Ethiopian Energy Authority

Energy sector regulation; capacity building for Regional regulators and Electrical Works Competency Certification System Development project

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Addis Ababa, Ethiopia

Acronyms

EEA	Ethiopian Energy Authority
IT	Information Technology
EEU	Ethiopian Electric Utility
AAACIREA	Addis Ababa Administration Construction Industry Regulatory Authority
MoUDC	Ministry of Urban Development and Construction
CoCs	Certification of Competencies
EWCC	Electrical Works Competency Certification
MOFED	Ministry of Finance and Economic Development
MoT	Ministry of Trade
MoWIE	Ministry of Water Irrigation and Energy
ESEE	Ethiopian Society of Electrical Engineers
WBS	Work Breakdown Structure

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EXECUTIVE SUMMARY

The main objective of the project is to address the issues related to the existing lack of regional regulation framework & practices of electrical Works in power generation, transmission, and distribution, building installations, industrial works and related businesses and provide professionals with technical guideline to assist their practices. It also aims for online automation of examination of competency candidates and strengthen the over capacity of EEA to handle their respective functions. Consequently, to capacitate the regional energy bureau's and the federal regulator in terms of: institutional, skilled man power, equipment facility and system development is high priority of energy sector regulation at this point in time.

Assessments and discussions with primary stakeholders have revealed that there exist, gaps, overlaps and duplication of efforts in issuing and administering certificate of competencies to electrical and electromechanical businesses and professional competency certification (Licensure) of electrical professionals. On the other hand there is prevalence of dissatisfaction in the regions due to the centralized certification at federal level and absence of EEA in the regions in some forms.

Different institutions are involved in the competency certification of electrical and electromechanical contractors and consultants. Even after the coming into effect of Proclamation No 810/2013 in January 2014 which created and empowered the Ethiopian Energy Authority to issue license and certificate of competencies to electrical and electromechanical businesses and regulate the electrical energy sector, electrical work consultants have the option of obtaining certificates of Competency from the Ethiopian Energy Authority or the Addis Ababa Construction Industry Regulatory Authority (By delegation from the Ministry of Urban Development and Construction). The Ministry of Urban

Development and Construction ceased issuing certificates of competency to electromechanical business but has continued issuing professional competency certificates to electrical engineering professionals. It has drafted the Building Electrical Installation Code and is expected to issue an official version of the document very soon. The Ministry of Water, Irrigation and Energy registers and issues certificates to electricians engaged in water well drilling. Each of these institutions has its own criteria which are not harmonized to the others.

The findings show that capacity shortages and high turnover of staff have essentially crippled the implementation of the existing certification procedures. Examinees have complained about lack of training modules, lack of online access to examinations. There is also a need for regional regulatory presence of the Ethiopian Energy Authority (EEA). Current technological advancements in ICT must be fully harnessed to ease access to common resources such as professional registers, database of contractors etc. Lack and/or shortage of proper instruments, manuals and checklists for testing and inspection and the skilled manpower to conduct the tests are some of the challenges that the EEA has to overcome in order to carry out inspections of licensees and customers' facilities and certify private inspectors and testers.

The major aim of this project is to put in place better opportunities to capacitate the Ethiopian Energy Authority and the state regulators, so that they could carry out their roles and responsibilities in energy sector regulation, effectively and efficiently. Particularly, provision of electrical works competency certification, conducting inspection and regulation activities which requires considerable material and financial support in addition to the regular government budget of the Authority. Hence, this project is proposed based on the EEA's current need derived from the energy law. The main focus of the project is; in addition to creating regional capacity, to conduct energy sector

regulatory activities, to develop a well-functioning National Electrical Works Competency Certification System, where all the existing over laps and gaps are avoided through a coordinated and well managed roles and responsibilities among relevant stakeholders for a standardized competency certification system, and more importantly, to lay the foundation of regional energy sector regulatory grounds to undertake regulatory functions.

It is structured with three main components (a) institutional coordination and Capacity Building, (b) Electrical Works Competency Certification System Development, and (C) Regional State Regulators establishment and capacity development. The project's expected major outputs are database development with different subsystems and avail online services, training of assessors, fulfilling of workshop tools, instruments, equipment, machinery and accessories for practical examination at workshops at federal and regional state and chartered cities and development of inspection handbook; development of capacities of regional regulators in matters of industry regulation, competency certification and other supports ,are among others. Detail project budget requirement, material and other inputs, project management and implementation arrangements are shown in this study document.

The project – charts out a roadmap that lists recommended activities, expected outputs and indicators, implementation plans and project budgets and project implementation set up. International practice of electrical work competency certifications were reviewed in order to incorporate best practices that fit the objective reality on the ground in Ethiopia. Recommended course contents for the training modules, regulatory capacity buildings, inspection and assessors' handbooks, recommended competency categories and grades and the professional levels required for each grade are provided and this requires a total of 47.5 million Birr capital budget support for its implementation

1. BACKGROUND

The Ethiopian government has clearly identified the role of energy to be key in ensuring rapid and sustainable development in the country. Several Hydro and wind power plants have been constructed and put into operation in the last decade and some more are under construction at the moment. The installed capacity is expected to jump to about 8,000-10,000 MW by the end of the Growth and Transformation Plan (2015) from a little over 2,000 MW at the moment. To implement the energy projects and provide affordable and reliable power to the economy, the Government has been restructuring the operating and regulating institutions of the energy sector in the country. The Ethiopian Energy Authority (EEA) is one such institution that has been transformed to regulate the energy sector, cope with the growing energy efficiency and conservation demands and facilitate private sector investment in the sector.

Energy Proclamation No 810/2013 which came into effect in January 2014 superseded all previous laws and regulations pertaining to the energy sector and broadened the authority and responsibility of the Ethiopian Energy Authority. This proclamation transformed the Ethiopian Electricity Agency into Ethiopian Energy Authority and the Council of Ministers' Regulation No 308/2014 established the Ethiopian Energy Authority. It is understood that there are some serious issues that necessitated the adoption of new energy proclamation; to mention among them; revamping enforcement of the regulations for promoting compliances by licensees, expanding certification regime of the professionals in the sector to cover professional domains so far not covered clearly classified, to include energy efficiency and conservation as one part of regulation which covers promotion, program design and implementation, defining commercial energy efficiency services and formulating certification schemes for such commercial services, defining efficiency standards and establishing laboratories for conformity assessment of efficiency standards, to include business competency certification for electric related businesses, and last but not least,

to empower and delegate regional energy regulatory institutions in the implementation/regulation and to be responsible for regulatory issues of energy products and services originated and disposed within their respective territory. This creates an opportunity to reach out federal regulatory activities to grass root level, since the Energy Proclamation No. 810/2013, Article 4/14 also empowers the EEA, where necessary to delegate its powers and duties to the appropriate regional executive organs and provide them with capacity building support.
To implement its mandates in a meaningful way, it requires; human, material and institutional capacity building both at federal and regional level.

Compared to its predecessor, the Ethiopian Energy Authority has broader mandate and responsibility, the most significant among others; being energy efficiency and conservation activity, Different type and level of competency certification for natural and juridical persons and Economic and technical regulation and devolving of its mandates to regional state organs.

The EEA is tasked to give competency certification to persons and firms for areas of electrical works. According to proclamation No 810/2013, these areas cover electrical design, installation, maintenance, testing, inspection, contracting, consultancy and electromechanical works and other electric related business certificates such as import, sale, manufacture and distribution of electric related products. The Energy Proclamation No. 810/2013, Article 4/14 also empowers the EEA, where necessary to delegate its powers and duties to the appropriate regional executive organs and provide them with capacity building support.

A decentralized Energy Sector regulation is an international practice since reliable, economical, safety, energy efficiency & conservation and effective utilization of public resources are at stake. Ineffective and inefficient regulation can be a cause for lack of good governance and also faulty designs and

workmanships which can cause loss of life and disability to humans and huge losses to the economy.

Energy efficiency and conservation, and Electrical and Electromechanical services competency certification with are not fully practices so far. Professional competence certificates for electrical professionals were/are still being issued by the ministry of Water, Irrigation and Energy, the Ministry of Urban Development and Construction and some Regions. The main problems are:

- Lack of a harmonized set of procedures and criteria in issuance of competency certificates. The EEA requires taking exams in order to qualify for certain professional competency levels. Other institutions have their own criteria.
- Overlaps and duplication of efforts.
- The EEA at present issues four classes of professional competency certificates. However, these four /classes of certificates are not broad enough to accommodate the tasks EEA has got through the recent proclamation No 810/2013 and its establishment as an authority. The professional competency certificate owner along with other requirements fulfillment will be provided trade competency certificate in order to secure trade license form MoT or Trade bureaus.
- No training manuals/guidelines exist for candidate examinees to prepare themselves in a more focused manner for each certification and grade.
- Absence of on-line access to services (exams, training manuals, remote applications and registration for examinations from the regions, contractor database…) is a major hurdle that needs to be overcome in order to provide efficient and speedy services to the public
- Capacity bottlenecks such as shortage of skilled manpower, lack of proper instruments and tools, logistic support have hampered EEA from accomplishing its mandate effectively (like inspection services,) on the Federal level as well as Regions

- Lack of regional presence required that people have to come all the way from the nine regions and Dire Dawa to Addis Ababa to get services from EEA. This is contributing to service dissatisfaction that needs immediate solution.

Proclamation no. 810/2013 empowers the Ethiopian Energy Authority to issue directives governing the electrical and electromechanical business sectors. Accordingly the Authority issues Certificate of competency to individuals and business entities engaged in electrical works.

The Ethiopian Electricity Agency had drafted and discussed with stake holders such as the Electromechanical Contractors' Association for the grading and certification of electrical and electromechanical contractors. Similarly the Ethiopian Electromechanical, Telecommunication and Electronics Contractors Association (EEMTECA) developed a similar document with the help of a consultant and shared copies with the Ministry of Water, Irrigation and Energy and the Ethiopian Energy Authority. But, it was only after the recent proclamation that the EEA was mandated to clearly handle competency certification of electrical works including building installation activities.

Realizing the problems and challenges prevailing in the current certification practice and the lack of regulatory services at the regions, EEA initiated this project, to study the problem and prepare a comprehensive package to address these problems.

The project focuses on the institutional capacity building of the EEA, developing electrical works competency certification system at Federal and Regions level. The regional regulation delegation and capacity building for electrical works competency certification will start as a pilot with four regions and Addis Ababa.

The necessary equipment and IT infrastructure will be in place and based on the experiences at these regions and Addis Ababa, the delegated regulatory activities including electrical works competency certification will be implemented in all nine regions and Dire Dawa City in a phased manner.

Competency of persons is expected to develop from the three components over the lifetime of a professional person, comprising education, training and experience. Certification of competency is undertaken by individual persons and firms for official recognition by the community, customers and government institutions that they have demonstrated professional integrity and competency in the field.

The project is expected to highly capacitate the EEA and the regions to enable them discharge their growing tasks and responsibilities. The regional capacity building process will accommodate interventions outlined by the Energy Sector Regulation Institutional Capacity Building Project at Federal and Regional State level document mentioned in the list of references.

The project targets to realize capacity and system development of: relevant regional institutions such as; regional energy Bureau's and the federal regulator. The project is designed to build and support these institutions to; attain improved efficiency, productivity, public safety, and provide effective regulatory services to licensed utilities and to their customers effectively handling issues as they occur. Maintaining regional presence of regulatory services to address industry issues that may require regulatory intervention is high priority of the day.

2. PROJECT RATIONALE

2.1. Problem Analysis

Energy, being an engine of development, is important that it has to be supplied to all the economic sectors of the nation; sustainably and up to a defined technical and commercial standard. Enforcement of service quality standards and commercial standards requires well defined regulatory services with adequate prevalence in the Regions. Lack of adequate regulatory capacity and lack of regional presence is one of the main features of the existing situation.

Towards achieving a goal of energy security and prosperity and avoiding the risk of retarding the hard won economic growth one of the important outstanding challenges is formulating adequate regulatory sphere of energy efficiency regulation and to effectively house it in relevant state offices which is lacking from the energy sector frame work. Energy efficiency regulatory institutional and human capacity is much to be desired. A functioning energy regulator with the appropriate legal and well coordinated institutional framework is one of the conspicuous deficiencies of the existing energy sector governance. The outstanding issue is instituting a well functioning energy sector regulate in the interest of addressing sector problems ranging from investment, distribution, safety, reliability, affordability, quality, sustainability, customers complaint, professional competency and accountability, environment etc. This is obviously a very demanding task beyond the prevailing capacity of the Authority. This adds up on the Authority's and that of the regional bodies to be delegated with the regulatory mandates, additional human capacity need to be acquired within a year at best to address the outstanding issues. With regard to similar issues to do economic and technical regulation in the power sector, tailor made training will be required. In order to define the legal and institutional frame work under which the Authority operates and to upgrade the human

capacity, the Authority anticipates making good use of various resources including tailor made training and proactively engage collaborators and stakeholders in the sector.

