a fully operational interconnected EAPP after protection systems & operational harmonization.” (KPLC – 13.1) b) <u>Kenya Internal</u> :” Being done. To review and assure strict compliance across the entire Country and enhance capacity.” (KPLC – 13.2)	5 year 3 years	KPLC / KNTGC	Systems Integration, Equipment
12	KNTGC, Interchange Scheduling: Section 14.1	<u>EAPP Coordination</u> “KPLC ok. Implementable in a fully operational interconnected EAPP after protection systems & operational harmonization.” (KPLC – 14.1)	5 years	KPLC / KNTGC	Equipment, Systems Integration, Inter-Regional Coordination

Item	Grid Code Provisions	Impacted Code Requirements	Estimated Time to Comply	Entity	Functional Requirements for Compliance
13	KNTGC, Balancing and Frequency Control: Sections 15.1.1 (b), (d)	<u>The Dispatch of Generating Units including Automatic Generation Control (AGC) and Demand Control</u> “Dependent on frequency control. Desirable that AGC be in place. Implementable under a fully operational interconnected EAPP and protection systems & operational harmonization, harmonised SCADA , communication & metering, also requires AGC to be operational with requisite HR capacity.” (KPLC 15.1.1 b, d)	7 years	KPLC/ KNTGC	Equipment, Software, Systems Integration, Inter-Regional Coordination
14	KNTGC, Ancillary Services: Sections 16.1, 16.2	a. <u>General</u> “Procedures exist at KPLC. AGC will be necessary in an interconnected EAPP.” (KPLC – 16.1) b. <u>Certification/Registration/Range of Services</u> “Need to enhance existing arrangements to be compliant. Align Power Purchase Agreements to the GRID code.” (KPLC – 16.2)	5 years 7 years	KPLC / KNTGC	Operational Procedures, Equipment, Software, Business Processes, Commercial Agreements
15	KNTGC, Kenya Metering: Section 17.1	<u>Commercial Agreements</u> “Need to harmonise PPAs to conform to GRID CODE.” (KPLC – 17.1)	3 years	KPLC	Commercial Agreements, Business Processes
16	KNTGC, Interconnection Metering: Section 18.1	<u>AGC</u> “Need to be done in a manner that is ready for power trade within an environment that has AGC control.” (KPLC – 18.1,)	3 years	KPLC	Systems Integration, Inter-Regional Coordination

Item	Grid Code Provisions	Impacted Code Requirements	Estimated Time to Comply	Entity	Functional Requirements for Compliance
17	KNTGC, Data Exchange: Section 19.1	<u>EAPP Coordination</u> “Need to complete on-going work by EAPP Planning Work Group on creation of interconnected Model.” (KPLC – 19.1)	3 years	KPLC	Power System Modelling, Inter-Regional Coordination
18	KNTGC, Information Exchange: Section 20.1	<u>EAPP Coordination</u> “Need to complete on-going work by EAPP Planning Work Group.” (KPLC – 20.1)	3 years	KPLC	Information Systems, Inter-Regional Coordination
19	KNTGC, Cyber Security: Section 21.1	<u>EAPP Coordination and Kenya Internal</u> “To work together with in EAPP in Tandem before implementation of AGC and fully SMART GRID operation.” (KPLC – 21.1)	6 years	KPLC	Business Processes, Inter-Regional Coordination, Software, Equipment, Information Systems
20	KNTGC, System Operator Training: Section 22.1	<u>Responsibilities and Minimum Acceptable Requirements</u> “To work together to ensure continuous capacity development.” (KPLC – 22.1)	Third Party Estimate: 1 – 3 years for initial training/certification; once a year re-certification	KPLC	Training
21	KNTGC, Connections, Balancing and Frequency Control, Information Exchange: General Comment	<u>Power System Observability</u> “No clause/clauses compelling System Users to provide the TSO/ISO/etc. with SCADA signals to enable system visibility as much as the TSO/ISO may require for effective and efficient Transmission System control, stability, reliability and contingency and fault reviews. Such signals may include but not limited to . . . ”	Third Party Estimate: 2 years	KETRACO	Equipment, Software, Systems Integration

KPLC provided comments on KNDC Sections 7.7, 8.1.2, 8.3.2, 8.1.5, 5.1.8, 5.1.11, 5.1.12, 5.2.13, 7.4.3, 9.5.1.1. These comments all sought clarifications and do not have any regulatory impact.

Other KETRACO, Thika Power, and KenGen comments were asking for clarifications or suggestions for grid code editorial or other revision. Refer to Appendix A for a full set of all received comments.

Table 3-4 Descriptions of Functional Areas Requiring Resource Investments

Requirement	Description
Business Processes	Development of business processes and management and organizational procedures
Information Systems	Development of IT systems for managing business, technical data and information
Commercial Agreements	Revision or re-negotiation of commercial agreements for consistency with codes
Equipment	Investment and installation of electrical, control, and communications systems and associated hardware
Software	Investment and implementation in systems control software, licensing power system operations/planning simulation software
Systems Integration	Development and implementation of software , hardware, and/or equipment to make existing and new control and communications systems functionally compatible
Operational Procedures	Development, implementation, and documentation of operating procedure for system control by the Kenya National TSO, Regional Control Centres, TNSPs and DNSPs
Training	Staff and customer training/education/workshops
Power Systems Modelling	Development of model data, models, and capacity for power systems modelling
Inter-regional Coordination	Participation in working groups and committees with EAPP IC member countries interconnecting with Kenya 's National Transmission System

Requirement	Description
Engineering Planning and Analysis	Power system quality analysis and planning involved in implementing improvement measures , power system measurement adequacy analysis, power system reliability analysis

Table 3-5 provides a summary of potential derogations for the Kenya National Transmission Grid Code and the Kenya National Distribution Code by code chapter, along with an estimated timeframe for compliance. The estimated timeframe is based on the original estimates from Table 3-3 as provided by sector entities, adjusted to take into consideration any concurrence, duplication and redundancy of effort for similar and/or related activities. Third party estimates are provided where no timeline was available from the commenting entity.

Table 3-5 Summary of Grid Code Provisions Requiring Derogations and Resources

Item	Grid Code	Sections	Details	Possible Derogations	Est. Timeline
1	Distribution	Connection	(1)Supply Application for Connection; (2) Application Approval Process; (3) Harmonics Analysis; (4) Flicker Monitoring; (5)Grounding; (6) Customer Education	Additional Customer Data, Reporting Structure to ERC, Harmonics/Flicker Analysis/Tracking/Monitoring Mechanism; Document with Grounding Requirements; Customer Understanding of Data Requirement	3 years
2	Distribution	Planning	Customer Education	Customer Knowledge for Understanding Data Requirement	3 years
3	Distribution	Metering	Net Metering	Policy Guideline and Implementation Plan for Net Metering	3 years
4	Distribution	General Condition	Derogation Register	Documenting all non-compliances for DNSP and ERC with necessary detail	3 years
5	Transmission	Connection	Restart after Power Station Blackout	Streamlined System Blackstart Policy; Procedure; and Guidelines	Third Party Estimate: 2 – 5 years
6	Transmission	Planning	Maintaining (N-1) Reliability Criteria	EAPP Interconnection; Centralized Automated AGC; Harmonised SCADA	5 years

Item	Grid Code	Sections	Details	Possible Derogations	Est. Timeline
7	Transmission	Operations	Operations Planning, Operational Security, Emergency Operations, Demand Control, System Tests	Centralized Automated AGC, EAPP Interconnection; Observable Network; Capacity Building/Safety Coordination Training; Remotely Breakers/Switches; Harmonised SCADA/Operation; Protection	3 – 5 years
8	Transmission	Interchange Scheduling	Facilitate Bilateral Cross-border Transactions	Fully Operational Interconnected EAPP after Protection Systems & Operational Harmonization	5 years
9	Transmission	Balancing and Frequency Control	Dispatch of Generating Units including Automatic Generation Control (AGC) and Demand control	Implementation of centralized automated AGC; Harmonized SCADA, Protection System; Interconnected EAPP; Communication and Metering; HR Capacity	7 years
10	Transmission	Ancillary Services	Range of Services, Certification/Registration/Range of Services	Implementation of AGC; PPAs Harmonised with Grid Code; Enhance Existing Arrangements	5 – 7 years
11	Transmission	Metering	Metering within Kenya, Metering of Each Point of Interchange	Harmonized PPA; AGC Control	3 years
12	Transmission	Data/Info Exchange	Interconnected Model, Reciprocal Obligations	Completion of Ongoing Work of EAPP Planning Work Group	3 years
13	Transmission	Cyber Security	Confidentiality, Integrity, and Availability of the Electronic Communication System	To work together with EAPP in Tandem; Implementation of AGC and Smart Grid	6 years
14	Transmission	System Operator Training	Responsibilities and the Minimum Acceptable Requirements	Continuous Capacity Development	Third Party Estimate: 1 – 3 years for initial training/certification; once a year re-certification
15	Transmission	Other	Power Network Observability	Additional RTUs/Measurements	2 years

