An evaluation, investigation and recording of the design and implementation of the Cost-based and Tariff Design training programme to align Eskom Distribution for EDI restructuring

By

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ABSTRACT

The South African Electricity Supply Industry (ESI) has been, over much of the last century, dominated by Eskom, a large and powerful state-owned, vertically-integrated monopoly. It produces 97 % of the electricity generated in the country and that represents almost 60% of the electricity generated on the entire continent of Africa. However, recent studies of the company's performance have lead to a decision to reorganize the industry due to the realization of poor investment decisions made in the past, which resulted in massive costs to the company.

The distribution business in the industry has been hugely affected by these past inconsistencies, thus in line with global trends and escalating problems, the South African Cabinet approved the restructuring of the Electricity Distribution Industry (EDI) in nineteen ninety eight, ahead of restructuring of the entire Electricity Supply Industry (ESI). There is currently a large number of municipalities plus Eskom in South Africa supplying electricity to consumers – leading to disparities in tariffs and prices. To resolve these issues, has accepted a proposal that Eskom and municipalities amalgamate to form six independent, financially viable Regional Electricity Distributors (REDs).

It is no secret that electricity in South Africa has consistently been amongst the cheapest in the world. This is credited to two principles; an abundant reserve of cheap coal resulting in economical production of electricity; and, the fact that there is still a number of citizens with no access to electricity. This is a concern for the Electricity Pricing sector now faced with the task to rationalise the price inequalities in the distribution business to be fair and equitable to all customers. The Eskom Distribution Electricity Pricing team is currently undertaking the Cost-based Tariff Design project to address tariff objectives such as; cost reflectivity and transparency. The Competency Building phase within this project affords potential future RED staff members opportunities to learn a broad overview about designing tariffs. This dissertation will report on, dissect, analyze and discuss results, and recommend the probable future of the project in light of the dynamic nature of the developments in the EDI restructuring process.

ACKNOWLEDGEMENTS

I would like to acknowledge the work done by the Eskom Distribution Electricity Pricing project team, which came up with the entire Tariff Design and Cost-based Design project. The team provided intellectual property, while they were busy with Tariff Design workshop-training courses countrywide. The project team members were as follows; Deon Conradie, Adriaan de Kok, Robert Smith and Philip Marais. A special mention to Adriaan De Kok for his supervisory efforts in terms of editing of my documents, information sharing and supplying me with constructive feedback. A big thank you to Thembi Makhubu for all her organizational skills and support.

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I would like to thank my family and for their support and consistent show of love and understanding.

Thanks to my unborn child and my inspiration, Gomolemo for enduring the long hours of hard work.

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Glossary and Definitions

Abbreviations

CB:	Competency Building
c/kWh:	Cents per kilowatt hour
COS:	Cost of Supply
DME:	Department of Minerals and Energy
DSM:	Demand side management
DUOS:	Distribution Use of Systems Charges
Dx:	Distribution
EDI:	Electricity Distribution Industry
ERIC:	Electricity Restructuring Interdepartmental Committee
ESI:	Electricity Supply Industry
ETD:	Education, Training & Development
Gx:	Generation
GWh:	Gigawatt hour
IPP:	Independent Power Producers
LRAIC:	Long run average incremental costs
MFMA:	Municipal Financial Management Act
MMM:	Multi-market model
NER:	National Electricity Regulator
NERSA:	National Energy Regulator of South Africa
OD:	Organisational Development
PFMA:	Public Financial Management Act
RED:	Regional Electricity Distributor
R/kVA:	Rand per kilovolt ampere
SME:	Subject Matter Expert
SOE:	State-owned enterprise
WEPS:	Wholesale Electricity Pricing System

Definitions

- **Billing** is the process of producing and delivering a bill (an account) for payment by a customer, calculated from the tariff schedule, and for most customers, is the consumption measure and recorded by the metering system. Note that bills can also be calculated on estimated consumption and for unmetered installations. Customers are billed at regular cycles, i.e. monthly.
- **Capacity** is the potential load that electrical equipment and/or a network can transfer
- **Charges, prices or rates** - the amounts that the customer pays for various products and services related to the supply of electricity. The product is electrical energy, for which one or more energy charges (or prices or rates) may be levied.
- **Competency building** – is an ongoing process that is necessary to continually replace skills that are needed to sustain the distribution business – focusing on knowledge, skills, and attributes to empower the future regional electricity distributors (REDs).
- **Consumer** a user of electricity or a service relating to the supply of electricity.
- **Contestable customer** large end-use customers, consuming more than 100 GWh of electricity on average per annum at a single contiguous site who would be entitled to purchase their electricity supplies at wholesale electricity pricing system (WEPS) rates. This average annual consumption must have been maintained over the last three years. Note: this customer is approved by regulator to select a retailer other than the local distribution company where the customer is connected. Thus it is this customer is considered a network service customer of the distributor.
- **Cost of supply** is the amount of money it costs a utility to provide electricity to a group of customers. Cost of supply study is the methodology utilised which has three phases namely; Identify Costs, Classify and Calculate Costs and Allocate costs to Customer groups. The study depicts a standard procedure of deriving and allocating costs for the design of tariffs.
- **Cost reflective tariffs** all the unique cost components of a tariff for a specific customer that represents the full economic cost (including profits) to supply electricity to that customer are called *cost reflective* or the real cost of supply for that customer.

- **Cross-subsidization** this is the over-recovery of revenue from some customers relative to cost of supply (i.e. Electricity levies) and the simultaneous and equal under-recovery of revenue from other customers relative to cost (i.e. Electricity subsidies). Note: cross-subsidation involves the process of providing assistance to same customer classes or cost categories by recovering more than cost from the same classes and transferring such recoveries to the assisted classes.
- **Customer** the legal entity contracting with a utility for the provision of an electricity supply or services.
- **Customer account** is a summary of the current status of financially related dealings in respect of agreements that the customer has with the utility. All financial transactions i.e. energy charges, payments, ad hoc charges in the utility's dealings with the customer are recorded against the customer account.
- **Demand-side management (DSM)** a technology or program that encourages customers to use electricity differently in order to be more energy efficient.
- **Distribute** means the distribution of electricity through a distribution system – electric lines of a normal voltage used to convey electricity to any premises or any other distribution system.
- **Distribution use of systems charges** are the charges designed to recover the costs of the distribution network infrastructure and the energy losses in that network, both of them shared by all customers, and include the costs of lines, transformation, meters, servitudes, etc. as well as the cost of the electrical energy lost in the lines.
- **Electricity distribution industry (EDI)** – the electricity distribution industry (EDI) is that part of the electricity supply industry which distributes, reticulates and retails the electricity at medium and low voltages to end-use customers. The players in the EDI consist of distributors, retailers and traders, either separately or in the form of vertically integrated utilities. The various businesses in the industry may be either state-owned or privately owned.
- **Electricity supply industry (ESI)** – the electricity supply industry may be considered in terms of its three functions: generation, transmission and distribution. The electricity supply industry (ESI) is that industry which generates electricity from one or more primary energy sources (such as coal, nuclear, hydro, oil, gas, etc.),

transmits the electricity so generated at high voltage over large distances to the main load centres, then distributes, reticulates and retails the electricity at medium and low voltages to end-use customers.

- **Electrification projects** are projects financed through the national electrification programme.
- **EDI Holdings Company** means electricity distribution industry holdings (proprietary) limited – a company duly registered and incorporated with limited liability in terms of the company laws of the republic of South Africa. In line with a ministerial order to facilitate the reorganization of electricity distribution systems in South Africa. Its share capital is held by the state.
- **Generation** means to produce electricity for sale or provide ancillary services for any other purpose that the electricity act allows.
- **Independent power producer (IPP)** – an entity that generates electricity as its main product and the selling thereof for a profit. Note: these are private entrepreneurs who develop, own or operate electric power plants fuelled by alternative energy sources such as biomass, cogeneration, small hydro, waste-energy and wind facilities – while competing against other state-owned and privately owned generators for profit.
- **Load factor** the load factor is a numerical factor, normally calculated over a billing month, reflecting the potential use of supply capacity based on the maximum demand. Load factor is a ratio between the actual energy consumed and the energy that could have been consumed had the demand remained at the maximum for a period. The load factor can be calculated for a number of different time periods i.e. daily, monthly and annually.
- **Multi-Market Model** (MMM) – the proposed restructuring model that aims to transform Eskom into a commercial corporation which will make opportunities for shareholding from private sectors as well as share capital – eventually introducing a full wholesale competition in the distribution context.
- **Municipality** is an entity at local government level that undertakes the remainder distribution of electricity through bulk buying from Eskom.
- **National energy regulator of South Africa (NERSA)** – previously known as the NER (national electricity regulator). The NER was created in terms of the electricity

act, 1987 (act no. 41 of 1987). The NER is the economic regulator for the electricity supply industry (ESI). It issues, modifies or revokes licenses to players in the ESI; evaluates and approves tariffs; collects, stores, manipulates and disseminates information; resolves customer and/or licensee complaints and disputes; mediates and arbitrates in ESI matters; etc.