With regard to competency certification, the Ethiopian Electric Light and Power Authority (EELPA) (now EEU) produced Regulations for Electric Consumers' Installation in 1969. The regulations were generally compiled from various internationally recognized Regulations and Specifications. The regulation was designed to ensure safety mainly electrical injury and fire hazards in the utilization of electricity in buildings. Even though the regulation was a big step towards electrical works regulation, its mandate covered small scope of the electricity sector. EELPA was issuing four grade/classes of electrical installations professional competency certificates named A, B, C and D.

At later stage EELPA was re-established as Ethiopian Electric Power Corporation/EEPCo/ to operate with commercial sense. Moreover, the Ethiopian Electric Agency (EEA) was also established to regulate the electricity sector. The EEA continued to play its role as a regulator and in the area of certification it continued to date to follow the A, B, C and D professional competency certification. The problem with the A, B, C and D certificates were many. The main ones are: it was not renewed annually and, revoked .Ones the certificate is issued the certificate owner continues to hold that title for life long. The reason EEA did not renew and revoke the certificates was because such details were not in its mandates. The other problem was that building installations works and the building codes follow up and management was under the Ministry of Urban Development and Construction (MoUDC). As the main focus and specialization of MoUDC was on the civil engineering issues the electrical installations work was marginalized in many ways.

The workshop on Electrical Works and Services Certification and Licensing Practices in Ethiopia, organized by the Ethiopian Electric Agency in collaboration with Science and Technology Professional Associations Joint

Secretariat in April 19-20, 2001 clearly spelled out all the existing problems of electrical works competency certification and licensing.

The competency certification issue has been problematic due to some root causes unsolved at the appropriate time with appropriate tools and policy instruments. Based on Stake holder consultations and review of existing legislation regarding the certificate of competency for electrical and electromechanical professionals and services, the problems/challenges listed below have been identified.

2.1.1. Overlaps and duplication of efforts

(a)The Addis Ababa Administration Construction Industry Regulatory Authority (AAACIRA) is issuing certificate of competencies to electrical consultants by way of delegation by Ministry of Urban Development and Construction (MoUDC). They are issuing these certificates to business entities for three levels, from Addis Ababa as well as those coming from the Regions.

The Ethiopian Energy Authority (EEA) is also issuing certificates for consultants for four levels. The problem with such practices in the same sector is big because each entity uses its own requirements and processes which cannot be expected to be consistent with each other and would affect professional skill development since players would not get consistent message from the system to encourage and groom them towards achieving professional excellence.

(b) Issuance and Registration of Professional Certificates to Electrical and Electromechanical Professionals

MoUDC, MoWIE and the AAIDRA, have established several professional competency levels based on educational qualifications and experience. They are issuing certificates and keep registry of professionals for the purpose of

obtaining their own business license or engage in designing, testing or inspection of public infrastructure, buildings etc. The MoUCD is still issuing the following professional certificates to electrical professionals:

(i) Practicing Professional Engineer
(ii) Professional Engineer
(iii) Graduate engineer
(iv) Associate Engineer
(v) Engineering Aid

Similarly the MoWIE is issuing similar certificates to electricians for drilling activities. The AA professional assessment and certification center is also currently issuing four levels of certificates to TVET professionals. Their plan is to expand the system up to eight levels and will be given to professionals' up to PhD levels.

The EEA is to issue competency certification for all electrical works under its mandate. All other tasks including building code development and management will be under the mandate of the EEA.

According to 691/2010, MoUDC has the mandate to issue certificates and register professional engineers and consultants. Also Proclamation 197/1992 and Regulation 115/1997 authorize MoWIE to issue these certificates and register professionals and businesses engaged in the water sector.

As can be seen from the above, there exists significant overlap and duplication of efforts as well as some "holes" in the professional certification of electrical/mechanical engineers and electricians. International practice shows that the registration and licensing of professionals to provide engineering services to the public varies. In the UK for example, licensing is not required to practice engineering profession. However, the Engineering Council regulates and maintains registry of engineers and certain titles such as chartered

engineer, engineer technician are regulated. In the UK there are five bodies approved by the Department of Communities and Local Government to register competent person's self-certification schemes. Those registered are deemed to be competent persons and they don't need to obtain approvals from the Local Authority. Those not registered need to inform the Local Authority before commencement and the work must be inspected and tested by them on completion and before connecting to the utility supply.

In Canada and USA licensing is required. In India engineers must register with municipalities to practice engineering. Institute of Engineers India issues professional certificates after the individual passes an examination in the relevant field. The Institute of Engineers of India provides two modules of exams to electrical engineers: Module one is basic and includes general concepts in Finance, management, planning, environment etc. Module two is more specific and contains contents from which the examinee can choose from in accordance with his field of specialization (machines, control, power systems etc..). In USA professional certificates are issued by a licensing board set up in each state. These licenses are given on a combination of education and experience criteria and examinations. Similar to the Indian practice, two sets of examinations are given; Fundamentals of Engineering (FE) and principles of Practice of Engineering (PE). These examinations are prepared and furnished by the National Council of Examiners for Engineering and Surveying (NCEES). NCEES is a non-profit organization whose members are from the Engineering and surveying licensure Boards of tall the USA states. It develops, administers and scores examinations used for engineering and Surveying licensure in the United States.

In the USA licensure and certification have different meanings and are given by different entities. Certification is given by non-governmental bodies such as non-

profit associations (like IEEE, ASME...) and it is voluntary. It does not authorize the individual to practice engineering profession. It is generally true that requirements for certification are more advanced and specialized than licensure.

(c) Duplication of Resources and efforts in setting up center for theoretical and practical examinations

To date these institutions, except EEA, are issuing the certificates without requiring examinations. As mentioned above, the certification is based purely on education qualification and assessment of experience which, most often, is subjective. Usually long queues are observed since most are issued from a single center. Some regions (Amhara, Oromia are typical) issuing their own CoCs to construction contractors that are effective only within their boundaries. Contractors and consultants are incurring a lot of costs especially those that come to Addis to get their certificates from EEA or the Ministries.

JICA is said to be setting up testing facilities for MoWIE. Hence, examinations, both theoretical and practical, are on the horizon for water sector professionals.

EEA has been giving examinations mainly focused on building and industrial electrical installation works. Four levels are being issued. This practice is to continue until the new Regulation takes its full effect.

Setting up centers for practical examinations requires huge investment because a lot of instruments and tools will be required. From simple instruments such as Multimeter, Clamp Ammeters, Megger to more complex and expensive sets such as Oil Dielectric Testers, instrument transformers, Applied voltage tester, earth electrode resistance tester, earth loop impedance testers, RCD testers,

motor starting equipment, phase sequence meter, synchronization equipment, cable polarity check etc… need to be procured.

2.1.2. Capacity bottlenecks

(a)Supervision and Inspection Activities

With the exception of EEA's Inspection at the utilities sub-station, network distribution, transmission line, power plant and services centres, contractor performance checks are almost non-existent in all the Ministries and EEA as well. The main reason behind this is lack of institutional capacity resources in terms of organizational, human and financial. They don't have the staff, vehicles, and budgets to make impromptu visits to a contractor's premises to ascertain whether the said professionals, equipment and work area required for the specific grade exist or visit a construction site and verify that the construction work is being accomplished by licensed professionals and workers are equipped with the proper safety and health gear. This task evidently is more difficult for construction work in the Regions.

This is a significant short coming of the certification processes. With the apprehension of this problem, the MoUDC is said to be working on setting up an Agency that would independently oversee this aspect of the certification work process.

(b)Lack of Training and training manuals

The EEA needs training manual for all the types of competency certification under its mandate. In the present practice, the areas of certification are only limited to the previous A,B,C and D professional competency certification solely on building and industrial electrical installation in which EEA provides examinees topic outlines, which is not sufficient to fully prepare them . It is expected from the EEA to develop the proper and full pledged training manual that will be

available within the data base system of EEA and eventually to be accessed online after the rolling out to regions with online automation.

(c) Data base Development

A central database of certified professionals and companies and access by the various Ministries would provide an excellent cost and time saving opportunity for both the private businesses, professionals and the Government institutions. The MoUCD has developed such a website with the help of INSA and it is expected to be running sometime soon.

The EEA will develop the data base system in the first phase of the project and at the second phase the full online automation will take place for registration, application and issuance of certificates and payment of fees for the same. This could provide valuable lessons for EEA's work. This issue is discussed in detail in item 5.1.6.

(d.) High staff turnover

There is high staff turnover unless motivating schemes and benefits are in place. The main benefits are competitive salary to the existing labor market and reasonable incentive package's such like: professional allowance, housing and transport allowance, 24hrs health insurance and different per diems rate's application requires immediate intervention of decision makers to sustain the staff of the Authority.

2.1.3. Harmonization of Legislations

The Trade Ministry Proclamation 686/2010 second revision provides only four trade categories for issuance of business licenses to Electrical and Electromechanical business entities. These are:

50320	Electrical Installation
5330	Electromechanical Works
63151	Electrical Equipment Erection and Maintenance
88770	Electrical Engineering Consultants

Proclamation 810/2013 stipulates the following seven areas of electrical work for competency services.

These are:-

- Electrical Design
- Electrical contracting or consultancy
- Electrical installation
- Electrical maintenance
- Electrical Testing
- Electrical Inspection
- Electromechanical works

These seven areas have to be streamlined with that of the MoT categories and be assigned EEA Grading of natural person and juridical persons classification of competency certification.

The titles for EEA Competency Certification–levels could be implemented by adapting them step by the step to the development of the electrical works sector.

2.1.4. Lack of Regional Presence affecting Industry Regulation at National Level

To address the issue of sustainable energy supply and fair utility services to all sectors of the economy among others, under comprehensive energy policy, the national energy resources and needs must be managed, developed and regulated. However, there is only a defined federal energy Regulator for the energy sector. There is no state regulatory body to address regulatory issues pertaining to the regions. While the actions and conducts of many federal, state and private institutions in one way or another do indeed affect the energy sector, often enough this is done without being given due attention and adequate coordination within and across state and federal institutions working in the energy sector. The outreach services (in areas of customers complaint

handling, quality of service inspection, competency certification,…) of the federal regulator was meant to extend regulatory services to the regions. However, so far the attempt has not proved to be sufficient enough to address the needs highly demanded by the average customers and stakeholders in the regions. As a result of lack of adequate regulatory services, marked improvement especially in the electricity service provision have not been achieved; even achieved often times these have not been sustained. While the gains from energy service activities are evident and more than self financing especially now when mature and cost effective energy technologies and services are available in the market; the economy have not yet achieved much partly because of lack of appropriate institutional and regulatory framework and regulatory instruments.

The absence of the EEA in real terms at the regional level is not only affecting the competency certification services but is also affecting industry regulation at national level. The trend shows the industrial development is also shifting to regions as Addis Ababa and its surroundings are getting crowded .Therefore, there is a real need for industry regulation presence at the regions and this proposed project is expected to handle this concern.

2.2. Demand Assessment

By the virtue of the fact that the economic growth of the country demand's much of the energy sector's input, in particular sustainable electricity supply, requires a framework assures presence regulatory services at the regional level for adequate and timely intervention in the process of services delivery.

The demand for competency certification is high in the energy sector in general and the electricity industry in particular. The different customers for the electricity industry work force require competent professionals and companies for productivity, safety and sustainability concerns. The issue has been raised at

different levels and events especially by professional associations and experts in the sector[1].

The growth of the economy accompanied by growth of the electricity industry ,the globalization of the economy , the commitments the country is engaged with neighboring countries in power trade and related developments bring the issue of competency certification to the for front of agendas that need fast response.

In the Ethiopian reality, with a federal system of government where the regional governments have considerable autonomy, there is real need of managing Properly the behaviors and activities of the professional workforce and companies engaged in the electricity industry. The government direction is also in line with this as it has decided to empower state governments to shoulder responsibility in utility regulation and in its competency certification.

In the country many electrical works are going in the generation, transmission, distribution, industries, buildings and many spheres of activities. Usually, in big projects where the client hires highly qualified international consultants, the designs, supervision and follow ups are to the international standard. But, the rest part of the electrical works is not getting the proper attention. One does not need detailed research or investigation, just a visit to one or two new buildings and a glance at the nearby distribution transformer installation will be enough to prove the mentioned argument.

The same is true in safety. The numbers of patients of electrical injury at Dejazmach Balcha Hospital run by the Russian International Red Cross clearly shows how safety is abused in this country. As 2012/2013 report in three years 800

[1] The workshop on Electrical Works and Services Certification and Licensing Practices in Ethiopia, organized by the Ethiopian Electric Agency in collaboration with Science and Technology Professional Associations Joint Secretariat in April 19-20, 2001

persons were admitted to the surgical department of the Hospital. Out of these 120 patients were due to electrical injury. This means 15 % of the patients at the surgical department[2].

Most of the accidents could have been prevented by simple professional procedures put in place. The frequent fire hazards due to faulty wiring and electrical installations is also another area that shows the abuse of the industry and is demanding for strict competency certification and management.

When one tries to see the future also the demand for competency certification will grow as the growth of the economy and the electricity industry will bring their own socio-economic and legal issues that need strict implementation of competency certification and their proper management nationwide. The competency certification process will also need to be highly transparent, coordinated and highly promoted in the country so as all administrative levels of the country understand the details and involved issues in their daily activities. The use of online registry and information management system will be of great help in realizing reliable competency certification system in the country.