APPENDIX A

COMMENTS RECEIVED FROM CONSULTATIVE PROCESS

Table A-1 KETRACO Comments and Status

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 1	2	Heading of Table 2-1 does not flow/make sense	Review and introduce brackets after the word 'definitions' in the heading OR remove the words after the word 'definitions' in the heading and appropriately re-phrase in the preceding introductory statement.	Changes made
KETRACO	KNTGC / Draft 1	2.1, Table 2-1	Some definitions are specific to some Sections (of an Act, assumed the Energy Act) only	Definitions of words/phrases used in the Code should be the meanings of such words/phrases wherever such words/phrases are used anywhere in the Code. See Page 32, 33 and others. Even if meaning are borrowed from another document (Act, EAPP IC), it is better to just ensure that the meaning is not contradicting BUT there is no need to say that this and that meaning are as in such and such Act or the other document. Example, reading the meaning of Network User on page 32 could be confusing esp. when it reads '... under this Act...' which Act is this? It may be argued that the heading already makes reference to the Energy Act but someone reading a specific chapter may wish to look for meaning of one word only and may not look at the heading. CONSIDER.	All definitions made consistent throughout both KNTGC and KNDC
KETRACO	KNTGC / Draft 1	2.1, Table 2-1	Definitions split into 2: This Code and EAPP IC sourced	Align the definitions in this Code to those of EAPP IC without having 2 sets of definitions: one for this Code and others borrowed from EAPP IC (page 33).	Aligned one consistent set of definitions
KETRACO	KNTGC / Draft 1	2.1, Table 2-1-	Page 26 and 27: Definitions appear to refer to REA	Please correct.	Corrected
KETRACO	KNTGC / Draft 1	2.1, Table 2-1	Definitions are not in alphabetical order flow	Re-arrange	Definitions arranged alphabetically

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 1	2.1, Table 2-1. 1.3.8, 1.3.9 and 4.5.1	'System Operator' is defined (page 39) BUT 'Kenya System Operator' is not. 'Kenya System Operator' is used in the Code (pages 20 – 23, 59)	Define 'Kenya System Operator'	Replaced consistently with the term Kenya National Transmission System Operator (TSO)
KETRACO	KNTGC / Draft 1	2.1, Table 2-1	Page 29: IEK definition is incorrect	Please correct	Definition corrected
KETRACO	KNTGC / Draft 1	2.1, Table 2-1	Defn. of User	The system being used should only be Transmission system (exclude Distribution System).	Corrected to remove referenced to Distribution System
KETRACO	KNTGC / Draft 1	2.1, Table 2-1	Voltage Dip should be defined in the Glossary and Defns chapter (phrase appears in the Code)	Define 'Voltage Dip' in the Glossary and Defns chapter	Voltage Dip defined
KETRACO	KNTGC / Draft 1	2.1, Table 2-1	Defn. for Voltage Flicker not accurate	Re-look and correct. Strictly load fluctuation does not lead to voltage flicker.	Consistent definition used in KNTGC and KNDC which does not reference load fluctuations
KETRACO	KNTGC / Draft 1	2.1, Table 2-1	VARs	Appears under defn. of Reactive Power. This abbreviation needs to be defined under abbreviations	Defined under Acronym section
KETRACO	KNTGC / Draft 1	2.1, Table 2-1	OC 3.7.3	Appears under defn. for Power Island. What does it refer to?	Internal reference corrected to Chapter 10 Emergency Operations

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 1	2.1, Table 2-1	PC 6.1	Appears under defn. for Power Balance Statement. What does it refer to?	Internal reference corrected to Chapter 5 Planning
KETRACO	KNTGC / Draft 1	1	Definition of Grid Code (1 st paragraph)	The phrase '... other than the owning ...' has the connotation that the Grid Code is not binding to the owner of the Transmission System. Is this the meaning to be construed from this definition?	Phrase removed
KETRACO	KNTGC / Draft 1	20.4.4 (1)	Unit Scheduling (page 229)	Replace the word 'Energy' with 'Power'	Replaced
KETRACO	KNTGC / Draft 1	20.4.4 (1) and (2)		Provision of next day's schedules to be done by 14h00m and NOT 21h40m.	Correction made
KETRACO	KNTGC / Draft 1	20.4.4 (1) and (2)	Unit Scheduling	The whole phrases in (1) and (2) do not appear to communicate the intended message. These may require discussion with the consultant and parties associated (ERC, KenGen and NCC/KETRACO). This is in respect with how to handle the provisions made available to the TSO by the Users. The current practice in Kenya to be discussed and compared with practice in other countries.	Unit scheduling provisions revised to reflect EAPP requirements and current compliant procedures
KETRACO	KNTGC / Draft 1	20.4.4 (1) and (2)	Unit Scheduling	Assuming that these provisions are available power or energy declarations, how does the need for some level of accuracy taken care of? It ought to be clarified even if that should be captured in the initial PPAs between responsible parties.	Commercial Issue, not appropriate for Grid Code
KETRACO	KNTGC / Draft 1		TNSP is not explained under abbreviations	Define	Included in Acronym table
KETRACO	KNTGC / Draft 1	3.9.2	How will it be determined that the Transmission Licensee is '... determined to be in a non-compliance ...'	Re-phrase to make this clause enforceable without arguments/contentions as to the intended meaning.	Change made in Draft 4 - Clarified meaning that it is ERC who shall determine if User is non-compliant

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 1		It may not be entirely true that a monetary penalty would lead to the correction of the non-compliance.	Re-phrase appropriately. What if the monetary penalty fails to result in non-compliance correction? It should be clear what would lead to licence revocation or suspension (unless this has been defined elsewhere in other ERC documents related to licencing).	Change Made in Draft 4 - Rephrased to direct ERC to be required to impose penalty and review licence in case of non-compliance
KETRACO	KNTGC / Draft 1		Tertiary Reserve (Primary Reserve and Secondary Reserve)	The term is defined BUT not the ones in brackets. However, the terms Primary Response and Secondary Response have been defined and also used in the similar subject matter as Tertiary Reserve. Clarify the difference between Reserve and Response in this context (Discuss).	Meanings clarified in code; all other reserves classified as Primary, Secondary, or Tertiary, all current reserve products made consistent with EAPP definitions
KETRACO	KNTGC / Draft 1			Spelling of Reserve on page 260, delete the last letter 'l'	Corrected
KETRACO	KNTGC / Draft 1	16.1.3	Frequency Control	Primary Response of Generating Units as a phrase is not defined, neither is Secondary Response of Generating Units (italicized). Define or remove italics appropriately.	Terms defined have been defined
KETRACO	KNTGC / Draft 1	15.1.7	Last paragraph	Definition of Tertiary Reserve Not correct. Discuss	Corrected for consistency

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 1		<p>There is no entity defined to be in charge of transmission system development and expansion (who builds additional transmission lines and sub stations?)</p> <p>NOTE:</p> <p>TNSP – owns and maintains (has no operation and expansion mandate)</p> <p>TSO – coordination of planning and operation (sounds/reads like only responsible for coordinating the planning and operation BUT does not do the actual planning and operation).</p>	Whose mandate is it to expand the transmission grid? Which entity? Is it assumed to be KETRACO? Ketraco is an entity that may fall under TNSP or TSO or both as these terms are currently defined in the Code.	Properly an issue for Energy Policy rather than the Grid Code
KETRACO	KNTGC / Draft 1		Acronyms and Units	Where acronyms are units these should be the same, eg. kWh for units and kWh for acronym NOT KWH, etc.	Acronyms and units made consistent
KETRACO	KNTGC / Draft 1		Transmission Licensee as defined is just for operation of transmission assets within the KNTS.	How about owning? Transmission Licence talks of transmitting only and may allow operation of the grid. Further, the definition of Grid in this Code inconsistently includes distribution system.	Ownership a matter of Energy Policy; Grid defined corrected for Transmission Code

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 1		Consistently use British English, eg Licence (noun), License (verb), Licensee (person/entity licensed, given licence)	I believe this is the general understanding in Kenya. You could consult if necessary.	British English used consistently
KETRACO	KNTGC / Draft 1		Definition for Transmission Licence (written License in this code) does not match the definition of Transmission Licensee in terms of what the licence allows to be carried out	The two need to match and be consistent.	Corrected to be consistent
KETRACO	KNTGC / Draft 1	Table 20-1	The 2 columns need to have headings		Column headings included
KETRACO	KNTGC / Draft 1	8.2.6, 8.2.7, 8.2.8, 9.3, 10.1.4, 10.2.2, 11.2.1, 12.2.3, 13.2.1	Documents from National Control Centre, Kenya Power have been reproduced almost word for word.	The documents should have been used to derive general clauses that allow for any future system operator to develop and/or improve/review operational documents/procedures and work instructions as may be necessary from time to time. The code should offer guidelines on the broad requirements, probably defining the minimum requirements that should never be exceeded.	All detailed procedures have been generalized and guidelines developed based on procedures
KETRACO	KNTGC / Draft 1		National Control Centre, System Controllers/Operators	Where these have been picked from KPLC documents, they should be re-phrased. Otherwise the terms may be defined.	The term Kenya National TSO is used consistently
KETRACO	KNTGC / Draft 1	Page 238 and 258	Footer has the word 'Nexant'	Remove the word. Check the entire document in case.	Removed

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 1		Power System Visibility	I do not recall seeing a clause/clauses compelling System Users to provide the TSO/ISO/etc with SCADA signals to enable system visibility as much as the TSO/ISO may require for effective and efficient Transmission System control, stability, reliability and contingency and fault reviews. Such signals may include but not limited to	Draft 4 includes: 20.4.3 (l) Generator breaker status.
KETRACO	KNTGC / Draft 1	Page 28	First Schedule, Fourth Schedule, etc.	If these refer to another document, specify. Eg. If it refers to the Energy Act, specify as much so that the reader immediately understands he/she should refer to the Act. NB: The same should apply to reference to any other acts/regulations. The easier the Code is to read/understand/interrelate the better and more user friendly to the reader/s.	All references revised to make clear as to the relevant acts or regulations
KETRACO	KNTGC / Draft 1	Page 37 and 40	Definition of Kenya National Transmission System Operator (TSO) appears on both pages	The meanings are different. Delete one and keep the desired meaning/definition.	The term Kenya National TSO is used consistently
KETRACO	KNTGC / Draft 1	Clause 4.2	Governance Documents	KNTGC Review Committee is not a product of the 2 Governance Documents stated.	Reference to the Review Committee removed in this section
KETRACO	KNTGC / Draft 1	Page 72 Clause 4.14.1 (c)	GOV 9.1 (b)	What does this refer to? Such reference appears at least one more time in the document. Using the search tool, they can be traced.	Internal reference corrected to Section 4.14.1(b)
KETRACO	KNTGC / Draft 1	4.13.1	Agreements and responsibility of Transmission Network System Provider	The phrase does not appear clear. Agreements are between which parties? Are these parties licensees/are they licensed? What is the role of ERC? Or, shouldn't ERC be the entity to ensure compliance?	TNSP are required to include obligations for Users to comply with KNTGC in connection agreements