- **Network** electrical infrastructure over which energy is transported from source to point of consumption. A network is a system of transmission and distribution lines cross-connected and operated to permit multiple power supply to any principal point on the lines.
- **Pricing signals** pricing signals are signals designed into the tariff structures and levels which aim to make end-use customers and intermediaries aware of the cost of generating, transmitting, distributing or retailing electricity so that they will use electricity efficiently, correctly, and responsibly, and respond to the signals appropriately through demand-side management (DSM).
- **Privatization** is the transfer of ownership by sale of assets or by restitution, the introduction of a competitive environment following deregulation or liberalization, and a system of contracting out the provision of goods and services in a public and private partnership.
- **RED** means regional electricity distributor – ring-fenced entities that are a combination of eskom region plus municipalities that will be responsible for distribution of electricity.
- **Regulation** is an activity of government to control or direct economic entities by rulemaking and adjudication. Note that the South African Electricity Industry is regulated by the National Energy Regulator of South Africa (NERSA).
- **Restructuring** means the transformation of the electricity distribution in South Africa to improve efficiency and rationalise. Also referred to as reformation, rationalizing.
- **Rural areas** low density non-proclaimed areas. This is an area that has clustered or scattered structures, usually of low density, not served by a well-established infrastructure (roads, telecommunications, etc.)
- **Subsidies** where the cost of supply is not equal to the tariff charged. Electricity consumers are subsidized or subsidize other customers. It is the *negative* difference

between the real cost of supply and the actual price paid, excluding any tax, called an electricity subsidy. Note: certain categories of customers, at a particular time due to combinations of their unique social, locality or consumption circumstances pay less than the real cost of supply and therefore receive an electricity subsidy.

- **Supplier** any local authority, utility or statutory body who supplies electricity to electricity end-users.
- **Tariff** a combination of monthly charges each at particular rates that is usually escalated annually and are applied to recover measured quantities such as consumption and capacity costs and unmeasured quantities such as service costs.
- **Tariff structure** the tariff structure contains all the components of price and the relationship to consumption and demand.
- **Unbundling** is disaggregating electric utility service into its basic components and offering each component separately for sale with separate rates for each component.
- **Urban (areas)** descriptive of an area that has formally or informally built structures, usually of high density, served by well-established infrastructure (roads, telecommunications, etc.). Note: the power network is usually supplied by more than one distribution station.
- **Utility** a regulated entity that exhibits the characteristics of a natural monopoly.
- **Vertical integration** means that a single entity controls the three distinct phases of electricity supply: ***generation*** at the power source (generating energy); ***transmission*** to the area where it will be used (substation); and, ***distribution*** directly to end-users or customers. That is, a single utility is in control of both the engineering (or wires) and customer service businesses.
- **Wholesale competition** is where customers/ retailers have a choice of supplier.
- **Wholesale electricity pricing system (WEPS)** this is a totally unbundled cost-reflective tariff structure made up of energy rates, levies, service and administration charges, transmission use of system charges, reliability service charges, loss factors and distribution use of system charges.

1. CHAPTER 1: RESEARCH OVERVIEW

1.1 Project environment background

Recent developments in the Electricity Distribution Industry (EDI) and Electricity Supply Industry (ESI) in South Africa (SA) have resulted in the need to establish Regional Electricity Distributors (REDs) in the near future. Eskom has six regions that will integrate with local authorities within their boundaries to form REDs. The Eskom Distribution Head Office has shrunk considerably in preparation for the amalgamation of Eskom Distribution with Municipalities and/or metros. These REDs will function autonomously and should therefore be fully competent in all areas core to the distribution business. This means that once a RED is formed, it will be expected to function independently (of Distribution) and manage their designated Wires and Retail businesses. A mandate from Government is that the first RED should be in place by June 2005. This RED will be the Western Region (Cape town region plus metros), however to prepare for the future REDs, Eskom Distribution is undergoing transformation in terms of staff movement and migration and empowerment of existing Distribution employees with competencies necessary in the REDs.

Programme 726 is a project entity or "special purpose vehicle" set up (by Eskom) especially to deal with the issues around the restructuring of the Eskom Distribution group. This project is consisting of a consortium of entities both from Eskom and Accenture. The author used to forms part of a four-member Competency Building (CB) work stream that is part of "the People stream": a small portion of Programme 726 concerned with "people" issues (i.e. human resource issues) – see ***figure 1 & 2*** depicting the people stream projects. The CB team is responsible for ensuring that regional employees are empowered with the appropriate (new) competencies (those previously done at head office level) for their entry in REDs. That is to determine the capacity requirements of the regions from an Education, Training & Development (ETD) perspective. The main purpose of the 726 CB team is to assist regions with the shift from the present centralized corporate approach to regional independence. The CB team will in

turn guide the design, development and implementation of appropriate skills development programmes and other interventions to enable regions to build capacity in the above-mentioned functional areas. This will equip each region to function autonomously.

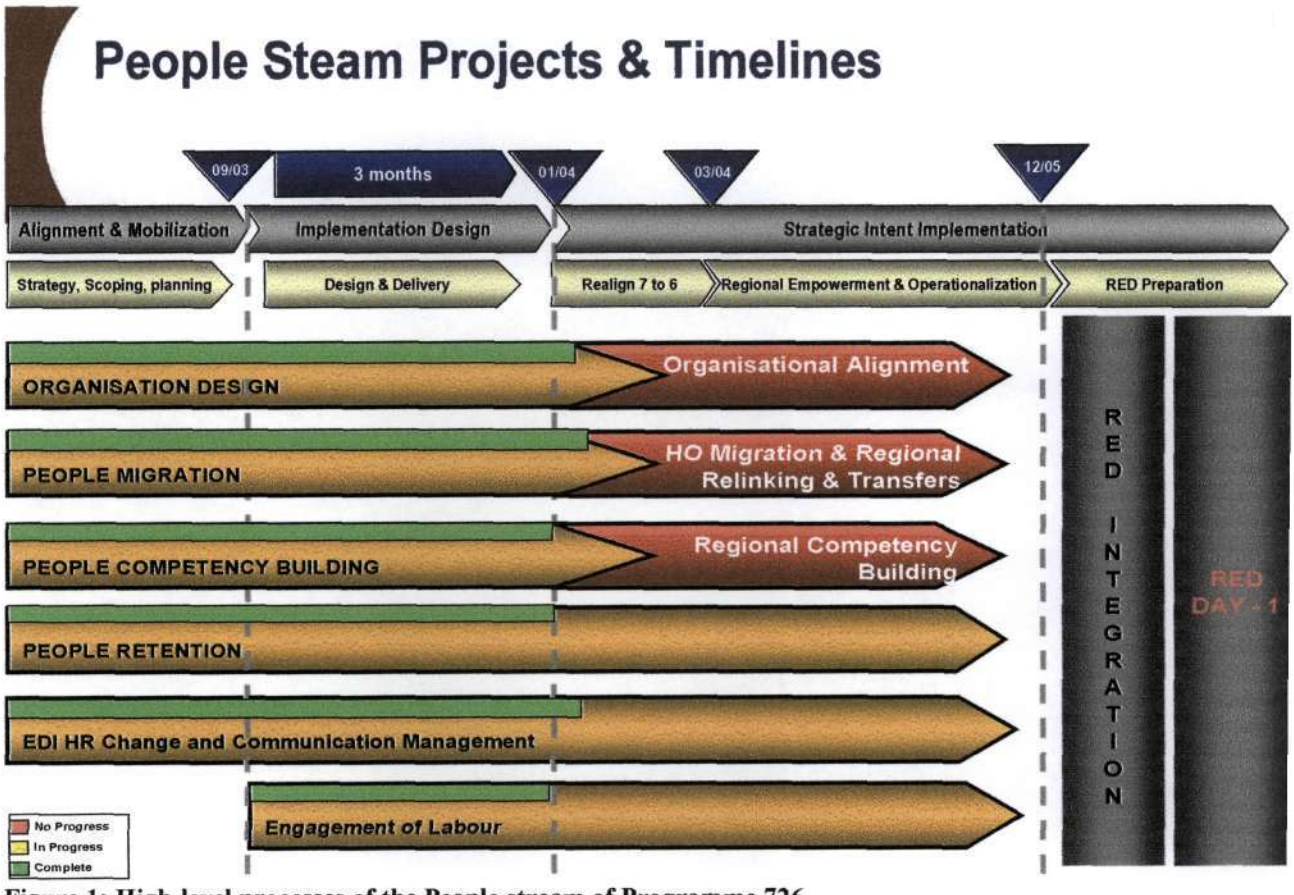

Figure 1: High-level processes of the People stream of Programme 726

This overview figure (period: 2003 – 2005) illustrate the five sub-streams that fall under the "People stream" together with timelines aligned to the whole project. This figure was inserted to clarify the complexity and background of one stream/aspect of the 726 project environment and their interdependencies. Although outdated, this figure illustrates the different project phases over a period of time and the progress different People Stream sub-streams. One should realize that this time framework is only relevant to the first RED (Western Region) that has to be in place and operating by end of 2005. Figure 2 represent the overview of the project environment and other Streams that form part of Programme 726, these include; Journey management and Communication, Governance, Information Management, Finance and Labour Secondees.

The CB team serves many functions in the Distribution business to ensure that the core Distribution businesses (Wires and Retail) are afloat, however it is also important to build capacity in the support functions to the business (Finance, Human Resources, Commercial, Business Strategy and Planning etc.). However, this research will focus specifically on competency building in the Pricing departments of Eskom Distribution falling in the Retail businesses. The retail business constitutes several groups including Customer Service, Purchasing, Contracting and Pricing. The Head Office Electricity Pricing Department has identified a need to transfer certain skills to regions that was previously done at head office level. The head office department will be converted into a transitional group (interim Head Office) that will provide strategic advice to regions during the restructuring process (De Kok, 2003). Thus the core pricing team (from head office) will monitor the restructuring process and its impact on to the department via this project, through their guidance and assistance of regions, who will have the accountability of building capacity.