These assessments lead us for the need of wide ranged competency certification in the country and accompanied by proper inspection. The EEA

[2] Case one: One EEPCo employee in Modjo was trying to stop distribution box burnig. It was 15 KV transformer. He climbed and stood on the cross arms and started to disconnect the fuses. Then the 15000 volts bypassed the air gap and the 15000 volts acted on his body and was electrically injured and thrown to the ground. He is now paralyzed and on wheel chair. He was treated but frequently he has some problems and visits the hospital. That young citizen comments had been there the 15000 volts disconnector stick that is properly insulated he could have stood on the ground and safely disconnected the fuse.

Case two: One EEPCo Employee in Tepi was working on 33 KV line, outgoing for rural supply. He started working as his immediate Forman informed him the line is switched off. In the middle of his work there was 33000 volts and he was electrically injured and thrown to the ground. This citizen is now disabled. His hands, legs are not functioning. He has also problem in his urinary system. He was 12+3 graduate with Diploma. The cause of the problem was the operator at the distribution substation in the town switched on the line, assuming that he was switching the outgoing feeder that supplies electricity to the town. This problem could have been avoided had there been professional procedures of power interruption, communication and chain of command.

Case three: One EEPCo Employee in Dessie,Ataya District was working on Transformer fusing .He thought that the transformer terminal is disconnected from the incoming 33 KV line .When he touched the terminal he was electrically injured and through on the ground. The problem was he did not see the wire from the transformer to the 33 KV as it is was nonstandard wire material that was not visible in the open air. He was 10+3 graduate.

needs to prepare Inspection Handbooks and continue proper follow ups at federal and regional levels. As this assignment is wide, the full-fledged involvement of Regional governments is vital. For this the EEA has to delegate some functions and assist them in capacity building mainly trainings and availing manuals and guidelines.

A lot could have been saved even with the existing poor certification systems in the country had there been a reliable inspection system. The issue of inspection is also highly compromised similar to the issue of competency certification. There is also huge demand for electricity regulatory services in the regions such as complaint handling related to electric utility services. In fact, some times the issue is becoming national problem beyond its nature of utility service problem.

2.3. Stakeholder Analysis and Target Beneficiaries of the Certification Scheme and Regions Regulatory Delegation Capacity Building

The assessment has approached different stakeholders that could be classified as the primary and secondary stakeholders.

Table 1. Stakeholder Table

Stakeholders	Interests	Potential Project Impact	Relative Priorities of Interest
Primary			
MoUDC	Engaged in CC	Coordination needed	High
MoWIE	Engaged in CC		High
AAACIRA	Engaged in CC	Coordination needed	High
AACG OCACC	Engaged in CC	Coordination needed	High
EEU	Direct beneficiary	Promote the Project	High
EEP	Direct beneficiary	Promote the Project	High
Regional states	Direct beneficiary	Promote and coordinate project implementation	High
AA City Administration Fire and Emergency Control and Prevention Authority	Indirect beneficiary	Building code input	High
Secondary			
EEMTECA	Indirect beneficiary	Promote the Project	Average
CGAA Productivity Center	Indirect beneficiary	Delegation for CoC	Average
ESEE	Indirect beneficiary	Promote the Project	Average

The outside and inside stakeholders meetings and discussions have clearly shown the many over laps and also gaps in the area of competency certification. The remedies for these problems will be coordination and smooth communication including online registry and links to enable each certifier to whom they have given certificates.

The stakeholders in the stakeholder table with high impact are those stakeholders that have some link in their role with the EWWCCSDP.As these stakeholders are involved somehow with the nature of work of the EEA competency process; there will be a need to coordinate, link and exchange ideas and resources. For example, the AA City Productivity Center can share some facilities with the EEA Project Unit. May be at later stage EEA could be more equipped and assist such stakeholders but at the start they are more positioned to assist EEA. The same is true the Ethiopian Electric Utility (EEU).With its huge training and examination center facilities can be of assistance to EEA ,as long as good cooperation schemes are in place.

The stakeholders assessment also shows need some adjustment of some legislation of some institutions. For example, the MoUDC proclamation in its future update has to accommodate proclamation in place such as the new Energy Proclamation of the country.

The EEA is established to regulate the utility services among all other of its powers and duties. The utility services that covers generation, transmission, distribution and sells of electricity is wide and vital sector that needs constant follow up and all round support for its modernization to meet the ever increasing demand of customers.

Huge resources of the nation are deployed for the generation, transmission and distribution projects. Hence, reliable check and balance has to be in place and the regulation role of EEA is one vital process in this regard. We hear and see huge material and human losses in the utility sector. It is one indicator of developed and transparent society to pin point the causes of the problems of such cases and make them public and also help come with mitigation measures to avoid such damages and losses in the sector.

In today's world power generation, transmission and distribution is highly regulated to enable customers get reliable and affordable electricity supply. The technical issues are also well managed through organized guidelines, standards, codes, trainings and advances communication schemes and modalities. In our country also such achievements are possible as the global experience is an input for country utility sector as well.

2.4. Policy Context and Implications

The Ethiopian Energy Policy and the Climate Resilient Green Economy (CRGE) Strategy advocate for sustainable continuous economic growth, clean, sustainable and adequate affordable energy supply. In order to materialize such policies and strategies the efficient and quality performance of the electricity sector is a prerequisite.

The CRGE for example, promotes the idea of zero carbon emissions in the society by 2025 when the country becomes middle income country. This target requires highly professional workmanship and execution in the building industry, in the transport industry, in the electricity industry and all other sectors for that matter. In this regards, the big ideals set by the policies and strategies of the nation require the competency of individual professionals and companies that are involved in the day to day execution of different activities.

Competency certification process is an ongoing business and never a onetime action. It is therefore, imperative to avoid copying of other countries policies or standards of competency certification. The process has to be homegrown but flexible enough to be improved at some stage of the economy growth of the country. However, it is always advisable to learn the best practices globally and

adapt them to the reality of one's country. It is not necessary at all to start to reinvent the wheel, for the sake of indigenousness.

All policies in Ethiopia advocate for sustainable and quality performance in each sector. The same is true with the Ethiopian Energy Policy. The Ethiopian energy policy promotes professional and quality workforce in the country. The key factor that can help the country to own quality and efficient work force in the electricity industry is when there is matured competency certification system in the country.

Why is the Ethiopian Airlines successful? The answer is among other things the workers are guided by highly professional ethics and professionally matured standards and manuals of the highest degree imaginable. These standardized modular manuals are accompanied by programmed trainings at different levels. That is why the most difficult sector of activity in the world has become the safer industry in the world. On the other hand, the electricity industry, which is globally operating unmanned power stations, substations and transmission lines using remote control equipment, has become injury prone sector for many citizens of Ethiopia. This is easily proved by simple visit to Balcha Hospital Surgical Department, where considerable percentage of the patients is due to electrical injury. This is highly paradoxical. For a nation that has tamed the aviation industry to being world class ,how can it not repeat this success for the electricity industry that has great global experience starting from 1812.The electricity industry of Ethiopia needs to be guided by standards, manuals and it has to believe also in continuous trainings. The issue of competency certification system and inspection will play an important role in lifting the Ethiopian electricity industry to a higher level with high efficiency and quality workforce in the not distant future. This will be great supplement for the success of the other socio-economic policies of the nation.

2.5. Regulatory Delegation to Appropriate Regional State Executive Institutions

Profile of regional institutional setups

Energy sector regulation structure is found at federal level and this regulation is solely conducted at federal level, since no legal mandate is given to regional state governments. Activities that related to energy (study on bio gas, bio fuel, and proven stoves, conduct promotion, and training to local energy saving technology producers, technicians and beneficiaries, …etc) have been working in regional state governments by establishing institutions like Mines and energy Resources Development and Promotion Agency. The agencies in their respective region are responsible for both mining and energy related activities. To give more emphasis and commitment, within the Agency, they establish one core department to coordinate the energy related activities by naming energy resources and technology expansion core department (process). The Agencies are established mainly under the umbrella of Water, mines and energy bureau. All regional states Energy institutions are performing their activities according to the National energy policy since they haven't their own energy policy.

The Ethiopian Energy Proclamation No.810/2013 enables the Ethiopian Energy Authority (EEA) where necessary to delegate its power and duties to the appropriate regional executive organs and provide them with capacity building support. Devolving of mandates shall be in gradual steps compatible with regional capacity and initially it is planned to devolve activities related to the core regulatory functions as listed i**n Annex I.**

3. THE PROJECT

3.1. Scope of the Project

The nature of Electrical Works Competency Certification Development Project and Regional State Regulators establishment and capacity development is not

a single location (area) project implementation. Currently, demand for competency certification nationwide is increasing from time to time as a result of the country's economic growth and the construction boom. Construction of high rise buildings, power generation and distribution facilities, industries and construction of transport infrastructure is expanding rapidly in almost all corners of the country. The role of electricity and electrical works is self-evident in this national endeavor. Electrical works such as electrical designs, electrical and electromechanical installation and maintenance services, inspection services, have to be carried out by competent persons in order to ensure public safety. Therefore certification of professionals and business entities is a mandatory requirement.

As the energy sector is expanding in parallel with the economic growth of the country, it is clear that regulatory function delegation to regional state with full capacity development is timely. The regional states regulatory delegation and capacity building starting from the following Regional state governments: Oromia, Amhara, Southern Nations, Tigray and Addis Ababa. With the proper experience and evaluation of the exercise at these four regions and one chartered city, then the delegation and capacity building will be scaled to include all regions and charted cities.

These objective conditions justify that the project scope should cover the Federal EEA, the regions and charted city mentioned. Availing of ICT facilities and system development, testing and lab equipment/Instruments, module and inspection handbook development and Exam Centre establishment are among others, many activities planned by the project. There is also need for the industry regulation at all levels of the nation and EEA has to delegate its power and duties phase by phase to the regions so at to avoid obstacles in the electricity industry development and service of the nation.

3.2. Project Description

Electrical Works Competency Certification Development Project (EWCCDP) and Regional State Regulatory functions delegation capacity development is aimed to address the existing gaps in regional regulatory absence and practices in electrical works such as: electrical installations, maintenances, electrical designs, electrical testing and inspections, consultancies and related activities in the energy sector of the country.

The project aims to lay the institutional and methodological foundations for developing a national system of competency certification and regulatory service development in the energy sector at federal and regional level, where all the existing over laps and gaps will be sorted out step by step through well-organized and coordinated roles and responsibilities among different stakeholders (sectors) involved in competencies, professional certifications and inspections in the country. The project also aims to internally strengthen the EEA, the regions and charted cities certifying team by equipping the competency certification system with all required knowledge, equipment and materials as well as training.

Project Objective

The main objective of the project is to address the issues related to the existing regional state regulatory function delegation gaps and practices of electrical Works in power generation, transmission, and distribution, building installations, industrial works and related businesses and provide professionals with technical guideline to assist their practices. In addition to facilitate candidates of competency certificate with data base and online automation examination services. On the other to strengthen the capacity of the EEA staff, the regions and the chartered cities ,certification team through assessors training, equipment and accessories facility procurement for practical exam workshop

setup both at federal and regional state level. Capacity building in basics of industry regulation, customers' protection, enforcements of service standards etc. is part of the project objectives.

Project Components

The project has three components, these are: - (a) institutional coordination and Capacity Building, (b) Electrical Works Competency Certification System Development,(c) Regional State Regulatory function delegation capacity development to this effect.

(a) Institutional coordination and Capacity Building

Major outcomes/outputs anticipated under the institutional and coordination of capacity building component include preparation of Electrical Inspection hand book, assessors' training program development and conduct training, and procurement of office facilities and materials for inspection activities.

(b) Electrical Works Competency Certification System Development

The then Ethiopian Electric Agency's role was limited to only certifying contractors and consultants in the area of electrical installation works alone. However, the agency's role and responsibility has been diversified by the recent proclamation number 810/2013. Accordingly, the Ethiopian Energy Authority is vested a power to issue Competency Certification in the area of inspection, maintenance, testing, design, consultancy, contracting and electro mechanical activities together with electrical installation works. Due to this enacted proclamation the sector's contractors and consultants' competency certification system would be comprehensive and broad enough in its scope. Outputs and activities detailed under this component would enable to materialize the Competency Certification System Development of the sector. These expected outputs are: training modules development, procurement of

workshop tools, instruments, equipment, machinery and accessories for practical examination workshops, database development with different subsystems (modules) and availing online services, reviewing, and development of electrical installation of building code.

(c) Energy regulatory services at the regions and the related capacity development

The Ethiopian Energy Proclamation No.810/2013 allows the EEA to delegate some of its powers and duties to the regions. This will enable the EEA to focus on strategic tasks after it successfully builds the capacity of all regions and charted cities to execute competency certification and regulatory tasks in their respective areas.

The EEA will take different steps to delegate and build the capacity of the regions and chartered cities. It will give them tasks that start from lower level of sophistication. Then by evaluating the progress the regions and charted cities are eventually to handle most of the activities of electrical works competency certification and the regulatory activities in their respective regions and cities.