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 1	Page 36	Two phrases: Kenya National Transmission System Grid Code Review Committee and Kenya National Transmission Grid Code Review Committee	The word 'System' may need to be deleted.	Word deleted
KETRACO	KNTGC / Draft 1	Pages 36 and 39	Defn. of KNTGC is similar to Defn. of System Operator	Please review/correct.	Definitions corrected
KETRACO	KNTGC / Draft 1		In the document (the Code), some words/phrases are italicized. In the Zambian Grid Code, there is an introductory statement to the effect that italicized words/phrases are defined words/phrases.	In this Code, certain words are italicized but are not defined (eg. Kenya System Operator). It should be clear to the reader why some words/prases are italicized and begin with capital letters. Consistency needed. Is it worth borrowing a leaf from the Zambian Code's introductory statement?	All defined terms are consistently italicised in code. An introductory statement to this effect is included.
KETRACO	KNTGC / Draft 2	1.1	Paragraphs 3 & 4 repetitive info.	Delete paragraph 4	Paragraph 4 deleted
KETRACO	KNTGC / Draft 2	1.1	Paragraph 2: '... The KNTGC will go through a rigorous process...'	This statement should be in the past tense to make sense to someone reading it after gazettelement. Consider re-phrasing as follows: '...the KNTGC underwent a rigorous...'	Changed as indicated

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 2	1.1	Paragraph 3 2 nd line: '...efficiently, and economically...' Para 3, last line: '... of the electric system, and the KNTGC will provide this.'	Remove the coma. Go through the entire document and deal with such punctuation mistakes. Replace 'electric' with 'power' for consistency. Delete the phrase after the coma.	While most common in American English, the "Serial Comma" is also indicated as being preferred in the Oxford Style Manual https://en.wikipedia.org/wiki/Serial_comma Replaced
KETRACO	KNTGC / Draft 2	1.1.1	1 st Paragraph: 'This new draft of the KNTGC follows ...' 2 nd Paragraph: '... and related Indian documents, the Zambian Grid Code...'	Re-phrase for future reading: 'This KNTGC follows...' It is better to avoid the phrase 'related Indian documents'. I believe all documents used for reference need be clearly named for completeness, etc.	Reference to related documents deleted
KETRACO	KNTGC / Draft 2	1.3.9	Sub Titles/Sub Clauses	The previous draft version had 3: (i) Interchange Scheduling, (ii) Balancing and Frequency Control & (iii) Ancillary Services. The latest draft version has omitted the 2 nd Sub clause and merged it with the 1 st one. However, in the main body, we have maintained the 3 sub clauses at chapters 14, 15 and 16. Check the Contents as well (the 2 nd item has been omitted under 1.3.9).	The sub-headings were corrected in this section

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 2	3.9.3 and 3.9.7	Clause 3.9.3 outlines how request for derogation may be sought/requested for (2 nd paragraph) and specifies the information required to be provided. Clause 3.9.7 appears to be an additional thinking seeking to provide a form to be filled in when applying for derogation. The form is deficient and the sentence underneath the table attempts to correct the deficiency.	Delete clause 3.9.7 altogether (clause 3.9.3 is good enough. Optionally, include table in clause 3.9.7 to clause 3.9.3 to cover the items in paragraph 2 of the clause 3.9.3.	Section 3.9.7 has been deleted. A Derogation form consistent with the KNTGC added as an Appendix.
KETRACO	KNTGC / Draft 2	5.2.1.1 c		There are 3 points, however they all seem to be hinged to point No. 1 (...that sub station...)	Replaced with: The development of the <i>KNTS</i> may include work involving transformers, breakers, switches, and other equipment connected to the <i>KNTS</i> .
KETRACO	KNTGC / Draft 2	5.2.1.8	Table 5-3	Re-arrange and have entire table over one page only.	Table now on one page

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 2	5.2.1.14 1. c 4 2. f 3. g	1. Poor Quality of Supply (QOS) 2. Expected Energy Not Served (EENS)	1. How is this different from c 1, 2 & 3? Aren't these all also aspects of poor supply quality. 2. Unless EENS is a globally used acronym, consider changing this to Expected Unserved Energy (EUE) 3. This is not clear	Changed to: 4. Voltage dips, surges, flickers, and harmonic distortion. Term QOS removed. Term EENS changed to EUE. Item g changed: g. The reduction in <i>EUE</i> shall be calculated on a probabilistic basis by a methodology approved by the <i>ERC</i> .
KETRACO	KNTGC / Draft 2	3.9.7	1 st sentence: 'The follow form shall...'	Re-phrase to 'The following form shall ...'	Form deleted; consistent form for both KNTGC and KNDC has been added to an Appendix.
KETRACO	KNTGC / Draft 2	3.10.1		ERC cannot arbitrate a dispute between itself and another party.	Pending for guidelines from ERC on Energy Act dispute resolution
KETRACO	KNTGC / Draft 2	8	Introductory sentence	Replace KNTS with KNTGC so that it refers to codes and NOT a code and a system.	Replacement made

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 2	8.1.1	2 nd paragraph: PC (Planning Chapter)	With reference to definition of PC in the acronym, does this PC refer to Planning Chapter in the EAPP IC or in the KNTGC?	Specific reference made to EAPP IC
KETRACO	KNTGC / Draft 2	8.2.2, b	<p>'...The Kenya National TSO and TNSPs shall ensure...'</p> <p>Disputes resolution</p>	<p>How will this be implemented in a coordinated manner?</p> <p>Is it in order that dispute resolution procedure specified by the TSO would be the one to be applied in resolving a dispute between the TSO and the User/s?</p>	Item b changed: b. Each <i>User</i> shall be responsible for their own safety rules and procedures. The <i>Kenya National TSO</i> and <i>TNSPs</i> shall coordinate to ensure the compatibility with regard to the safety rules and procedures of all <i>Users</i> .

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 2	8.2.2, c	<p><i>Users</i></p> <p>1st sentence: '...within 14 days.'</p>	<p>Please check the use of the word <i>Users</i> in the document. It may be better to define the word <i>User</i> (singular), with the plural being construed. This aspect of Singular and Plural being construed could be in an introductory statement of the glossary and definitions chapter.</p> <p>Details of such faults, and any others on the KNTS, must be immediately or in the shortest possible time, be relayed to the KN TSO. This 14 days could be for details after post fault analysis has been carried out to determine exact cause and remedial action plans by the relevant user/s.</p>	<p>Sentence added to introduction to Glossary.</p> <p>Change made: In case of any equipment fault impacting the <i>KNTS</i>, <i>Users</i> must report such faults to <i>the Kenya National TSO</i> immediately, or in the shortest possible time. Details of such faults should be reported as soon as possible, but no later than 14 days for the purpose of post-fault analysis in order to determine causes and remedial action plans. Details regarding the fault shall include such information as: (i) date, time, and location of fault; (ii) cause of fault; (iii) switching operation(s); (iv) injuries/damages; (v) interruptions and duration of interruptions; and (vi) any other information, as appropriate. <i>The Kenya National TSO</i> shall record and maintain all relevant information pertaining to all faults on the KNTS.</p>

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 2	8.2.5.2	<p>'...Planned Outages shall be deferred under the following circumstances:'</p> <p>'The objectives to be used by the Kenya....'</p> <p>'...by the User to the Kenya National TSO at least seven days prior ...'</p> <p>'...communicated back to the requester via email or telephone...'</p> <p>'Outages, once approved, shall be entered ...'</p>	<p>'...Planned Outages may be deferred under the following circumstances:'</p> <p>(d) is not clear. Consider deleting the words after the word 'security'</p> <p>Under the sub heading: Generators shall provide the Kenya National TSO, under item</p> <p>(b): why 5 years ahead?</p> <p>(c): replace the last word 'reports' with 'plans'</p> <p>'The guidelines to be used ...' Itemise these guidelines</p> <p>'...by the User to the Kenya National TSO in a timely manner, but not later than seven days prior ...'</p> <p>'...communicated back to the applicant through established channels/modes of communication.'</p> <p>Replace this entire sentence by: 'Approved outages shall be entered into the appropriate...'</p> <p>Delete the word 'all' in this sentence.</p> <p>Delete all the words after Outages at the end of this sentence.</p> <p><i>Applicants should be notified via the established channels of approval/rejection/deferment of outage applications.</i></p>	<p>1. Change made</p> <p>2. 5 years is a common international standard time horizon for planning</p> <p>3. "Reports" replaced with "plans"</p> <p>4. Itemised</p> <p>(b) 5 years is a standard typical planning time horizon for annual evaluation in the USA and other places</p> <p>Changes made as suggested to this paragraph.</p>