What is encouraging about the Distribution Head Office Electricity Pricing team is that they have initiated a "Tariff Alignment and Cost-based Design" project with the following objectives;

- to build capacity in the six Distribution regions prior to RED formation, to position and empower regional staff, and
- to obtain NER and Eskom direction to develop and implement regional tariffs and move towards different RED tariffs.

This project stems from the Retail (training) project that set out to empower regional staff in the following categories; Electricity Pricing (EP), Electricity Supply Contracting (ESC), Electricity Forecasting (FC), Electricity Special Pricing (ESP) and Electricity Trading (ET). Following the failure of the Retail (training), the Head Office Pricing department thus decided to venture independently, to ensure that the target audience receives training modules that have relevance to the business, that training is efficient and that ultimately value is added to the overall business. The major predicament for the

pricing team is with the current Tariff structures (Figure 5) and how the EDI will ultimately move towards different RED tariffs after reducing the different tariffs that exist currently in the industry.

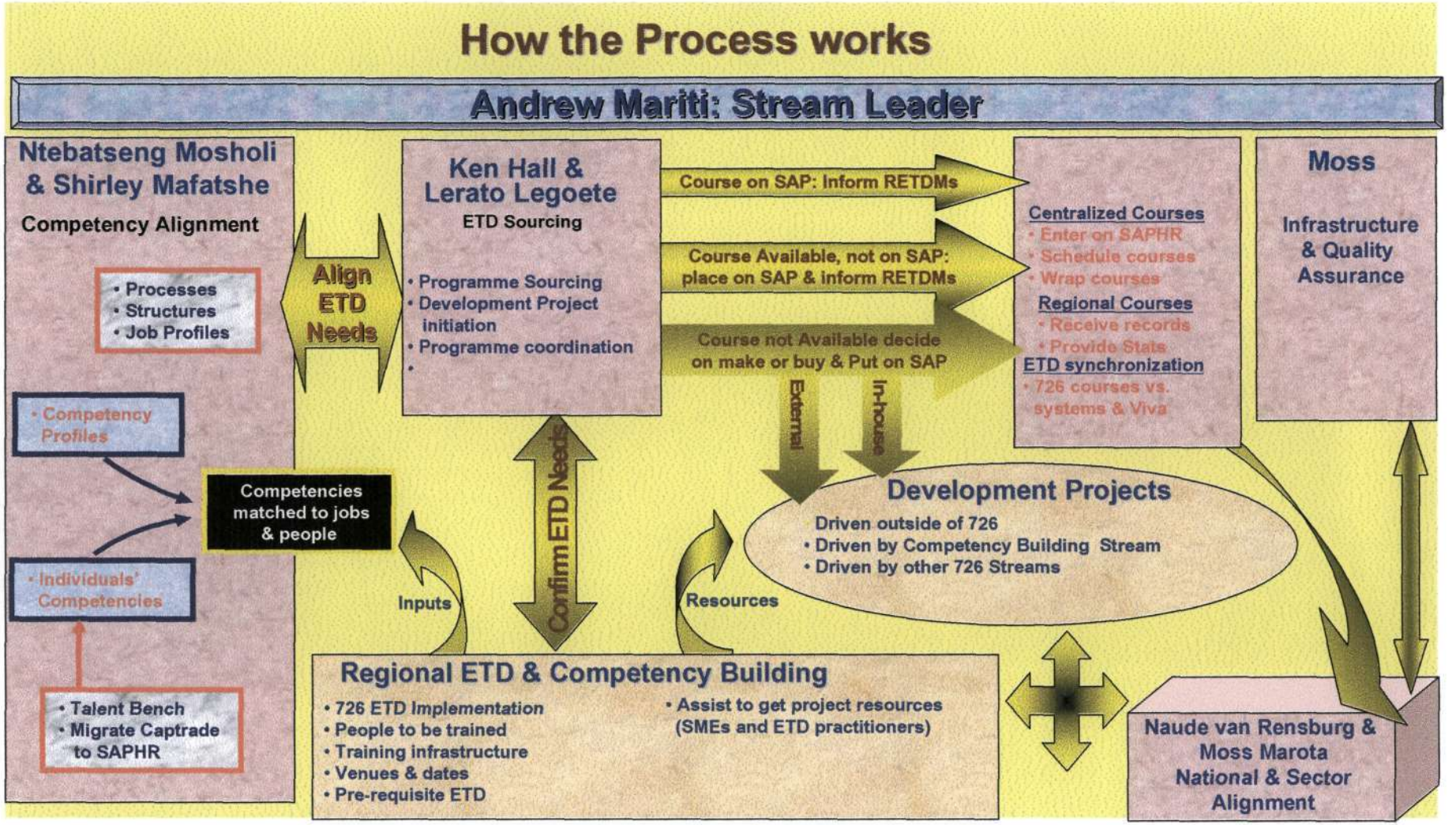

Figure 2: The Competency Building sub-stream high-level plan with regard to the current project phase (source: CB sub-stream presentations, 2004)

1.2 Practitioner bibliographical sketch

Lerato Legoete was born in Baragwanath Hospital, Soweto, grew-up in Soweto (Pimville), moved to Randpark Ridge and completed her schooling at Randpark High School in 1997. She then graduated with Honours at the University of Cape Town majoring in Biochemistry and Microbiology in 2002.

In 2003 she joined Eskom Distribution Human Resource Training and Development department at Head Office (Megawatt Park) as an experiential learner. During this year she worked on two projects. The Data Purification project: extracting information on service providers from an old data capturing system (EDCO) to the new SAP system that was about to be launched. The other project being Service Delivery Training where she compiled a Business Support Toolkit (after extensive research) for the employees in the support functions to the core Distribution businesses; Wires and Retail.

In 2004 she was involved in the Retail project aimed at building capacity in the following departments; Electricity Pricing (EP), Electricity Supply Contracting (ESC), Electricity Forecasting (FC), Electricity Special Pricing (ESP) and Electricity Trading (ET). At this point she then joined Programme 726 Competency Building team at the Eskom College in Midrand (see Project Environment Background). In this project her role included designing, sourcing and implementing competencies (workshops, courses, training) and also liaison with all stakeholders (target audience(s) and facilitators/trainers) – see the above Figure 2. During this year she also enrolled for the MComm, Masters in Strategic Leadership and Project Management, which has brought about this research topic.

Currently, she now forms part of the Head Office Electricity Pricing department assisting with certain outputs such as implementing and managing pricing projects and developing and maintaining training material. Her major role in this department is to project manage the implementation of the "Cost Based Tariff Design" project. This project is in place to create awareness in REDs, on Pricing and Tariffs while building capacity through knowledge transfer in regions by designing their own tariffs.

1.3 General problem context

Currently Eskom Distribution is preparing itself to merge with Municipalities and Metros to form Regional Electricity Distributors (REDs) that will be pooled entities providing energy services to customers. There are a lot of complexities in this system, because the government (Department of Minerals and Energy) has constituted that these entities form by end of 2007 and they would later operate in a competitive market where customers will be able to choose where to buy their energy/ electricity, i.e. as privatized entities.

Recently, the Eskom Distribution Electricity Pricing department approached the Competency Building team for extensive assistance with the "Cost-based Tariff Design" project that is run by their department. The problem identified by this department is regarding the tariff structures that will be adopted in the future REDs. This is seen as an issue as each region (once a RED has formed) needs to submit a tariff plan to the regulator. This was previously done at Head Office for the whole of Eskom Distribution business. In the pricing context, privatization means liberalization, that is, to unbundle the current electricity costs and sales via the number of sellers to distributors and end users at market based costs with innovative pricing options (Salvodi, 2005). Thus price and competition are vital in establishing an effective (future) market (Salvodi, 2005).

In search for global alignment, Eskom Distribution has proposed competition amongst the future REDs. Therefore an analysis of the rationale of this restructuring process (from a pricing perspective) should enlighten the concerns of the different stakeholders. This will require concentration on the project feasibility particularly in Pricing and how entities with such different policies and procedures would survive the merger as well as how this would affect the employees at the bottom of the "food chain"?

The stakeholders include the Government (Department of Minerals and Energy), EDI Holdings, The National Electricity Regulator, labour representatives from Eskom (Distribution, Transmission, Generation) and Municipalities. One foresees the following concerns raised by some of the stakeholders:

- What about those with no tertiary qualifications?
- How will staff and skills be transferred to the REDs?
- Will there be a duplication of jobs and competencies in the new REDs?
- What will eventually happen to Distribution, will it be completely separated from Eskom?
- Will the REDs be governed under the Municipal or Public Act?

This research will not attempt to answer all the above questions but to focus on building capacity in terms of tariff design. This should probably enlighten the reader and build confidence on the efforts in place to ensure proper establishment of future RED tariff structures.

The complexity of the overall Programme 726 project deepens on a daily basis with constant scope changes, for instance the current stance (although not official) is that Eskom Distribution will initially have an operating agreement relationship with the RED. This means that less than ten percent of Distribution staff will be seconded to the REDs. Thus the project team faces scope changes of the expected outputs, as this is a very political project with constant changes from the Government. At this rate one might be under the impression that the Government is thus delaying RED formation considering the pressing timelines.

The latter example is just one of the hiccups delaying the process which will ultimately take place, even in a decade. According to De Kok (2003) from the Distribution Electricity Pricing department, "if Distribution moves out of Eskom into REDs, it will act as an agent for Eskom regional tariffs". Alternatively, if not, Due diligence exercise will be necessary to ensure proper transfer of assets and people although it will take another 18 months to transfer all Distribution staff members. "However, tariff structures will have the same principles no matter what direction the future REDs will ultimately take" (De Kok, 2003).

