第 15 章

今後の課題

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15.1 送電設備面における今後の課題

15.1.1 角度鉄塔の多用

今回の調査対象である Dar es Salaam、Arusha、Moshi のような大都市では、年々人口が増加傾向にあるため、送電線ﾙｰﾄの確保が困難になりつつある。そのため、従来のような「送電線ﾙｰﾄを決定後、補償金を支払い線下の住宅を異動させる」方法は限界があると考えられる。

それを解決する方法の１つとして「角度鉄塔の多用」がある。これは、今までのような「送電線ﾙｰﾄは可能な限り直線鉄塔を使用し、最短ﾙｰﾄを選定する」方法と比較し、住民や周辺環境に与える負担を軽減する効果がある。この方法は建設費を増大することになるが補償金の大きさと比較して考えるべきである。また、角度鉄塔を適用するには、ﾙｰﾄ測量を今まで以上に正確に行う必要がある。

15.1.2 台帳の整理

今回の調査において、送電線支持物の位置や型式(懸垂形、耐張形)、鉄塔高、径間長等が正確に記録された図面や台帳が充分整備されていないことが明らかになった。緊急事故対応、定期巡視や点検、ｽﾍﾟｱﾊﾟｰﾂの計画的調達、貯蔵といった点から、地図、台帳は送電線路毎に早急に整備するべきである。

15.1.3 パイロット碍子による汚損測定

今回の詳細設計では、Ubungo-New Oysterbay 132kV 送電線の一部（測量番号 P14～NOB S/S）の等価塩分付着密度を 0.35mg/cm^2 としたが、可能であれば等価塩分付着密度を正確に把握するため、ﾊﾟｲﾛｯﾄ碍子を New Oysterbay S/S 予定地(Kinondoni North regional office 敷地内)や Msasani S/S に木柱を建てて設置し、定期的に実測することを推奨する。

15.1.4 コンクリート柱の導入

現在、33kV 送電線用支持物は主に木柱が使用されているが、雨期に洪水になったり、湿地等の水はけの悪い箇所では通常よりも早く根元が腐食を起こし、交換を余儀なくされている。なお、市街地では住宅等の過密化により交換作業そのものが困難な箇所もある。そのため、前回実施した Dar es Salaam 電力供給拡張計画では、木柱と比較し、耐候性のある鋼管柱が採用された。今回も一部で鋼管柱を適用する設計とした。

しかし、鋼管柱は非常に高価であるため、鉄筋ｺﾝｸﾘｰﾄ柱の採用が期待されるが、重量が鋼管柱(14m、550kg)に対し鉄筋ｺﾝｸﾘｰﾄ柱は重い(14m、1,200kg)ため、建柱用の重機が必要になる。また、鉄筋ｺﾝｸﾘｰﾄ柱は鋼管柱同様、輸入することになるため、現状では導入することは困難である。将来的には、耐候性が高く、鋼管柱よりも廉価な鉄

筋ｺﾝｸﾘｰﾄ柱の導入が期待される。

15.2 変電設備面における今後の課題

ﾀﾝｻﾞﾆｱの変電設備に関する今後の主要な課題のうち、一つは設備の機能維持すなわち保守・点検の確立であり、もう一つは、柔軟な運用を行うため、将来配電用変電所(33kV/11kV)の基本構成の確立である。

15.2.1 設備の機能維持について

機器の状態把握の方法は大別して、課電状態、通電状態での健全性を確認する巡視点検と、機器に異常が発生した場合あるいは、数年毎に定期的に機器を停止し、詳細な外観点検に加え、専用の計器や測定器具を使用し、絶縁抵抗値など基本的な電気性能と、開閉器等の動作特性を確認する方法がある。

すなわち、日常の巡視による機器の状態把握と、定期的な機器の診断が変電設備の状態把握に欠かせないものである。

(1) 定期的な巡視点検の実施

2 週間に 1 回程度の頻度で設備を巡視し、点検路等から目視で設備全体の状態把握と、ﾀｯﾌﾟﾁｪﾝｼﾞｬｰ等動作回数を記録する。具体的には、巡視項目のﾎﾟｲﾝﾄは以下のとおりである。

Table 15.1 変電所の巡視点検のﾎﾟｲﾝﾄ

項　目		点検のﾎﾟｲﾝﾄ	備　考
1	設備全般	外部から侵入の形跡の有無及び、飛来物の有無確認 異音、異臭の有無確認	
2	主要変圧器	変圧器全般に異変の有無確認 異音、異臭の有無確認 ﾌﾞｯｼﾝｸﾞ、碍管の状態確認 油漏れの有無確認、または、漏油拡大の有無確認 油面、油温表示の確認 ﾀｯﾌﾟﾁｪﾝｼﾞｬｰ動作回数の確認･記録	その都度または、1回/月で記録する。
3	遮断器	遮断器全般に異変の有無確認 異音、異臭の有無確認 ﾌﾞｯｼﾝｸﾞ、碍管の状態確認 油面、ｶﾞｽ圧の確認 油漏れ有無の確認 操作箱内の状態確認 操作機構からの漏油有無確認	油遮断器
4	断路器	断路器全般に異常の有無確認 碍管の状態確認 通電部に変色発生の有無確認 操作機構の状態確認	

項　目		点検のﾎﾟｲﾝﾄ	備　考
5	計器用変成器	計器用変成器全般に異常の有無確認 碍管の状態確認 異臭の有無確認 漏油の有無または、漏油拡大の有無確認	
6	ｷｭｰﾋﾞｸﾙ	ｷｭｰﾋﾞｸﾙ全般に異常の有無確認 異音、異臭の有無確認 電圧、電流、電力値の記録 小動物侵入形跡の有無確認	巡視時に毎回記録
7	配電盤類	配電盤全般に異常の有無の確認 電圧、電流、電力値の記録	巡視時に毎回記録
8	直流電源装置	直流電源装置全般に異常の有無の確認 異臭、異音の有無確認 充電器の状態確認 ﾊﾞｯﾃﾘｰ液の状態確認 電圧、電流、電力値の記録	巡視時に毎回記録
9	屋外母線	碍子、電線の状態確認 飛来物有無の確認 異音、加熱形跡有無の確認	

(2) 定期点検･診断の実施

変電機器の内、長期間運転に伴い絶縁劣化傾向を示す機器や、開閉動作回数、経年使用に伴い磨耗する機器や、動作特性が低下する機器については、その動作回数または、使用年数で詳細な点検を実施する必要がある。

代表的なものとして、主要変圧器と開閉機器がある。その他の機器については上記の巡視の結果と、停止時の詳細な状態確認で使用の可不可を判断せざるを得ない。

変圧器の油中ｶﾞｽ分析装置を、TANESCO も出資している Arusha の電力機器ﾒｰｶｰ TANELEC の工場内に設置する方法をとれば、TANESCO 設備の全ての主要変圧器を対象に、効率的、経済的な診断が可能となる。高価な電気設備を維持していく手段として、今後具体的に検討する必要があると考える。

Table 15.2 に変圧器と、遮断器の点検方法例を記載する。

Table 15.2 機器の定期点検手法

項　目		定期点検･診断の手法	備　考
1	主要変圧器	油中ｶﾞｽ分析の実施 :絶縁油を少量採油し、油の性状及び、油中可燃ｶﾞｽの定性、定量分析をおこなう。 その他、変圧器の漏油が著しい場合は、ｵｰﾊﾞｰﾎｰﾙを行う必要がある。	変圧器等、油入機器は点検時に開放すると、吸湿、酸化で絶縁油、絶縁物に悪影響が大である。 このため、運転中でも診断できる油分析が内部異常を早期に発見する最も優れた方法である。
2	遮断器	事故電流を 10 回以上遮断した場合、あるいは 6 年以上の使用年数のものについては、製造者による詳細点検を実施する。 必要に応じ、ｵｰﾊﾞｰﾎｰﾙや、遮断動作特性の測定を実施する。	遮断器の分解は、製造者に依頼する。

15.2.2 将来変電所の増設方法の提案

変電所機器の標準化については、変電所の概念設計で述べたとおりであるが、ここでは、変電所の増設方法の基本的な考え方を記載する。

変電所に求められる基本事項としては、

- 常時は、変電所の設備出力 100%で運用できること。
- 事故時には、短期間で設備修復ができ、緊急時には回路切換等で求められる出力で運転できること。
- 修復期間が仮に、長期間に至る場合でも、ﾋﾟｰｸ対応ができ、変電所機器に致命的なﾀﾞﾒｰｼﾞを与えないこと。

これらを、満足するためには、

- 遮断器、断路器、変流器などの直列機器の電流容量は、変圧器の短時間の過負荷運転に充分耐え得る定格とする必要がある。
- 変圧器は、一般的に 150%以上の運転を行うと、期待する機器寿命が急激に短縮されることが考えられることから、事故時等の緊急事態でも、150%過負荷で 2 時間程度の運転範囲とする必要がある。

具体的な増設方法としては、

- 第１ｽﾃｰｼﾞでは、変圧器１台設置
- 第２ｽﾃｰｼﾞでは、変圧器１台増設
- 最終ｽﾃｰｼﾞでは、変圧器１台増設合計３台とする。

現在は、最終ｽﾃｰｼﾞでの変圧器台数が２台の変電所がほとんどであるが、上述した条件を満足するためにも、今後は最終ｽﾃｰｼﾞで変圧器３台とすることを推奨する。

このため、新設変電所の用地確保時には、変圧器３台と分割母線が構成可能な主回路並びに、その他所機器が設置可能な敷地を考慮することを提案する。

15.2.3 SCADA システムの必要性

配電系統の信頼性は、設備そのものの信頼性の他、給電配電ｼｽﾃﾑを含む運用ｼｽﾃﾑや運用環境にも左右される。配電系統は面状に布設され、その保守運用には膨大な労力が掛ること、今回策定したﾏｽﾀｰﾌﾟﾗﾝによれば、TANESCO の配電系統は今後一層複雑化すること、将来の TANESCO の料金収入を確保するためには、需要家に係わる業務の高速化が望まれることなどを考慮すると、信頼性の高いｼｽﾃﾑを構築するため、配電ｼｽﾃﾑを集中的に監視制御する監視制御ｼｽﾃﾑ(SCADA:Supervisory Control and Data Acquisition)の導入が必須となる。TANESCO の配電ｼｽﾃﾑでは、Dar es Salaam 地区で部分的に SCADA が導入されているものの、以下の問題を抱えており抜本的な対策が望まれる。

- 老朽化が著しく取替部品も不足して、当初の機能を維持していない。
- 通信回線の問題もあり、機器状態(遮断器の入/切情報)や障害情報の監視のみに使用されており、電圧・電流・周波数の計測情報は監視しておらず、制御も行っていない。
- 通信手段には VHF を使用しているが、VHF 帯は混信が発生しやすく、無線を伝送路として用いる場合、専用の通信線を信号伝送路として用いる場合と比べ信頼性が低い。また通信ﾁｬﾝﾈﾙの確保も困難で配電の自動化を進めるには向いていない。
- SCADA に取り込まれていない配電用変電所も多数ある。

また、Arusha および Kilimanjaro の配電系統では、SCADA ｼｽﾃﾑは導入されていない。

前述のように、ﾀﾝｻﾞﾆｱの配電系統では、被制御機器の信頼性や通信ｼｽﾃﾑの問題があり、Dar es Salaam において、一部 SCADA ｼｽﾃﾑが導入されているものの、本格的な SCADA ｼｽﾃﾑは導入されていない。SCADA ｼｽﾃﾑを導入する場合、通信ｼｽﾃﾑと自動化処理の計算機器との親和性や TANESCO の保守管理組織とｼｽﾃﾑ構成の整合性を考慮する必要がある。

ﾀﾝｻﾞﾆｱの配電ｼｽﾃﾑに SCADA を導入する場合には、少なくとも下記について考慮する必要がある。

- VHF 回線は混信が発生しやすく、機器の制御には用いることには問題があるため、現行の VHF 回線の代りに、ﾏｲｸﾛ波伝送や光ﾌｧｲﾊﾞｹｰﾌﾞﾙなどの信頼性の高い伝送路を構築する。
- Ilala S/S の SCADA ｼｽﾃﾑは 1987 年製であり、老朽化が著しい。補充部品の調達も困難であり、全面的に再構築する必要がある。現状の SCADA ｼｽﾃﾑは監視と給電電話にのみ使用されているが、更新の際には配電自動化や遠方制御を考慮した総合的なｼｽﾃﾑとする必要がある。
- SCADA ｼｽﾃﾑ構築に当っては、TANESCO の設備運用方法やﾒﾝﾃﾅﾝｽ方法と協調を取るとともに、運転保守する TANESCO のｵﾍﾟﾚｰﾀおよびｴﾝｼﾞﾆｱに受入れられる技術を適用したものにする必要がある。
- SCADA ｼｽﾃﾑを既設設備に適用する場合、既設設備が SCADA ｼｽﾃﾑ対応に設計されていないことから、ｲﾝﾀｰﾌｪｰｽ部分について SCADA ｼｽﾃﾑに取り込む際に問題が生じる可能性がある。したがって、SCADA ｼｽﾃﾑへは、新設の変電所から被制御箇所に取り込むことが望ましい。
- 既設の変電所で遠方操作を実施するためには、少なくとも遮断器用の遠方制御回路を追加する必要がある。その場合、簡易形のﾌﾟﾛｸﾞﾗﾏﾌﾞﾙｺﾝﾄﾛｰﾗを利用することを推奨する。
- 一般的には SCADA ｼｽﾃﾑを導入することにより、それまで電話連絡で現場に出向いて機器操作を行っていたものが、制御所からの遠方操作で可能になることから、運転保守の効率化が図られ、人員削減につながると言われている。しかしﾀﾝｻﾞﾆｱの場合これまで配電ｼｽﾃﾑに本格的な SCADA ｼｽﾃﾑが導入されていないこともあり、初期の段階では設備のﾄﾗﾌﾞﾙや運転員の不慣れによる誤操作等が予想される。したがって人員合理化を行うとしても、SCADA による運転実績を充分に積んでから実施する必要がある。