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 2	9.2.1.4	Rewrite the 1 st sentence in 3 rd para	<p>'Any time a switchgear in the KNTS is to be operated, the Kenya National TSO shall issue the switching sequence for such operation including equipment identification.'</p> <p>The 2nd sentence remains unchanged.</p> <p>Interlocks should not be defeated except under emergency or extreme circumstances and then only by certain operational crew only.</p>	<p>Change made:</p> <p>3rd Paragraph: The <i>TNSP</i> shall carry out switchgear operation as instructed as expeditiously as possible. Whenever switchgear interlocks exist, the <i>TNSP</i> shall carry out an operation to defeat inter-locks before performing switchgear operation. Interlocks should not be defeated except under emergency or extreme circumstances and then only by designated operational crew.</p>
KETRACO	KNTGC / Draft 2	15.2.1, a		<p>Items 3 & 4 are at variance. Reconcile.</p> <p>Confirm if indeed item 5 is an indicator of frequency normalcy</p>	<p>Item 3 and 4 are consistent – time constraint is imposed on Item 3 as a sub-set of Item 4. Referenced to South African Grid Code Version 8.0 July 2010.</p> <p>Change made in sub-heading title – section generalized to “Normal Conditions”</p>
KETRACO	KNTGC / Draft 2	22	The introductory sentence: '... EAPP IC and the KNTS...'	Should KNTS be replaced by KNTGC so that there is reference to two codes instead of a code and a system?	Change made

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC / Draft 2	17.1	<p>1st sentence: 'The metering requirements of the <i>Eastern Africa Power Pool</i> and <i>East African Community Interconnection Agreement (EAPP IC)</i></p> <p><i>deal ...</i></p> <p>(also 1st sentence of item 18.1 refers)</p> <p>Under clause 1.1 INTRODUCTION last paragraph we have: '<i>...the Eastern Africa Power Pool (EAPP) and East African Community Interconnection Code (EAPP IC)</i></p>	<p>Compare with page 23 Table 2-2 where EAPP IC acronym is expanded and page 12 Table 2-1 Glossary and Definitions where the phrase is explained: the highlighted word Agreement does not appear.</p> <p>The word 'and' highlighted in green should be italicized.</p> <p>The inference here is that EAPP IC is the acronym for <i>East African Community Interconnection Code</i>. This is inconsistent with how this acronym has been defined and also used in other parts of the document. Whenever the word 'and' is not italicised between the two phrases the 2 phrases stand alone in meaning if they are italicised.</p> <p>Check and correct this throughout the entire document.</p>	All references replaced with EAPP IC, with proper definition in glossary.

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO		17.1	2 nd paragraph: 'To avoid confusion regarding the two Grid Codes that deal with metering, they... The name of the metering code which is part of the EAPP IC is the EAPP IC Metering Chapter (IMC) of Chapter 18, and the name of the metering code which is part of the KNTGC is the ...	Re-phrase to read 'To avoid confusion regarding the two chapters that deal with metering in this Grid Code (or Code), they... The name of the metering chapter which is based on the EAPP IC is Interconnection Metering chapter (IMC) of Chapter 18, and the name of the metering chapter which is based on the KNTS is the Kenya Metering chapter (KMC) of chapter 17. Refer to page, item 3, and introductory sentence: ...chapters. Refer also to 2 nd paragraph item 18.1 which is better phrased except for the need to change '...based on the KNTGC ...' to '... based on the KNTS...'	Change made as indicated.
KETRACO		17.1.5 a	Transmission Metering Administrator (TMA)	This is italicized yet it is not a defined phrase in the glossary and definition. TMA acronym, however, appears in the table of acronyms. I doubt if acronyms have to be italicized though. Generally, please check and keep consistency all through the document.	Definition added to Glossary; all instances italicised.
KETRACO		17.1.7.1, f	'...consecutive estimations/10 or more estimations...'	This phrase is not clear.	Clarification in made: <i>f. Meters needing three or more consecutive estimations or a total of 10 or more estimations in a month shall be tracked for problems needing attention.</i>

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO		13.2.1	Read through and make corrections.	Why is the word <i>Generating</i> italicised (it is not a defined word). The defined phrase is 'Generating unit'. This phrase, however, is not italicised in this clause.	Three consistent terms are now used: Generation Licensee: the owner of a generation asset and the entity responsible for compliance with the KNTGC Generating Plant: The KNTGC term for physical generation assets Generating Unit: The EAPP IC term for physical generation asset (only used in EAPP IC sections.) Same changes made in KNDC
KETRACO		13.2.1 a - m	Read through and make corrections.	Is it the new <i>Generating Plant</i> that is making applications or the owner of the Plant?	See last comment.
KETRACO		13.2.1, f & g	'...7 days before the commissioning date'	It is noted that this specified period appears to be what is in the existing KPLC documents. Is it not better to restrict such specifics to the continuous preparation/review of such documents by the various entities and code users and preferably use a phrase like, '...within a prescribed minimum period of time before the commissioning date'? If agreed, do so for any specifics, unless it is felt that the Code must specify these (operational documents are live and are prone to several improvement reviews as per applicable and prevailing ISO QMS standard requirements.	No change made. Unless the provision contains a specified date, it will be loose/open ended. The Transmission Grid Code Review Committee can make changes such as this as deemed appropriate.

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO		17.1.4, d	'...CT cores but one dedicated VT shall be allowed.'	<p>Why is one dedicated VT allowed but NOT one CT?</p> <p>Additionally, there a number of italicised words/phrases that are not defined in the glossary and definitions chapter (incl. <i>Main</i>, <i>Check</i>, <i>Check Metering</i>, etc.). Read through and correct accordingly for consistency in the document.</p>	<p>Definitions included in Glossary</p> <p>Change made:</p> <p>d. Each metering point shall be installed with <i>Main</i> and <i>Check Metering</i> where practical and economical. <i>Customers</i> with a maximum demand of at least 5 MVA shall have <i>Main</i> and <i>Check Metering</i>, with the same accuracy as of the main <i>Meter</i>. All CTs and VTs installed after the implementation of the KNTGC shall have separate <i>Main</i> and <i>Check</i> CT and VT cores..</p>
KETRACO		17.1.4, e f.	<p>'...between the <i>Users</i>.'</p> <p>TMA</p>	<p>'...between the concerned parties' may be a better way to state this since <i>Users</i> is a defined word and implies all users as in the defined term/word <i>Users</i> which is not what this statement should imply.</p> <p>Alternatively, this should be '...between the User and TNSP.'</p> <p>Define in the glossary/definitions</p>	<p>Changed to "applicable Users"</p> <p>TMA added to Glossary</p>

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO		17.1.6, a 1 18.1.9.3 para 2	Compare the minimum period (40 and 30)	EAPP IC has the minimum period as 30 days. Why does the KNTGC have 40? It is better to align KNTGC with EAPP IC as far as is possible. Additionally, why minimum 40? Confirm if this statement captures the need that meters should have the ability to freeze and store certain selected parameter data, eg. maximum MVA and MW. These should be tagged with time and date when they were recorded in the month. 3 rd para of 18.1.9.3: DCS is missing in acronyms	KNTGC standards kept at 40 days. KPLC Smart HT VT and CT AMR Smart Meter.pdf document indicates: "The meters shall have at least 40 special days to take care of national holidays, world holidays and Easter holidays." DCS and all terms in Section 18.1.3 (part of the EAPP code) added to the Glossary and Acronyms table
KETRACO		18.1.3	Key Definitions	<ol style="list-style-type: none"> How about having these definitions with the other defined words/phrases in the glossary It would help for consistency if italicised words/phrases imply the same thing all through the document: defined words and such defined words should all be traceable in one chapter, glossary and definitions chapter. 	Definitions included in Glossary
KETRACO		18.1.5	'EAPP CC shall a Meter Information... at Defined Metering Points (DMPs).'	There is a missing word/s in the statement	Error from EAPP IC. Corrected as: "EAPP CC shall maintain Meter Information ..."
KETRACO		18.1.9	Last para	Not clear. Could a word or two be missing? 18.9.1 and 18.9.2 are not existing (may be 18.1.9.1 and 18.1.9.2, check).	Corrected to be 18.1.9.1 and 18.1.9.2.

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO		20.3, c		<p>Include 'Derating of generating unit and/or plant'.</p> <p>Change 'Decommissioning of generating plant' to read 'Decommissioning of generating unit and/or plant'</p>	<p>De-rating of Generating Plants added</p> <p>Added "and/or units"</p>
KETRACO		20.3, i	'...with information relating to the following:'	'...with information relating to the items in table 20-1 below:'	Change made
KETRACO		20.4.3	Acronym DTE	While this appears to be explained at item 'h' it is better to include ALL acronyms in the entire document under the list of acronyms.	Included in acronyms
KETRACO		20.4.4.2	1 st Paragraph: '... file transfers through shall be negotiated with the Kenya...'	Replace 'negotiated' with 'agreed'	Change made
KETRACO		20.5	Information from <i>Kenya National TSO to Users</i>	It is not necessary that ALL Users get such information as is defined in this clause. Additionally, some of the information should flow from certain Users to the TSO, eg. AGC Mode should be from Generator to TSO	Changed to "applicable Users"
KETRACO		20.5.3.2, b	'...shall negotiate in good faith...'	Delete the words 'in good faith' as it does not add value neither is it really possible to determine when a negotiation is in good faith or not.	Change made.