1.3.1 Specific problem manifestation

To expand on the problem raised above, at this point there are multitudes of tariffs for Eskom and local authority distributors' customers and this has to be rationalised, anticipating the competitive market that the REDS are moving towards. The issue here is how to move everyone to the ultimate tariffs? The following key issues regarding tariff rationalization will unfold and be discussed; cost reflectivity, data (customer, network, financial), legislation, customer needs and social obligations of Eskom Distribution, the billing system and a brief look at the future tariff structures as discussed by my colleagues in the pricing department.

The EDI restructuring model aims to eventually move Eskom from a monopoly to full wholesale and retail competition (Salvodi, 2001; Mountain, 1994). This restructuring model is applicable to the whole ESI and EDI but affects Eskom largely because it is the biggest energy producing entity in Africa. The current stance in Eskom is a vertically integrated utility where electricity is transferred (using transfer pricing mechanism) from Generators – to – Transmitters – to – Distributors. The latter thus summarizes the supply chain in Eskom and the three most valuable groups that are interdependent on each other (see ***figures 3 & 4***). Distribution is the largest group in Eskom (constituting the bulk of Eskom employees) and privileged to liaison directly with the electricity end users (3.5 million customers) by providing services such as meter reading and billing. Distribution has contracts with Transmission and Generations and thus sells its energy to the local authorities who in turn sell to their customers (see ***figures 3, 4 & 5***). For this reason, although only Distribution is being restructured, it is clear that this restructuring process will affect the other two groups as well. However, this research will only concentrate on the implications of the restructuring process on Distribution.

Following the above arguments, costs are passed down the supply chain (as depicted in the figures). According to Salvodi (2001), in order for Eskom to enter into the future REDs, the way in which electricity is priced in Eskom has to change. The current tariff structure (Figure 5) need to be modified to suit future tariff applications. Figure 5 shows

that Eskom currently has national tariffs with all prices to customers for a specific tariff the same across the country where, Municipalities have their own tariff structures that are not aligned to Eskom's tariffs in terms of levels and structures (Conradie, 2005). This way of bundling tariffs together (without specification) should no longer be acceptable as the future tariffs need to be cost reflective (Salvodi, 2005; DME, 1998). The Tariff Alignment and Cost-based Design project is thus aimed to produce a framework of what tariffs should look like in future, with the guidance of the NER framework. Thus rationalization and convergence of tariffs means moving towards the same: tariff categories/classes/segments, tariff structures, chargeable tariff components, and pricing levels (Conradie, 2005). This research will thus pave the way to the realization of the ultimate tariffs that will be approved and easily regulated by the regulator.

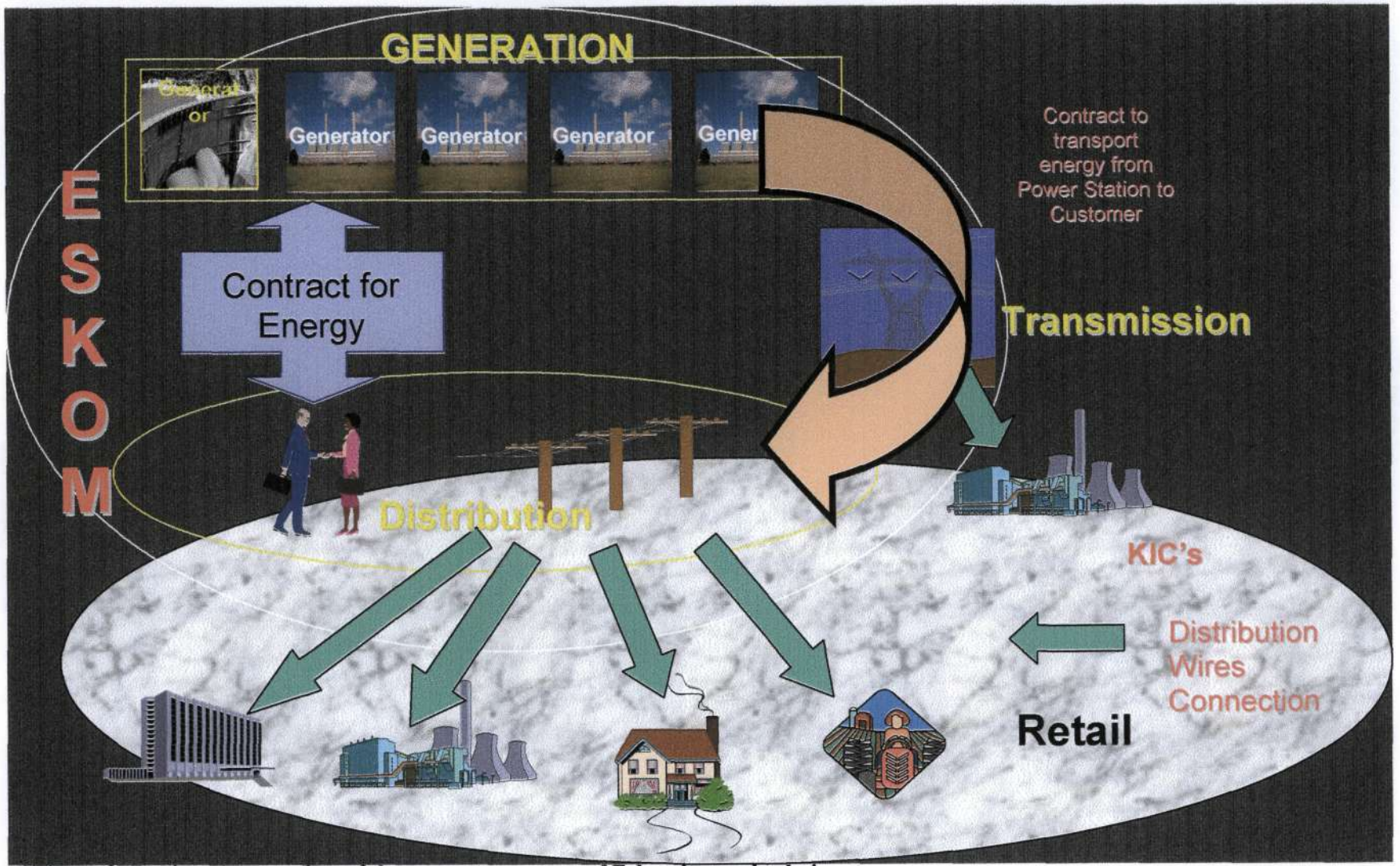

Figure 3: Depicts the overview of the current structure of Eskom's supply chain

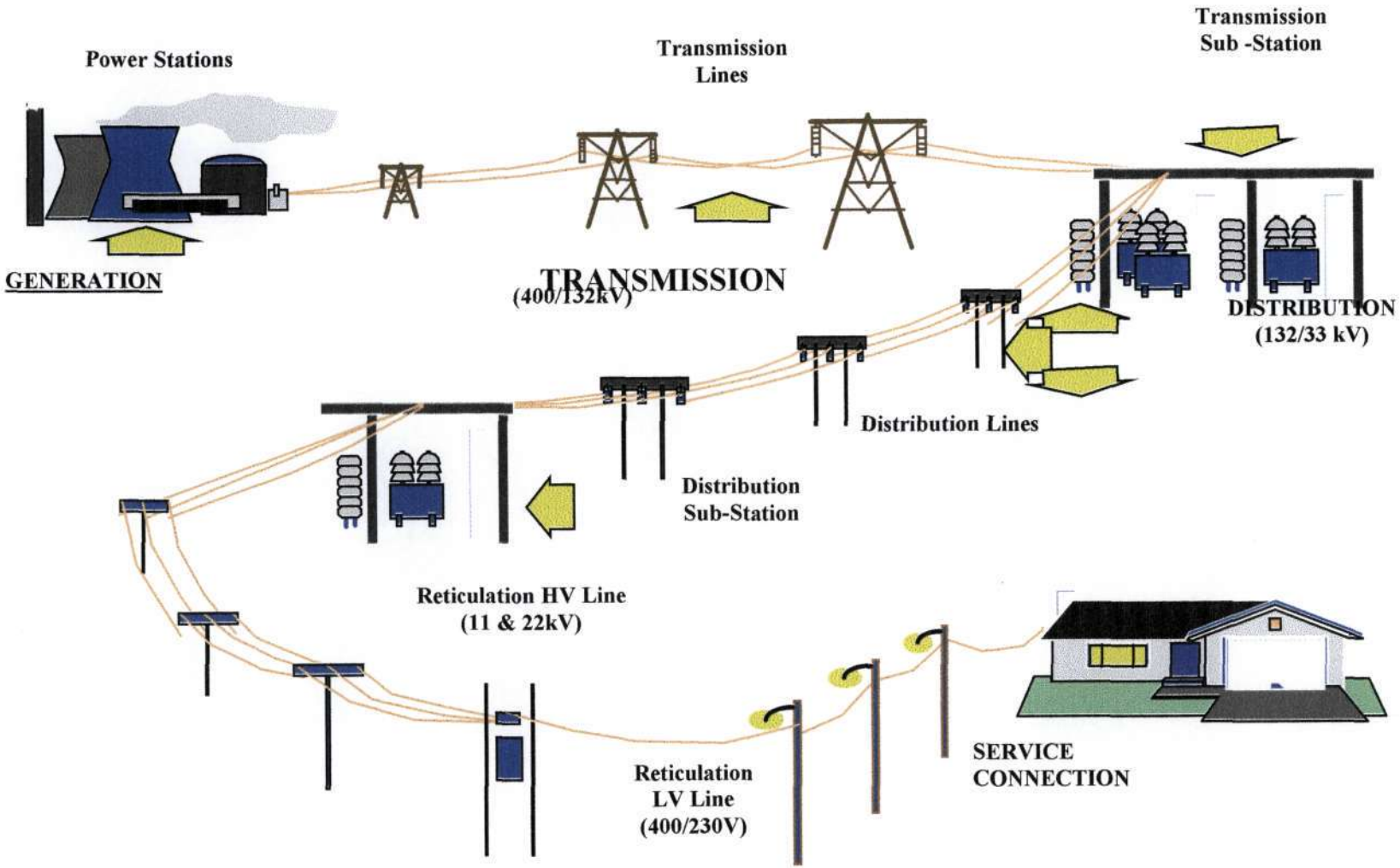

Figure 4: Depicts the Supply Chain in Eskom (source: Salvoldi, 2001)