15.3 配電設備面における今後の課題

電力設備の損失軽減に努めることは、貴重な電気ｴﾈﾙｷﾞｰの有効活用を意味し、経済的な効果が大きく、また設備の効率的な運用という面からも決しておろそかにはできない重要な課題である。電圧改善効果を伴う改修工事は、並行的に電力損失の軽減を果し得る場合が多いので、本計画に示された諸対策を実施することによって、相当大きな損失軽減効果が期待できる。配電設備の電力損失を軽減するため、今後 TANESCO が努力すべきであると思われる事項を以下に記す。

15.3.1 設備面での対策

(1) 11kV ﾌｨｰﾀﾞｰ

線路の損失軽減対策を理論的な観点から見れば、当然ながら線路抵抗の低下をはかることが最も効果的である。既設 11kV ﾌｨｰﾀﾞｰは、HDCC 35 mm2、ACSR 100 mm2、

ACSR 50 mm2 など種々の電線が混在している部分が多く残されている。これらの電線は、TANESCO の標準である ACSR 100 mm2 に張替えを行うべきであり、損失軽減の効果は大きい。また、電線の張替え工事により電線接続の不良個所を一掃できることにもなり、この面での大きな効果も期待される。

(2) 低圧配電線

計画対象地域における配電線の損失分布は、低圧配電線亘長とその 1 回線当りの平均電流値等から想定して、低圧線が占める割合が圧倒的に大きいものと判断される。したがって、損失軽減対策の重点も低圧線にあると考えられる。混在した線種およびｻｲｽﾞの劣化電線を PVC 絶縁ｱﾙﾐ電線 100 mm² または 50 mm² に張替えることにより、事故停電の画期的な減少、電圧の安定化および大幅な損失の軽減が期待できる。

(3) 配電用変圧器

既設変圧器に対しては運用面での対策を講ずることとし、需要増対策として新規購入するものについては、低損失変圧器についての経済評価も行って、ﾒﾘｯﾄの追求をはかっていくことも必要となる。

15.3.2 運用面での対策

(1) 不平衡電流の解消

3 相 4 線式低圧配電幹線の不平衡電流を完全に解消するのは至難のことであるが、定期的な測定によって各相電流の大きさを把握し、単相分岐線および引込線を適切に接続替えすることで不平衡電流を大巾に解消することができる。不平衡電流は電力損失の増加をもたらすばかりでなく、電圧降下の不平等などにより線路の各点で三相電圧のｱﾝﾊﾞﾗﾝｽをひき起し、負荷機器の効率低下を招くなど、線路運用上好ましいことではない。低圧幹線の不平衡電流が大巾に解消されれば、11kV ﾌｨｰﾀﾞｰの不平衡電流も改善されることになり、さらに上位系統にも好影響を与える。

(2) 重負荷ﾌｨｰﾀﾞｰの解消

連系用区分開閉器を活用して、負荷分割をはかり可能な限り各ﾌｨｰﾀﾞｰの負荷分担の平均化をはかることが必要である。

(3) 配電用変圧器運用の適正化

容量過大なものや容量不足なものなど、既設変圧器同士をそれぞれ適正な容量のものに入れ替えて使用する配慮も、変圧器の利用率と全日効率を高める面から有効な手段である。また、配電用変圧器は一般に 20%程度の過負荷運転が可能であるから、変圧器の性能を個別に検討して過負荷運転の範囲を明確化することで変圧器に対する投下資本の繰りのべが可能となり、経済的効果が期待できる。

(4) 力率改善用低圧ｺﾝﾃﾞﾝｻの設置

誘導負荷で一定力率以下のものについては、電気供給の条件として適正容量のｺﾝﾃﾞﾝｻの設置を需要家に義務づけることが効果的である。ただし電気料金面で負荷率割引などの優遇措置を講ずる必要があろう。

(5) 計器管理

(a) 電気取引きの公正化

取引用計器の検定制度を確立し、許容される公差の範囲で取引きする。

(b) 未計器供給の解消

可能な限り未計器供給をなくする。止むを得ず未計器供給とする場合は、適正な協定電力量とし盗電防止に努力する。

(c) 検針ｴﾗｰの解消

定められた周期で正しく検針し、検針ｴﾗｰを絶滅する。

(d) 契約の適正化

契約の適正化をはかるため、契約容量に応じた電流制限器の取付を推奨する。

(6) 電力損失管理手法の明確化

配電線以下の電力損失は、実際には電力量計の経年による誤差や盗電、漏れ電流損などが意外に大きく、物理的な損失よりもこれらの取扱いについて問題となることが多い。配電系統の損失改善対策を推進する場合、まず配電用変電所の全送り出し電力量は定められた誤差の範囲内で、正しく計量されているかを確認する。また、販売電力量のうち定額需要電力量の換算は合理的であるかを検討するなど、一定の前提条件のもとで管理手法を明確化することが必要である。明確化された損失管理のなかから純物理的な損失を把握し、その後の技術的改善対策に活用することが求められる。

15.4 維持管理における今後の課題

需要家に対して良質の電気を安全にしかも間断なく供給するためには、電力設備の維持、改善、運用が不断に行われなければならない。配電設備は広範な地域に面的に分布し、かつ煩雑なため設備全体を掌握することは非常に手間を要する事であるが、これを怠ると計画的な保守運用ができなくなり設備の荒廃を招くことになる。

配電設備を合理的かつ効率的に運用管理するためには次のような基準類を作成し、これに従い統一された手法で維持管理を続けることが必要である。これらの手法によって不断の努力を重ねることが設備の予防保全につながる。

(1) 保安基準

屋内配線を含む電線路の絶縁抵抗値、電線路の地上高、樹木や建造物などとの離隔距離、電気機器の接地抵抗値など設備が維持すべき基準を定める。

(2) 保守要則

保守責任者、保守業務の分担、巡視点検、事故の未然防止を図るための保守作業及び事故復旧作業などの基本的事項を明確化し、円滑な保守業務の運営をはかる。

(3) 巡視点検要領

巡視点検の周期、巡視点検の方法、巡視点検調査項目などを定めたもので、巡視の際は巡視点検ｶｰﾄﾞを持参し必要事項を記入する。記入された巡視点検ｶｰﾄﾞは、即日緊急改修分、10 日以内改修分、計画改修分などに分類され、保修工事指示の重要な基礎資料となる。

(4) 保修作業実施要領

緊急作業や計画的保修工事の計画、作業命令系統、作業責任者などについて定めるものである。

(5) 配電線路の電圧電流測定

(a) 需要家供給電圧の測定

需要家の供給電圧を変圧器の至近需要家および末端需要家について年 1 回程度または必要に応じ、ｻﾝﾌﾟﾘﾝｸﾞで 24 時間測定記録し設備改善計画のための基礎ﾃﾞｰﾀとする。

(b) 負荷電流の測定

変圧器や低圧線路の負荷電流を年 1 回程度または必要に応じ測定し、負荷管理を適切に行うための資料とする。

(6) 配電線路図（配電系統図）

5000 分の 1 程度の大きさで電柱の位置、電柱番号、径間距離、電線やｹｰﾌﾞﾙの種類及びｻｲｽﾞ、変圧器取付け位置及び容量、区分開閉器の位置及び大口需要家の位置、名称などを記入した配電線路の台帳を作成し、これを維持する。

配電系統の連系操作や停電事故復旧操作は、この図面によって行われるので図面は設備変更の都度直ちに修正し、常に設備の現状と一致させておかなければならない。

(7) 設備管理ｶｰﾄﾞ

配電設備では機器の数が多く、また変更が度々行なわれるため、次のようなｶｰﾄﾞを作成し管理する事が望まれる。

(a) 変圧器ｶｰﾄﾞ

変圧器の経歴、低圧線区域、使用ﾀｯﾌﾟ、電圧、負荷電流、接地抵抗値などの状態を管理するためのものである。このｶｰﾄﾞは需要家の負荷設備を記録することによって電柱ごとの負荷も知ることができ、低圧線の電圧降下も計算できる。したがって、負荷管理、電圧管理上欠くことのできない重要なｶｰﾄﾞある。

(b)その他の機器ｶｰﾄﾞ

区分開閉器、ｱﾚｽﾀｰなどの柱上機器および地中線路機器について、銘板、施設場所、点検保修事項などを記録して機器類の施設管理のため作成するものである。

(8) 配電線事故復旧指針

配電線の事故復旧に当っての初動体制、事故探査、復旧作業における留意事項について定め、停電時間の短縮化をはかることを目的とするものである。

(9) 供給信頼度管理要領

適正電圧の達成率や需要家の事故停電回数、作業停電回数、停電時間等を配電線路別に記録し、次期の設備改善計画のための基礎ﾃﾞｰﾀとする。

15.5 経営面における今後の課題

TANESCO は、ﾀﾝｻﾞﾆｱ政府の保護・監督の下、電力事業を独占的に行なってきた。政府の電力事業に対する基本方針は電力を安価に供給する事と地方電化の促進であり、電力事業の収益性については二の次とされてきた。以上の経緯もあり、ﾀﾝｻﾞﾆｱ政府もTANESCO も既に認識していることではあるが、TANESCO の経営には改善すべき点が多い。

TANESCO の経営に直接影響を与える問題は、依然として設備投資を可能とするﾚﾍﾞﾙに料金が設定されていない点にある。しかし、この問題は国民福祉と電力事業経営の両面からﾀﾝｻﾞﾆｱ政府が検討すべき課題であり、TANESCO が独自で解決できる問題ではない。また、電力事業の構造改革と共に慎重に検討されることとなろう。

上記に次いで大きな課題は料金徴収の改善にある。料金徴収上の課題は非技術的なｴﾈﾙｷﾞｰ・ﾛｽと未収金とに大別される。近年急増している非技術的なｴﾈﾙｷﾞｰ・ﾛｽについては、第 11 章にて述べた様に、「電力ﾒｰﾀｰの不正確な検針」、「ﾒｰﾀｰの故障･誤動作」、「不正確な推定による請求書の発行」、「盗電、ﾒｰﾀｰの改造、ﾊﾞｲﾊﾟｽ等の不正行為」などが理由とされている。TANESCO が採るべき対策はたくさんあるが、先ず、検針員の教育、ﾒｰﾀｰの校正・修理・取替え等の対策が必要となる。推定による請求書の発行については、検針員の不足が大きな原因であるので、検針員の増員、移動手段として自転車やｵｰﾄﾊﾞｲの供与などの対策が必要となろう。不正確な請求書の発行は料金徴収の遅れの原因となると共に、不払いの口実となっている。従い、検針員の増員・移動手段の供与等の対策は料

金回収率の向上にも役立つものと思われる。盗電などの不正行為については政府に働きかけ罰則を強化すると共に、監視強化も必要となろう。対策を立案・実施するに当たっては、各対策の費用対効果を確認した後、有効と判断される対策については予算を確保し、予算に基づき計画的に実行することが重要である。

上記以外では、以下の対策が必要である。

- 運転、停電など事故処理の記録を整え、財務管理に反映させる。
- 現実的な予算を作成し、予算に沿った財務管理を行なう。
- 現金、売掛金、買掛金、在庫等の管理を適切に行なう。
- 現業部門から管理部門への適切なﾚﾎﾟｰﾃｨﾝｸﾞ・ｼｽﾃﾑを構築する。
- あらゆる部署・階層のｽﾀｯﾌを対象に教育・訓練を強化する。
- 燃料代金、一般管理費、輸送費などを中心にｺｽﾄ管理・削減に努める。

なお、既に述べた様に、構造改革完了までの期間を対象に、南ｱﾌﾘｶの Netgroup Solutions (Pty) Ltd.がﾏﾈｼﾞﾒﾝﾄ・ｺﾝｻﾙﾀﾝﾄとして起用されている。Netgroup Solutions は、未収金の回収を含め、既に TANESCO の経営改善に着手している。

付録１ 調査団員および担当業務

氏　名	所　属	担当業務	備考
小　谷　　敞	J-Power	総括／制度組織分析	
境　武　久	J-Power	変電設備１	
本庄暢之	J-Power	変電設備２	
山中鉄也	J-Power	送電	
野口久弥	J-Power	配電１	
森　正　樹	J-Power	配電２	
苫米地辰夫	J-Power	電力需給	
大森芳行	J-Power	積算	
今枝良隆	E&E Solutions	財務・経済分析	
佐藤忠雄	J-Power	保守管理／教育訓練	
中隈清彙	J-Power	環境配慮	
土岐公宏	J-Power	業務調整	第１次、３次現地調査
今泉高宏	J-Power	業務調整	第５次現地調査