4. PROJECT IMPLEMENTATION PLAN

4.1. Project Outputs and major activities under each component

The project has three major components: (1) Institutional Coordination and Capacity Building, (2) Electrical Works Competency Certification System Development, and (3) Regional State Regulators establishment and capacity development

4.1.1. Outputs of Institutional Coordination and Capacity Building are:

4.1.1.1. Inspection Handbook Developed

4.1.1.2 Electrical Engineers Assessors trained and certified

4.1.1.3 Office facilities and materials for inspection activities procured.

Detail activities under each output of component one are as follows:-

Output 4.1.1.1: Inspection handbook Developed

Major activities

- Developing of TOR,
- Short listing or biding each service,
- Evaluate proposals and award contracts
- Monitor progress and review and accept deliverables
- Conduct workshops to obtain feedback and inform Stakeholders.

Output 4.1.1.2: Assessors (engineers) trained and certified

Major activities

- Establishing task team
- Conducting Assessor training need assessment
- Identify training institutions as per the need
- Shortlist and invite appropriate training institutions,
- Select the best service provider,
- Conduct training of assessors'

Output 4.1.1.3: Office facilities and materials for inspection activities procured.

Major activities

-Preparation of specification for each good
-Short listing or bidding suppliers for each good
-Evaluation and selection of winner for each good
-Awarding and signing the contract to each supplier
-Procuring each goods as per the specification
-Distribute each good to users

4.1.2. Outputs of Electrical Works, Competency Certification System Development are:

4.1.2.1 Training Modules Developed

4.1.2.2 Workshop tools, instruments, equipment, machinery and accessories for practical examination at workshop procured

4.1.2.3 Database developed with different subsystems and available Online.

Detail activities under each output of component two are as follows:-

Output 4.1.2.1: Training modules Developed

Major Activities:

- TOR preparation for hiring consultants to develop Training modules.
- Short list consultants and request for expression of interest.
- Evaluate proposals and award contracts.
- Monitor progress and review and accept deliverables
- Conduct workshops

Output 4.1.2.2: Workshop tools, instruments, equipment, machinery and accessories for practical examination at workshops procured.

Major Activities

- Preparation of specification for each good
- Short listing or bidding suppliers for each good
- Evaluation and selection of winner for each good
- Awarding and signing the contract to each supplier
- Procuring each goods as per the specification
- Inspection and delivery of items.

Output 4.1.2.3: Database developed with different subsystems (modules) and available online

Major Activities

- Preparation of TOR to hire a consultant
- Bid evaluation and award
- Consultant conducts need assessment and defines system requirements
- Develop specifications for hardware and software
- Issue tender document, evaluate and award contracts for hardware and software develop(s)

- Supply and install hardware and software in Addis Ababa and the Regions
- Test the system and train staff
- Conduct workshops on the features of the system

Output 4.1.2.4: Electrical installation of building code reviewed and developed.

Major Activities

- Developing of TOR,
- Formation of task team to review and re-develop the code,
- Draft document preparation,
- Organize stakeholder consultative workshop,
- Prepare final document and make ready for approval

4.1.3. Outputs of Regional State Regulators establishment and capacity development are**:**

4.1.3.1. Regional States sign MoUs with EEA

4.1.3.2. Office facilities, vehicles and instruments for inspection and testing activities procured

4.1.3.3. Trained Regional staff for regulatory function and assessors trained and certified for competency certification.

4.1.3.4. Online examination, applications, database services, etc. become available in the Regions

The activities for these outputs are accommodated by the note mentioned at the Work Break down Structure (WBS).

4.2. The Project Work Breakdown Structure

The project's WBS is developed by starting with the end objective and successively subdividing it into manageable components in terms of size, and

responsibility, however detail activities, tasks, and additional necessary steps to achieve the objective are articulated in the activity schedule.

The following WBS diagram focuses on the project Development objective, components and major outputs/deliverables of the project and respective activities under each output; in this regard major deliverables are indicated under their respective components of the project. Detailed breakdown is also shown in a tabular form with activity schedule of the project.

EWCC, Regional Regulators Capacity Development Project Intervention logic

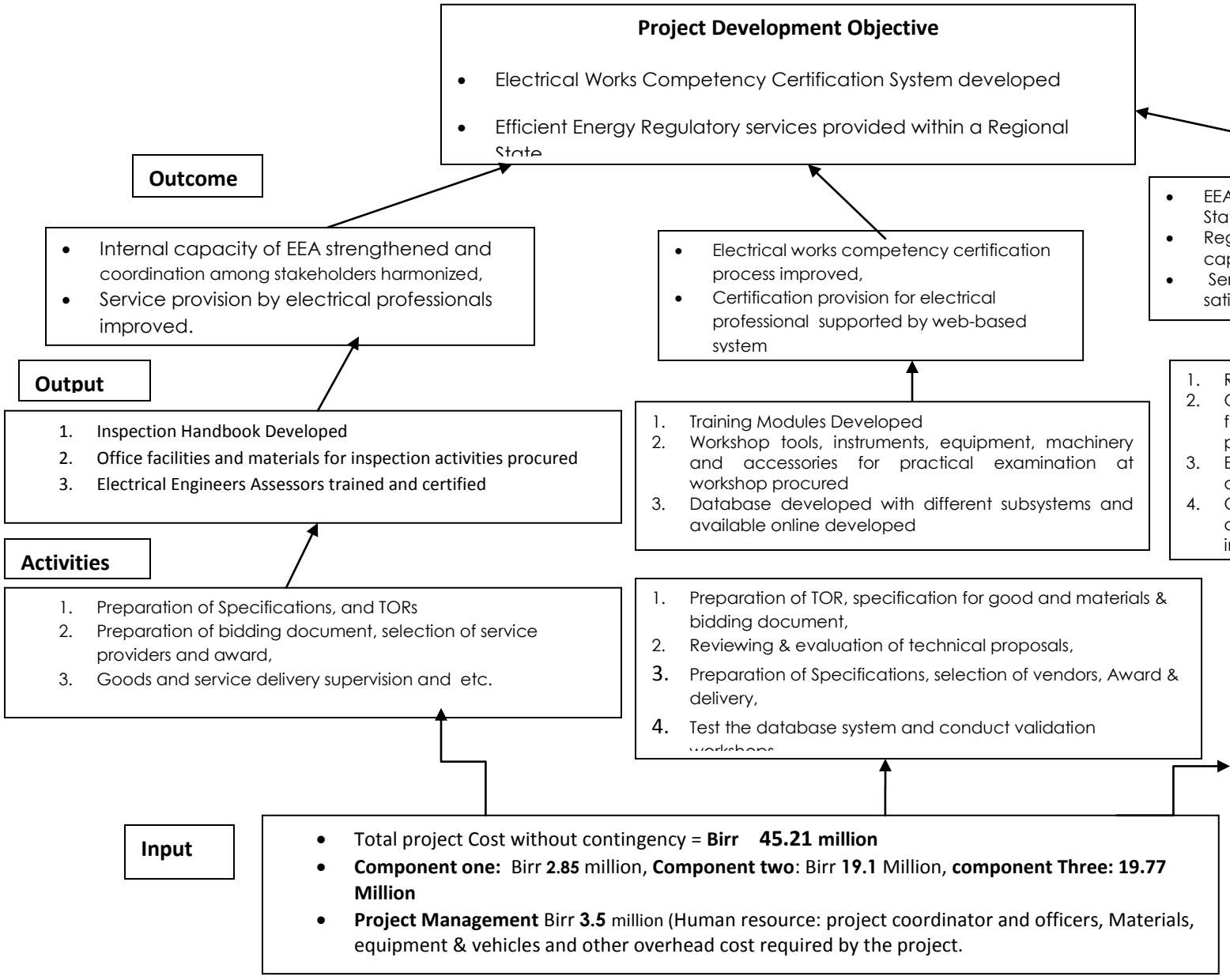


Table 2 Project Logical Framework

Project description	Objectively verifiable Indicators	Verification
Objective/Impact: • Electrical Works Competency Certification System developed. • EEA Powers and Duties devolved to Regional States and the public provided with services at Regional level	1. A standardized electrical competency certification Systems in place by the end of 2017 & 2018, 2. %age decrease in life & property damage due to incompetent electrical service providers by the end of the project year, 3. %age increase of public satisfaction by electrical service providers. 4. State Regulators established and well functioning.	• EEA/PIU periodical and status reports, • Public service satisfaction Survey. • Inspection reports • Check of Register of examinees and certificates issued by the Regional State Regulators
Project Outcome: 1. Internal capacity of EEA strengthened	1. Decrease in number of	• Electrical professionals

and Service provision to users improved 2. Electrical works competency certification process improved and institutionalized there by duplication of effort decreased and coordination among stakeholders strengthened & harmonized, 3. Certification provision for electrical professional supported by web-based system 4. Service provision by electrical professionals improved. 5. Regional Regulators provide inspection, Certification, customer-utility related regulatory services, power quality and other duties as delegated by EEA	electrical professionals issued CoCs by other institutions. 2. %age increase in provision of electrical services by certified professionals. 3. Number of applicants through web-based system. 4. Number of online applications approved for ECC. 5. No of facilities inspected in the Regional State 6. No of customer complaints resolved 7. No of applicants taking Examinations at the Regional State bureaus	association report, • EAA annual report.
Project Outputs/Results		

1. Inspection hand book developed	No of hand books developed 18 months after the commencement of the project.	Record of EEA a project report
2. Office facilities and materials for inspection activities procured	No. of materials & equipment procured and Availed for inspection.	EEA inventory a project report
3. Electrical Engineers Assessors trained and certified	Number of Electrical enginers/assosors trained and certified at the end of the project period	List of Trainees a project reports
4. ECC Training modules Developed	Number of training modules developed at end of the project period.	EEA record, periodical report
5. Database developed with different modules & available online	• No of database service users at the end of the project period. • No. Of database	• EEA inventory, • Project report

	modules made available for users	
6. Electrical installation of building code reviewed and developed.	Document reviewed & developed at the 18th month after project start	EEA & PIU repo EEA Documentatio
7. Workshop tools, instruments, equipment, machinery and accessories for practical examination at workshops for federal & regions procured	Number of tools, instruments, equipment, machinary and accessories delivered to EEA	EEA library a documentation
8. Capacity of Regional State Regulators developed	No of applicants for Online examinations at the region No of Certification services provided at regional level No of Inspection services provided No of customer complaints handled	
Activiies	**Inputs**	
1. Preparation of TOR for services 2. Preparation of Specification for goods 3. Preparation of bid documents	• Number of workers hired, by the project, • Type and quantity of materials and equipment	Project document

4. Evaluation of proposals submited by bidders 5. Selection and Awarding Adminstrating the contract 6. Evaluation of delivered services and delivered goods/Items.	made available • Financial budget of Birr 45.22 million for the project.	

Project Implementation Work Plan (Schedule)

S/N	Expected outcomes /Outputs /activities	Unit	Project target	Year 1				Year 2				Responsib
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
4.1	**Component One: Institutionnel coordination and Capacity Building**											
4.1.1	**Output 1:** Inspection Hand-book developed.	No	1000									
4.1.1.1	Developing of TOR,											EEA Proct
4.1.1.2	Short listing or biding each service,											EEA Proct
4.1.1.3	Evaluate proposals and award contracts											EEA team
4.1.1.4	Monitor progress and review and accept deliverables											P.coordin
4.1.2	**Output 2,** Assessors /engineers, trained and certified, EEA staff trained, workshops conducted	No	5									
4.1.2.1	TOR Preparation											EEA
4.1.2.2	Identify training institutions as per the need											PIU &EEA
4.1.2.3	Shortlist and invite appropriate training institutions											PIU &EEA

S/N	Expected outcomes /Outputs /activities	Unit	Project target	Year 1				Year 2				Responsib
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
4.1.3.4	Select the best service provider,											PIU& EEA
4.1.3.4	Conduct the training											Consultar
4.1.3	**Output 3**: Office facilities and materials for inspection activities procured.	LS	1									
4.1.3.1	Preparation of specification for each good											P Coordin
4.1.3.2	Short listing or bidding suppliers for each good											EEA Procr
4.1.3.3	Evaluation and selection of winner for each good											EEA team
4.1.3.4	Awarding and signing the contract to each supplier											EEA
4.1.3.5	Procuring each goods as per the specification & delivery											EEA Proct
4.1.3.6	Distribute each good to users											EEA
4.2.1	**Component two: Electrical Works, Competency Certification System Developed**											
2.1	**Output 4:** Training modules Developed	LS	1									
4.2.1.1	TOR preparation for hiring consultants to develop training modules.											Module develope
4.2.1.2	Short list consultants and request for expression of interest.											EEA
4.2.1.3	Evaluate proposals and award contracts.											EEA team
4.2.1.4	Monitor progress and review and accept deliverables											Coordina
4.2.1.5	Conduct workshops											PIU
4.2.2	**Output 5**: Workshop tools, instruments, equipment ,machinery and accessories for practical examination at workshops procured	LS	1									

S/N	Expected outcomes /Outputs /activities	Unit	Project target	Year 1				Year 2				Responsib
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
4.2.2.1	Preparation of specification for each good											
4.2.2.2	Short listing or bidding suppliers for each good											
4.2.2.3	Evaluation and selection of winner for each good											
4.2.2.4	Awarding and signing the contract to each supplier											
4.2.2.5	Procuring each goods as per the specification											
4.2.2.6	Conduct inspection and delivery of items											
4.2.3	**Output6:** Database developed with different subsystems (modules) and available on line	LS	1									17,760
111174. 2.3.1	Preparation of TOR, for hiring a consultant											PIU
4.2.3.2	Needs assessment and defining system requirements and features											PIU
4.2.3.3	Develop specifications and tender document											PIU
4.2.3.4	Evaluate and award a contract											Supplier
4.2.3.5	Supply, install and test HW and SW											PIU &EEA
4.2.3.6	Conduct training on the system for assessors and inspectors											PIU
4.2.3.7	Conduct workshops on the features of the system											PIU
4.2.4	**Regional State Capacity Building**											
4.2.4.1	Workshops with State Bureaus											
4.2.4.1	MoU signed between EEA and Regional States											
4.2.4.2	Regional Regulators Established, vehicles, office furniture and equipment procured											
4.2.4.3	Engineers and Assessors trained											

S/N	Expected outcomes /Outputs /activities	Unit	Project target	Year 1				Year 2				Responsib
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
4.2.4.4	Exam center and inspection equipment procured and delivered											
4.2.4.5	Online access and examination submodules and hardware developed and installed											
4.2. 5	**Project Management & Implementation**	LS	1									
	Major Activities											
4.2.5.1	Staff contract, project execution and monitoring & evaluation											PIU
4.2.5.2	Quarterly, status & end of project reports preaparation	Doc	12									PIU
4.2.5.3	Conduct technical evaluations and supervising consultants											PIU
4.2.5.4	Procurement of consumables for office use for EEA and the Regions											

5. Project Inputs and Costs

Major cost categories of the EWCCSDP

The following cost estimate is a summary of the overall project cost. The detail is organized in excel at its proper place.