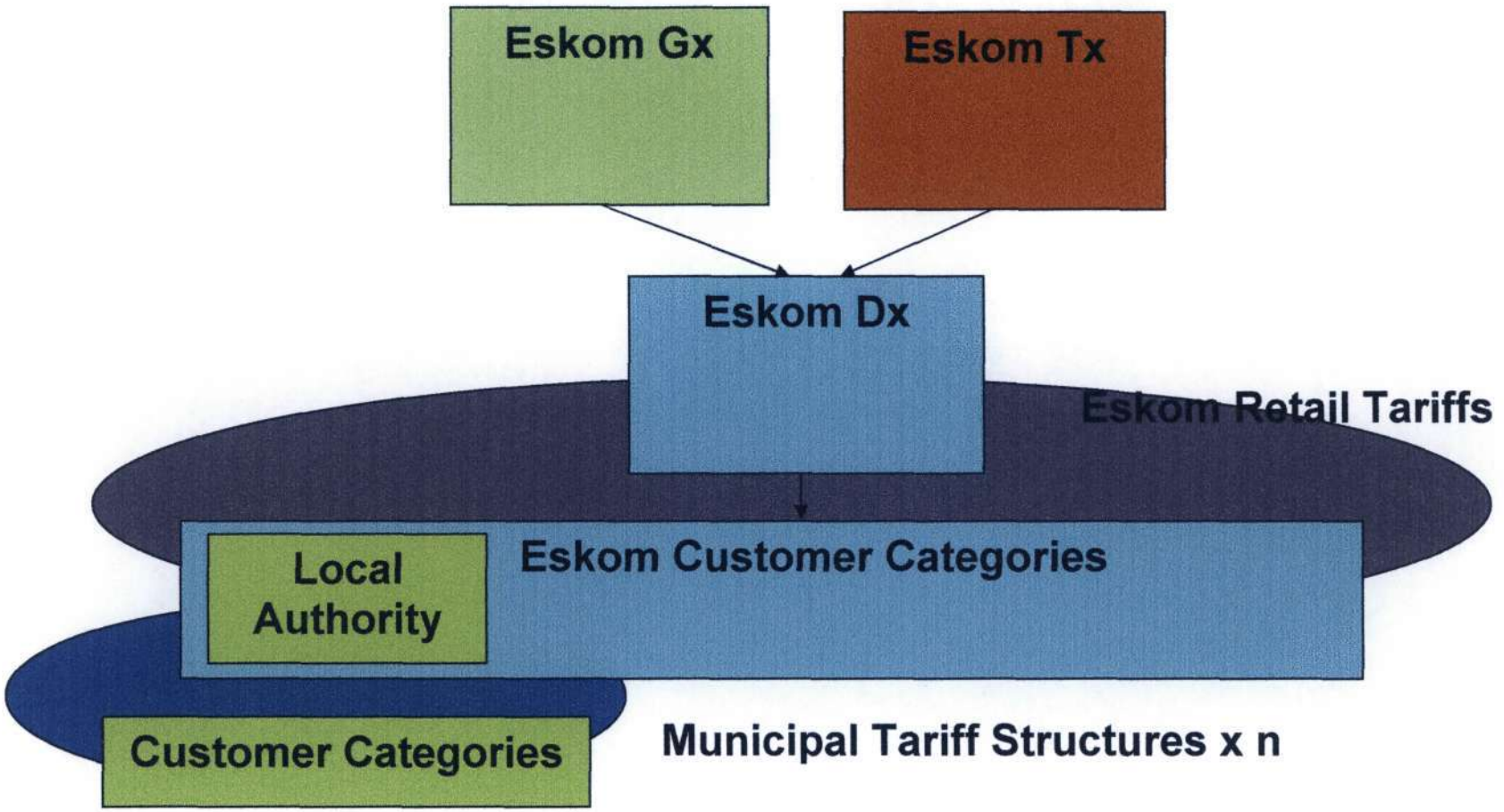

Figure 5: Current Tariff Structures in the Industry (source: Conradie, March 2005)

1.3.2 The Tariff Alignment and Cost-based Design Project

The above discussion explains clearly the problems facing the pricing department due to the restructuring process. Currently Eskom's tariffs are set according to; whether the supply is classified as urban, rural or residential, what the supply will be used for or size of the supply.

Discussions on the approach that tariffs will take in RED day one was around the following issues, whether to;

- adopt a set of *new* retail tariffs, or
- continue with *existing* tariffs and transform over time or utilise a combination of above.

Following this, the official stance from the NER is that the approach should be to start with the existing tariff arrangements on RED day one. This decision was taken due to the following; uncertainties & inaccuracies in RED info (e.g. costs/customer data) create very high financial risks, time to perform cost of supply studies, develop tariff models, approval & implementation (metering & billing systems) and the fact that Municipalities are unfamiliar with Rate of Return regulation. These issues will thus form the bulk of the discussions in this research. Developing new tariffs require detail and accurate data sets about customers, assets, costs and models. In other words new tariffs must be based on a comprehensive Cost of Supply study and analysis which will lead to cost reflective tariffs.

From the above discussion, the pricing sector maintains that the rationalization and liberalization of tariffs need to be in place in order for future REDs to be sustainable in the industry. This became the key issue following a study of the retail environment, hence the need to focus on empowering regions with the ability to design tariffs prior to RED formation. This project is currently of high priority for the Distribution Electricity Pricing department as each region will have to produce a tariff plan as soon as it becomes a RED (within six months), only then can tariff implementation occur. With that, the

accountability that regions will have will be expanded to their tariff structures, purchasing contracts and sales/load/price forecasting. The focus of this project is to ultimately equip that each region develop a RED tariff restructuring plan that will consist of: Cost of supply studies per RED, RED tariffs design, and implementation of tariffs according to the RED Tariff Restructuring Plan as approved by the NER. This is thus a benchmark project that will benefit of the entire EDI and is driven by EDI Holdings and supported by the NER.

The project has five phases with two components; the "***Competency Building***" component (phase 1) – empowering pricing staff to have Cost of Supply and Tariff Design competencies necessary for future REDs and the second component "***RED Tariff Design and Implementation***" (phase 2 – 5) – concentrating on tariff design within the REDs as well as implementation. Refer to figure 7.

This research will only concentrate on the first component – Competency Building. This component has five steps, which have to be delivered before RED formation. Currently the project has only progressed to step two for most regions and Municipalities. The five steps of the process include;

1. Understanding the EDI (Eskom & Municipalities)
2. Introducing tariff simulation and Workshop interventions
3. Data collection and purification
4. Cost of Supply Study
5. Tariff Design

According to Conradie's presentation (2005), the following high-level outputs are expected in the regions after the capacity building project (see figures 7);

- The understanding of regional and metro (RED) revenue requirements - including current cross – subsidization
- The agreement on a tariff structural framework should be reached between EDI Holdings/NER
    - Define appropriate tariff classes and the chargeable components

    - To agree tariff setting principles
- Obtain a decision re Residential tariffs and determine the implications
- Decide how Distribution-use-of-systems will be charged for in the REDs – EDI Holdings/NER
- To provide a requirement specification of what is needed in terms of data sourcing
- Design and test tariffs during the first year to 18 months
- Develop a strategic pricing direction for each RED
    - Develop Tariff Restructuring & Implementation Plan
    - Develop phasing plans for introducing tariff changes

The Competency Building component will thus equip all potential RED pricing staff (Eskom, Municipalities, Metros) to have detailed understanding and confidence in designing their own (entity) tariffs. Having acquired such skills, one is ready to move on to the second project component which will entail the following steps;

- Data gathering and Amalgamation of REDS,
- Customer Classification for REDS,
- Cost of Supply Study for RED, Tariff Design and
- Rationalization of Tariffs for RED Tariffs

At the end of this component each RED should have a tariff plan and design in place (ultimate tariff structure) for submission at the regulator. It is hoped that cost allocation will thus be done according to figure 6 below…