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO		20.5.3.2, c	'...as described in Chapter 3 (Governance) shall be...'	In the document, Governance is Chapter 4, NOT 3. Re-check and have the correct reference. (Additionally, failure in performance should attract a penalty and should not be branded as a dispute at this stage unless the responsible entity feels it may have been incorrectly adjudged to have failed in performance)	Reference corrected to Chapter 4. ERC reviewed Dispute Resolution. Reference to Energy Act included. ERC given discretion to impose penalties. Guidelines for penalty severity provided.
KETRACO		20.5.3.2, g	Refers to Under Frequency Load Shedding Relays	In future, the system is likely to have Under Voltage Load Shedding Relays. Include fully in the relevant parts of the Code.	Reference to under voltage load shedding added.
KETRACO		20.5.3.3, a	SAIFI, SAIDI, SAIRI, etc.	Define these in acronyms and glossary/definitions. It should not be assumed that what these phrases mean/define are known by all users/readers.	Reference to SAIRI removed (not used) Definitions and Acronyms for SAIFI and SAIDI added. CAIDI included as a metric.
KETRACO		22	System Operator Training	Who provides/offers the training (Who is the trainer)? Who ensures the training is done as prescribed? Consequences of no training (as prescribed in the Code)? Training Manual?	Updated Training provisions to provide that the Regulatory Authority certifies all training materials and

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
		22.1.9		Is it possible to find out if it is possible to include under this clause (although pulled out from EAPP IC) a new item 'Peer Review Exchange'. This is slightly different from 22.1.9 (a) in that Peer Review Exchange would allow for visiting counterparts to positively critique/suggest improvements for each other (procedures, methods, systems, governance, etc.) for purposes of spurring each other to better performance. Such Peer Review Exchange critiques/proposals are however not binding. Such Peer Review Exchanges/Visits exist in and have served some parts of the USA very well.	No change made; suggestion to EAPP CC for update. Could not require other TSO's to engage in Peer Review Exchanges.
KETRACO		22.1.8.4	Man- Machine Interface	Human-Machine Interface.	Changed to User Interface
KETRACO		22.1.4	2 nd last line: '...with regulators, <i>Generators</i> , and <i>End-use Userse.. System Operators</i> should be capable...'	Note the typo-error.	Change made.
KETRACO			Discuss and consider including a clause/clauses, in (an) appropriate chapter/s, that would require TSO to correct certain operational limit violations within some period of time as agreed with the Regulator. Eg. Reserve, Frequency, Voltage limit violations. Such could be considered for other Users/Players as well.		Included Section 15.2.2: "The Kenya National TSO shall maintain the system frequency between 49.7 and 50.2 Hz. Excursions outside of this range will be permitted for no more than 1.25% of the time, to be checked on a quarterly basis. The Kenya National TSO shall maintain voltage on the KNTS within +/- 10% of nominal."

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC	Chapter 5		At the end of chapter 5 (mitigation of network constraints), "Kenya Power" as an entity has been referred to directly, but there was an agreement to desist from mentioning agencies by their name in the grid code. I propose we describe the function e.g the off-taker, distributor, DNO or any other name.	Reference to KPLC removed in Draft 4
KETRACO	KNTGC	Chapter 6		In the last sentence in my opinion should read "...in the event that the principal circuit breaker fails to interrupt the fault current...." instead of "...in the event that the main protection system fails to interrupt the fault current...." Because we are talking about a circuit breaker/switchgear failure not protection failure, and it is CBs that interrupt currents not protection systems.	As written, the requirement is more stringent since it includes circuit breakers. This also is an EAPP requirement and has been left unchanged.

Table A-2 KPLC Comments and Status

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KPLC	KNDC / Draft 1	7.7 (Pg 114)	KPLC seeks clarification since Street Lighting is under the County Governments and not KPLC.		DNISP only responsible for "public lighting for which it has maintenance responsibility"

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KPLC	KNDC / Draft 1	Item 8.1.2: Embedded Generator Distribution	<p>We propose that Item No. 1 shall read in parts as follows:</p> <p>Part 1 In accordance with prudent operating practice, supply and install the main metering equipment and back-up metering</p> <p>Part 2 Shall in conjunction with the Distribution Network Provider, test commission the main metering equipment and back-up metering</p>	KPLC to clarify	Changes made as suggested
KPLC	KNDC / Draft 1	Item 8.3.2: LV Metering System	We propose that metering cubicle be provided by the Distribution Network Service Provider, but the costs of the same be borne by the Distribution Network User.	DNSP to give specs and customer install, or DNSP can install and customer bear costs	Changes made as suggested

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KPLC	KNDC / Draft 1	Item 8.1.5: Metering Disputes	If the Distribution Network Service Provider determines that there is inaccuracy due to the meter interference/ tampering, the Distribution Network Service Provider shall take appropriate steps to remedy the defect including repair or replacement of the equipment and adjustment of the meter data. The cost of repairs and replacement shall be borne by the Network Service User.	Each is responsible for its own meter	Change made as suggested
KPLC	KNDC / Draft 1	5.1.8 (Pg 70)	A clarification is sought- whether the time between application and supply connection of quotation issued? And if to supply connection, how will be the time attributed to external factors like customer payments, way leaves be treated?	OK as is	Determined to be appropriate after discussion with KPLC

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KPLC	KNDC / Draft 1	5.1.11 (pg 71)	Whereas this is possible and is normally done for generators, it would not be practical for consumers. KPLC could not economically establish internal capacity to conduct such verifications for all new consumer installations.	<p>What does KPLC do now with respect to all consumers?</p> <p>Is MVA demand used to define Large/Medium/Small customers?</p> <p>Stand-by generation should have process defined for connections. Procedures be defined under shutdown. Customer must have procedure.</p>	Requirement is only for new or amended connection agreements – acceptable as written
KPLC	KNDC / Draft 1	5.1.12	KPLC requests ERC to clarify to whom does the Certification of approval apply. Is it all that connect to the network or a certain category?	<p>Requirements for medium voltage – 11kV and above all requirements – a-h</p> <p>Small customers – a) only.</p>	Revisions made as suggested by customer size in Draft 4
KPLC	KNDC / Draft 1	5.2.13 (Pg. 82)	0.85 lagging as the threshold is on the lower side. Recommend a review upwards to at least 0.9 lagging	<p>Currently doing .9, penalized below .9</p> <p>Confirm .9/.85</p>	Change made as suggested
KPLC	KNDC / Draft 1	7.4.3 (Pg. 106)	<p>It is not clear which Network Users should submit their Annual Maintenance Plans to the Distribution Network Service Provider</p> <p>Compliance is required of submitting the Annual maintenance Plans to ERC by November 1st each year.</p>	No change after discussion with KPLC	No change required after discussion with KPLC – KPLC is compliant.

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KPLC	KNDC / Draft 1	9.5.1.1. (Pg. 145)	It is not clear to KPLC what would be the objective and criteria of clearly defining a rural customer in the distribution network	Voltage standards in Table 9-1	Logged for Review. KPLC to review if urban and rural standards should be the same, and if different provide definitions

Table A-3 KenGen Comments and Status

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KenGen	KNTGC / Draft 1	2.2 Page 41	Acronyms: Acronyms as picked from Kenya Power ISO Documents are not defined e.g. ETIMS, ELOA, EPTW	ETIMS, ELOA, EPTW to be defined	Acronyms defined or removed as appropriate
KenGen	KNTGC / Draft 1	3.9.5 Page 50	Sample Derogation Application form in page 15: The sample form is missing. There is no page 15. Introduction is page 18.	Attach a sample form.	Sample form included
KenGen	KNTGC / Draft 1	4.5.2 Page 59	Composition of Review Committee – Representation of generators: Representation for generators should be reviewed to have separate representation for public and private generators	One representative for all public generators. One representative for all IPPs (Independent Power Producers).	Review committees to include public and private representatives for Transmission, Distribution, and Generation.

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KenGen	KNTGC / Draft 1	5 page 94	Mitigation of Network Constraints: Reference to Kenya Power Company is not good for the national Grid Code.	The whole document should refrain from referring to Kenya Power Company by name but only refer to the Transmission Network Service Provider (or TSO).	All references consistently made to Kenya National TSO
KenGen	KNTGC / Draft 1	6.1.4 page 98	Voltages – Users to comply with lagging power factors – It is not clear.	Power factor limits for leading and lagging should be made clear	EAPP requirements clarified: “TSOs shall endeavour to ensure that Users comply with lagging power factors of 1.0 or less during periods of minimum demand and 0.95 or higher during peak and shoulder hours. TSOs shall endeavour to ensure that during periods of minimum demand Users comply with a unity or lagging power factor and a power factor of 0.95 or higher during peak and shoulder hours.”
KenGen	KNTGC / Draft 1	6.1.4 page 100	Table 6-4 for Acceptable harmonic distortion: Appears like a typing error in first column on 22000kV.	2200kV consider if it is 220kV	Corrected

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KenGen	KNTGC / Draft 1	5,6,15 and 16 (pages 87,90,92, 94,103,104)	Cross-referencing in pages 87, 90, 92, 94, 103, 104: References are made to Chapters e.g. 2.1.7, 2.1.8.1, 2.1.10, CC 1.4.1, CC 1.8.4 and CC 1.7 which do not exist in the document	May remove the references.	All internal references made consistent
KenGen	KNTGC / Draft 1	8.2.4 page 133	Safety Co-ordination: TSO should certify personnel for the various classes of switching Authorization	Add a clause stating that TSO will be responsible for training, testing and certify personnel for the various classes of switching Authorization in the transmission networks.	Clause included as suggested
KenGen	KNTGC / Draft 1	8.2.8 page 137	Generation System Data Requirement: Work instructions should be for all power producers irrespective of being KenGen or IPP or UETCC	Replace the IPP and KenGen terms with generators. Replace UETCC with neighbouring TSOs	Revision made as suggested
KenGen	KNTGC / Draft 1		Requirements: Each protection device shall be tested ...	The word "recalibrated" to considered for replacement with word "tested".	Change made
KenGen	KNTGC / Draft 1	9.3.1 page 146	Additional Responsibilities - Switchgear Operation9.2.7 page 144: Work instructions (a)(5) has a typing error and may need to read ...objection that may...	May consider replacing the word "the" with the word "that" in the sentence ...objection the may...	Procedure generalized, wording corrected