付録 2 調査期間と実施内容

調査種別	調査期間	主な実施内容
国内準備作業	2001 年 2 月 2 日～2 月 7 日	ｲﾝｾﾌﾟｼｮﾝﾚﾎﾟｰﾄ作成 現地調査準備
第 1 次現地調査	2001 年 2 月 8 日～3 月 19 日	ｲﾝｾﾌﾟｼｮﾝﾚﾎﾟｰﾄの説明、現状把握と資料収集
第 1 次国内作業	2001 年 6 月 7 日～8 月 17 日	ﾏｽﾀｰﾌﾟﾗﾝ検討、現地再委託準備
第 2 次現地調査	2001 年 6 月 12 日～6 月 30 日	DAMP 調査、現地再委託
第 3 次現地調査	2001 年 8 月 25 日～10 月 23 日	ﾏｽﾀｰﾌﾟﾗﾝに関する追加調査、DAMP ﾓﾃﾞﾙｹｰｽｽﾀﾃﾞｨｰ、電力ｾｸﾀ構造改革、TANESCO 民営化調査
第 2 次国内作業	2001 年 11 月 1 日～2002 年 2 月 13 日	ｲﾝﾃﾘﾑﾚﾎﾟｰﾄ作成
第 4 次現地調査	2002 年 2 月 18 日～3 月 3 日	ｲﾝﾃﾘﾑﾚﾎﾟｰﾄの説明 構造改革追加調査
第 3 次国内作業	2002 年 6 月 26 日～7 月 16 日	ﾄﾞﾗﾌﾄﾌｧｲﾅﾙﾚﾎﾟｰﾄ作成
第 5 次現地調査	2002 年 7 月 16 日～8 月 5 日	ﾄﾞﾗﾌﾄﾌｧｲﾅﾙﾚﾎﾟｰﾄの説明、技術移転ｾﾐﾅｰ開催
最終報告書作成	2002 年 8 月 6 日～9 月 6 日	ﾌｧｲﾅﾙﾚﾎﾟｰﾄ作成

付録３ 面談者リスト

タンザニア国主要都市配電設備リハビリテーション調査
第1次現地調査 面談者リスト

氏　名	所属/職位
(1) 在タンザニア日本大使館	
佐藤啓太郎	特命全権大使
柏村博之	二等書記官
(2) JICAタンザニア事務所	
青木澄夫	所長
古川光明	次長
鈴木馨	Assistant Resident Representative
Mr. Fabian M. Chilumba	Chief Programme Officer
(3) エネルギー鉱山省関係(MEM)	
Mr. Bashir J. Mrindoko	Commissioner for Energy and Petroleum
Mr. Theophillo Bwakea	Assistant Commissioner for Electricity
(4) TANESCO	
Mr. Baruany Elijah A. T. Luhanga	Managing Director
Mr. B. Msowoya	Deputy Managing Director(Technical Service)
Mrs. E. M. Masunzu	Director Operations
Mr. M.M.Fazal	Manager Distribution & Commercial
Mr. Cosmas Masawe	Manager Rural Electrification
Mr. Mayila	Manager Planning
Mrs. Mercy S. Baregu	Chief Distribution & Commercial Engineer
Mr. Makala E.Kingu	Chief Rural Electrification Engineer
Mr. A.Feresh	Chief Transmission Line Engineer
Mr. Bengiel Msofe	Senior Electrification Engineer
Mrs. Sophia S. Mgonja	Senior Distribution Engineer
Mr. Lebbi Changullah	Senior Planning Engineer
Mr. Elton Mwakaburi	Senior Surveyor
Mr. Sanibella Mahenge	Commercial Engineer
Mr. James Mwalilino	Supplies Oversea
Mr. Robert Semsella	Electrical Engineer Rural Electrification
Mr. Ayoub Nghasha	Mechanical Engineer Rural Electrification
Mr. Changi	Transmission Line Engineer
Mr. W.H.Chambo	Draftsman
Mr. James Bendict Diu	Directorate of Corporate Planning and Research
Mr. Mbawala	Manager Project Construction
Mr. Mikina	Project Construction
Mr. John Sangiwa	Safety Engineer
Mr. John E. Lazimah	Research & Investigation Unit
Mr. Martin Kalokola	Regional Manager-Ilala

Mr. Ephraim N.Kaali	Senior Engineer-Ilala
Mrs. E.G. Fumbuka	Regional Manager-Kinondoni (North)
Mr. Mmari Goodluck	Senior Engineer-Kinondoni (North)
Mr. John B.Mwakipesile	Regional Manager-Kinondoni (South)
Mr. Theodory F.Bayona	Planning Engineer-Kinondoni (South)
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Mrs. Fatuma I. Chungu	Senior Engineer-Temeke
Mr. Thomas Uiso	Planning Engineer-Temeke
Mr. Joel Lukumai	Regional Manager-Kilimanjaro
Mr. Maclean Mbonile	Senior Engineer-Kilimanjaro
Mr. Innocent G. Luoga	Planning Engineer-Kilimanjaro
Mr. Francis Maze	Custmer Service Engineer -Kilimanjaro
Mr. Gasper Msigwa	Construction and Maintenance Engineer-Kilimanjaro
Mr. Fawstin Antony	Electrical Workshop Engineer-Kilimanjaro
Mr. Christopher J. Masasi	Regional Manager-Arusha
Mr. Ng'erere Makoye	Sinior Engineer-Arusha
Mr. Amosy Maganga	Construction Engineer-Arusha
Mrs. Dinah Msuya	Maintenance Engineer-Arusha
Mr. Stanley Hunphrey	Customer Service Engineer-Arusha
Mr. Paschal Kibassa	Transmission Engineer-Arusha
Mr. Oscar Muhamba	Surveyor-Tanga
Mr. Dezideri R. Rutta	Njiro S/S
Mr. Miwitaji Sarum	Njiro S/S
Mr. Jafari A. Mpina	Project Engineer – DAMP
Mr. Saady Julius Kateti	Maintenance Engineer - DAMP
Mr. H. Moshy	Maintenance Supervisor - DAMP
Mr. Nicepitory Ngonyani	DAMP
Mr. Mwingizi	Manager of Manpower Development & Training
Mr. Yabaya Ali	Manager, TANESCO Training Center
Mr. R. Luteganya	TANESCO Training Center
Mr. Sipendeki J. Lugata	Mikocheni S/S
Mr. Mallale	Ubungo S/S
Mrs. Rukia Mpako	Ubungo S/S
Mr. Bakari Mkytenda	Ubungo S/S
Mrs. Grace H.Ndibalema	Ubungo Office
Mr. Tumaini Sembuche	Electrical Workshop Department - Ubungo Workshop
Mr. Ombeni Minja	Ilala
Mr. Frank S. Mwatuka,	Ilala S/S
Mr. Joseph Manene	Ilala S/S
Mr. Mafuko J. Chinganga	FZ III S/S
Mr. Yohani Sheao	Same S/S
Mr. Emanuel Mosi	Usa River District Office

(5) Pricewaterhouse Coopers

Mr. Simon Lapper	Management Consultant
Mr. Sandip D. Rughani	Consultant
Mr. Jeremiah Lima	Consultant

(6) Deloitte Touche Tohmatsu

Mr. Simon C. Mponji	Partner

Mr. Jones Ackor	Associate Director

(7) Others

Mr. Rawson P. Yonazi	Assistant Director, Division of Environment, Vice President Office
Ms. Ruth Lugwisha	Senior Pollution Control Officer, National Environmental Management Council
Mr. RN. Muheto	Director Natural Resources, *Ministry of Natural Resources & Tourism*
Mr. G. P. Mashurano	Assistant Director, Forest Utilization & Extension, Ministry of Natural Resources & Tourism
Mr. Juma A. Kayera	Assistant Director Resources Utilization, Wildlife Division, Ministry of Natural Resources & Tourism
Mr. Ulinyelusya K. Jenende	*Assistant Director, Macro Economy Division,* President's Office Planning Commision
Mr. R. A. Monyo	Factory Inspectorate, Ministry of Labor
Ms. Tillya DMr. George	Department of ArtiquitiesNational Museum
Mr. Peter Sumbi	Forest Projects Officer, WWF
Mr. Simon Milledge	Senior Programme Officer, TRAFIC, WWWF
Ms. Nadhi Sadiki	*Water Laboratories Unit, Ministry of Water*
Mr. Ph. D. Yanda	IRA, Dar es Salaam University
Dr. Ludwig Siege	Wildlife Division, Selous Conservation Programme (GTZ)

タンザニア国主要都市配電設備リハビリテーション調査
第2次現地調査　面談者リスト

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柏村博之	二等書記官
(2) JICAタンザニア事務所	
青木澄夫	所長
木之本浩之	次長
鈴木馨	*Assistant Resident Representative*
(3) TANESCO	
Mr. B.E.A.T. Luhanga	Managing Director
Mrs. E. M. Masunzu	Director Operations
Mr. M.M.Fazal	Manager Distribution & Commercial
Mrs. Mercy S. Baregu	Chief Distribution & Commercial Engineer
Mr. Bengiel Msofe	Senior Electrification Engineer
Mrs. Sophia S. Mgonja	Senior Distribution Engineer
Mr. Cosmas Masawe	Manager Rural Electrification
Mr. Sanibella Mahenge	Commercial Engineer
Mr. W.H.Chambo	Draftsman
Mr. Martin Kalokola	Regional Manager-Ilala
Mrs. E.G. Fumbuka	Regional Manager-Kinondoni (North)
Mr. Mmari Goodluck	*Senior Engineer-Kinondoni (North)*
Mr. John B.Mwakipesile	Regional Manager-Kinondoni (South)
Mr. Theodory F.Bayona	Planning Engineer-Kinondoni (South)
Mr. Nsajigwa J.Mwaisaka	Regional Manager-Temeke
Mrs. Fatuma I. Chungu	Senior Engineer-Temeke
Mr. Joel Lukumai	Regional Manager-Kilimanjaro
Mr. Maclean Mbonile	Senior Engineer-Kilimanjaro
Mr. Innocent G. Luoga	Planning Engineer-Kilimanjaro
Mr. Francis Maze	Customer Service Engineer-Kilimanjaro
Mr. Gasper Msigula	Construction and Maintenance Engineer-Kilimanjaro
Mr. Christopher J. Masasi	Regional Manager-Arusha
Mr. Ng'erere Makoye	Senior Engineer-Arusha
Mr. Amosy Maganga	Construction Engineer-Arusha
Mr. Stanley Humphrey	Customer Service Engineer-Arusha
Mr. Jafari A. Mpina	Project Engineer-DAMP
Mr. Saady Julius Kateti	Maintenance Engineer-DAMP
Mr. H. Moshy	Maontenance Supervisor-DAMP
(4) Pricewaterhouse Coopers	
Mr. Bob Hawkins	Director, Management Consulting Services
Mr. Mark Appleby	Senior Manager, Assurance and Business Advisory Service

Mr. Sandip D. Rughani	Consultant
Mr. Jeremiah Lima	Consultant

(5) Deloitte Touche Tohmatsu

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Mr. Jones Ackor	Associate Director
Mr. Issac M. Kiwango	Director

タンザニア国主要都市配電設備リハビリテーション調査
第3次現地調査　面談者リスト

氏　名	所属/職位
(1) 在タンザニア日本大使館	
柏村博之	二等書記官
(2) JICAタンザニア事務所	
青木澄夫	所長
鈴木馨	Assistant Resident Representative
二見 伸一郎	Assistant Resident Representative
(3) 日本貿易振興会(JETRO)ダルエスサラーム事務所	
奥貴史	所長
(4) TANESCO	
Mr. B.E.A.T. Luhanga	Managing Director
Mr. B. Msowoya	Deputy Managing Director(Technical Service)
Mrs. E. M. Masunzu	Director Operations
Mr. M.M.Fazal	Manager Distribution & Commercial
Mr. Cosmas Masawe	Manager Rural Electrification
Mr. Felician N.Mayila	Assistant Manager Corporate Planning
Mrs. Mercy S. Baregu	Chief Distribution & Commercial Engineer
Mrs. Sophia S. Mgonja	Senior Distribution Engineer
Mr. A.Feresh	Chief Transmission Line Engineer
Mr. Lebbi Changullah	Senior Planning Engineer
Mr. Obay Sigala	Distribution Engineer
Mr.Fadhili Kalissa	Distribution Engineer
Mr. Benedict Lyaruu	Distribution Engineer
Mr. Gilbert S. Mrosso	Land Surveyor
Mr. Mwalongo A. M.	Land Surveyor
Mr. W.H.Chambo	Draftsman
Mr. Martin Kalokola	Regional Manager-Ilala
Mr. Ephraim N.Kaali	Senior Engineer-Ilala
Mr. Ombeni Minja	Senior Engineer-Ilala
Mr. Frank S. Mwatuka	Ilala S/S
Mr. Joseph Manene	Ilala S/S
Mrs. E.G. Fumbuka	Regional Manager-Kinondoni (North)
Mr. Mmari Goodluck	Senior Engineer-Kinondoni (North)
Mr. Benas Bwire	Technician-Kinondoni(North)
Mr. Saidi Msuya	Engineer-Tegeta S/S
Mr. Sadiki S. Rupia	Ras Kilomoni
Mrs. S. C. Assey	District Manager-Bagamoyo
Mr. John B.Mwakipesile	Regional Manager-Kinondoni (South)
Mr. Theodory F.Bayona	Planning Engineer-Kinondoni (South)
Mrs. Margareth M. Kabadi	Senior Engineer-Kinondoni (South)