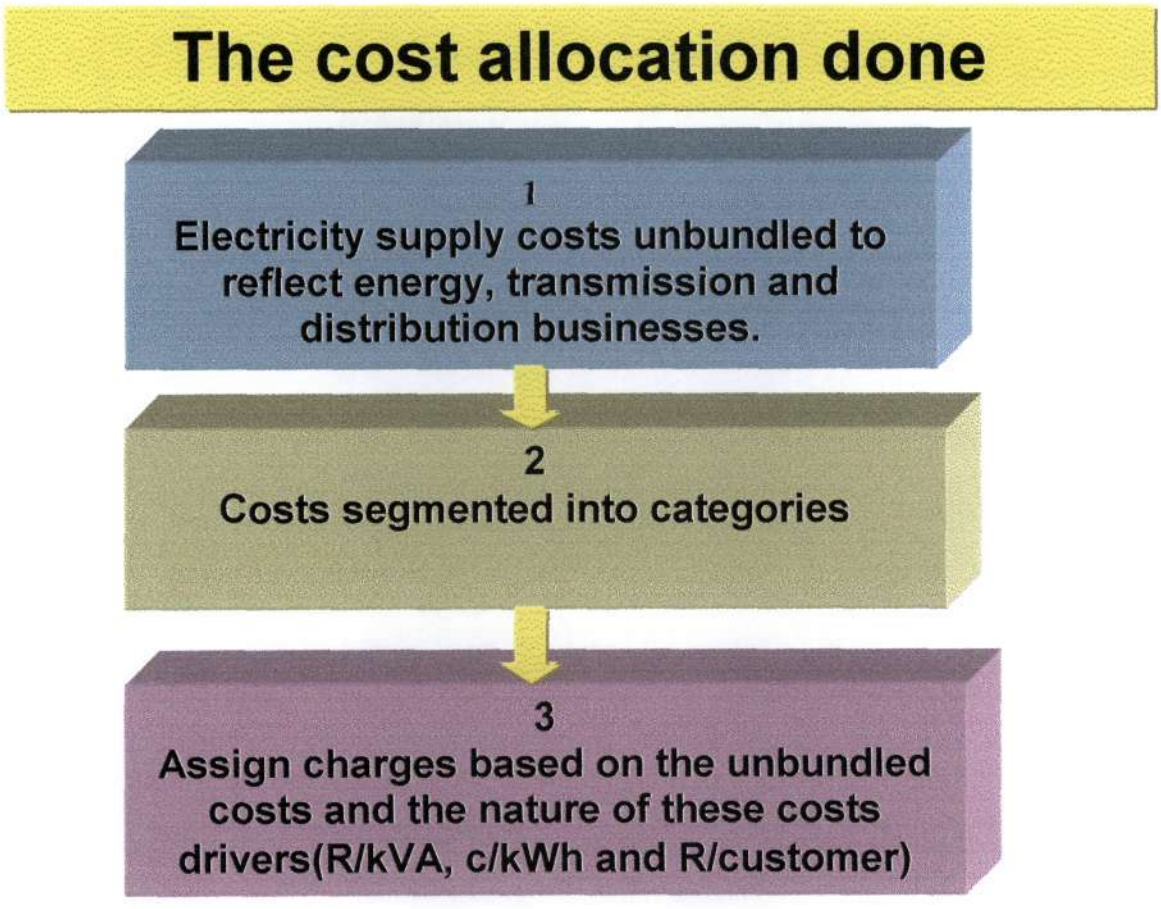

Figure 6: Depicts the proper way in which costs should be allocated according to the NRS058 document

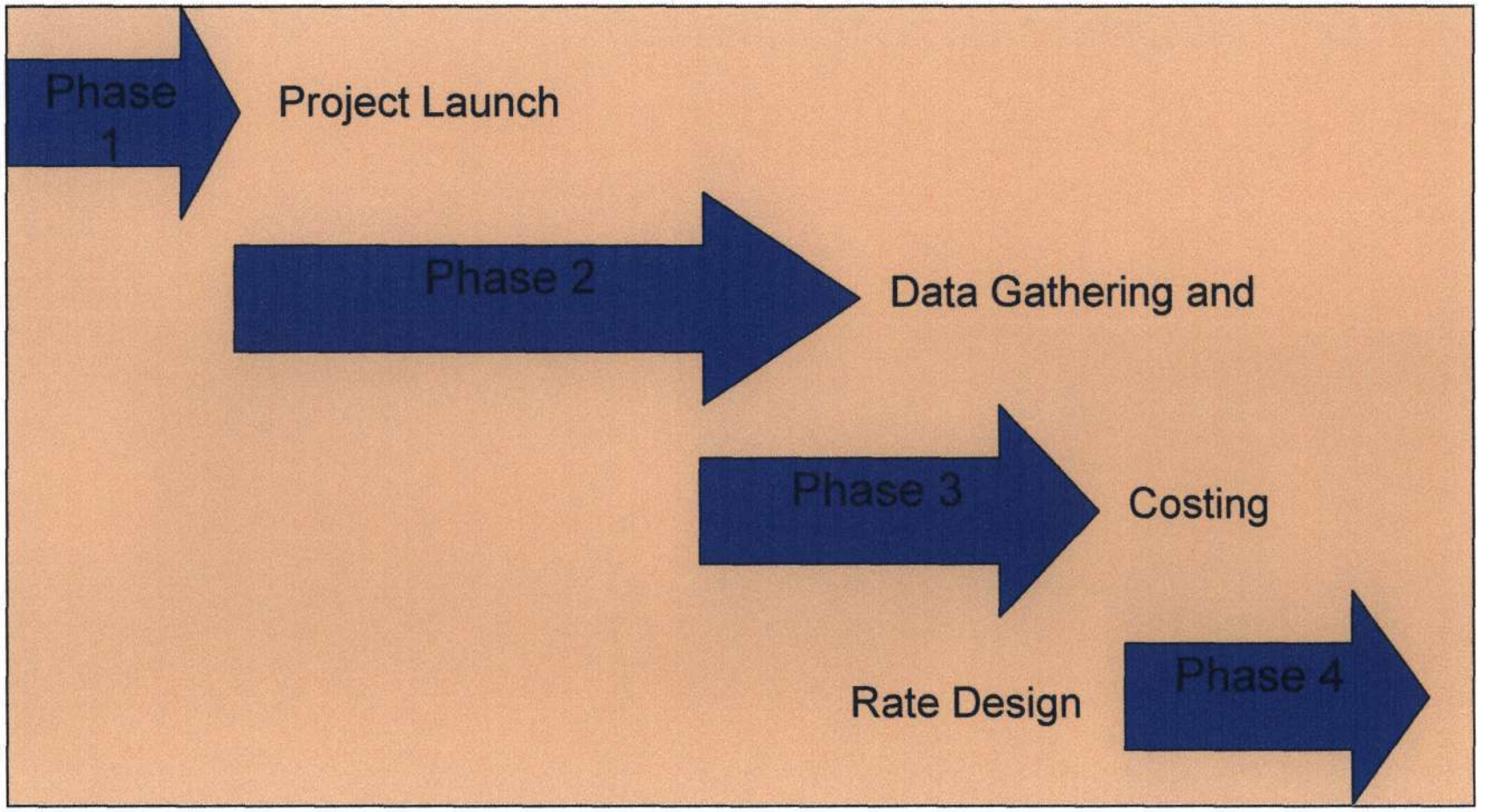

Figure 7: Tariff Alignment and Cost-based Design Project phases

1.4 Comprehensive problem statement

The purpose of this study is to describe the Competency Building component of the Tariff Alignment and Cost-based Design project aimed at transferring Cost of Supply and Tariff Design skills to future RED staff while exploring the rationale of the Electricity Distribution Industry Restructuring model currently being used in Eskom Distribution and its appropriateness from the perspectives of the different stakeholders.

The discussion so far clearly reveals that this research will be Action Research, that is, conversation with the author. As the author is involved in the project itself, one would most likely occasionally discuss the project from a biased point of view as she relates to the target audience (McNiff, 2000). The nature of knowledge immediately follows on from action research. *The type of knowledge that is expected to be gained here is Procedural or Know-how knowledge. They underpin training and development in which know-how is transmitted as skills for jobs; and they reinforce transactional forms of communication which codify knowledge as systems to be learnt within a company ethic of master craftsman and apprentice* (McNiff, 2000).

The latter statement captured by McNiff (2000) summarises the essence of this project and its proposed achievements and outputs. That is, to expose all pricing employees or potential future RED employees with the high-level principles of tariff design. This will in turn equip individuals with information and to experience the Tariff design simulation model to be able to design their own tariffs in future REDS. To sum up this point on McNiff's (2000) account about skills transfer that, "knowing how to access and use information and how to use electronic systems" will be an indication that skills have been transferred to the next person. Howver, in this instance, the project team is hoping for future REDs to delivery their own tariff structures in the next five years, this will prove the success of the Cost-based and Tariff Design project.

Although the research will be action-orientated, it will also be qualitative, "the methodology of an emerging design based on experiences of individuals in a natural

setting" (Creswell, 1994; Creswell, 2003; Merriam, 1988). That is, this research will be based on emerging aspects and development of the above-mentioned project in the Eskom Distribution Electricity pricing department. The research will not be a mixed method approach as one will not dwell too much on the actual cost of supply studies which entails utilizing statistical analysis on the excel system. However, both approaches will give one a holistic view of the "rationalization" of tariff structures in future REDs. To be more specific surveys and interviews will be conducted with the relevant audience that stem from the various stakeholder groups affected by the project.

Looking at the problem context and the grouping of Systems Methodologies, it is plain that this is research will take a soft systems approach because of all the uncertainties with the current transformation process – these dynamics already discussed. The analysis of the system holistically with its tribulations has revealed much complexity seeing there are a lot of stakeholders affected by the bigger project (EDI restructuring) and the future success depends on the relationship between the different stakeholders (who have to get buy-in). It is thus appropriate to consider that the Systems methodology in this research is Complex-Pluralist.

This approach will assist the writer to identify and understand the system that is of focus, in the context of this environment. This is to further understand the nature and problem of the system in hope to resolve the problem or at least get to the gist of the problem to be able to recommend. From the latter discussions, one picks up that the planning process of the project will be an interactive one and it is visibly a soft systems approach (Flood & Jackson, 1991; Gill & Johnson, 2002). The aim here is to start with a problem situation that is unstructured (Flood & Jackson, 1991; Gill & Johnson, 2002), that is, the lack of tariff design knowledge in the regional pricing department. This problem needs to be addressed and curbed within a certain time period (before RED amalgamation) with the hope that support will be consistent from other departments (CB stream of 726) and other stakeholders that this project is dependent on the success of this project ultimately affecting the success of the future REDS and their ability to handle their tariff structures, purchasing of their own contracts and forecasting of the sales and prices.

2. CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

The electricity sector is one of the most complex and important sectors in any country – particularly in developing countries like South Africa (Cicchetti, 1995). Electricity has broad economic, social and political implications as it affects and is necessary in the following settings; agriculture, human health, education, transportation, and industry.

Throughout the world, the electricity sectors of both developed and developing countries share at least three common characteristics. They are vertically integrated; the availability of electricity and production thereof affects economic growth and lastly, these electricity sectors have become a focal point of economic concern and political debates (Cicchetti, 1995).

Governments have regarded electricity as a public necessity for which they have had the prime responsibility to ensure national control over this sector (Cordukes, 1990). As a result, the organization of electricity supply utilities in developing countries has generally become centralized under state ownership (Cicchetti, 1995; Cordukes, 1990).

During the 1990s, a phenomenal transition has rapidly grown worldwide regarding these electricity sectors. The vertically integrated, monopoly franchises are reforming and restructuring to introduce increased service efficiency of public utilities as well as increased competition in the electricity sectors (Cicchetti, 1995; Cordukes, 1990). Cohen (2000) wrote her thoughts in her paper when it was announced that North America would pursue an Energy Framework. The interesting point that came out was that "the Canadian government justified deregulation ideology by claiming that private producers operating through the market were inherently superior to government-provided services, and thus the introduction of competition in electricity markets would reduce prices".

Vertical integration has been associated typically with franchise monopoly status where government regulated electricity supply to control prices, profits, and performance. However, the difficulty that many governments are experiencing is obtaining adequate funds for financing expansion programs (Cordukes, 1990, Cohen, 2002).

Vertically integrated means that a single entity controls the three distinct phases of electricity supply: ***generation*** at the power source (generating energy); ***transmission*** to the area where it will be used (substation); and, ***distribution*** directly to end-users or customers. That is, a single utility is in control of both the engineering (or Wires) and customer service businesses. (Cicchetti, 1995; Moorhouse & Demsetz, 1986).

Electricity supply utilities in many countries are being scrutinized and criticized by many of their stakeholders including; government, business decision makers, regulators and the end customers. According to Ciccheti (1995), "Many question the vertical structure of the industry, wondering whether competition can replace or augment monopoly status and regulation. Although, there is political concerns associated with rising prices and costly new capital investments. However, many countries have determined that restructuring their electricity sectors is a particular effective way of increasing efficiency and improving electricity provision." (Cicchetti, 1995; Cordukes, 1990).

This chapter will focus mainly on the restructuring of developing countries also drawing on experiences from developed countries, concentrating on the Distribution part of the business. This review is thus to enhance the knowledge base on past restructuring experiences and to go back and see if the South African Electricity Supply Industry reform is on track. The focal group for the rest of this research will be on the Distribution Pricing Department currently in the process of producing a set of rational tariff structures for the whole of the South African industry.

2.2. A look at the electricity supply industry (world wide)

The electricity supply industry may be considered in terms of its three functions: generation, transmission and distribution (Cicchetti, 1995). In this chapter, the overview of issues pertaining to restructuring of electricity sectors will be discussed – exploring past and present restructuring experiences around the world, concentrating on developing countries.

However, this discussion will focus on the restructuring of the distribution group and how this impacts on customer service. As distribution entails activities such as load dispatching, customer installations, equipment maintenance, meter reading, billing, demonstrating (customer education), and advertising (Moorhouse & Demsetz, 1986).

Distribution is the delivery of low-voltage electric power from load centre (transmission) to residential, commercial, and industrial consumers. In short, it is the selling of electric power to electricity end users (Moorhouse & Demsetz, 1986).

From the economists' point of view, Cohen (2002) asserted that, "Given the natural monopoly character of local distribution, most states impose territorial restrictions that prevent direct competition between two or more retailers in the same community (Moorhouse & Demsetz, 1986; Cordukes, 1990).

"The conflicts between state and federal regulation, among classes of electricity users, between electricity users and the owners and employees who produce it, and among government agencies with specialized interests of their own – tax revenues, safety, abundant energy supplies, and environmental quality – all interact to create a confusing and unpredictable regulatory system.[1]"

Some utilities are under the impression that conceivably – perhaps even plausibly – unregulated markets work better than regulated markets even when scale economies are important (Moorhouse & Demsetz, 1986).

However, the view that the electricity sector is essentially a natural monopoly is being challenged both in developed and developing countries (Cordukes, 1990). One perspective (way to look at it) is that government-owned and regulated utilities are not efficient and give unsatisfactory performance. Conversely, to encourage competition there needs to be a change in the regulatory framework, and deregulation to reduce government involvement in daily operations and provide sufficient autonomy to utilities allowing them to operate on a fair basis with other suppliers (Cordukes, 1990).

2.3. Regulation of Electricity

"Regulation is a response to market failure!"[2] Governments have sought to control the policies and operations of electric utilities through regulation. Regulation is thus the enforcement and monitoring of a set of operational rules to meet defined objectives by an appointed autonomous entity accountable to government (Cordukes, 1990; Cicchetti, 1994). "Regulation is potentially warranted when unregulated market outcomes are inefficient, since regulatory intervention in theory could be beneficial". (Church, and Ware; 2000).

Regulation has taken many forms but to extend Church & Ware's (2000) thoughts, Cordukes (1990), Moorhouse (1986) and Hammond (1995) have affirmed that in addition to controlling prices and restructuring access to other market suppliers, governments have regulated utilities by controlling borrowing and investment programs and typically restricting the power and autonomy of board of directors and managers of power utilities. In spite of the aforementioned, regulation has been aimed at ensuring the efficiency of the industry, the safety of supply, minimizing environmental impact, and constraining the power of utilities to operate other than service regulations.

As a model and to clarify the role of regulation in this paper, Ciccheti (1995) considered the regulation of electricity in the United States (US). Regulation in the

[1] Moorhouse, J. C. The Uncertain Future of the Electricity Power Industry, in Electric Power, in Moorhouse & Demsetz, ed., ***Electric Power: Deregulation and Public Interest***. 1986. pp 1-20.

US is the joint responsibility of the fifty state regulatory agencies and the Federal Energy Regulatory Commission (FERC). Often, these bodies adopt varying approaches to such problems as how to determine allowed rates of return; how to set rates for different classes of customers (residential, commercial, and industrial); who (customers or investors) should bear the cost of excess capacity; and how much competition should be mixed into a system which until very recently characterized primarily by monopoly suppliers. (Cicchetti, 1995).

The traditional tools for utility regulation center on determining the three R's: rate base, rate of return, and rate (price) structure. Nonetheless, Ciccheti (1995) derived that there are four components of this regulation that in combination distinguish the public utility from other sectors of the economy: control of entry, price fixing, prescription of quality and conditions of service, and the imposition of an obligation to serve all applicants under reasonable conditions.

Cordukes (1990) also came up with a notion is that these fundamental components of regulation were developed in response to two basic considerations. The first is that electricity, unlike most other goods and services, is essential to consumers' well being. The other basic consideration is that a public utility is a "natural monopoly".

Evidently, the central mission of utility regulation has always been to protect the consumer from the high prices and reduced outputs that accompany monopoly power (Moroeng, 2005). The conventional argument to support the introduction of regulation is that electricity utilities are "natural monopolies" because they enjoy economies of scale, that is, unit costs that decline throughout a relevant production range as output increases. That is, scale economies in producing, transmitting, and distributing electricity thus prohibit competition because a single utility can supply the entire market demand at lower costs than could two or more utilities supplying the market[3] (Moorhouse & Demsetz, 1986). To move forward in this search, one should get an understanding of the history of regulation…

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[2] Church & Ware. ***Industrial Organization: A Strategic Approach***. McGraw-Hill, Boston. pp 749.
[3] Moorhouse, J. C. Part I: Elcrtic Utility Regulation, in Moorhouse & Demsetz ed., ***Electric Power: Deregulation and Public Interest.*** 1986. pp27

2.4. The History of Electricity Regulation

The electricity industry has been regulated since the 19th century. Initially, local government exercised control over small, local-service electric utilities by granting operating licenses and permission (Moorhouse & Demsetz, 1986). Subsequently in the 20th century, electricity utilities developed into national/intercity systems, and states began to establish public utility commissions to regulate electric companies.

The evolution of regulatory arrangements in developing countries has been greatly influenced by those in developed countries (Cordukes, 1990) – for the simple reason that developing countries always aspire to become more like developed countries in all aspects. Typically political and administrative authorities have intervened to control electric utilities through a wide range of laws, regulations, decrees and decisions issued by the legislature, the head of state, ministers and regulatory bodies (Cordukes, 1990).

Incentives to improve electricity sector efficiency and attract private sector involvement include; Organizational change, Legislation – the relationship between the government and the industry needs to be clarified and Regulations – over prices, borrowings, budgets and investment (Cordukes, 1990).

Restructuring, privatization, and Independent power producers (IPPs) represent several responses to increasing the efficiency of electricity sectors throughout the world. Cicchetti (1995) raised the idea that energy efficiency investments can help countries to ease impacts of energy price increases and minimize environmental pollution; thereby stimulating economic competitiveness. Moorhouse and Demsetz (1986) further motivate the latter by stating that "a regulated industry will be more efficient than the unregulated industry because of the evidence on the poor performance of the regulated industries in general".