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KenGen	KNTGC / Draft 1	9.3.1 page 146 and 147	Additional Responsibilities - Switchgear Operation: Work instructions (b) need to capture also other switchgear stresses in addition to CB low medium levels.	Needs to capture work instructions for other more signs of stressed switchgears. e.g Burnt and welded contacts etc.	Procedure generalized such that specific procedures are to be developed by responsible entities
KenGen	KNTGC / Draft 1	9.3.1 page 149	Additional Responsibilities - 7. Appendices: The title does not match the content.	Consider replacing the “7 Appendices” with another terms such as “generator operation limitations”.	Title changed to “Generating Plant Operations”
KenGen	KNTGC / Draft 1	9.3.1 page 150	Protection Equipment: Work instruction in line 3 (iii) should reference line 5 instead of 4. Work instruction in line 4 should reference line 6 instead of 5.	Work instruction in line 3 (iii) - ... <i>proceed per operation number 5</i> . Work instruction in line 4 - ... <i>proceed per operation number 6</i> .	Procedures have been generalized and numbered work instructions have been removed
KenGen	KNTGC / Draft 1	9.3.1 page 154	Transmission line fault: Work instruction in line 55 (i) should reference line 63 instead of 55 Work instruction in line 55 (ii) should reference line 56 instead of 57	Work instruction in line 55 (i) - ... <i>proceed per operation number 63</i> . Work instruction in line 55(ii) - ... <i>proceed per operation number 56</i> .	Procedures have been generalized and numbered work instructions have been removed

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KenGen	KNTGC / Draft 1	9.3.1 page 155	<p>SCADA Equipment Failure: Title should be clear on which SCADA is being referred to</p> <p>Work Instruction in Line 1 (i) should refer to line 2 instead of line 2.1</p> <p>Work Instruction in Line 1 (ii) should refer to line 8 instead of line 3.1</p>	<p>Work instruction in line 1 (i) - ... <i>proceed per operation number 2.</i></p> <p>Work instruction in line 1(ii) - ... <i>proceed per operation number 8.</i></p>	Procedures have been generalized and numbered work instructions have been removed
KenGen	KNTGC / Draft 1	10.2.2 (g)(h) page 164, 11.2.1 pages 172&173 1	<p>Contingency planning and Incidence reporting - Work Instructions: Procedures and Work Instructions picked from Kenya Power should only pick the content and not reference the Document No.</p>	The document references and their numbers may be removed.	Procedures have been generalized and numbered work instructions have been removed
KenGen	KNTGC / Draft 1	15.1.12 page 197	<p>Table 15-1 on Operations during Abnormal Conditions: Reference to Municipalities and South African Power Pool out of context</p> <p>The term EL1 generation is not defined</p>	<p>Remove SAPP.</p> <p>Define the term EL1.</p>	Table revised in Draft 4 to match Kenya Emergency Operating procedures upon review with KPLC

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KenGen	KNTGC / Draft 1	15.1.12 page 198	Table 15-1 on Operations during Abnormal Conditions: Rapid frequency decline - Load shedding frequency conditions for frequency F item 6 are not clear	Put the commas for different frequency condition and the dot (point) at the seconds. [remove confusion on use of commas]	Corrected as suggested
KenGen	KNTGC / Draft 1	17.1.1, 17.1.11, 17.1.13 pages 207 & 212	Metering: Metering reference standard is NRS-057, and 047 which are South African (Eskom) Standards.	Recommend to use the relevant IEC Standard	All standards have been replaced with IEC or KS IEC
KenGen	KNTGC / Draft 1	17.1.9 page 211	Testing of metering Installations: The term ECB is not defined	Define the term ECB	Term removed, refers to predecessor organization of ERC
KenGen	KNTGC / Draft 1	18 page 218	Installation of meters: The Chapter is not clear on which energy meters are owned by TSO at the power interchange.	The supplier of the power should own the main billing energy meter.	EAPP code provision, revisions should be made through EAPP
KenGen	KNTGC / Draft 1	20.4.2 page 227	Commissioning and Notification: Items 3 and 4 should be merged as one sentence.	One sentence for 3 and 4.	Sentences combined

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KenGen	KNTGC / Draft 1	20.4.6 page 230	Communication Facilities Requirements: Digital data exchange system between generators and TSOs (communication protocol) at the exchange system should be agreed upon mutually.	Change facsimile to scan and email facilities	No change made
KenGen	KNTGC / Draft 1	21 page 238	Nexant Logo at the page bottom left: Consultant Logo should not appear on the document	Remove the Nexant logo.	Removed
KenGen	KNTGC / Draft 1	21.2 page 239	Objectives of Cyber Security ...as per reference 21.1 in this document	Change reference 1 to 21.1	Reference changed

Table A-4 Gulf Power Comments and Status

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
Gulf	KNTGC / Draft 1	2.1	Definition of Network User and User	<p>The two definitions means more or the same things and should therefore be harmonized.</p> <p>Various clauses in the Grid Code consistently refer to “Transmission Licensee” and “distribution licensee” and Users. Considering that the former are also Users, these narrations should be cleaned up so as to avoid inconsistencies except on very specific clauses.</p>	Single consistent term User is employed throughout the code.

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
Gulf	KNTGC / Draft 1	3.9	Non-Compliance in this clause only refers to the Transmission Licensee and Distribution Licensee	Should be amended to include all Users	Amended as suggested.
Gulf	KNTGC / Draft 1	3.13	The clause is repetitive and needs amendments	<p>In the event of any conflict between the provisions of the KNTGC and any contract, bilateral agreement or arrangement between a Transmission Licensee or a User, the provisions of the KNTGC shall prevail unless the [Energy Regulatory Commission] provides otherwise.</p> <p>It is important to note that most generators are also bound by PPAs on which basis financing of the projects was procured.</p>	Hierarchy provision maintained as written
Gulf	KNTGC / Draft 1	4.5.2	Composition of the Kenya National Grid Code Review Committee does not provide adequate representation for the licensed generators considering their diversity	<p>Generators should be represented based on either of the following:</p> <ul style="list-style-type: none"> a. IPPs or Government Owned b. Technology used for generation, e.g. Hydro, Thermal, Wind, Nuclear, Solar, and Geothermal 	Review committees to include public and private representatives for Transmission, Distribution, and Generation.
Gulf	KNTGC / Draft 1	17	Meter specifications	An annex should be provided with specific guidelines on the various meters specifications for clarity. This will help standardize the various requirements for meters.	Logged for Review. Pending KPLC provisions of metering standards.

Table A-5 Thika Power Comments and Status

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
Thika Power	KNTGC / Draft 1	3.10, page 50	Dispute Resolution	This section shall also recognize the dispute resolution mechanism set up in the PPA section 18.1 and 18.2	Grid Code does not address commercial agreements.
Thika Power	KNTGC / Draft 1	4.3, page 57	Governance Document	The section dealing with Energy Tribunal contradicts section 3.10.2, which states that determination by ERC on any dispute shall be final	No change required
Thika Power	KNTGC / Draft 1	4.5, page 58	Kenya National Transmission Grid Code Review Committee	This section states "KNTGCRC is not a decision making body and the ERC shall not be bound by its deliberation or recommendations". This contradicts section 3.10 which indicates that ERC shall refer all disputed matters to KNTGCRC for consideration.	No change required
Thika Power	KNTGC / Draft 1	4.5.2, page 59	Composition of Kenya National Transmission Grid Code Review Committee	The licensed generators are under-represented. Proposes that KenGen and IPPs should each have one representative depending on the mode of generation, e.g., a. KenGen – 1 rep b. Wind – 1 rep c. Diesel – 1 rep d. Solar – 1 rep	Review committees to include public and private representatives for Transmission, Distribution, and Generation
Thika Power	KNTGC / Draft 1	4.13.3, page 71	Registration of Kenya National Transmission Grid Code licensees	Since IPPs have licenses to generate already by ERC, they already comply and should not be subjected to further licensing. Further licensing may imply high cost of electricity to the end users since the generators will have to recover the cost	Grid Code does not address commercial agreements

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
Thika Power	KNTGC / Draft 1	6.2.5, page 113	Restart after power station black out	<p>Provide provision for restarting of the diesel power plants with steam turbine. It would be prudent to define the power station black out time, e.g. 10 hrs, 20 hrs, etc. Note that if the grid failure lasted more than 8 hours, the steam system would have cooled down hence requiring more than 6 hours for restarting after the engine has been restarted. This will avoid startup of turbine being classified as unreasonable delay due to limited time set in the grid code.</p> <p>Note the following Thika steam turbine startup:</p> <p>a. Steam turbine startup from cold with cold boilers 6 hours b. Steam turbine start from hot conditions 4 hours</p> <p>To avoid thermal stresses on the boilers and steam turbine due to daily startup, it is recommended that steam turbine shall be operated continuously unless there is grid problem or fault on the turbine. Steam turbine shall be priority equipment to maintain in operation due to long startup time unlike the diesel engines.</p> <p>This section shall be expanded to include various situation; it would be advisable to seek comments from the power generators on how fast they can be able to start the power plants.</p>	Potential area for Derogations if generators cannot meet requirements
Thika Power	KNTGC / Draft 1	6.2.6, page 114	On-load tap changing for generating unit step up transformers	If the generating unit does not have unloaded tap changer, they shall be required to install the tap changer which is an extra cost to the power plant operator. The grid code shall provide provision for the IIPs to recover the costs through the PPAs.	Grid Code does not address commercial agreements