Cost Summary, EWCCSDP in Eth.Birr

Cost Description	Amount
1. Component One Total	**2,849,850.00**
1.1. Training and workshop	2,020,000.00
1.2. List of office facilities and Materials for Inspection Activities	79,850.00
1.3. Consultancy service cost	750,000.00
2. Component Two Total	**19,092,563.53**
2.1. Testing and Lab Equipment/Instruments	69,176.00
2.2. Training and Exam center Equipment/	1,263,191.00
2.3. IT Equipment & Data Base	17,760,196.53
3. Component Three: Devolution of Power to four Regional States and Addis Ababa total	**19,766,000**
3.1 ITEquipment & submodule development for online services	8,864,000.00
3.2 Exam Center equipment and materials	6,040,000.00
3.3 Inspection Activity Instruments	113,000.00
3.4 Five Vehicles	3,500,000 .00
3.5 Office Furniture and equipment	287,000.00
3.6 Training of regulators and assessors and inspectors	903,000.00
3.7 Workshops	30,000.00
3.8 Signing of MoUs	39,000.00
4. Project Management & Coordination Total	**3,497,300.00**
4.1. Project Staff	2,484,000.00
4.2. Consumables or Expendables	1,013,300.00
Project Total	**45,215,713.00**
Contingency 5 %	2,260,785.70
Grand Total	**47,476,500.00**

6. PROJECT MANAGEMENT, ORGANIZATION AND INSTITUTIONAL CONTEXT

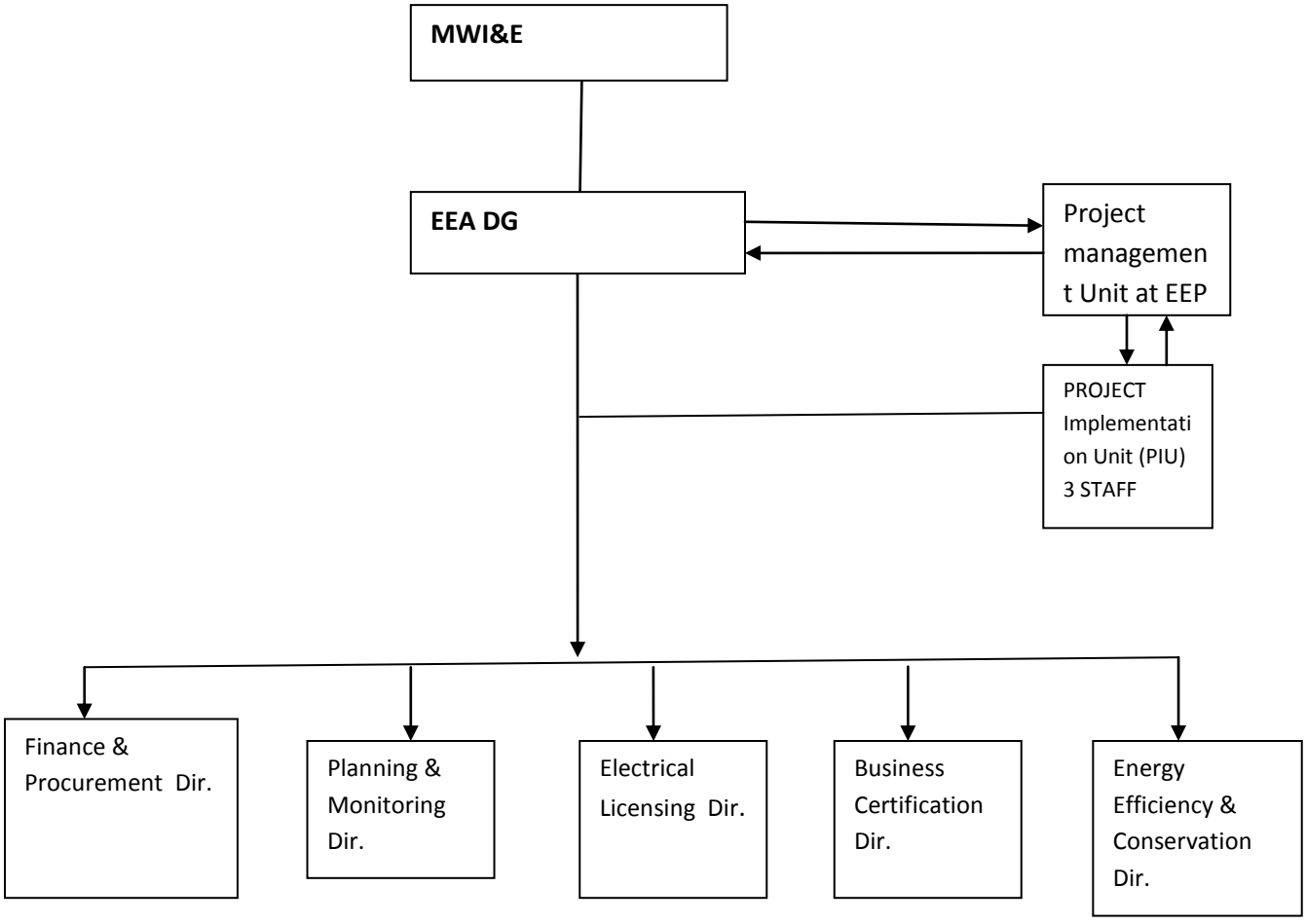
6.1. Institutional arrangement and project coordination

At the national level, organization of the project's institutional arrangement is anticipated to be managed under the EEA General Director, who will be assumed for the overseeing of the project. Whereas, competitively recruited project staff would be assigned to provide technical support and follow up the daily routine activities of the project. A Project coordinator will lead the Project Unit (PU). Administrative matters can be managed under the EEA's organizational role. The PU will have three important staffs as shown in Table 3. The functions shown in the chart other than the three PU staff will be handled by EEA permanent staff.

Table 3. List of EEA CoC PU Staff

no	Title	Minimum Education level required	Work experience	Remark
1	Project coordinator	MSc in electrical engineering	10 years and above	
2	Module Developer and Training Facilitator	MA/MSc in Electrical engineering, pedagogical science, sociology & social work,	More than 10 years	
3	IT Specialist	MSc in Computer science, networking, software development, and electrical engineer.	8 years and above	

6.2. Organizational Structure of the project at EEA



7. CROSS-CUTTING ISSUES

7.1. Gender Issues

The Ministry of Water, Irrigation and Energy (MoWIE) has developed national Gender Action Plan (GAP) for the whole energy sector. Therefore, it is important for this project to be gender sensitive so as to assist in materialization of the objectives set in the GAP.

This is approach will help in avoiding any potential discrimination against female workers at federal and regional levels. By the way gender sensitivity is not only human right issue but also development issue. For example gender mainstreaming experts were suggesting that if Japan increase female employment from the present around 60 % to 80 %, then it will get more than 2 million new work force. In countries such as Norway, where female employment is more than 86 % is contributing more than the revenue the country gets from its oil resources. Especially, for countries like Ethiopia that highly rely on their human resource for the projected growth, we need to be gender sensitive in all spheres of socio-economic activities.

7.2. Environmental Issues

The Competency Certification System development and Regional Regulatory capacity building project is highly timely and critical for the overall development of the country. The implementation of this project is going to highly positively impact the development of the electricity industry of Ethiopia and the sub region. Hence, all the known procedures of environmental and social impact concepts have to be embedded in the process of implementation of the project. This means all of the electrical works related activities to be implemented by this project need to accommodate the environmental regulations of the Ministry of Environment and Forest (MoEF).

8. PROJECT BENEFIT AND JUSTIFICATION

Benefits from implementation of the project will accrue from averting loss of life and damage to property due to improved quality of workmanship, use of quality materials and provision of services to the public at the local level. Clients will save costs that would have otherwise been incurred in travelling to Addis Ababa to obtain competency certificates, inspection services and process complaints against the utility services provision shortfalls. The overall efficiency of getting proper services will improve due to saving of time and energy by getting services at the Regional level. As shown below, the project has an NPV of 38.81M Birr and an IRR of 31% without even considering the money saved by clients due to the availability of services locally, revenues generated from applications and exam fees, sale of manuals etc… and considering very conservative estimates as described below. The project cost effectiveness in attaining socio-economic welfare of society is assessed in comparison with the situation without the project and it is evident that the project is economically viable.

8.1 COSTS WITHOUT THE PROJECT

The first scenario is a situation of inadequate competency certification as a result of which social and economic losses continue to occur unabated in the country. The inadequacy in implementation of competency certification in the country and unavailability of the Regulatory services at the Regional State level is costing the country economically, socially and environmentally.

Human Safety loss

Human safety is endangered by hazards associated with electricity, which include physical burns, electric shock, psychological and neurological damages and other irregularities resulting in death. Electrical accidents are debilitating and fatal. The risks to safety arise both from damages of human body by the power of electricity or by fall, explosions and reactions to shock when exposed to the hazardous situation. The occurrence of these hazards is minimized with

electrical safety standards in place. Standards applicable in: design, installed systems, installation practices, work places, maintenance practices, operation practices, equipment and parts quality contribute to reduction of hazards of electricity. Competency certifications and inspections of competencies contribute to this effect.

Compromised human safety with regard to handling electric power is quite common in Ethiopian context. The findings from a visit to the Balcha hospital are indicative of the state of enforcement electrical safety standards in the country. The evidence is a tip of an iceberg since similar incidents are happening all over the country. Among 800 patients admitted to the surgical department of Balcha hospital in a period of three years, 120 persons were admitted as a result of electrical injury, which is on average of 40 persons per annum. Some of the workers are paralyzed and some are handicapped. The loss of wellbeing to society is high in many counts. This being data from one hospital, one may imagine the extent of damage of electrical injury nationwide. We may take the Balcha hospital case and extrapolate it to other hospitals across the nation to arrive at a rough estimate of safety losses. If the combined cases in all other hospitals of the country were 5 times the case of Balcha Hospital, 200 cases would be the annual electric hazard. The number of cases could be minimized to zero if proper safety standards are adhered to. The various aspects of competency certification enhance adherence and minimize the costs.

Valuation of financial losses under the existing inadequate state of competency certification hints the value of prevention of injury and savings in financial terms through competency certification scheme. An average per head expenditure of 20,000 birr[3] for half of the 200 injury cases would amount to 2,000,000 birr annually. The annual cost of prevention of such losses by investing on

[3] This figure is too low for paralysis, heavy injuries and death while it looks too much in case of minor injuries

strengthening competency certification system and ensuring proper implementation would likely be less than the social loss due to injury. The social benefit in terms of attained human safety is more than offsetting the financial costs of investment on competency certification. Hence the comparison is likely to go in favor of prevention of injury with provision of adequate competency certification.

The enforcement of safety standards through competency certification minimizes such occurrences; rather the financial saving would be supplemented by avoidance of human suffering. Competency certification, when properly implemented, aids in filtering out human and material causes of electric hazards arising from sub standard practice, bad installations, sub standard materials, and inadequate facilities and equipment.

Some observed and potential electric hazards from practices of EEU exemplify the inadequacy of workmanship and inspection that would have been averted by competency certification. The picture of one of EEU's distribution transformers below amply depicts the deterioration of workmanship quality and the dangers posed to pedestrians and children playing around. The cables are within reach of children and the chance of touching live parts of the transformer is quite probable. These potential dangers could be averted if there were proper inspection and workmanship by competent and licensed persons.