Mr. Kingunza F.Gallus	Technician-Kinondoni(South)
Mr. Nsajigwa J.Mwaisaka	Regional Manager-Temeke
Mrs. Fatuma I. Chungu	Senior Engineer-Temeke
Mr. George Mtunda	Supervisor-Planning-Temeke
Mr. Jerome Alfrede	Technician-Temeke
Mr. Wilson Shayo	Superintendent-Temeke
Mr. Jafari A. Mpina	Project Engineer - DAMP
Mr. Richard E. Nsulau	Regional Manager-Kilimanjaro
Mr. Maclean Mbonile	Senior Engineer-Kilimanjaro
Mr. Innocent G. Luoga	Planning Engineer-Kilimanjaro
Mr. Laban R. Mampagwa	Area Manager-Same
Mr. Augustino G. Kamanga	NYM Hydropower Station
Mr. Christopher J. Masasi	Regional Manager-Arusha
Mr. Amosy Maganga	Construction Engineer-Arusha
Mr. Paschal Kibassa	Transmission Engineer-Arusha
Mr. Emanuel Mosi	*District Manager-Usa River*
Mr. Matei Alex Mshana	District Manager-Monduli
Mr. Dezideri R. Rutta	Njiro S/S
Mr. Oscar Muhamba	Surveyor-Tanga

(5) Deloitte Touche Tohmatsu

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Mr. Issac M. Kiwango	Consultant
Mr. Parga Shiswawala	Consultant

(6) Others

Mr. Emmanuel Mbisse	TOL Electrical Engineer
Mr. Kusungulwa J. Mitto	TANELEC Production Engineer
Dr. Emilion Urassa	Monduli District Hospital
Dr. A. S. Swai	Monduli District Hospital

タンザニア国主要都市配電設備リハビリテーション調査
第4次現地調査　面談者リスト

氏　名	所属/職位
(1) 在タンザニア日本大使館	
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(2) JICAタンザニア事務所	
木之本浩之	次長
小林知樹	Assistant Resident Representative
Mr. Fabian M. Chilumba	*Chief Programme Officer*
(3) TANESCO	
Mr. B. Msowoya	Deputy Managing Director(Technical Service)
Ms. E. M. Masunzu	Director Operations
Mr. M.M.Fazal	Manager Distribution & Commercial
Ms. Mercy S. Baregu	Distribution & Transmission Specialist
Mrs. Sophia S. Mgonja	Chief Distribution & Commercial Engineer
Mr. Patrick.O. Songa	Senior Engineer-HQ
Mr. Benedict Lyaruu	Distribution Engineer
Mr. Sanibella Mahenge	Commercial Engineer
Ms. Rukia Mpako	System Development Engineer
Mr. S. E. Shayo	Transmission Engineer
Mr. J. Sakia	Senior Engineer-Transmission
Mr. Gilbert S. Mrosso	Land Surveyor
Mr. Mwalongo A. M.	Land Surveyor
Mr. James Bendict Diu	*Directorate of Corporate Planning and Research*
Mr. M. T. Mallale	Chief System Control Engineer
Mr. Chibate A. Makali	Senior Engineer (System Control)
Mr. Christian Msyani	Senior System Control Engineer (O)
Mr. Martin Kalokola	Regional Manager-Ilala
Mr. Ombeni Minja	Senior Engineer-Ilala
Mr. Mmari Goodluck	Senior Engineer-Kinondoni (North)
Ms. Stella Manyanya	Planning Engineer-Kinondoni North
Mr. John B.Mwakipesile	Regional Manager-Kinondoni (South)
Ms. Margareth M. Kabadi	Senior Engineer-Kinondoni (South)
Mr. Theodory F.Bayona	Planning Engineer-Kinondoni (South)
Mr. Nsajigwa J.Mwaisaka	Regional Manager-Temeke
Ms. Fatuma I. Chungu	Senior Engineer-Temeke
Mr. Thomas Uiso	Planning Engineer-Temeke
Mr. Richard E. Nsulau	Regional Manager-Kilimanjaro
Mr. Maclean Mbonile	Senior Engineer-Kilimanjaro
Mr. Gasper Msigwa	*Construction and Maintenance Engineer-Kilimanjaro*
Mr. Christopher J. Masasi	Regional Manager-Arusha
Mr. Ng'erere Makoye	Senior Engineer-Arusha

Mr. Amosy Maganga	Construction Engineer-Arusha
Mr. Paschal Kibassa	Transmission Engineer-Arusha
Ms. Dinah Msuya	Maintenance Engineer-Arusha

(4) Deloitte Touche Tohmatsu

Mr. Simon C. Mponji	Partner
Mr. Jones Ackor	Associate Director
Mr. Issac M. Kiwango	Consultant
Mr. Parga Shiswawala	Consultant

タンザニア国主要都市配電設備リハビリテーション調査
第5次現地調査　面談者リスト

氏　名	所属/職位
(1) 在タンザニア日本大使館	
出木場一實	特命全権大使
柏村博之	二等書記官
(2) JICAタンザニア事務所	
青木澄夫	所長
小林知樹	Assistant Resident Representative
(3) ｴﾈﾙｷﾞｰ鉱山省関係(MEM)	
Mr. M. Mbwambo	Senior Executive Engineer
Mr. Theophillo Bwakea	
(4) TANESCO	
Mr. Rudy Huysen	Managing Director
Mr. Steve Van Staden	Deputy Managing Director
Mr. Cosmas Masawe	Acting Director Operations
Mr. M.M.Fazal	Manager Distribution
Mr. Kingu, M.E.	Acting Manager Rural Electrification
Mrs. Mercy S. Baregu	Distribution and Transmission Specialist
Mr. S.Saidi Ngoma	Senior Distribution Engineer
Ms. Stella Manyanya	Planning Engineer
Mr. Johnson Mwigune	Commecial Engineer
Mr. Simon B. Kihiyo	Acting Chief Engineer Distribution
Mr. Benedict Lyaruu	Distribution Engineer
Mr. Martin Kalokola	Regional Manager-Ilala
Mr. Ephraim N.Kaali	Senior Engineer-Ilala
Mr. Ombeni Minja	Senior Engineer-Ilala
Mrs. E.G. Fumbuka	Regional Manager-Kinondoni (North)
Mr. Mmari Goodluck	Senior Engineer-Kinondoni (North)
Mr. John B.Mwakipesile	Regional Manager-Kinondoni (South)
Mr. Samwel M. Moliel	Acting Planning Engineer-Kinondoni (South)
Mr. Theodory F.Bayona	Acting Senior Engineer-Kinondoni (South)
Mr. Nsajigwa J.Mwaisaka	Regional Manager-Temeke
Mrs. Fatuma I. Chungu	Senior Engineer-Temeke
Mr. Thomas Uiso	Planning Engineer-Temeke
Mr. Richard E. Nsulau	Regional Manager-Kilimanjaro
Mr. Maclean Mbonile	Senior Engineer-Kilimanjaro
Mr. Innocent G. Luoga	Planning Engineer-Kilimanjaro
Mr. Christopher J. Masasi	Regional Manager-Arusha
Mr. Ng'erere Makoye	Senior Engineer-Arusha
Mr. Paschal Kibassa	Transmission Engineer-Arusha
Mr. Amosy Maganga	Construction Engineer-Arusha

付録４ 収集資料リスト

第1次現地調査入手資料リスト

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A2	HIGH VOLTAGE TRANSMISSION LINES
A3	GENERATOR & GEN. TRANSFORMER
A4	ELECTRICAL PARAMETERS FOR 220kV AND 132kV GRID
A5	220/132/33/11kV DIAGRAM OF UBUNGO CONTROL COMPLEX CENTRE
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A7	System of dispatching operation and maintenance(existing)
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A12	The general climatic condition of Dar es Salaam, Kilimanjaro and Arusha regions.
A13	EXISTING WORKSHOP FACILITIES FOR OPERATION AND MAINTENANCE
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A177	Power System Master Plan, 2000 Update, Draft Final Report, Nov. 2000 Acres International
A178	*Tanzania Power System Master Plan, Demand Forecast Update, May.2000* Planning Dept.

A179	Annual Report & Accounts 1998
A180	Annual Report & Accounts 1997
A181	Annual Report & Accounts 1995
A182	Annual Report & Accounts 1993
A183	DAMP – Organization Chart 2001
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A189	"ARCHAEOLOGY" from "Tanzania in Maps"[Map of Historical Ruins; copies]
A190	DAR ES SALAAM (1/1,000,000)[Map of Historical Ruins; copy]
A191	ARUSHA: ZONE H (1/500,000)[Map of Historical Ruins; copy]
A192	"Temporary Standards for Receiving Waters"[copies]
A193	Land Cover and Land Use[Maps; 3 sheets]
A194	NEMC: Organization Chart
A195	Eastern Arc Mountains [copy]
A196	An Act to Provide for the establishment of the National Environment Management Council
A197	National Environmental Policy
A198	Report on Existing Legislation Pertaining to Environment
A199	Tanzania Environmental Impact Assessment Procedure Volume1 EIA Procedure & General Information
A200	Tanzania Environmental Impact Assessment ProcedureVolume2 Screening and Scoping Guidelines
A201	Tanzania Environmental Impact Assessment ProcedureVolume3 Report Writing Guidelines
A202	Tanzania Environmental Impact Assessment ProcedureVolume4 Review Guidelines
A203	Tanzania Environmental Impact Assessment ProcedureVolume5 General Checklist of environmental Characteristics
A204	Status on Ratification/Accession to Conventions [copies]
A205	"Coastal Forests" and "Mid-elevation Forests" [copies]from "East African Ecosystems and their Conservation"
A206	1994 Indicator Monitoring Survey (IMS) Volume1 Preliminary Report
A207	Developing a Poverty Basement in Tanzania
A208	Updating the Poverty Baseline in Tanzania
A209	The Economic Survey 1999
A210	An Act to provide for the Preservation and Protection of Sites and Articles of Palaeontological, Archaeological, Historical, or Natural Interest and for matters connected therewith and incidental thereto
A211	An act to amend the Antiquities Act, 1964
A212	Annual Report of the Antiquities Division for the years 1976 and 1977
A213	SERA YA UTAMADUNI(National Cultural Policy)
A214	Forests Chapter 389 of the Laws (Principal Legislation)
A215	Tanzania Electricity Supply Company(TANESCO) Electricity Tariff Study Final Report(Volume2) Main Report
A216	Topographic Maps (1/50,000)[MWANGA]
A217	Topographic Maps (1/50,000)[WEST HAI]

A218	Topographic Maps (1/50,000)[LEMBENI]
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第2次現地調査入手資料リスト

No.	Name of Documents
Documents compiled during the site survey or interview from TANESCO	
B1	BENEFICIARIES OF THE PROPOSED 132/33KV OYSTERBAY SUBSTATION
B2	SUBSTATIONS AND FEEDERS MAXIMUM DEMAND -ARUSHA REGION

第3次現地調査入手資料リスト

No.	Name of Documents
Documents compiled during the site survey or interview from TANESCO	
C1	STRATEGIC URBAN DEVELOPMENT PLAN (SUDP) INCEPTION REPORT COMMENTS ON THE REPORT
C2	ADDITION OF ONE EXTRA SITE FOR A PROPOSED SUB-STATION AT NJIRO B
C3	PROPOSALS FOR REHABILITATION AND RECONDUCTORING OF HT LINES - ARUSHA
C4	PROPOSALS FOR REHABILITATION AND RECONDUCTORING OF HT LINES - KILIMANJARO REGION
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C21	DAR ES SALAAM 1:2500 MAP J12-2
C22	General Foundationplan 145kV Switchyard Kunduchi Substation
C23	Arrangement 145kV Linebay Ubungo Plan and section Kunduchi Substation
C24	Arrangement 145kV Transf.bay T1&T2 Plan and section Kunduchi Substation
C25	Arrangement 145kV Linebay Zansibar Plan and section Kunduchi Substation
C26	Arrangement 145kV Switchyard Section Kunduchi Substation
C27	Arrangement 145kV Busbar Plan and Section Kunduchi Substation
C28	1:50,000 Map HIMO
C29	1:50,000 Map MOSHI
C30	1:50,000 Map NYUMBA YA MUNGU
C31	1:50,000 Map USA RIVER
C32	1:50,000 Map MONDULI
C33	1:50,000 Map SANYA CHINI
C34	1:50,000 Map SAME
C35	1:50,000 Map WEST HAI
C36	1:50,000 Map MWANGA
C37	1:50,000 Map DAR ES SALAAM
C38	1:50,000 Map BAGAMOYO
C39	1:50,000 Map KISARAWE
C40	1:50,000 Map KAWE

C41	TARIFF BOOK OF HARBOUR DUES AND CHARGES
C42	APPLICATION FOR UTILIZATION OF CUSTOMS DUTY AND VAT REMISSION GRANTED TO TECHNICAL ASSISTANCE PROJECT MATERIALS AND EQUIPMENT
C43	APPLICATION FOR UTILIZATION OF CUSTOMS DUTY AND SALES TAX REMISSION GRANTED TO TECHNICAL ASSISTANCE PROJECT MATERIALS AND EQUIPMENTS
C44	Material cost in Dar es Salaam
C45	TANELEC TRANSFORMER PRICE LIST
C46	TANZANIA TAESUNG PRICE LIST
C47	JAMHURI YA MUUNGANO WA TANZANIA
C48	The Single Bill of Entry
C49	Special Bill Supplement No.1
C50	PROPOSED 132kV LINE ROUTES UBUNGO S/S - NEW OYSTERBAY S/S SEPTEMBER 5, 2001
C51	Moshi & Arusha Feeder Data (1990)

付録 5 TANESCO との議事録

MINUTES OF MEETING
MASTER PLAN STUDY ON THE POWER SECTOR FOR MAJOR TOWNS IN THE UNITED REPUBLIC OF TANZANIA

- 1ST MEETING HELD ON FEBRUARY 13, 2001 -

The Master Plan Study Team (the Team) dispatched by the Japan International Cooperation Agency (JICA), headed by Mr. Hiroshi Kodani visited the United Republic of Tanzania on February 9, 2001 for the purpose of Master Plan Study on the Power Sector for Major Towns (Dar es Salaam, Arusha and Moshi).