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
Thika Power	KNTGC / Draft 1	9.3.1, page 145	Auxiliary supply	<p>In case of loss of auxiliary power supply to power station, ERC shall provide tariff noting clearly that the power station shall not be charged for:</p> <ul style="list-style-type: none"> a. KVA demand b. KW demand c. Power factor surcharge <p>It shall be noted that where power station takes power from grid due to prolonged shut down or during zero dispatch, it shall be on flat rate tariff excluding the following</p> <ul style="list-style-type: none"> a. KVA demand b. KW demand c. Power factor surcharge 	Grid Code does not address commercial agreements
Thika Power	KNTGC / Draft 1	General		Kenya national electricity grid code to have annex stipulating that it shall respect all the commercial agreements signed between KPLC and other organizations including IPPs	Grid Code does not address commercial agreements

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
Thika Power	KNTGC / Draft 1	General		<p>Where implementation of the KNTGC affects the income of the IPPs, such other extra costs to the IPPs shall be met through increase in tariff or single payment approval from ERC through the treasury. This extra cost to be paid through tariff increase or from treasury shall include:</p> <ul style="list-style-type: none"> a. Any improvement, re-commissioning of the equipment, which is a requirement of the KNTGC b. Commercial losses (capacity payment, energy chargers, or other incomes that IPP owner get from KPLC) which would have lost during the power plant improvement period required and recommended by the KNTGC c. Cost incurred if any during signed of any agreement with KNTS as stipulated in pages 110 and 111 or any other agreements during implementation of the KNTGC d. Any cost incurred to meet any future compliance required by the KNTGC as noted by ERC and which was not defined during commissioning of the power plant e. Any cost incurred or required to meet transitional provision as required by the KNTGC f. Any other cost required to meet the requirements of the KNTGC 	Grid Code does not address commercial agreements

Table A-6 Kipeto Comments

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
Kipeto	KNTGC Draft 3	5.2.1.8	We have reviewed the new version 03 of the transmission grid code dated October 2015. Table 5-3 now references IEC 62053. However, this standard is in reference to AC metering equipment, not voltage harmonic limits as the table states. The previous grid code was referencing NRS 048, which is derived from IEC 61000. Could you clarify if this table should mention IEC 61000, which contains harmonic distortion limits?		Standard reference corrected to be KS IEC 61000 in Draft 4

Table A-7 Quantum Comments

Comment Received From	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
Quantum	KNTGC and KNDC Drafts 1	General	QPEA has reviewed the Draft Transmission and Distribution codes and has neither comments nor suggested amendments based on the requirements of the perceived power plant intended for the Geothermal Project ni Menengai, Nakura. We appreciate ERC's recognition of our institution as a key stakeholder in the sector.		Comment received.

Table A-8 Additional Changes Made After Consultations

Party Consulted	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC	20.4.4 7.2.11	Unit Scheduling should reflect current operations	20.4.4: Users provide day-ahead power and ancillary service schedules by 14h00m; TSO provides final schedules to Users by 16h00m. During the day of operation, TSO provides deviations to schedules 10m before the hour. 7.2.11: Clarification in language: RPP provides 7 day ½ hour forecast by 14h00m on a daily basis.	Changes made in Draft 4;

Party Consulted	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KETRACO	KNTGC	20.4.4	Provisions made for Generating units (such as Hydro) that provide monthly energy forecasts	<p>If the user provides a schedule more than a day in advance and provides no update to the previously provided schedule by 14h00 on the day prior, the Kenya National TSO shall use the most recently provided schedule.</p> <p>At the discretion of the Kenya National TSO, the User may submit a daily energy schedule, which the Kenya National TSO will use to determine the hourly schedule of the generator, subject to the generator and/or hydrological constraints.</p> <p>Renewable Power Plants should provide a forecast as specified in section 7.2.11</p>	Changes made in Draft 4
ERC	KNTGC KNDC			Hierarchy provision is not consistent between KNTGC and KNDC	KNTGC and KNDC made consistent

Table A-7 KPLC Action Plan for Compliance – Kenya National Distribution Code

Clause	Review Team Remarks	Time Requirements*
3.12.4 (Pg 42)	<p>Currently non-compliant</p> <p>An appropriate register to be developed and maintained</p>	3years
5.1.5 (Pg 61)	The current KPLC Supply application form requires a revision to capture additional customer data as proposed by the Grid Code. IT Systems like ICS and DCS may require modifications	3 years

Clause	Review Team Remarks	Time Requirements*
5.1.6 (Pg 62)	Many customers may not likely present that depth of information. A lot of customer education required	3 years
5.1.10 (Pg 710)	KPLC to establish a reporting structure to ERC of such exceptions, across all the Counties.	3 years
5.2.7	The company would have to invest in equipment that monitor harmonics. Monitoring may be impractical for all customers but it is suggested that focus be on large consumers, with sampled Audits for the other Customers.	3 years
5.2.8	Time required to determine the means of monitoring, cost implications	3 years
5.2.9 (Pg 80)	Develop a document detailing the grounding requirements to be available to all applicants.	3 years
6.1.4 (Pg. 94)	Not being done currently. Customers to be sensitized and compliance enforced	3 years
8.1.2. (Pg. 133)	KPLC does not yet have a policy guideline on net metering. A policy to be developed first then be implemented	3 years

*The periods indicated do not include period for funds mobilisation

Table A-8 KPLC Action Plan for Compliance – Kenya National Transmission Grid Code

Clause	Review Team Remarks	Time Requirements*
5.1.5 b, c	Completion of Interconnectivity within the East African Power Pool and implementation of AGC with automated demand control will the criteria to be fully achievable. Improve and harmonize SCADA across the interconnected region	5years
5.1.7	Collection of equipment data and Specifications is on-going in order to create a better model of the Kenya n Network and EAPP interconnected Model: to allow dynamic analysis. Steady state analysis can, however, be conducted on the Kenya System.	1 year
5.1.8	EAPP planning sub-committee is currently putting the required data together	1 year
Chapter 8	Automatic generation control to be impilmented with entire Network visible at EACC	3years
8.1	Subject to the establishments of EAPP CC	5years
8.2	To build capacity	2 years
Chapter 9.1	Not ready. Requires AGC and also a system where all Breakers at Transmission stations can be switched remotely. SCADA system need to be compatible across the Region, communication systems and harmonized protection schemes are necessary	5years
Chapter 9.2	Achievement on N-1 criteria with the interconnected system plus the anticipated large wind & Solar component requires AGC for faster response for system to realize system security. Harmonised SCADA systems and automation that allows remote switching at Key Substations, coupled with HR capacity building is necessary.	5 years
10.1; 10.2	AGC will be important. Handling of the Emergency Situations as prescribed could be compliant with about 3years. However commissioning of the intermittent wind and solar impacts compliance	4 years

Clause	Review Team Remarks	Time Requirements*
12.1	Under frequency management scheme is in place (see attachment). Also dependent on the establishment of EAPP CC and will require operational AGC in the different control areas for effective demand control	5years
12.2	Dependent on system automation, harmonization of SCADA systems, and AGC implementation	5years
13.1	Kenya System Ok. Implementable under a fully operational interconnected EAPP after protection systems & operational harmonization	5years
13.2	Being done. To review and assure strict compliance across the entire Country and enhance capacity	3 years
14.1	KPLC ok. Implementable in a fully operational interconnected EAPP after protection systems & operational harmonization	5years
15.1.1 b, d	Dependent on frequency control. Desirable that AGC be in place. Implementable under a fully operational interconnected EAPP and protection systems & operational harmonization, harmonised SCADA , communication & metering, also requires AGC to be operational with requisite HR capacity	7years
16.1	Procedures exist at KPLC. AGC will be necessary in an interconnected EAPP	5years
16.2	Need to enhance existing arrangements to be compliant. Align Power Purchase Agreements to the GRID code	7years
17.1	Need to harmonise PPAs to conform to GRID CODE	3 years
18.1	Need to be done in a manner that is ready for power trade within an environment that has AGC control	3 years

Clause	Review Team Remarks	Time Requirements*
19.1	Need to be done in a manner that is ready for power trade within an environment that has AGC control	3 years
20.1	Need to complete on-going work by EAPP Planning Work Group	3 years
21.1	To work together with in EAPP in Tandem before implementation of AGC and fully SMART GRID operation	6 years
22.1	To work together to ensure continuous capacity development	

*The periods indicated do not include period for funds mobilisation

Table A-9 Buchangu & Sirwa Hydropower Projects Action Plan for Compliance – Kenya National Transmission Grid Code

Party Consulted	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
Buchangu & Sirwa Hydropower Projects	KNTGC	7.2.3.1		<p>Figure 7-2 and Section 7.2.3.1 Fault Ride Through for RPPS.</p> <p>We will have a problem with this requirements for small hydro synchronous generators.</p> <p>Eskom had the same requirements for the RPPs but it was recently proven to them that it cannot work for the small hydro synchronous and Eskom/the regulator are currently amending their curve which we expect to be published this month. (we are waiting for the regulator's approval)</p>	Section 7 Requirements apply only to wind and solar generating plants

Table A-10 Comments Received at the March 11, 2016 Public Meeting and During Public Comment Period

Party Consulted	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
World Bank	KNTGC	Derogations	<ol style="list-style-type: none"> How will the cost of making investments needed to comply with the Code be financed? What is the gap between existing arrangements and the target in the Code & what's the impact of the regulatory compliance? 		Commercial terms not addressed in Grid Code, potential items for Derogations