Damages to property

Damages to property that are associated with electric power use are common. The Addis Ababa Fire Authority data for 2013/2014 shows that there were 351 fire accidents, out of which 73 were due to electrical causes. Usually, these electrical problems are related to poor installation practices and unregulated use of substandard electrical materials. The damage due to these 73 accidents was Birr 11,278,200.00. The potential damage averted was worth Birr 518,000,000.00. In these accidents one person died, 22 persons wounded and 437,000 liters of water was consumed by the fire brigade machines. If such huge financial loss is registered in Addis Ababa due to fire causes by electrical work problems, the cumulative loss nation-wide will be even higher. With a simple extrapolation of such damages to property to the rest of the country, we may take 1.5 times of this figure to have a feel of the extent of damage nation-wide, which amounts to about 16,917,300 birr.

Loss of productivity

Power failures and energy losses arising from substandard equipment, installation and practices substantially reduce productivity. Production firms face direct losses of materials and indirect loss of business opportunities. Material losses on process, time loss in meeting schedules, losses due to idling of costly human resources and facilities are consequences of using partly substandard elements in the electrical power supply system. Quantifying the losses is quite possible with the availability of data, although it is extremely challenging to isolate those losses arising from the absence of enforced competency certification. Assuming an average cumulative loss from all aspects of power failure to be 1000 birr per day for 1200 manufacturing firms[4], for 5% of the working days of the year it would mean a loss of about 21,900,000 birr.

Cost of Claim and utility loss for users

There is huge cost to the Ethiopian Electric Utility (EEU) due to customer claim of property damage arising from different electrical works problems. These costs are in the range of millions annually. Not only are damages to electrical appliances and gadgets, the loss of utility to consumers resulting from power interruptions or damages to equipment are huge. If damages to some 100TV sets are assumed at one malfunction of the power system, it would mean a loss of one million birr. If equipment damage due to electrical faults arising from lack of competency is assumed to be 25% of the above, which is 250,000 birr, with an occurrence of such damages for 10 days in a year means 7,500,000birr loss annually.

Opportunity costs to EEU

The Ethiopian utility experiences huge transformer failures at generation substations, transmission substation and distribution networks. These failures could, to some extent, be attributable to equipment aging and power system faults and switching, but the absence of proper maintenance service, inspections and poor workmanship or designs are likely to account for a significant percentage. Not only are the power interruptions causing significant havoc to the manufacturing and service sectors of the economy (loss of production, equipment failure and wastage of raw materials under process during power failure), the loss of revenues to Ethiopian Electric Utility (EEU) due to

[4] figure close to 50% of the number of large and medium firms

unsold energy is huge. A daily loss of 0.5 birr (un-served energy of one kwh, EEPCO master plan study applies US$0.5 per KWH) per household amounts to 500,000 birr loss in1000,000[5] households using electric supply from EEU. The annual opportunity loss that would follow from power failure in 5% of the days of the year amounts to 9,125,000 birr.

Environmental costs

Environmental sustainability provides another perspective for comparison of situations with and without the project. Conservation of energy is one of the important measures to attain and maintain environmental sustainability. Efficiency in energy conversion and use assists conservation and reduce environmental degradation associated with energy. Pressures on natural resources and the ecology could significantly be reduced with conservation and efficient use of electric power. The damages to the environment that follow inadequate conservation and inefficiency could in principle be quantified by environmental valuation methods. Inspection and competency certification contributes to the minimization of such costs. The prevention of such damages could therefore be through saving the value equivalent to the damage through conservation and efficiency. Conservation and efficiency in electric power conversion and use require certified competency. Environmental sustainability perspective further necessitates strengthening competence certification.

Partial Costs with Inadequate Implementation of the Competency Certification

Without quantifying the human sufferings, loss of utility and environmental damages, the financial losses to the society of malpractice under inadequate competency certification are huge. The lower side estimate in the foregoing analysis suggests that it is in the range of 57,442,300. The damage will exponentially increase with the increase of generation and use of electricity in the country. If we assume 1% annual growth in such costs it would rise to Birr 59,183,000 by the end of the project. Estimates with 1% rate annual increase for five years after the project completion would be as follows:

[5] if the total number of households using electricity is estimated at 2000000, and 50% of the households are assumed to be affected by power failures

Table 4: Electrical damage related financial loss projection

Costs at the year of completion of the project	Year 1	Year 2	Year3	Year 4	Year 5
59,183, 000	59,774, 688	60,372,435	60,976,159	61,585,921	62,201,780

8.2 Partial benefits with strengthened competency certification

Competency certification will help in maintaining safe work and natural environment, thereby decreasing the loss of life and injury to humans and damage to property and production. The overall estimate of damage costs indicated above in financial terms, are lower side estimates. These damage costs would be prevented gradually if adequate competency certification scheme is put in place. With a conservative estimate of 20%, 40%, 60%, 75% and 90% reduction of these annual damage costs in five years of operation of the project, the benefits will be as shown in the table below (Table 5 below)

Table 5: Benefits in five successive years of operation of the project

Costs at the year of completion of the project(MBirr)	20% prevention of costs in Year 1	40% prevention of costs in Year 2	60% prevention of costs in Year3	75% prevention of costs in Year 4	90% prevention of costs in Year 5
59.18	11.84	23.91	36.22	45.73	55.43

Assuming running costs of about 6M in the first year and increasing at 10% per year (salary of inspectors and assessors and vehicle running costs for the five regions and EEA), and an investment cost amounting to 47.5M, the NPV at a discount rate of 10% is calculated to be about 38.81MBirr. IRR is about 31%.

8.3 Financial cost estimates of the project

The project to strengthen Competency Certification and devolve power to the Regional States is a two year project. Over the project life, four Regional States and Addis Ababa will have been delegated some of EEA's powers and duties.

The remaining Regional States will gradually be provided with the delegations depending on the needs and capacity of the Regional State energy bureaus. The financial requirements of the project activities are estimated at Birr 47.5 Million including 5 % contingency. The disbursement is across a span of two years. The financial requirements of the project are skewed towards the second year as bidding and contract signing take place in the first year, major purchases taking place in the second year and lighter disbursements associated with system installation follow in the third year.

Table 6: Total cost of the project

Total Project Budget Estimate(MBirr)	Financial Budget disbursement of the project	
	Year1	Year2
47.47	16.5	31

8.4 Net Benefit of the Project

The principal benefits of the project are prevention of losses after completion of the project. The costs of the project are financial costs incurred in establishing the facilities of competency certification, devolution of EEA powers to Regions in the first two years period and operational budget estimate for running the system in the following five years. The net present value (NPV), the benefit cost ratio(B/C) and the Internal rate of return(IRR) of the project are computed using discounted benefits and costs of the project in the period of two years of establishment of the enhanced competency certification system and the first five years of operation of the project. The discount factor taken is 10%.

Table 7 Net Present Value

Year	1	2	3	4	5	6	7	Sum of present values
Discounted benefits at 10% at end of year(MBirr)	0	0	8.89	16.33	22.49	25.81	28.44	**101.97**
Discounted costs at 10% at end of year	-15	-25.62	-4.51	-4.51	-4.51	-4.51	-4.51	**-63.16**
Net Present Values	-15	-25.62	4.39	11.82	17.98	21.31	23.93	**38.81**

The IRR of the project is 31%, which confirms the convincingly high viability of the project. The benefit to cost ratio at a discount rate of 10% is about 161%.

8.5 Projective sensitivity to input price changes and delayed operation

If the project operation is delayed for one year after project costs are incurred the present value of net benefit of the project declines to 70% of that without delay. The same decline in the net present value occurs if project costs increase by 30%. Therefore the project is more sensitive to delays than cost rises at less than 30%.

9. THE FINANCIAL PLAN and SOURCES OF FUND

The financial plan indicates the cost of the project, the disbursement schedule, and the sources of funds.

9.1 Costs categories and disbursement summary

The major cost categories of the project are: Training and Workshops, office facilities and materials for Inspection Activities, Consultancy service cost, Testing and lab equipment/Instruments, Training and Exam Centre Equipment, *IT Equipment & Database* , Project Management & Coordination, Project Staff, and Consumables or expendables(Ref the summary table below).

Table 8: Summary of Electrical works Certification Development Project (ECCDP), Cost Estimate and Disbursement Schedule

No	Description	Total Budget(x1000Birr)	Year1	Year2
	Project Total	45,206	16,745	28,461
I	Component One Total	2,849.85	554.85	2,295
1.1	Training and Workshops	2,020,	250	1770
1.2	Office facilities and materials for Inspection Activities	79.85	79.85	
1.3	Consultancy service cost	750	225	525
2	Component Two Total	19,092.43	6,660.43	12,432
2.1	Testing and lab equipment/Instruments	69.18	69.18	
2.2	Training and Exam Centre Equipment	1,263.19	1,263.19	
2.3	*IT Equipment & Database*	17,760.06	5,328.06	12,432
3	Project Management & Coordination	3,497.3	1623.3	1,874
3.1	Project Staff	2,484	1242	1242
3.2	Consumables or expendables	1,013.3	381.3	632
4	Regional Regulators capacity building	19766	7906	11860
	Contingency5%	2,260.73	784.86	1,475.87
	Grand Total	47,475	16,482	30,993

9.2 Sources of fund

-After commissioning to operation, this project is going to generate income through certification charges, sales of training materials and services. An

estimated revenue from these sources is about 1.25 million birr(see table below), which will offset a portion of the operation costs[6].

Table 9: Internal financial sources

Internal Revenue source	Average Unit charge	Estimates Annual quantity	Annual Revenue
Application fees for Competency Certification	100	2000	200000
Competency certification written exam fees	100	2000	200000
Competency certification practical exam fees	150	300	4500
Competency certification fees	400	1500	600000
Competency certification renewal fees	100	1500	150000
Sales of training material	200	500	100000
Total annual revenue estimate			**1, 254,500**

Electrical Works Competency Certification System Development Project (EWCCDP), Cost Estimate

Item No	Description	Unit	Qty	Unit price	Total (MBirr)	Financial Budget Projection			Remark
						Year1(Mbirr)	Year2(Mbirr)		
	Total Project Budget Estimate				45.21	16.74	28.46		
I	Component One Total				2.85	0.554	2.3		
1.1	Training and Workshops				2.02	0.25	1.77		C1
2	Guidelines, standards and documents review workshops	no	3	40000	0.12	0.04	0.08		
3	Training for EEA staff (Short term Local)	person	10	100000	1.0	0.2	0.8		
4	Training of assessors for EEA (Short term	no	5	160000	0.8	-	0.8		

[6] Most of these revenue items are considered as transfers rather than economic benefits to the economy. Moreover the inclusion of these revenues to economic benefits of the project does not bring about important change on NPV, BCR and IRR.

	Abroad)								
5	Workshops/seminars on developed software		2	30000	0.06	0	0.06		
20	Onorarium	LS			0.04	0.01	0.03		
1.2	List of office facilities and materials for Inspection Activities				0.07985	0.07985			C1
1	Desk top computers	o	2	10000	20000	0.02			
2	Lap top PCs	o	1	6300	6300	,0.063			
3	Medium size photocopy	o	1	8500	0.0085	,0.0085			
4	Office table	o	3	500	7500	,500			
5	Office chair	o	3	550	1650	,650			
6	Shelves	o	3	4550	13650	3,650			
7	Megger 1000 V,digital , accuracy 5%, 1 Maat 1 Mohm	o	1	4600	4600	,600			
8	Megger 500 V ,digital , accuracy 5%, 1MA at 1 MOHM	o	1	4150	4150	,150			
9	Megger 2500V,digital (for LV & circuits up to 1000 V	o	1	6500	6500	,500			
10	Megger for MV cables 2500 V,	no	1	7000	7000	,000			-
1.3	Consultancy service cost				0.75	0.225	0.525		C1
1	Training Modules on electrical installation, inspection, maintenance,	LS			0.6	0.18	0.42		

	testing design, contracting, and etc.Preparation								
2	Preparation of cerified inspectors Hand books				0.15	0.045	0.105		
2	Component Two Total				19.093	6.660.43	12,432.5		
2.1	Testing and lab equipment/Instruments				0.69.18	0.69.18			C2
1	Megger 1000V, digital, accuracy 5%, 1 MA at 1Mohm	no	2	4,600.00	0.0092	0.0092			
2	Megger 500V, digital accuracy 5%, one mA	no	2	4,150.00	0.0083	0.0083			
3	Megger 2500V, digital(for Lv cables and circuits upto 1000V)	no	2	6,500.00	0.013	0.013			
4	Megger 5000V (for MV cables)	no	2	7,000.00	0.014	0.014			
5	RCD tester		2	2580	0.0052	0.0052			
6	Applied voltage tester, 4Kv		2	400	0.0008	0.0008			
7	Clamp ammeter, 1000A		2	1200	0.0024	0.0024			
8	Multimeters		6	575	0.00345	0.00345			
9	Phase sequence		2	1440	0.00288	0.00288			
10	earth resistance tester, measure to within 0.01 ohm, 5% accuracy		2	345	0.000690	0.000690			
11	Harmonic analyzer		2	2540	0.005080	0.005080			
12	Power factor meter		2	600	0.001200	0.001200			
13	Earth loop resistance tester		2	1508	0.003016	0.003016			