The Inception Report prepared by the Team was explained to TANESCO and after that, the Team and TANESCO discussed about the scope of study, supporting method by TANESCO, the schedule of site survey, the counterpart personnel and so on. Through the discussion, both of the Team and TANESCO have agreed as described on the attached sheets.

Confirmed and signed on February 13, 2001.

Mrs. E. M. Masunzu
Director Operations
Tanzania Electric Supply
Company Limited

Mr. Hiroshi Kodani
Leader of the Team
Japan International
Cooperation Agency

ATTACHMENT

1. SCOPE OF THE STUDY

The Team will carry out the Master Plan Study depending upon the Scope of Works agreed between TANESCO and JICA on October 17, 2000 in Dar es Salaam.

2. COUNTERPART PERSONNEL

Mrs. Mercy S. Baregu, Chief Distribution & Commercial Engineer, is assigned as the Overall Leader of the counterpart personnel of TANESCO. The Team is supposed to request the arrangement of individual counterpart, preparation of data and so on to TANESCO through her in the Master Plan Study. Name of respective counter parts is as follows:

Dar es Salaam Region

Region	Name	Position
Head Office	Mrs. M. S. Baregu Mr. Mahenge	Chief Distribution & Commercial Engineer Commercial Engineer
Kinondoni (North)	Mr. G. E. Mmari	Senior Engineer
Kinondoni (South)	Mr. T. F. Bayona	Planning Engineer
Ilala	Mr. E. Kaali	Senior Engineer
Temeke	Mrs. F. T. Chungu	Senior Engineer

Arusha Region

Region	Name	Position
Arusha	Mr. Amosi Maganga	Construction & Planning Engineer

Kilimanjaro Region

Region	Name	Position
Kilimanjaro	Mr. Innocent Luoga	Planning Engineer

3. OFFICE SPACE

TANESCO offers the suitable working space for the Team in Kinondoni North Regional Office. The offered office space is supposed to be used throughout the study period for the Team.

4. QUESTIONNAIRE

The Questionnaire prepared by the Team is explained to TANESCO. After that, both of the Team and TANESCO confirmed the following items.

- Desirable deadline to submit the answer sheets from TANESCO to the Team is March 9, 2001
- Headquarters of TANESCO will send the Questionnaire to Arusha and Kilimanjaro and request them to prepare the answers regarding to respective region.

MINUTES OF MEETING
MASTER PLAN STUDY ON THE POWER SECTOR FOR MAJOR TOWNS IN THE UNITED REPUBLIC OF TANZANIA

- 2ND MEETING HELD ON MARCH 13, 2001 -

The Master Plan Study Team (the Team) dispatched by the Japan International Cooperation Agency (JICA), headed by Mr. Hiroshi Kodani visited the United Republic of Tanzania from February 9, 2001 to March 18, 2001 for the purpose of Master Plan Study on the Power Sector for Major Towns. The Team had a series of meetings with personnel concerned of Tanzania Electric Supply Company Limited (TANESCO) and conducted field surveys on the existing and proposed sites.

As a result of the discussions and field surveys, both parties have agreed and confirmed the main items described on the attached sheets.

Confirmed and signed on March 14, 2001.

Mr. B.E.A.T. Luhanga
Managing Director
Tanzania Electric Supply
Company Limited

Mr. Hiroshi Kodani
Leader of the Team
Japan International
Cooperation Agency

ATTACHMENT

1. TANESCO'S PROPOSAL

TANESCO's latest proposal for the expansion or rehabilitation of power supply facilities are as follows;

1.1 Dar es Salaam

(1) Substations

Name	System Voltage	Capacity(MVA)	Remarks
Tegeta Grid	220/132kV	2 units of 150	New
Yombo	220/132kV	2 units of 150	New
Oyster Bay	132/33kV	2 units of 45	New
	33/11kV	CB, DS, etc.	Rehabilitation
Mbezi	132/33kV	2 units of 45	New
	33/11kV	2 units of 15	Expansion
Mbagala	132/33kV	2 units of 45	New
Kurasini	132/33kV	2 units of 45	New
Mburahati	33/11kV	2 units of 15	New
Tabata	33/11kV	1 unit of 15	New
Tandika	33/11kV	1 unit of 15	New
Tandale	33/11kV	1 unit of 15	Expansion
Sokoine	33/11kV	1 unit of 15	Expansion
Mikocheni	33/11kV	1 unit of 15	Expansion
Msasani	33/11kV	1 unit of 15	Expansion
		Line CB	Expansion
Mbagala	33/11kV	Line CB	Expansion
TOL	33/11kV	1 unit of 15	New
Kigamboni	33kV	Switching station	New
Factory Zone-I	33/11kV	CB, DS, etc.	Rehabilitation
Factory Zone-II	33/11kV	CB, DS, etc.	Rehabilitation
City Center	33/11kV	CB, DS, etc.	Rehabilitation
Bagamoyo	33/11kV	1 unit of 10	Expansion
Factory Zone - III	33/11kV	1 unit of 15	Expansion

(2) Transmission and Sub-transmission Lines

Section (from to)	System Voltage	Length(km)
Ubungo - Tegeta	220kV	25
Ubungo - Yombo	220kV	20
Ubungo - Oyster Bay	132kV	8.5
Tegeta - Mbezi	132kV	6.0
Mbezi - Oyster Bay	132kV	10.0
Factory Z.-III - Yombo	132kV	8.5
Yombo - Mbagala	132kV	10.0
Mbagala - Kurasini	132kV	16.0
Ilala - Kurasini	132kV	11.0
Tegeta - Bagamoyo	33kV	60.0

(3) Distribution Lines
Upgrading, expansion or rehabilitation of lines related to the substations.

1.2 Arusha

(1) Substations

Name	System Voltage	Capacity(MVA)	Remarks
Njiro	132/33kV	2 units of 45	Expansion
Unga Ltd.	33/11kV	2 units of 10	New
Mt. Meru	33/11kV	2 units of 10	Expansion
Kilitex	33/11kV	2 units of 10 (1 future)	New
Themi	33/11kV	2 units of 10 (1 future)	Expansion
Sakina	33/11kV	2 units of 10 (1 future)	New
Usa River	66/33kV	2 units of 10 (1 future)	New
Oljoro	33kV	Switching station	New

(2) Transmission Lines
Modification, upgrading, expansion or rehabilitation of lines related to the substations. Rehabilitation of 66kV line from Moshi to Arusha.

(3) Distribution Lines
Upgrading, expansion or rehabilitation of lines related to the substations.

3/5

1.3 Moshi

(1) Substations

Name	System Voltage	Capacity(MVA)	Remarks
Kiyungi	132/33kV	2 units of 20	Expansion
		66kV CB	Rehabilitation
Trade School	33/11kV	2 units of 10 (1 future)	Expansion
Boma Mbuzi	33/11kV	2 units of 10 (1 future)	Expansion
KCMC	132/33kV	2 units of 20	New
Marangu	66/33kV	1 unit of 10	New
YMCA	33/11kV	2 units of 10 (1 future)	New
Gomberi	33/11kV	1 unit of 5	New
Same	132/33kV	CB, DS, SW Board, etc.	Rehabilitation
Nyumba ya Mungu	66/33kV	Line CB	Rehabilitation
Boma Ngombe	33/11kV	2 units of 5 (1 future)	New

(2) Transmission and Sub-transmission Lines

Section (from to)	System Voltage	Length(km)
Kiyungi - KCMC	132kV	17
Kiyungi - Marangu	66kV	43
Kiyungi - Trade School for Machame Feeder	33kV	12
Kiyungi - Boma Mbuzi for Rombo Feeder	33kV	9
Trade School - Gomberi	33kV	12
Same - Mwanga	33kV	55

(3) Distribution Lines
Upgrading, expansion or rehabilitation of lines related to the substations.

2. FIELD SURVEY

The Team conducted field survey of existing substations, proposed substation sites, transmission line routes and distribution lines together with TANESCO's counterparts. Results of the field survey will be utilized in the Master Plan Study effectively.

3. DATA PROVIDED BY TANESCO

TANESCO has provided data as requested by the Team according to the Questionnaire prepared and explained by the Team at the first meeting. A list of data received by Team is shown in Appendix. In case if additional data or information became necessary during the study in Japan, the Team will inform TANESCO and TANESCO will respond accordingly.

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(2) Transmission and Sub-transmission Lines

Section (from to)	System Voltage	Length(km)
Ubungo - Tegeta	220kV	25
Ubungo - Yombo	220kV	20
Ubungo - Oyster Bay	132kV	8.5
Tegeta - Mbezi	132kV	6.0
Mbezi - Oyster Bay	132kV	10.0
Factory Z.-III - Yombo	132kV	8.5
Yombo - Mbagala	132kV	10.0
Mbagala - Kurasini	132kV	16.0
Ilala - Kurasini	132kV	11.0
Tegeta - Bagamoyo	33kV	60.0

(3) Distribution Lines
Upgrading, expansion or rehabilitation of lines related to the substations.

1.2 Arusha

(1) Substations

Name	System Voltage	Capacity(MVA)	Remarks
Njiro	132/33kV	2 units of 45	Expansion
Unga Ltd.	33/11kV	2 units of 10	New
Mt. Meru	33/11kV	2 units of 10	Expansion
Kilitex	33/11kV	2 units of 10 (1 future)	New
Themi	33/11kV	2 units of 10 (1 future)	Expansion
Sakina	33/11kV	2 units of 10 (1 future)	New
Usa River	66/33kV	2 units of 10 (1 future)	New
Oljoro	33kV	Switching station	New

(2) Transmission Lines
Modification, upgrading, expansion or rehabilitation of lines related to the substations. Rehabilitation of 66kV line from Moshi to Arusha.

(3) Distribution Lines
Upgrading, expansion or rehabilitation of lines related to the substations.

3/5

Appendix

List of Drawings and Documents received from TANESCO 1/5

No.	Title of Document	Remark
Documents submitted as the answer for Questionnaire		
1	Organization Chart Head Office	Head Office
2	HIGH VOLTAGE TRANSMISSION LINES	Head Office
3	GENERATOR & GEN. TRANSFORMER	Head Office
4	ELECTRICAL PARAMETERS FOR 220kV AND 132kV GRID	Head Office
5	220/132/33/11kV DIAGRAM OF UBUNGO CONTROL COMPLEX CENTRE	Head Office
6	GRID SUBSTATIONS	Head Office
7	System of dispatching operation and maintenance(existing)	Head Office
8	Topographical and Geological Data	Head Office
9	Import Duties and Exchange Rate	Head Office
10	Currency and Customs Clearance	Head Office
11	Department directly and indirectly Concerned with the implementation Of M/P on the Project	Head Office
12	The general climatic condition of Dar es Salaam, Kilimanjaro and Arusha regions.	Head Office
13	EXISTING WORKSHOP FACILITIES FOR OPERATION AND MAINTENANCE	Head Office
14	PRESENT METHOD OF OPERATION AND MAINTENANCE 1. POWER STATIONS	Head Office
15	Maintenance of Power Station & TL, 55	Head Office
16	WATT-HOUR METERS ON SS	Head Office
17	Standard For Planning And Designing	Head Office
18	RELAYS SYSTEM	Head Office
19	Summary and Recommendation Answer for P6 Q7	Head Office
20	Asset classification and useful economic lives	Head Office
21	Map of West Hai (1:50,000)	Head Office
22	Map of Sanya Chini (1:50,000)	Head Office
23	Map of Himo (1:50,000)	Head Office
24	Map of Rongai (1:50,000)	Head Office
25	Map of Oloitokitok (1:50,000)	Head Office
26	Map of Mwanga (1:50,000)	Head Office
27	Map of Same (1:50,000)	Head Office
28	Map of Arusha (1:50,000)	Head Office
29	Map of Monduli (1:50,000)	Head Office
30	Map of Usa River (1:50,000)	Head Office
31	Map of Dar Es Salaam 1 (1:10,000)	Head Office
32	Map of Dar Es Salaam 2 (1:10,000)	Head Office
33	Map of Dar Es Salaam 3 (1:10,000)	Head Office
34	Map of Dar Es Salaam 4 (1:10,000)	Head Office
35	Map of Dar Es Salaam 5 (1:10,000)	Head Office
36	Map of Dar Es Salaam 6 (1:10,000)	Head Office
37	Map of Dar Es Salaam 7 (1:10,000)	Head Office
38	Map of Dar Es Salaam 7 J15-2 (1:10,000)	Head Office
39	Map of Dar Es Salaam 8 (1:10,000)	Head Office
40	Map of Dar Es Salaam 9 (1:10,000)	Head Office
41	Map of Arusha Municipality 1 (1:10,000)	Head Office
42	Map of Arusha Municipality 2 (1:10,000)	Head Office
43	Map of Arusha Municipality 3 (1:10,000)	Head Office
44	Map of Arusha Municipality 4 (1:10,000)	Head Office
45	Map of Moshi Municipality 1 (1:10,000)	Head Office
46	Map of Moshi Municipality 3 (1:10,000)	Head Office
47	Ilala S/S CB Specification	Ilala