Party Consulted	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KenGen	KNTGC		Vector group of transformers - TX arrangements not to be left to generator owners		Grid code does provide requirements for transmission connections.
KenGen			Backfeed metering - The tariff in place is optimized for export metering but not import metering		Accuracy for measurement in both directions has been specified
KenGen			Generation Licensees Representation in the Review Committee - To be proportional to the level of generation capacity a utility is generating.		Representation has been determined by Technical Review Working Group
KenGen			Optimization of excitation & governor response for generators - The optimization for existing generators to be funded by ERC and optimization levels provided by a joint committee		Cost issues not applicable in Grid Code
KenGen			System operator training - -To be expanded to other cadres of staff in the utilities as well		Not applicable for Grid Code

Party Consulted	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KTDA Power	KNDC		What is the limit of responsibility in meeting performance standards between a Generator & a DSO?	<ul style="list-style-type: none"> -Distribution losses affect system voltages & frequency, affecting the generating entity -Define joint data collection procedures -Analysis & identification of parties occasioning non-compliance -Task & monitor the responsible party to provide technical solutions in support of generating companies to access the grid and comply with voltage & frequency issues. Where possible or feasible, install AVRs to enhance system stability. 	<p>Both DNSPs and Generators need to comply.</p> <p>Grid Code may compel installation of AVRs to enhance system stability</p>
ERC				<p>How will upgrade investments needed to comply with the Code be financed given that IPPs have already signed PPAs with KPLC?</p> <p>Do we have a preferred software for transmission planning such as PSSE that is required in the Grid Code?</p>	<p>Not applicable to Grid Codes.</p> <p>No</p>
ERC	KNDC	Penalties		The No. of outages in a year should be capped and penalties applied to licensees exceeding the target maximums.	Specified in Appendix A

Table A-11 Comments Received at the April 13, 2016 Technical Review Working Group (TRWG) Meeting

Party Consulted	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
KPLC	KNDC/ Draft 4	5.1.7.1	"Generators on a radial distribution line shall not exceed 15% of the line section's annual peak load"-	<u>KPLC</u> will get back on KPLC current practice in this regard	KPLC confirmed no change required
KPLC	KNDC/ Draft 4	5.1.7.1	"If the Generating Plant is to be connected on single-phase shared secondary, then the aggregate generation capacity on the shared secondary, including the Generating Plant, will not exceed 20 kilovolt-amps (kVA)"	<u>KPLC</u> will get back on KPLC current practice in this regard.	KPLC confirmed no change required
KPLC	KNDC/ Draft 4	5.1.13	Testing of User Equipment		Added: "Equipment at connections points shall be subject to re-testing every four (4) years."
KPLC	KNDC/ Draft 4	5.3.3	Protection System Coordination	KPLC will provide current KPLC practice and requirements for system protection at connection.	KPLC confirmed no change required
KPLC	KNDC/ Draft 4	6.1		Nexant will change text to reflect the data requirement for customer connection and generator connection >1 MVA	"All Distribution Network Users with Medium Connections larger than 1 MVA and all Large Connections and connected at Medium or High Voltage shall annually provide the DNSP with its Energy and Demand Forecasts at each Connection Point for the five (5) succeeding years."

Party Consulted	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
NCC	KNTGC	22.2.3		Nexant will add language that" ERC will coordinate and certify the training process" in appropriate place.	"Each Licensee shall establish a clear requirement, define and develop a systematic approach in administering the training, and provide the necessary feedback as a measurement of curriculum suitability and trainee progress. Each entity should recognise the importance of training and provide sufficient operator participation through adequate staffing and work-hour scheduling. The ERC shall certify the training practices established by each Licensee."
KETRACO	KNTGC	16.2		Charles (KPLC) will provide documentation for current practice on correcting violations within specified time. Nexant will add language in this section according to the current practice.	Change pending receipt of information from NCC
ERC	KNDC and KNTGC	4.3.7	Appointments by the ERC (to the Grid Code Review Committee)	Nexant will modify language to reflect that "if a member position is vacant for a particular sector, ERC will nominate someone from that sector to fill in that position."	"The appointed Member must be from an entity from the corresponding category as described in Section 4.3.2. "
ERC	KNDC and KNTGC	4.6.3.1	Notice of Meeting	Consumer Association Representative shall be invited by the chairman of the committee for attending meeting as a non-voting participant.	"The Chairperson shall provide notice of the meeting to Consumer organizations, to allow their representatives to observe the meeting."

Party Consulted	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
ERC	KNDC and KNTGC	4.6.7	Attendance by Conference	Nexant will modify the language to reflect that the members shall attend the meeting in person except for special circumstances.	"Members shall attend meetings in person. In special circumstances as approved by the Chairperson, meetings may consist of a conference between Members who are not all in one place but who are able directly or by teleconference to speak to each of the others and to be heard by each of the others simultaneously. The word "meeting" shall be construed accordingly."
KPLC	KNDC and KNTGC	General	For the newly added standards, Nexant will check and update if there are equivalent KS standards.		Pending Nexant Review
TRWG	KNDC	5.1.10	Revise wording of approval process		"After processing the application submitted by the Distribution Network User, the DNSP shall inform the Distribution Network User whether the proposed Distribution Network User connection is acceptable or not. If the DNSP identifies any degradation in system performance or a violation of technical requirements which can be remedied with system improvements, the Application will be approved upon completion of the improvements, and the DNSP shall inform the applicant of the finding and make available the associated information."
KPLC/TRWG	KNDC	5.1.8	Definition of "Processing of Applications"		"Processing of applications shall include any necessary studies and analysis and the communication of a final determination to the User. Processing of applications shall begin upon submission of an accurate and complete application by the User."

Party Consulted	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
ERC	KNDC and KNTGC			Replace references to Energy Regulatory Commission and ERC with “the Regulating Authority” throughout the codes.	Complete
TRWG	KNDC	5.1.7.2	Medium Generating Plant (50 kW – 10 MW) B8. Single or Three -Phase		Deleted because generating plants larger than 50 kW should/ not be single phase
TRWG	KNDC	General			“one -line diagram” replaced with “single line diagram”
TRWG	KNDC	5.1.11	Connection Agreement: “it will be necessary for the DNSP to be reasonably satisfied”		Removed the word “reasonably” to avoid any room for ambiguity
TRWG	KNDC	5.2.1	Supply Quality Standards		Added reference to IEC 61000 in section 5.2.1
TRWG	KNDC	5.3	Technical Requirements at Generator Connection Point: The Generators connected to the Distribution System ... shall meet the requirements for preventing Unintended Islanding Operation in ANSI/IEEE Standard 1547-2003		Added reference to IEC 62116:2008 (Test procedure of islanding prevention measures for utility-interconnected photovoltaic inverters)
TRWG	KNDC and KNTGC	Chapter 5/7	Renewable Power Plants/High Wind Curtailment		Renamed the section as “Active Power Control for Wind Generating Plants” to better reflect requirements
TRWG	KNDC	6.1	Distribution Planning Responsibility		Language modified to reflect coordination with TSO

Party Consulted	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
ERC	KNTGC	Chapter 5, Planning		Changed reference to “Kenya’s planning and development organizations” to specific entities, such as the Regulatory Authority or the Kenya National TSO.	
TRWG	KNDC and KNTGC	3.10.2	Derogation Review		“as soon as reasonably practicable” to ...”
TRWG	KNDC	5.4.2	Remain Connected Voltage Condition		Changed language to reflect the Remain Connected requirement on medium and large generators.
TRWG	KNDC	7.11.5	Safety Precautions		Changed text to include wind and solar specific safety standards
ERC	KNTGC	20.6	Confidentiality of Information	May be deleted as significant information/clauses not confidential and document silent on the same.	Section deleted
ERC	KNDC and KNTGC	4.3.10	Entities should appoint Alternates, rather than Members appointing Alternates		For future review by TRWG or Grid Code Review Committees – no change.
ERC	KNDC and KNTGV		Definition of Environmental , Health, and Safety Obligations	There could be other obligations under other laws i.e NEMA	Added “and other applicable regulations”

Party Consulted	Code / Draft	Clause	Comments	Suggested Amendments	Status in Final Code
ERC	KNDC and KNTGV	3.9.2	Penalties	This clause seems to be more substantive? How many issues/matters/ breaches can be occasioned in the Distribution or Transmission Code! This cannot be legal since the penalty depends on the gravity of the breach. How do other Codes treat this. The gist of the Code/standard is that there are consequences for such breach. We need to establish possible breaches in the Code and propose what penalty can be attached to each.	Revised to include consideration of the following factors: <ul style="list-style-type: none"> ▪ Severity of the non-compliance and any environmental, health, and safety impacts ▪ Instances of repeated and deliberate non-compliance ▪ Penalties shall be comparable to those specified in other laws, regulations, and applicable contracts ▪ Penalties shall be set at a level such that non-compliance will not be economically preferable to compliance
ERC	KNDC and KNTGC	4.3.7	Appointment by the Regulatory Authority	There could be conflict, else it can appoint the CEO among the defaulting entities and if decline to proceed without representation?	For future review by TRWG or Grid Code Review Committees – no change.
Alten Energías Renovables	KNDC and KNTGC	5.4.9 and 7.2.5, Ramp Rates	Add provision for solar plants for ramp rate violations under rapidly changing conditions, equivalent to exiting wind provision		Added” It is recognised that falling wind speed, <i>rapidly changing cloud conditions</i> , or frequency response may cause either of the maximum ramp rate settings to be exceeded.”