2.2	Training and Exam Centre Equipment				1,263.19	1,263.19	-	-	C2
1	distribution boards, 6 MCB capacity, 3P+N+E	no	10	900	0.09	0.09			
2	Sockets, 16A, with earth terminal	no	50	800	0.4	0.4			
3	Switches, one way, 10A, 230V	no	50	75	0.00375	0.003750			
4	Switches two way, 10A, 230V	no	50	80	0.004	0.004			
5	MCBs, one pole 10A, 230V, 3KA	no	50	115	0.00575	0.00575			
6	MCBs, one pole 10A, 230V, 3KA	no	50	1250	0.0625	0.0625			
7	MCBs, 3 phase 50A, 400V, 10KA	no	50	3000	0.15	0.15			
8	MCCBs, 100A, 3 phase, 400V, 35KA	no	20	140	0.00028	0.00028			
9	Contactor, 230V, single phase, 16A	no	20	1200	0.024	0.024			
10	Contactor 3 phase 400V, various current ratings (10---50A), auxiliary coil 230V	no	20	200	0.004	0.004			
11	Isolating switches	no	100	140	0.014	0.014			
12	Fuses, various	no	10	100	0.001	0.001			
13	Fuse switches	no	10	900	0.009	0.009			
14	LV current transformers various,(75/5A...500/5A,)	no	10	800	0.008	0.008			
15	Transfer switches, manual	no	6	1200	0.0072	0.0072			
16	Transfer switch automatic	no	10	600	0.006.00	0.006			

17	Power factor correction capacitors, 400V	no	10	600	0.006	0.006			
18	Detuning reactors	no	10	1120	0.0112	0.0112			
19	Contactors for capacitive current switching	no	10	680	0.0068	0.0068			
20	Thyristors	no	10	200	0.002	0.002			
21	Firing boards	role	1	685	0.000685	0.000685			
22	Power cables,	role	1	600	0.0006	0.0006			
23	Crimping tools	no	10	2400	0.0024	0.0024			
24	Wires diameter 2.5 sq. mm	role	1	800	0.0008	0.0008			
25	Conduits diameter 20 mm, metre long	no	20	120	0.0024	0.0024			
26	Trunking 50mm *100m 3 metre long	no	4	285	0.00114	0.00114			
27	Earthing rods, diametre 16 sq. mm 1metre long	no	2	345	0.00069	0.00069			
28	Earthing resistance testers	no	2	4180	0.00836	0.00836			
29	Meggers	no	2	4600	0.0092	0.0092			
30	RCD testers	no	2	2580	0.00516	0.005160			
31	Applied voltage tester	no	2	400	0.0008	0.0008			
32	Earth loop tester	no	2	1508	0.003016	0.003016			
33	Multimeters	no	6	575	0.00345	0.00345			
34	Power factor meter	no	2	600	0.0006	0.0006			
35	Harmonic analyzer	no	2	2540	0.00508	0.00508			
36	Phase sequence tester	no	2	1440	0.00288	0.00288			
37	Synchronous generator, 3 phase,	no	2	23000	0.046	0.046			

	400V, 5 KVA								
38	Induction motor, wound type, 3 phase 400V	no	1	6000	0.006	0.006			
39	Induction Motor squirel cage, 3 phase, 400V	no	1	5700	0.0057	0.0057			
40	Induction motor single phase	no	1	2600	0.0026	0.0026			
41	DC generator	no	1	2400	0.0024	0.0024			
42	DC motor	no	1	2200	0.0022	0.0022			
43	Universal motor	no	1	2200	0.0022	0.0022			
44	Transformer, 3 phase 15kv/400V	no	1	240000	0.24	0.24			
45	dry type transformer	no							
46	live line testers	no	2	4180	0.00836	0.00836			
47	Grounding rod	no	4	400	0.0016	0.0016			
48	Cable jointing	no	6	960	0.00576	0.00576			
49	Hydraulic press and die	no	1	30000	0.03	0.03			
50	MV cable sealing end	no	60	20	0.0012	0.0012			
51	Conductor repair kits	no	4	300	0.0012	0.0012			
52	Relay tester	no	2	8900	0.0178	0.0178			
53	Various relays,(overcurrent, differential, distance, earth fault, over/under voltage, etc)	set	5	12000	0.06	0.06			
54	Motor starters (star delta, soft starters..)	no	10	800	0.008	0.008			
55	Motor Control Circuits (MCCs)	no	3	450	0.00135	0.00135			

56	synchronizing equipment	no	1	40000	0.04	0.04			
57	work tables	no	10	3000	0.03	0.03			
58	Safety gear, gloves, helmet, shoes	set	10	6000	0.06	0.06			
59	Power supply units	no	4	800	0.0032	0.0032			
60	Battery and charger sets	no	2	4500	0.009	0.009			
61	Solar panels	no	4	4500	0.018	0.018			
62	Controllers	no	1	5000	0.005	0.005			
63	Invertors	no	1	24000	0.024	0.024			
64	Various tools (electrical and mechanical toolboxes with hand drills, saw, cable cutter, striper, solder, pipe cutter and thread….)	set	4	3000	0.012	0.012			
	Various Mechanical tool boxes	set	2	13000	0.026	0.026			
65	oil dielectric tester	no	1	45000	0.045	0.045			
66	line stringing set (dynamometer, thermometer, tensioner…)	no			-	-			
67	PLCs	no	1	28000	0.028	0.028			
68	Oscilloscopes		2	7080	0.01416	0.01416			
69	HVAC equipment	set	1	60000	0.06	0.06			
2.3	*IT Equipment & Database*				17.76	5.328	12.432		C2
1	Blade Server and Storage Area Network		1 lot	3,929,250.00	3.,93	1.19	2.75		
2	Tape BackUP system and Cartridges		1	222,657.50	2.23	0.67	0.16		

3	RDX Backup System		1	78,585.00	0.079	0.024	0.056		
4	Backup Software		1	91,682.00	0.092	0.028	0.064		
5	Enterprise OS with clustering future		4	32,743.75	0.131	0.039	0.092		
6	Database Management Software		2	130,975.00	0.262	0.079	0.183		
7	Antivirus subscription for the project period		1	104,780.00	0.104	0.0314	0.073		
8	Messaging Software		1	117,877.00	0.118	0.0354	0.083		
9	Fire Wall, VPN & Intrusion Detection System		1	183,365.00	0.183	0.0055	0.128		
10	Network Switches		2	130,975.00	0.262	0.079	0.183		
11	Access Points [for library area and others]		6	21,829.17	0.131	0.039	0.092		
12	Rack mounted UPS		1	104,780.00	0.105	0.031	0.073		
13	Rack mounted monitor + KVM		1	130,975.00	0.131	0.0393	0.092		
14	Rack Cabinet with PDU, fan		1	117,877.50	0.118	0.0354	0.083		
15	LAN Structured Cabling cost		1	392,925.00	0.393	0.118	0.275		
16	Electrical work to provide power to each examinee PCs and admin PCs		1	261,950.00	0.262	0.079	0.183		
17	Lease Line subscription and usage fee for project period, 10mbs		2	196,462.50	0.393	0.118	0.2750		
18	Trunk lines subscription and usage fee for project period, 10 lines		1	314,340.00	0.314	0.194	0.22		

19	PABX + Telephone Apparatuses		1	1,047,800.00	1.05	0.314	0.733		
20	Examinee Booths		15	9,168.20	0.14	0.041	0.096		
21	Air Conditioner [split un it]		2	65,487.50	0.131	0.0393	0.092		
22	Generator with ATS, 30kva		1	392,925.00	0.393	0.118	0.275		
23	Security Camera System		1	654,875.00	0.655	0.196	0.458		
24	Access control and evvironmental monitoring		1	523,900.00	0.524	0.157	0.367		
26	Camera + finger print system [to take picture of examinee before exam starts]		1	157,170.00	0.157	0.047	0.11		
27	PCs/Laptops for Admin staff and examiners		15	34,053.50	0.511	0.153	0.358		
28	PCs for examinees [for taking exam]		15	34,053.50	0.511	0.153	0.358		
29	PCs for registration [walk-in examinees wishing to register at the exam center]		2	34,053.50	68,107.00	20,432.10	47,674.90		
30	PCs to serve for exam practice and downloading manuals or other necessary docs [It will be placed in the library for walk-in customers use]		5	34,053.50	0.17	0.051	0.119		
31	Central UPS for examinees pcs only		1	785,850.00	0.786	0.236	0.550		
32	Printers [a mix of MFP and standard printers]		5	157,170.00	0.786	0.236	0.55		
33	Printer toners required during the project life cycle		1 lot	157,170.00	0.157	0.047	0.11		

	[should go under stationery]								
34	Software Development fee		1 lot	3.239,000.00	3.239	0.972	2.267		
36	Software testers		3	34,926.67	0.105	0.00314	0.073		
37	Domain Name and Webhosting yearly fee [for two years]		1 lot	104,780.00	0.105	0.0314	0.074		
39	Certificate Printing System [have it printed at printing house then hand write the name of exminee and have it signed with the responsible person] 0 cost for now		1 lot	261,950.00	0.262	0.079	0.183		
41	Costof WorkShops, Seminars and traininigs, on the developed system		1 lot	785,850.00	0.786	0.236	0.550		
III	Project Management & Coordination				3.497	1.209	2.288		
3.1	Project Staff	months	36		2.484	0.828	1.656		C1
1	Project coordinator	months	36	25,000.00	0.9	0.3	0.6		
2	Module developer and Training facilitator	months	36	22,000.00	0.792	0.264	0.528		
5	IT Specialist	months	36	22,000.00	0.792	0.264	0.528		
3.2	Consumables or expendables		36	LS	1.013	0.381	0.632		C1
13	CDMA-EVDO	no	10	1,000.00	0.01	0.01			
15	USB flash memory	no	20	600.00	0.012	0.004	0.008		
16	Stationery including, blank CDs,DVDs, back up hard disks	year	3	60,000.00	0.18	0.12	0.6		

18	Perdeim	months	36	10,500.00	0.378	0.126	0.252		
19	Air travel (Local)	LS			0.08	0.02	0.06		
22	Publication cost:								
23	publication of brochures and proceedings	LS			0.06		0.06		
26	Printer & photocopy cartridge	year	144.00	2,000.00	0.288	0.096	0.192		
27	Stapler Big size	no	2.00	400.00	0.0008	0.0008	0		
28	Stapler midium size	no	10.00	150.00	0.0015	0.0015	0		
29	Dividers	no	20.00	150.00	0.003	0.003	0		
						0.00	-		

Budget for Capacity Building of Regional Regulators

Item No	Description	Unit	Quantity	Unit price	Total	Year I	Year II
1	Workshops	Each	1	30,000	30000	30000	
2	Signining of MoUs	Each	5	7700	39000	39000	
3	Furniture and office equipment	lot	5	57400	287000	287000	
4	Vehicles, 4x4, pick up truck	each	5	700000	3,500,000	3,500,000	
5	IT equipment	lot	5	1,772,000	8,864,000	1,772,000	7,091,000
6	Exam center equipment	lot	5	1,208,000	6,040,000	1,208,000	4,832,000
7	Instruments for inspection services	lot	5	22600	113000	22600	90,400

8	Training of inspectors (perdiem, travel costs in EEA premises, about one month)	each	5	9364	103000		103000
9	Training of Assessors abroad	each	5	160,000	800,000		8000000
	Total				19,766,000	6,858,600	12,916,400

List of Tools, Instruments, Equipment and Machines for Practical Examination for the different grades per Region

Item	Quantity	Unit Price (ETB)	Total Price (ETB)
1. Distribution boards, 6 MCB Capacity, 3P+N+E	10	900	9,000
2. Sockets, 16A, with earth terminal	50	80	4,000
3. Switches, one way, 10A, 230V	50	75	3,750
4. Switches two way, 10A, 230V	50	80	4,000
5. MCBs, one pole 10A, 230V, 3KA	50	115	5,000
6. MCBs, 3 phase 50A, 400V, 10KA	50	1,250	6,250
7. MCCBs, 100A, 3 phases, 400V, 35KA	50	3,000	150,000
8. Contactor, 230V, Single Phase 16 A	20	1040	20,800
9. Contactor 3 phase 400V, various current ratings (10-50A), auxiliary coil 230 V	20	1, 200	24,000
10. Isolating switch	20	200	4,000