List of Drawings and Documents received from TANESCO 2/5

No.	Title of Document	Remark
48	TANESCO ILALA REGION FEEDER'S FAULT RECORDS FOR THE YEAR 1996	Ilala
49	SINGLE LINE DIAGRAM ILALA S/S	Ilala
50	SINGLE LINE DIAGRAM FACTORY ZONE-III S/S	Ilala
51	SINGLE LINE DIAGRAM KARIAKOO S/S	Ilala
52	ONE LINE DIAGRAM CITY CENTER S/S	Ilala
53	ONE LINE DIAGRAM SOKOINE S/S	Ilala
54	POWER SUPPLY AND DEMAND IN 10 YEARS	Ilala
55	POWER FACILITIES - SUBSTATIONS	Ilala
56	Organization Data - Ilala Region	Ilala
57	ORGANIZATION CHART - ILALA REGION - DAR ES SALAAM	Ilala
58	Peak Load of Ilala Region	Ilala
59	MAGOMENI SUBSTATION SINGLE LINE DIAGRAM	Kinondoni South
60	UNDERCONSTRUCTION AND PLANNED(DISTRIBUTION LINES) 33KV/11KV	Kinondoni South
61	KINONDONI SOUTH REGION NUMBER OF CUSTOMERS FROM YEAR 1991 TO 2000	Kinondoni South
62	Kinondoni South Regional Office Information	Kinondoni South
63	Kinondoni South Organization Chart	Kinondoni South
64	Feeders and demand of Tandale S/S and Ubungo S/S	Kinondoni South
65	TEMEKE REGIONAL ORGANIZATIONAL CHART	Temeke
66	PRESENT SITUATION OF TANESCO	Temeke
67	POWER FACILITIES	Temeke
68	PEAK LOAD	Temeke
69	TEMEKE REGION UNPLANNED OUTAGES IN 1999	Temeke
70	TEMEKE REGION PROPOSALS	Temeke
71	NUMBER OF EMPLOYEES BY JOB CLASSIFICATIONS IN EACH OFFICE(PRESENT SITUATION)KINONDONI NORTH REGIONAL OFFICE)	Kinondoni North
72	BAGAMOYO DISTRICT NUMBER OF EMPLOYEES BY JOB CLASSIFICATION(PRESENT SITUATION)	Kinondoni North
73	KINONDONI NORTH REGION ORGANIZATION CHART	Kinondoni North
74	ORGANIZATION CHART - BAGAMOYO DISTRICT	Kinondoni North
75	Answer Sheets - Kinondoni North	Kinondoni North
76	Data of Tegeta S/S	Kinondoni North
77	TANESCO ARUSHA REGIONAL OFFICE ORGANIZATION CHART	Arusha
78	PRESENT SITUATION OF TANESCO	Arusha
79	ELECTRIC POWER SITUATION AND POWER FACILITIES	Arusha
80	ORGANIZATION CHART FOR KILIMANJARO REGION	Kilimanjaro
81	Answer Sheets for Questionnaire	Kilimanjaro
82	SUPPLEMENTARY DATA	Kilimanjaro
83	KILIMANJARO REGION NUMBER OF EMPLOYEES BY JOB CLASSIFICATIONS IN EACH OFFICE	Kilimanjaro
84	SINGLE LINE DIAGRAM MWANGA S/S	Kilimanjaro
85	LAYOUT OF MWANGA S/S	Kilimanjaro
86	SINGLE LINE DIAGRAM NYUMBA YA MUNG S/S	Kilimanjaro
87	LAYOUT OF NYUMBA YA MUNG S/S	Kilimanjaro
88	COMMUNICATION DIAGRAM IN KILIMANJARO REGION	Kilimanjaro
89	KIYUNGI 132/66/33kV TRANSMISSION SUBSTATION EXISTING AND PROPOSED DESIGNS SINGLE LINE DIAGRAM	Kilimanjaro
90	KIYUNGI 132/66/33kV TRANSMISSION SUBSTATION EXISTING AND PROPOSED DESIGNS PLAN	Kilimanjaro

List of Drawings and Documents received from TANESCO 3/5

No.	Title of Document	Remark
91	KIYUNGI 132/66/33kV TRANSMISSION SUBSTATION CONTROL BUILDING NEW PANEL LOCATIONS PLAN AND ELEVATIONS	Kilimanjaro
92	SINGLE LINE DIAGRAM MACHAME & SANYA JUU	Kilimanjaro
93	ARRANGEMENT MACHAME & SANYA JUU S/S	Kilimanjaro
94	SINGLE LINE DIAGRAM GONJA	Kilimanjaro
95	ARRANGEMENT GONJA S/S	Kilimanjaro
Documents compiled during the site survey or interview from TANESCO		
102	SINGLE LINE DIAGRAM OF UBUNGO SUBSTATION	
103	SINGLE LINE DIAGRAM OF ILALA SUBSTATION	
104	SINGLE LINE DIAGRAM OF MIKOCHENI SUBSTATION	
105	SINGLE LINE DIAGRAM OF OYSTERBAY SUBSTATION	
106	SINGLE LINE DIAGRAM OF FACTORY ZONE III SUBSTATION	
107	SINGLE LINE DIAGRAM OF MSASANI SUBSTATION	
108	SINGLE LINE DIAGRAM OF SOKOINE SUBSTATION	
109	SINGLE LINE DIAGRAM OF FACTORY ZONE II SUBSTATION	
110	SINGLE LINE DIAGRAM OF FACTORY ZONE I SUBSTATION	
111	SINGLE LINE DIAGRAM OF KURASINI SUBSTATION	
112	SINGLE LINE DIAGRAM OF WAZO HILL SUBSTATION	
113	SINGLE LINE DIAGRAM OF KIGAMBONI SUBSTATION	
114	SINGLE LINE DIAGRAM OF MBEZI SUBSTATION	
115	SINGLE LINE DIAGRAM OF CITY CENTRE SUBSTATION	
116	KIGAMBONI 33/11KV SUB-STATION ELECTRICAL GENERAL LAYOUT AND BLOCK PLAN	
117	LAYOUT OF FACTORY ZONE I SUBSTATION	
118	LAYOUT OF FACTORY ZONE II 33KV SUBSTATION	
119	LAYOUT OF KURASINI SUBSTATION	
120	LAYOUT OF MIKOCHENI SUBSTATION	
121	LAYOUT OF MSASANI SUBSTATION	
122	LAYOUT OF SOKOINE SUBSTATION	
123	LAYOUT OF UBUNGO SUBSTATION	DRAFT
124	LAYOUT OF UBUNGO SUBSTATION	
125	LAYOUT OF ILALA SUBSTATION	Before Expansion
126	LAYOUT OF ILALA SUBSTATION	After Expansion
127	LAYOUT OF OYSTERBAY SUBSTATION	Existing
128	LAYOUT OF OYSTERBAY SUBSTATION	132kV Substation
129	LAYOUT OF FACTORY ZONE III SUBSTATION	Before Expansion
130	LAYOUT OF FACTORY ZONE III SUBSTATION	After Expansion
131	LAYOUT OF MBEZI SUBSTATION	Existing
132	LAYOUT OF MBEZI SUBSTATION	132kV Substation
133	LAYOUT OF CITY CENTRE SUBSTATION	Existing
134	LAYOUT OF CITY CENTRE SUBSTATION	132kV Substation
135	DAR ES SALAAM POWER MASTER PLAN 220kV, 132kV AND 33kV SINGLE LINE DIAGRAM	2001/2/1
136	TANZANIA ELECTRIC SUPPLY COMPANY LIMITED ELECTRICITY TARIFF WITH EFFECT FROM JANUARY 1999 BILLING	
137	TANZANIA POWER SYSTEM MASTER PLAN UPDATE REDUCED LOAD 2010	
138	GRID GENERATION SUMMARY 1990 - 2000	

MINUTES OF MEETING
MASTER PLAN & FEASIBILITY STUDY
ON THE POWER SECTOR FOR MAJOR TOWNS
IN THE UNITED REPUBLIC OF TANZANIA

The Master Plan & Feasibility Study Team (the Team) dispatched by the Japan International Cooperation Agency (JICA) conducted field surveys for the captioned project. During the investigation, the Team had a series of discussions with responsible personnel of TANESCO on the latest status of projects proposed at the meeting held on March 14, 2001 in Dar es Salaam.

As a result of the discussions and field surveys, both parties have agreed and confirmed the main items described on the attached summary report.

Confirmed and signed on October 11, 2001

Mr. B. E. A. T. Luhanga
Managing Director
Tanzania Electric Supply
Company Limited

Mr. Hiroshi Kodani
Leader of the Team
Japan International
Cooperation Agency

[ATTACHMENT]

SUMMARY REPORT OF THE THIRD SITE SURVEY

1. SUMMARY OF SURVEY

1.1 Period

From August 26 planned to be continued until October 21, 2001

1.2 Object Areas

Dar es Salaam, Arusha and Moshi

1.3 Major Items

The Team conducted the survey to obtain data and information as the supplemental materials for compiling master plan and feasibility study. Items of the survey or study are shown as follows

- Confirmation of latest existing system status
- Data acquisition and measurement of the latest load served
- Resurvey of project site conditions and project routes
- Measuring of the existing and proposed site data for designs
- Reevaluation and predetermination of existing equipment proper use
- Case studies of DAMP
- Financial and economic conditions
- Environmental consideration

1.4 Survey Results

The Team fundamentally confirmed and understood that each individual project had adequate possibility on the technical matters. On the other hand the Team confirmed that some proposed transmission lines involve difficulties on construction conditions. Survey results including previous surveys will be compiled as the master plan and feasibility study reports.

2. ALTERNATIVES FROM THE ORIGINAL PROPOSALS

Through the discussion between the Team and TANESCO, alternatives from the original proposals and additional conditions on proposals are confirmed as follows.

2.1 Dar es Salaam

- 132kV transmission line from Ubungo S/S to New Oysterbay S/S is required to have further study by TANESCO for definition of its right of way
- Location of Kitunda S/S will be fixed by TANESCO.
- Transformer capacity of Bagamoyo S/S will be changed from 10 to 15MVA
- Tabata S/S will be designed as Tabata switching station
- Study result of five new substations named as Kawe, Kinondoni, Kigogo, University of Dar es Salaam and Bahari Beach will be compiled in study reports.
- Study result of two new switching stations named as Bunju and Kimara will be compiled in study reports
- Study result of a new sub-transmission line named as FZII – Kisarawe will be compiled in study reports

2.2 Arusha

- Usa River S/S will have technical and economic/financial evaluation among the practicable plans of
  - i) 132/33kV S/S,
  - ii) 66/33kV S/S including necessary transmission lines, or
  - iii) 33kV exclusive feeder.
- Northwest area will have technical and economic/financial evaluation between the practicable plans of
  - i) Sakina S/S, Oljoro switching station and Monduli S/S
  - ii) Sakina S/S and Monduli S/S
- Study result of new S/S named as Njiro B will be compiled in study reports

2.3 Moshi

- KCMC S/S will have technical and economic/financial evaluation between the practicable plans of
  - i) 132/33/11kV S/S, and
  - ii) 33/11kV S/S including necessary transmission lines.
- Supply to Marangu area will have technical and economic/financial evaluation between the practicable plans of
  - i) 66/33kV S/S, and
  - ii) 33kV Switching station including their transmission lines.

3. STUDY SCHEDULE

The comprehensive study for the master plan and feasibility study will be carried out to compile complete reports involving all required items. Schedule of completion of the reports as mentioned in the inception report is shown as follows.

3.1 Interim Report

The interim report will be compiled completely by March 2002.

3.2 Draft Final Report

The draft final report will be compiled completely by June 2002. The Team will hold a meeting with TANESCO to explain the final results of whole study and to discuss on the details of the report in order to coordinate current status and environment.

3.3 Final Report

The final report reflected the results of the discussions mentioned above, will be compiled completely by September 2002.

MINUTES OF MEETING
MASTER PLAN & FEASIBILITY STUDY ON THE POWER SECTOR FOR MAJOR TOWNS IN THE UNITED REPUBLIC OF TANZANIA

The Master Plan & Feasibility Study Team (the Team) dispatched by the Japan International Cooperation Agency (JICA), headed by Mr. Hiroshi Kodani visited the United Republic of Tanzania from February 19, 2002 for the purpose of discussion of interim report of captioned project (the Interim Report) and confirmation of latest condition of TANESCO's structural reforming.

During the investigation, the Team had a series of discussions with responsible personnel of designated regions of TANESCO regarding the Interim Report and provided an explanation of the latest result of study.

As the result of the discussions, both parties have agreed and confirmed the contents of Interim Report and attached amendment.

Confirmed and signed on March 1, 2002

Mrs. E. M. Masunzu
Director Operations
Tanzania Electric Supply
Company Limited

Mr. Hiroshi Kodani
Leader of the Team
Japan International
Cooperation Agency

[ATTACHEMENT]

1. AMENDMENT OF INTERIM REPORT

1.1 Dar es Salaam

- The 240mm^2 conductor shall be considered for the interconnector.
- Suitable incomming feeder for Kinondoni S/S will be proposed from TANESCO.
- 33kV transmission line from FZ III to Chang'ombe S/S will be compiled in the study.
- Application of steel pipe pole shall be considered in the study especially for interconnection lines.

1.2 Arusha

- Usa River S/S(33/11kV 10MVAx2) will be designed as switching station.

1.3 Moshi

- 33kV transmission line from Himo to Kifaru will be compiled in the study.

2. OBJECTS OF FEASIBILITY STUDY

The Team will pick up some projects from the master plan up to 2010 as urgent matter, carry out detailed study (e.g. basic design, financial analyses), and compile as draft final report. Basically, the projects, which are described to be needed by 2003 in interim report, will be taken as the objects of feasibility study. The Team may make some modification of criteria according to status of each project on actual selection.

3. STUDY SCHEDULE

The modification of master plan and further feasibility studies will be carried out to compile complete reports involving all required items. Schedule of completion of the study reports as mentioned in the inception report is shown as follows.

3.1 Draft Final Report

The draft final report will be compiled completely by June 2002. The Team will visit the United Republic of Tanzania to hold a meeting with TANESCO to provide explanation of the final results of whole studies and discussion on the details of the report in order to reflect the current status and environment on final report.

3.2 Final Report

The final report reflected the results of the discussion between both parties will be compiled completely by September 2002.

Meeting between TANESCO and JICA
Regarding Interim Report of MASTER PLAN & FEASIBILITY STUDY
ON THE POWER SECTOR FOR MAJOR TOWNS IN THE UNITED REPUBLIC OF TANZANIA

Date 28. Feb 2002 10:00-11:30

Place Kinondoni-North Regional Office Board Room

List of Participant

JICA

1	Mr. Hiroshi KODANI	Team Leader
2	Mr. Tetsuya YAMANAKA	Transmission Planner
3	Mr. Nobuyuki HONJO	Substation Planner

TANESCO

1	Ms. Sophia S. Mgonja	Chief Distribution & Commercial Engineer
2	Mr. Theodory F.Bayona	Planning Engineer-Kinondoni (South)
3	Ms. M. M. Kabadi	Senior Engineer-Kinondoni (South)
4	Mr. John B.Mwakipesile	Regional Manager-Kinondoni (South)
5	Mr. M. T. Mallale	Chief System Control Engineer
6	Mr. Amosy Maganga	Construction Engineer-Arusha
7	Mr. Ng'erere Makoye	Senior Engineer-Arusha
8	Mr. Patrick O. Songa	Senior Engineer-HQ
9	Mr. Sanibella Mahenge	Commercial Engineer-HQ
10	Mr. Mmari Goodluck	Senior Engineer-Kinondoni (North)
11	Mr. Maclean Mbonile	Senior Engineer-Kilimanjaro
12	Mr. Chibate A. Makali	Senior Engineer (System Control)
13	Mr. Christian Msyani	Senior System Control Engineer (O)
14	Ms. Stella Manyanya	Planning Engineer-Kinondoni North
15	Ms. Rukia Mpako	System Development Engineer
16	Mr. S. E. Shayo	Transmission Engineer
17	Mr. J. Sakia	Senior Engineer-Transmission
18	Mr. Nsajigwa J.Mwaisaka	Regional Manager-Temeke
19	Ms. Fatuma I. Chungu	Senior Engineer-Temeke
20	Mr. Thomas Uiso	Planning Engineer-Temeke
21	Mr. Benedict Lyaruu	Distribution Engineer
22	Mr. Ombeni Minja	Senior Engineer-Ilala
23	Mr. Martin Kalokola	Regional Manager-Ilala
24	Mr. Mwalongo A. M.	Land Surveyor-Ilala
25	Mr. Gilbert S. Mrosso	Land Surveyor-Ilala

MINUTES OF MEETING
MASTER PLAN STUDY ON THE POWER SECTOR FOR MAJOR TOWNS IN THE UNITED REPUBLIC OF TANZANIA

- EXPLANATION OF THE DRAFT FINAL REPORT -

The Master Plan Study Team (the Team) dispatched by the Japan International Cooperation Agency (JICA), headed by Mr. Hiroshi Kodani visited the United Republic of Tanzania on July 17, 2002 and scheduled to stay in the country until August 3, 2002 in order to explain and to consult Tanzania Electric Supply Company Limited (TANESCO) on the components of the Draft Final Report.

The Team had a series of meetings with personnel concerned of TANESCO and conducted field surveys on the existing and proposed sites.

As a result of the discussions, both parties have agreed and confirmed the main items described on the attached sheets.

Confirmed and signed on July 30, 2002.

Mr. Steve Van Staden
Deputy Managing Director
Tanzania Electric Supply
Company Limited

Mr. Hiroshi Kodani
Leader of the Team
Japan International
Cooperation Agency

Witnesses

Mr. K. Kurokawa
Energy and Mining Development
Study Division,
Japan International
Cooperation Agency

ATTACHMENT

1. Components of Draft Final Report

The Team submitted 15 copies of the Draft Final Report to TANESCO and held a workshop and have explanatory meetings at each regional office. Through the meetings and workshop, TANESCO has agreed and accepted in principle the components of the Draft Final Report. Program and participants of the workshop are as shown on Annex-1.

2. Proposed Revision

(1) Kinondoni North

- Construction of Bahari Beach SS has been completed
- Contract was signed for total rehabilitation work for Mbezi SS
- LBS would be installed at T-off points on 33kV lines for 33/11kV substations
- Instead of the plan of Kunduchi SS, additional transformer is to be installed in Mbezi SS at the same time of expansion of Bahari Beach SS
- Msasani SS expansion to be year 2004

(2) Kinondoni South

- Length of 33kV line to University SS is to be 3km
- Nordic feeder needs to add LBS and line materials to link with Tegeta feeder
- Larger sized conductor shall be applied to 33kV link between Magomeni SS and Tandale SS

(3) Ilala

- Sokoine SS and FZ-III needs to be upgraded at earliest time
- 33kV feeder form FZ-III needs to add expecting to have more than 8,000KVA load in total
- 33kV line to Kigogo SS should be T-off from upgraded Ubungo-Ilala 33kV line

(4) Temeke

- Tandika SS and new 33kV double circuit line is to be covered by kfw fund
- Tandika SS will receive power from FZ-III SS through FZ-I SS

(5) Arusha

- no revisions have been made -

(6) Moshi

- Place of Marangu SW/S should be shifted to Mkuu and 33kV line to the station is to be 43km accordingly

3. Office Equipment and Tools

The Team is to hand over to TANESCO its office equipment, measuring instruments, tools and others used for field surveys. Details of the items are as shown on Annex-2.

4. Further Schedule

The Team will make the Final Report in accordance with the confirmed items, and send it to TANESCO by the end of September 2002.

Annex-1.1

WORKSHOP PROGRAM

[Held on 26th July, 2002 at the Crystal Room in New Africa Hotel, 10;00 to 16:00 hours]

1. Opening Address (Mr. S. Aoki, Chief Representative, JICA Tanzania office)
2. Opening Address (Mr. R. Huysen, Managing Director, TANESCO)
3. Opening Address (Mr. H. Kodani, Study Team Leader)
4. Explanations of workshop schedule (Mr. Y. Imaeda)
5. Workshop
   (1) Main items of the study result (Mr. N. Honjo)
   (2) Case study of DAMP (Mr. H. Noguchi)
   (3) Loss reduction in distribution system (Mr. H. Noguchi)
   (4) Questions and answers (Team Member)

   +++ Buffet Lunch at the Bandari Grill +++

   (5) Brief introductions of automatic distribution line operating system in Japan (Mr. H. Noguchi)
   (6) Situation of TANESCO's training in maintenance of distribution facilities (Ms. E. G. Fumbuka, Regional Manager, TANESCO Kinondoni North)
   (7) Effects of Japanese grant aid projects (Mr. C. Masawe, Director Operations, TANESCO)
   (8) Questions and answers (Team Member)
6. Closing Address (Mr. S. V. Staden, Deputy Managing Director, TANESCO)

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Annex-1.2

ATTENDANCE AT WORKSHOP

(1) Ministry of Energy

Mr. M. Mbwambo	Senior Executive Engineer

(2) TANESCO

Mr. Rudy Huysen	Managing Director
Mr. Steve Van Staden	Deputy Managing Director
Mr. Cosmas Masawe	Acting Director Operations
Mr. M.M.Fazal	Manager Distribution
Mr. Kingu, M.E.	Acting Manager Rural Electrification
Mrs. Mercy S. Baregu	Distribution and Transmission Specialist
Mr. S.Saidi Ngoma	Senior Distribution Engineer
Ms. Stella Manyanya	Planning Engineer
Mr. Johnson Mwigune	Commecial Engineer
Mr. Simon B. Kihiyo	Acting Chief Engineer Distribution
Mr. Benedict Lyaruu	Distribution Engineer
Mr. Martin Kalokola	Regional Manager-Ilala
Mr. Ephraim N.Kaali	Senior Engineer-Ilala
Mr. Ombeni Minja	Senior Engineer-Ilala
Mrs. E.G. Fumbuka	Regional Manager-Kinondoni (North)
Mr. Mmari Goodluck	Senior Engineer-Kinondoni (North)
Mr. John B.Mwakipesile	Regional Manager-Kinondoni (South)
Mr. Samwel M. Mollel	Acting Planning Engineer-Kinondoni (South)
Mr. Theodory F.Bayona	Acting Senior Engineer-Kinondoni (South)
Mr. Nsajigwa J.Mwaisaka	Regional Manager-Temeke
Mrs. Fatuma I. Chungu	Senior Engineer-Temeke
Mr. Thomas Uiso	Planning Engineer-Temeke
Mr. Richard E. Nsulau	Regional Manager-Kilimanjaro
Mr. Innocent G. Luoga	Planning Engineer-Kilimanjaro
Mr. Christopher J. Masasi	Regional Manager-Arusha
Mr. Ng'erere Makoye	Senior Engineer-Arusha
Mr. Daniel Mshana	PR Manager

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Mr. John Masanko	Photographer

(3) JICA Tokyo Office

Mr. Kiyoto Kurokawa	Energy and Mining Development Study Division

(4) JICA Tanzania Office

Mr. Sumio Aoki	Resident Representative
Mr. Tomoki Kobayashi	Assistant Resident Representative

(5) JICA Study Team

Mr. Hiroshi Kodani	Team Leader
Mr. Hisaya Noguchi	Distribution Planner
Mr. Takehisa Sakai	Substation Planner
Mr. Nobuyuki Honjo	Substation Planner
Mr. Tetsuya Yamanaka	Transmission Planner
Mr. Masaki Mori	Distribution Planner
Mr. Tatsuo Tomabechi	Demand & Supply Planner
Mr. Yoshitaka Imaeda	Economist
Mr. Tadao Sato	Maintenance and Training Planner
Mr. Seigo Nakakuma	Environmentalist
Mr. Takahiro Imaizumi	Coordinator

(6) Others

Mr. Tuma Abdallah	Senior Journalist
Mr. Elisha Elia	Press Journalist
Mr. Mbwana Kitenge	Press Cameraman
Mr. Chatta A.	Freelance Journalist
Mr. Riziki Mwambusi	Radio Tanzania Reporter
Ms. Joyce Macha	Claud FM Reporter

Annex-2

EQUIPMENT AND TOOLS HANDED OVER TO TANESCO

Description	Qty
IBM Netvista A20 Personal Computer	3
MS Office Professional Edition	1
HP Color Laserjet 4500 Printer	1
HP 840C Color Deskjet Printer	2
Kodak DC3800 Digital Camera	3
HP Scanjet 3200C	3
Canon B155 Fax Machine W/Answering	1
APS Backups 650 UPS	3
GPS-310	2
Tool Box	9
Voltage Checker for Low Voltage Fuzzy V550	9
Portable Voltage Checker for High-Voltage HST-30	2
Phase Sequence Indicator for High Voltage HP-S20	2
Clamp on Power Hi Tester 3165	2
Insulation Resistance Tester DI-11N	2
Portable Insulation Resistance Tester 3213A	2
Lyte Speed 500 (Range Meter)	2
Protective Footwear	9
Rubber Glove	9
Safety Helmet	9

付録 6 本調査の S/W に関する TANESCO との議事録

SCOPE OF WORK
FOR

THE MASTER PLAN ON THE POWER SECTOR

FOR MAJOR TOWNS
IN THE UNITED REPUBLIC OF TANZANIA

AGREED UPON BETWEEN

TANZANIA ELECTRIC SUPPLY COMPANY LTD.

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Signed at Dar-Es-Salaam
on 17th October 2000

Bashir J. Mrindoko
Commissioner for Energy and Petroleum
Affairs, Ministry of Energy and Minerals,
the Government of Tanzania

Masahiko Kaneko
Leader,
The Preliminary Study Team
Japan International
Cooperation Agency

Beat Luhanga
Managing Director,
Tanzania Electric Supply Company LTD.
(TANESCO)

I. INTRODUCTION

In response to the request of the Government of Tanzania, the Government of Japan has decided to conduct the master plan study on the power sector for major towns in the United Republic of Tanzania. (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programmes of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of Tanzania.

The present document sets forth the scope of work with regard to the Study.

II. OBJECTIVES OF THE STUDY

The objective of the Study is to formulate the master plan and pre-feasibility study to assess the technical, economic and financial viability of the projects for the expansion and maintenance of the electrical distribution system in major towns in the United Republic of Tanzania.

III. SCOPE OF THE STUDY

In order to achieve the Study, JICA shall carry out the following study.

1. Master Plan Study

The master plan shall comprise the long-term master plan for 10 years and the medium-term plan for 5 years.

2. Pre-feasibility study

The Pre-feasibility study shall be conducted for the projects identified in the medium-term master plan.

3. Target towns and districts for the Study.

The target towns of the Study would be Dar-Es-Salaam, Arusha and Moshi.