11. Fuses, various	100	140	14,000
12. Fuse switches 15 KV	10	100	1,000
13. LV current transformers			
various, (75/5A …500/5A)	10	900	9,000
14. Transfer switches, manual	10	800	8,000
15. Transfer switches automatic	6	1,200	7,200
16. Power factor correction			
Capacitors, 400 V	10	600	6,000
17. Detuning reactors	10	600	6,000
18. Contactors for capacitive			
Current switching	10	1120	11,200
19. Thyristors	10	680	6,800
20. Firing boards	10	200	2,000
21. Power cables,			
diameter 2.5 sq. mm	100 m	685	685
22. Power cables,			
diameter 25 sq. mm	100 m	6,000	6,000
23. Crimping tools	10	2,400	2,400
23. Wires diameter 2.5 sq. mm	100 m	800	800
24. Conduits diameter 20 mm,			
3 meter long	20 pcs	120	2,400
25. Trunking ,50mmx100m,			
3 meter long	4	285	1,140
26. Earthing rod,			

diameter 16 sq. mm,			
1.8 m long	2	345	690
27. Earthing resistance testers	2	4,180	8,360
28. Meggers	2	4,600	9,200
29. RCD testers	2	2,580	5,160
30. Applied voltage tester	2	400	800
31. Earth loop tester	2	1508	3,016
32. Multimeters	6	575	3,450
33. Power factor meter	2	600	1,200
34. Harmonic analyzer	2	2,540	5,080
35. Phase sequence tester	2	1,440	2,880
36. Synchronous generator,			
3 phase, 400 V, 5 KVA	2	23,000	46,000
37. Induction motor,			
Wound type,			
3 phase 400 V, 4 KW	1	6,000	6,000
38. Induction motor,			
Squirrel cage,			
3 phase 400 V, 4 KW	1	5,700	5,700
39. Induction motor,			
Single phase 1.6 KW	1	2,600	2,600
40. DC generator 1 KW	1	2,400	2,400
41. DC motor 1 KW	1	2,200	2,200
42. Universal motor 1 KW	1	2,200	2,200

43. Transformer, 3 phase			
15 KV/400V	1	240,000	240,000
44. Live line testers	2	4,180	8,360
45. Grounding rod	4	400	1,600
46. Cable jointing set	6	960	5,760
47. Hydraulic press and die,			
Diameter 95 sq.mm AAC	1	30,000	30,000
48. MV cable sealing end set	60	20	1,200
49. Conductor repair kits	4	300	1,200
50. Relay tester	2	8,900	17,800
51. Various relays,(overcurrent,			
differential, distance, earth fault,			
over/under voltage,etc.)	5 sets	12,000	60,000
52. Motor starters			
(star delta, soft starters ...)	10	800	8,000
53. Motor Control Circuits	3	450	1350
54. Synchronizing Panel Board	1	40,000	40,000
55. Work tables	10	3,000	30,000
56. Safety gear, gloves, helmet,			
Shoes	10 set	6,000	60,000
57. Power supply units	4	800	3,200
58. Battery and charger sets	2		
59. Solar panels 75 Wp	4	4,500	18,000
60. Charge controllers	1	5,000	5,000

61. Inverters 1500 Watt	1	24,000	24,000
62. Various tools (electrical Tool boxes with hand drills, saw, cable cutter, striper, etc.)	4	3,000	12,000
63. Various tools (mechanical toolboxes)	2	13,000	26,000
64. Oil dielectric tester	1	45,000	45,000
65. PLCs	1	28,000	28,000
66. Oscilloscopes	2	7,080	14,760
67. HVAC equipment	1 set	60,000	60,000
68. Miscellaneous Accessories	set	44,500	44,500
			ETB 1,208,091.00

List of office facilities and materials for Inspection Activities per Region

1. Desk top computers	2	10,000	20,000
2. Lap top PCs	1	6,300	6,300
3. Medium size photocopy	1	8500	8500
4. Office table	3	2,500	7,500
5. Office chair	3	550	1,650
6. Shelves	3	4,500	13,500
			ETB 57,450

List of instruments for Inspection Services per Region

7. Megger 1000 V,digital , accuracy 5 % ,1 MA at 1 Mohm	1	4,600	4,600
8. Megger 500 V ,digital , accuracy 5 % ,1 MA at 1 Mohm	1	4,150	4,150
9. Megger 2500V,digital (for LV cable and circuits			

up to 1000 V)	1	6,500	6,500
(for MV cables)	1	7,000	7,000
			ETB 22,250

10. Assumptions, Risks and Risk Management Strategies

Project Risks

The most likely and highest impact risks were added to the project schedule to ensure that the project team and stakeholders take the necessary steps to implement the mitigation response at the appropriate time during the project implementation. For this specific Electrical Works Competency Certification system development and Regional regulatory capacity building project, risk identification was conducted in the initial project risk assessment meeting with sector institutions. Following the assessment study, project assumptions have been identified in the logical framework against different level of outputs and project purpose. In this process, main risks have been assessed in terms of severity and its likelihood to happen. These along with mitigation measures to be instituted are summarized in Table 9.

Table 9. Project Risk Assessment and Mitigation Measures

Risk	Impact	Probability	Mitigation
1. Securing Finance	High	Medium	Exert additional effort to communicate with donors through MOFED & MoWIE
2. Staff turn over	Medium	Medium	EEA salary structure above the average civil service standard/supported by the energy law/ is revised & proposal presented.
3. Weakness in institutional coordination and capacity building hampers for the coordinated and harmonized institutional set up	Medium	Medium	Put in place systematic coordination approach with stakeholders, particularly with different sectors, professional associations and regions.

Risk	Impact	Probability	Mitigation
4.Weakness of Project Implementation Unit (PIU) staff Capacity	law	law	Finance and procurement staff have previous World Bank project experience lend services as financial implementing body with in EEA even to Ministry of Mines. Financial transaction is to be hosted at EEP PMU /Electric Power who has adequate experience
5. Preparedness of regional energy bureaus or their equivalent who are to be delegated with some of the powers of EEA. Local governments commitment etc.	High	Medium	Work needed in awareness creation and establishing common understanding through meetings and workshops Support provided by EEA & MOWIE during establishment of Regional Regulators is critical.
6. Non-cooperation of institutions with existing facilities for training and examining electrical work professionals such as EEU Training Center at Kotebie and Productivity Center at Lideta	High	Medium	Awareness creation through meetings and availing some incentives

11. Monitoring & Evaluation (M& E)

11.1. Reviews

A Project Implementation Plan (PIP) for the life of the project period including a detailed work plan for the initial year will be prepared by the project team up on inception in collaboration with the EEA, which will be reviewed and updated annually on a rolling basis. The project management team will prepare a progress report every three months using the standard formats, which shall contain:

- An account of actual implementation of the activities compared to that scheduled in the work plan, the implementation of activities, delivery of outputs, and description of progress towards achieving project outcomes, based on the objectively verifiable key indicators;
- Identification of problems and constraints (technical, human, financial, institutional) encountered during implementation;
- Recommendations for corrective measures, actions taken and results obtained;
- A detailed budget and work-plan for the following reporting period (quarter, annual).

Overall performance and progress reports will be submitted at the end of the fiscal year. Individual ECCDP PIU team members will submit progress reports to the project coordinator in a monthly basis and plan against achievement in a quarterly basis. The project coordinator will submit a comprehensive project performance report (Physical & financial) every quarter to EEA and EEA will verify the correctness of the report and submit the same to MOFED.

The Project Steering Committee (PSC) would provide overall strategic guidance to the project, using the progress reports as the basis for discussions with the national project office and General Director of EEA. The PSC would in particular guide the project on government policies and priorities. It is also expected to take the lead in overseeing project evaluation processes at mid-term and terminal stages of the project.

11.2. Monitoring and Knowledge Sharing

The overall responsibility for day to day monitoring of project implementation and results lies with the project coordination, supported by the EEA and technical Directorates within EEA and experts responsible for specific components and outputs. The project will promote sharing of knowledge and lessons learned through timely posting and updating of relevant documents, studies and reports on an appropriate web portal.

11.3. Mid Term and Terminal Evaluation

The Mid-Term and Terminal Evaluations, to be undertaken by independent monitoring and evaluation experts, will complement routine project monitoring and review processes. They are designed to help ensure continuing relevancy and adequacy of Electrical works Certification project design, assess appropriateness of implementation approaches, identify possible refinements, and learn lessons for the future. At the end of the project, the project implementation Unit will prepare a Terminal Report for submission to EEA and MoFED. The report will assess and document the results and the extent to which the project's outputs and outcomes have been achieved at time of project closure, and to recommend future actions.

The Mid-Term Evaluation (MTE) would be instituted no later than the mid of project life i.e. about year after project commenced this would help ensure strategic and technical issues are examined early enough for any necessary mid-course correction to be made. Other independent ad-hoc thematic and institutional reviews would also be instituted, depending on need. The Terminal Evaluation (TE) would be completed within six months after completion of the project. While drawing on all documented project information, the TE would deepen and undertake additional assessments, through substantive interactions with stakeholders and project participants at the various levels.

ajor areas of focus in both evaluations will be on achievements and performance of Electrical works Certification Development Project (ECCDP) in terms of the relevancy, effectiveness, efficiency, impact, and development sustainability of the interventions, with specific reference to the PDO (Project Development Objective) and anticipated component outcomes. Additionally, issues of harmonisation of methodologies among federal and regional institutions, and coordination in information system development, deployment and utilisation will be critically analysed.

11.4. Reporting Schedule

The reporting schedule would include the following:

- Project status (physical and financial) report will be prepared by the project team and submitted to the EEA, and MOFED, in a quarterly basis following the budget calendar;

- Progress reports will be submitted to the Project Steering Committee every 6 months by the project implementation Unit,
- Technical project staff and consultants will prepare assignment reports at the end of each month and submit to the project coordinator.
- At the end of the project, the project team will prepare a Terminal Report for review and revision by independent body and the government.

Terminal Evaluation will be carried out by an independent body at the end of the project no later than six months after project closure. The report will critically assess the performance of the project and document lessons learned will also assess achievements in relation to the Project Development Objective; anticipated outputs and outcomes. The contributions of the project towards a higher level of impacts; sustainability and replicability issues be assessed and documented as well. Key lessons and recommendations for future action and follow-up would also be demonstrated; See Table 4 below.

Table 10. Reporting Requirement timeline of the project

Report Type	Prepared by	Submission Period	Submitted To
Monthly Report	project staffs.	Day 1-2 of the following Month	Project team coordinator
Quarterly Report	Planning, M&E Specialist	Day 1-5 of the following Month	EEA, MoFED, Donors
Bi-annual Report	Planning, M&E Specialist	ten days after end of quarter/yr	EEA, Donors and MoFED
Annual Report	Planning, M&E Specialist	Two weeks after end of budget yr.	EEA, donor and MoFED
Financial Report	FM Specialist	Quarterly	EEA, donor and MoFED
Implementation Completion Self-assessment Report	Planning, M&E Specialist and Project coordinator	End of the Project	EEA, donor and MoFED
Final Evaluation Report	Independent Consultant	After end of project period	EEA, donors and MoFED

Annex I- Initial Selected Activities for delegation to Regional States executions

1. Electric and Electric related Business Competency Certification

Business Code	Lists of Businesses under the code
62321	Retail trade of electric motor, generators, transformers, pumps(not mentioned in other places except household and office electrical equipment)
62322	Retail trade of house hold electrical appliances and equipment including household air conditioners
62323	Retail trade of lighting and lighting accessories
62324	Retail trade of electricity distribution and controlling apparatus
62325	Retail trade of wiring and cables accessories
62326	Retail trade of solar energy equipment
62329	Retail trade of electrical equipments not mentioned in other codes
36000	Manufacturing of electrical baking stove

Expected responsibilities on these delegated activities are:-

- Give the necessary information to customers that are put in to the directive**,**
- Ensure whether the customer has fulfilled the criteria for his/her application, prepare and issue competency certificate,
- Fill the form which is prepared for guarantee in accordance with the business code,
- Take maximum care, no individual be employed for two or more companies by preparing a database,
- Organize full information for those who have taken competency certificate in soft copy(in data base) and in hard copy(file),

- Conduct pre/post inspection to check whether it is implemented according to the competency certificate,
- Compile inspection report and if there is wrong, take corrective measure and follow up its implementation accordingly,
- And conduct other related activities….

2. Electricity Service Delivery follow-up and Inspection

Expected responsibilities on these delegated activities are:-

- Conduct inspection on distribution networks, prepare report and follow up there its implementation,
- Handle complaints of the utility's customer grievance, prepare a solution in writing and hand on to the utility and follow up its implementation,
- Collect a feedback from customers by questionnaire, compile a report and follow up its implementation,
- Conduct an emergency inspection and inform to the Authority or solve with the utility's concerned district,
- Establish a discussion forum with the customers and organize issues raised by them and hand on to the utility for taking a measure,
- Organize lodged cases of the customers and identify solved with the unsolved ones,
- And others that related with inspection activities,

3. Electrical Installation Competency Certification

Expected responsibilities on these delegated activities are:-

- Examine documents of the applicant and if legible for exam inform to fill application forms, if not legible, inform to come again with the necessary documents,
- Conduct registration with its line of application,
- Give a written exam, and inform the result,
- Duly organize practical exam equipments, and give a practical exam and make him/her to the result,
- Organize exam results(written and practical),
- Prepare payment coupon for those who passed the exam,

- Ensure on payments and give competency certificate,
- Organize the applicants information in a pre-set database form,
- Give information to those who need information on certification issue,
- And other related with certification…

4. Energy Efficiency and conservation

Activities related to energy efficiency and conservation to be devolved to state regulators will be determined as the frameworks at the Federal level is completed and operationalized.