4. The offices of the Study

Tanzania Electric Supply Company LTD (hereinafter referred to as "TANESCO"), Head office, Arusha and Moshi office would prepare the offices of the Study.

5. The offices of the operation and maintenance study

The office of the Dar-Es-Salaam Power Distribution and Maintenance Project (hereinafter referred to as "DAMP") at Msasani Peninsula would be used as the office of the operation and maintenance study.

And the sub- Maintenance Centre would be established at Arusha od Moshi.

6. Relevant organization and enterprises
TANESCO; Head office, Arusha and Moshi offices.

7.Administration organization
Ministry of Energy and Minerals

8. Study items.
In order to achieve the above objective, the Study will cover the following items;

(1) Master plan study

1) Collection and review of data
2) Field survey
3) Power demand forecast
4) Planning of power transmission and substation facilities
5) Planning of distribution line facilities
6) Planning of reinforcement of manpower and facilities for operation and maintenance
7) Environmental study
8) Implementation schedule
9) Cost estimation
10) Economic and financial study

(2) Pre-feasibility study

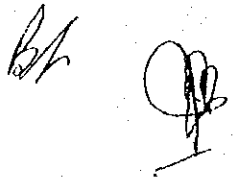
1) Detailed site survey
2) Preliminary design
   Transmission lines
   Substation
   Distribution network
3) *Implementation schedule*
4) Cost estimation
5) Economic and financial study

(3) The model case study of the operation and maintenance center

1) Present situation of DAMP
2) the role of the sub- Maintenance Centre at Arusha or Moshi
3) the five-year-medium-term plan of DAMP(including expansion plan of DAMP) and the . sub- Maintenance Centres

IV. STUDY SCHEDULE

The Study will be carried out in accordance with the attached Tentative Work Schedule shown in Appendix I.



V. REPORTS

JICA shall prepare and submit the following reports with floppy discs to the Government of Tanzania

(1) Inception Report (20 Copies) in English
(2) Progress Report (20 Copies) in English
(3) Interim Report (20 Copies) in English
(4) Draft Final Report and its summary (20 Copies) in English
(5) Final Report and its summary (20 Copies) in English

The government of Tanzania will provide its comments on the draft final report within one month after the submission of the draft final report.

VI. DIVISION OF TECHNICAL UNDERTAKING

The division of technical undertakings for the study by TANESCO and JICA is shown in Appendix II.

VII. UNDERTAKINGS OF THE GOVERNMENT OF TANZANIA

1. To facilitate smooth conduct of the Study, the government of Tanzania shall take necessary measures:
   (1) to secure the safety of the Japanese study team,
   (2) to permit the members of the Japanese study team to enter, leave and sojourn in Tanzania for the duration of their assignment therein, and exempt them from foreign registration requirements and consular fees,
   (3) to exempt the members of the Japanese study team from taxes, duties and other charges on equipment, machinery and other materials brought into Tanzania for the conduct of the Study,
   (4) to exempt the members of the Japanese Study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Japanese study team for their services in connection with the conduct of the Study,
   (5) to provide the necessary facilities to the Japanese study team for unrestricted re-export of equipment and machinery brought into Tanzania for the conduct of the Study,
   (6) to provide necessary facilities to the Japanese study team for remittance as well as utilization of the funds introduced into Tanzania from Japan in connection with the conduct of the Study,
   (7) to secure permission for entry into private properties or restricted areas for the conduct of the Study,
   (8) to secure permission for the Japanese study team to take all data, documents (including photographs) and specimens related to the Study out of Tanzania to Japan,

(9) to provide medical services as needed, its expenses will be chargeable to members of the Japanese study team,
(10) to secure permission to use walkie-talkies and other wireless telecommunications for execution of the field Study.

2. The Government of Tanzania shall bear claims, if any arise, against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the conduct of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese study team.

3. TANESCO shall act as counterpart agency to the Japanese study team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth conduct of the Study.

4. TANESCO shall, at its own expense, provide the Japanese study team with the following, in cooperation with other organizations concerned:

(1) available data and information related to the Study,
(2) counterpart personnel including one distribution-system-manager to work for the Study under the management of TANESCO.
(3) suitable office space with necessary equipment in TANESCO; Head office, Arusha, Moshi, DAMP and the sub- Maintenance Centre at Arusha or Moshi.
(4) credentials or identification cards.

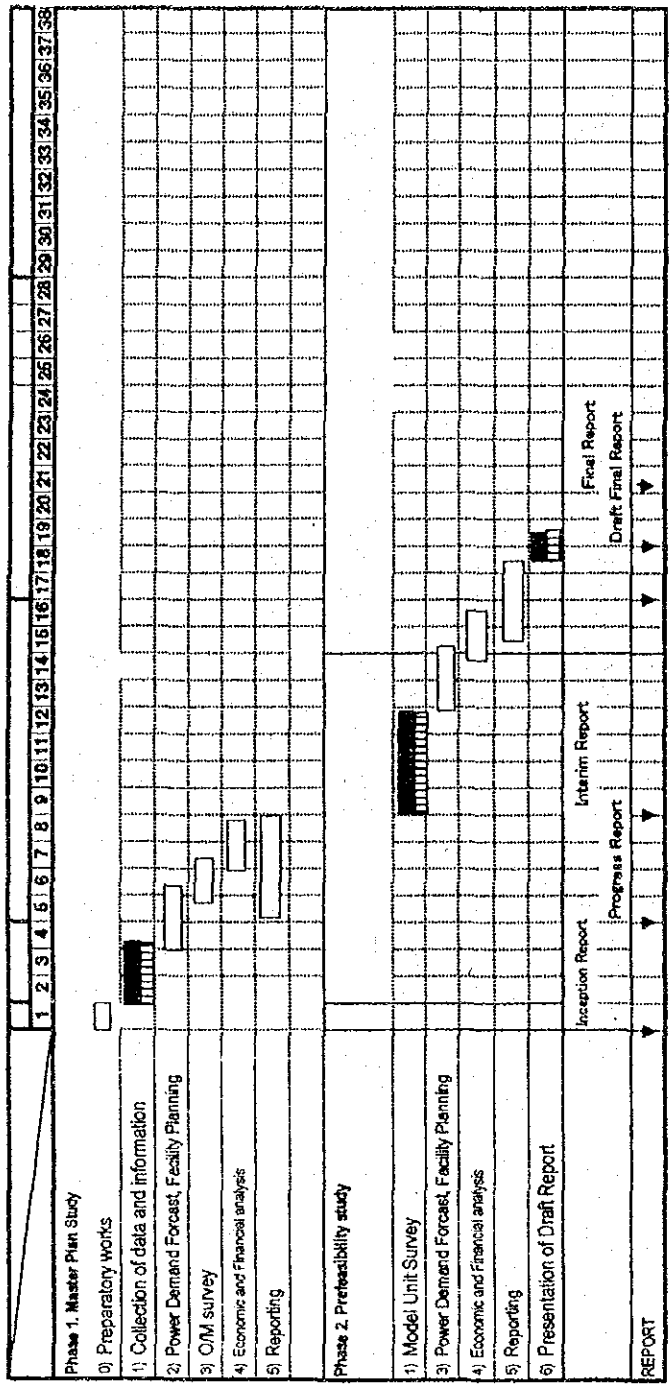
Ⅵ. UNDERTAKINGS OF JICA

For the conduct of the Study, JICA shall take the following measures:

(1) to dispatch, at its own expense, the Japanese study teams to Tanzania,
(2) to pursue technology transfer to Tanzanian counterpart personnel in the course of the Study.

Ⅶ. OTHERS

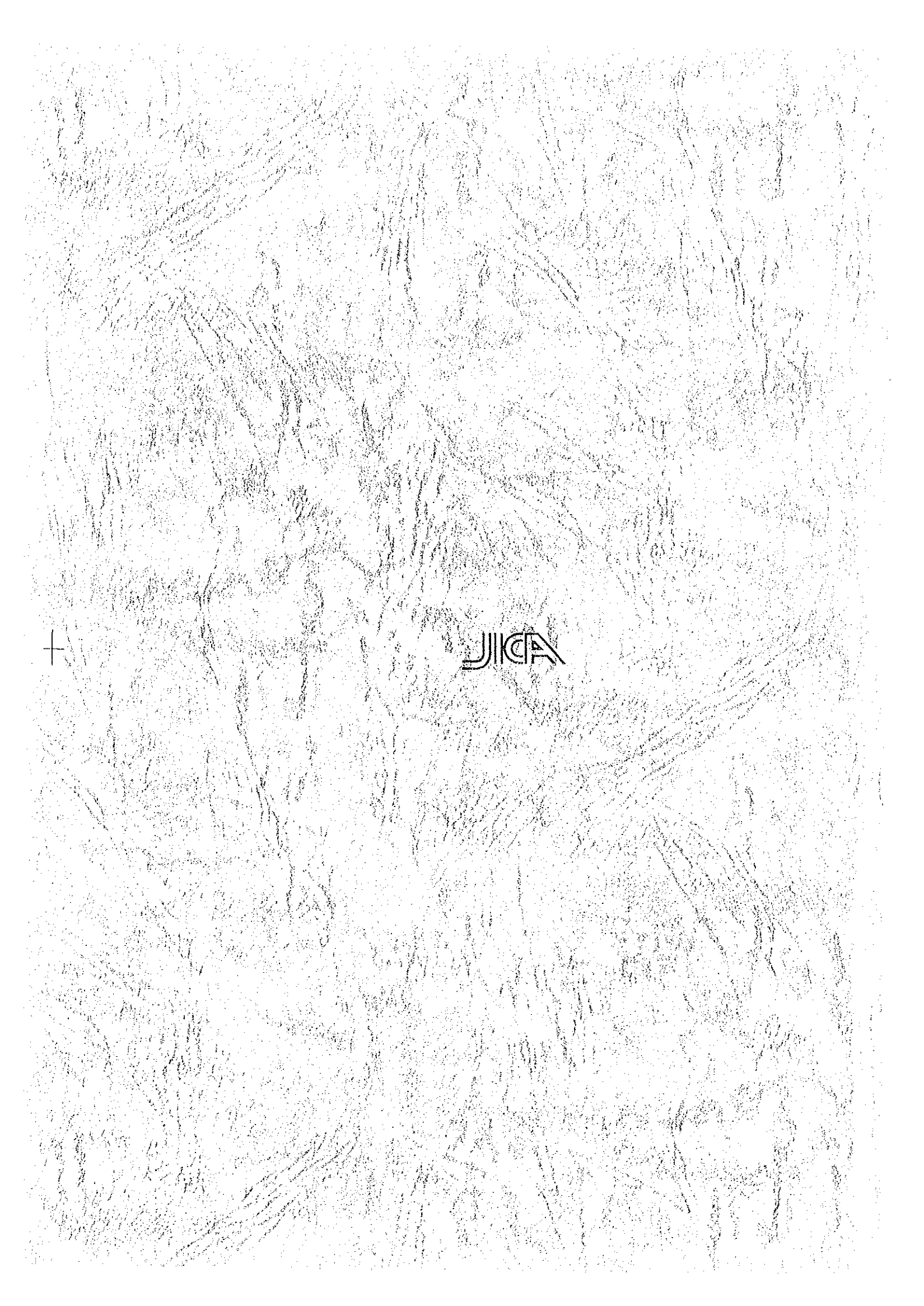
JICA and Tanzania Electric Supply Company LTD and Ministry of Energy and Minerals shall consult with each other in respect of any matter that may arise from or in connection with the Study.


APPENDIX I
TE TENTATIVE SCHEDULE
: by JICA in Tanzania
: by TANESCO etc.
: Report
: by JICA in Japan
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Phase 1. Master Plan Study
0) Preparatory works
1) Collection of data and information
2) Power Demand Forcast, Facility Planning
3) O/M survey
4) Economic and Financial analysis
5) Reporting
Phase 2. Prefeasibility study
1) Model Unit Survey
3) Power Demand Forcast, Facility Planning
4) Economic and Financial analysis
5) Reporting
6) Presentation of Draft Report
Inception Report
Progress Report
Interim Report
Final Report
Draft Final Report
REPORT

APPENDIX II

Division of Works

Work items	Undertakings by JICA	Undertakings by TANESCO
Master Plan Study		
1) Power demand forecast	planning, forecast	provision of population data, industrial development plan
2) Planning of power transmission and substation facilities	planning,cost estimation	provision of necessary data and information
3) Planning of distribution line facilities	planning,drawing plans, cost estimation	provision of present drawing
4) Planning of reinforcement of manpower and facilities for operation and maintenance	Equipment planning,cost estimation	provision of necessary data and information
5) Environmental study		provision of necessary data and information
6) Implementation schedule	planning	provision of necessary data and information
7) Cost estimation	procurement survey	provision of necessary data and information
8)Economic and financial study	review, financial analysis	provision of necessary financial data
Pre Feasibility Study		
1) Detailed site survey	planning	provision of detail map
2) Preliminary design		
Transmission lines	planning,drawing	provision of necessary data and information
Substation	planning	provision of necessary data and information
Distribution network	planning,drawing,mapping	provision of necessary data and information
3) Implementation schedule	planning	provision of necessary data and information
4) Cost estimation	procurement survey	provision of necessary financial data
5) Economic and financial study	review, financial analysis	to make comments on the works
The model case study of O/M center		
1)Present situation of DAMP	review	provision of necessary data
2) the role of the sub- Maintenance Centre at Arusha or Moshi	planning	provision of necessary data
3)the five-year-medium-term plan	planning	provision of necessary data


JICA