With all this evidence, one has to keep in mind that no two countries are alike when it comes to electricity sector reformation. Motivations may differ – these will unfold as the chapter progresses and when looking at experiences that flowed from restructuring

in countries that have embarked on the challenge see and how it has progressed so far…

This chapter outlays and unpacks components of electricity markets around the world. Examining and evaluating the restructuring proposals in these electricity supply industries, probing and questioning the experiences (whether successful or failed) – especially for developing countries, and particularly introducing the history of the restructuring process in South Africa to lay the ground work for the rest of the dissertation to give direction on the process that the South African Electricity Supply Industry as a whole will eventually embark on…

2.5. Electricity Markets in Developing Countries and the need for Restructuring

Recently, electricity sectors have either come under direct political fire or become the focal point of economic distress. In both developed and developing countries, an industry once dominated by engineers who produced declining real prices and improved supply, has come under much closer political scrutiny. This phenomenon has reached worldwide status where countries around the world have realized that electricity costs are probably higher than necessary, and thus the electricity sector does not need to be ***vertically integrated.***

Numerous problems plague the electric power industry. Gordon (1989) examined that with careful consideration it is evident that the basic problem worldwide is the failure of traditional public utility regulation to respond to the radically changed state of the electricity industry. Unregulated utilities tend to face problems of expensive energy, the resulting reduction of demand growth, and more stringent environmental regulations, particularly those affecting nuclear power.[4]

From that viewpoint, Gordon (1986) concluded that reform is clearly needed in electricity utilities. This would eliminate industry problems arising from combined effects of different governmental actions causing the industry to be fragmented. Therefore the minimum acceptable reform would be deregulation of electricity

generation, and total deregulation of electric utilities might be preferable. Moreover, restructuring might not produce the improvements that are anticipated.

Alternatively, for a developing country, the electricity sector can be of critical importance. South Africa is an example where Eskom has social and political obligations to ensure that most of the citizens are supplied (including rural areas) with electricity despite that they cannot afford this basic need due to high unemployment. There is the "catch" situation in developing countries, where industrial developments rely on efficient infrastructure and a key component of any efficient infrastructure is an adequate and reliable supply of electricity. Thus, sufficient electricity supply is critical to sustainable economic and industrial development, as well as for improving the standard of living (James, 1996). As is the case in South Africa, supplying the whole country with electricity is a government objective; distributors are faced with high demand growth rates leading to significant power shortages (Cicchetti, 1995).

To further elaborate, the issue of meeting the electricity supply and demand objectives in sub-Saharan Africa has been identified as a adverse one. These utilities (vertically integrated) are generally not well developed in terms of size, accessibility for majority of the population, provision of high quality service, and national and international connections. More specifically, this refers to the poor integration of the national networks have stifled electricity trading potentials in the region (Turkson).

The electricity sector is typically the dominant percentage of a developing nation's investments and is generally financed with foreign debt. The increasing burden of foreign debt can result in a variety of macroeconomic financial restrictions. A vicious cycle begins when a nation's foreign debt cannot be paid, and the nation must accept stringent macroeconomic controls (fiscal, monetary, and foreign exchange, for example) to refinance existing dept and any increment advanced by lenders (Cicchetti, 1995).

As acknowledged above, electricity sectors in such countries are used to address social equity issues such as; ensuring that all classes of individuals receive adequate

[4] Gordon, R. L. "Perspectives on Reforming Electric Utility Regulation" in Moorhouse & Demsetz,

energy services to support basic human needs such as health and education; governments may subsidize electricity sector operating costs (Moorhouse & Demsetz, 1986).

Contrary to that, Cicchetti (1995) and Moorhouse & Demsetz (1986) have indicated that some policies may lead to an uneconomic pricing structure and absorption of significant amounts of government capital, monies that could be used to address directly social concerns such as health, education, and national security. Cicchetti (1995) believes that though subsidized power relives budget constraints on power utilities, the solution to the resulting shortfalls becomes a burden of general taxes. In addition, power shortages that inevitably result from the inability to finance system expansion to meet increased demand often require some form of rationing. (Cicchetti, 1995; Cordukes, 1990). Thus electricity utilities have not been operating efficiently because of the absence of competitive forces and an adequate level of accountability between the utilities...

Another expected setback, according to Cicchetti (1995), is that developing countries have responded traditionally to their energy needs by expanding the energy supply base with little concern for the efficiency with which energy is supplied or consumed. Obviously, this can lead to significant financial and environmental problems.

To break the vicious cycle, developing countries are initiating programs in which new generation can be acquired without increasing foreign debt. The idea behind this was under the following thoughts; that, if electricity suppliers do not need to be vertically integrated for engineering reasons, why cant developing countries purchase electrical energy as it flows from a power station vault owned and operated by a private company? Developing countries can avoid increased debt, pay for the kilowatt hours (kWhs – the smallest unit of electrical energy flow) of electrical energy as they use them, and achieve the increased *GNP* associated with greater electricity consumption (Cicchetti, 1995).

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ed., ***Electric Power: Deregulation and Public Interest.*** 1986. pp 447-476.

2.6. A Natural Monopoly

Moorhouse and Demsetz (1990) had the following criteria to define what a natural monopoly is; the existence of economies of scale and that a monopoly is based on the fact that electricity is a (social) necessity – it was believed that any competition would cause social disruptions. Lastly, that electricity is a highly capital-intensive industry i.e. requires a stable revenue base to support the necessary large investments in plant and equipment[5].

The latter summarizes the typical operations previously accepted in South Africa. Hammond (1995) further evaluated that this entails allowing one utility to monopolize the industry in the interest of saving on per-unit costs, while at the same time, regulating that utility's behaviour to avoid any abuse of its monopoly power.

However, Moorhouse & Demsetz, 1986 commented that given that public utilities are regulated monopolies, more or less isolated from direct competition, the incidence and economic effects of utility taxes have not received serious attention until recently. They represent vast revenues and tangible wealth. Taxes at low rates can yield large stable flows of revenue at almost no administrative and enforcement costs. In short, economists view utility taxation as a special problem in the state and local finance. The major concern regarding the impact taxation has on efficient resource use has been the misrepresentation created by the favoured tax status of publicly owned utilities as a part of the larger private-public power controversy[6].

In contrast, Kafoglis, 1986 stated that, public utilities do make substantial tax payments to all levels of government. They pay special taxes because they are unique enterprises, and these are collection agents for a variety of customer exercise taxes levied once more by all levels of government. Utility taxation is also an instrument for implementing local industrial development policies. Pickering's (1994) view point

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[5] Hammond, C. H. "An Overview of Electric Utility Regulation" in Moorhouse & Demsetz, ed., ***Electric Power: Deregulation and Public Interest.*** 1986. pp. 32-43.

[6] Kafoglis, M. Z. "Tax Policy & Public Utility Regulation" in Moorhouse & Demsetz ed., ***Electric Power: Deregulation and Public Interest.*** 1986. pp 97 – 132.

supported the above testimonial by adding that taxation should be regulated, transparent and subject to national norms.

Taxation of utilities came about due to the failure of municipal regulation and the discontent during the latter part of the nineteenth century as a policy of neutrality in taxation gradually evolved. Thus neutral tax gave way to special tax. Economic theorists have considered the possibility of substituting taxation for regulation. This required a lump-sum taxation of utility profits coupled with a per-unit output subsidy equal to the difference between average and marginal cost at the competitive output to encourage optimal output expansion (Moorhouse & Demsetz, 1986).

Since utilities have monopoly power that may be ineffectively controlled, special-purpose utility taxation can be justified in the interim, as a recapture of monopoly profits. In this day and age, taxation in the public utility sector has become much more complex. However, economists use two special-purpose models – the Averch-Johnson (A-J) model of the profit-maximizing regulated utility and the more practical revenue-requirements model – to predict outcomes under utility taxation (Lee, 1988).

2.7. The Introduction of Competition in the Production of Electricity

Until recent developments in the US and UK have led to increased private sector participation or the potential thereof, competition has been limited worldwide in the electricity sector (Cordukes, 1990). Previously, governments had the outlook where they electricity supply was considered a public concern and tariffs as being tools for meeting their social obligations. Thus price increases have been highly sensitive politically because Governments perceived that they contribute to inflation and impact adversely on their electoral status (Cordukes, 1990).

In the past, competition was not favoured; however, consolidation and price fixing followed franchise proliferation. In the early 1900s, reliance on market competition was abandoned in favour for regulated monopolies. The outlook was "Public utilities are best conducted under a system of legalized and regulated monopoly". States had

such opinions and thus regulation received more support than public ownership and thus policies against market competition were established[7].

Zardkoohi (1995) raised a major policy concern in terms of whether restructuring of the electricity industry could enhance competition and consequently improve economic efficiency. He also mentioned that pooling can be the response to the above concern. Pooling is generally defined as the common facility planning, construction and use by several independent companies. Two major benefits are: pools substantially improve reliability at considerably reduced costs; and pooling can result in substantial cost savings in power generating and transmitting[8]. However, pooling arrangements yield many benefits. It can facilitate investment coordination and construction of large generating units and transmission lines, leading to economies of scale in the latter groups.

The industry paper consolidated by Cordukes (1990) appeared to be confident that the latter perspectives (on competition) will cease to exist in the near future...
To elaborate on that point, Cordukes (1990) has evidence of developing countries that have already embarked on introducing competition; a brief look at these examples might lead one to a more positive outlook on the subject;

In Chile, realistic pricing policies have been adopted where the government regulates prices for distribution companies, through this, a climate for promotion of cogeneration and private sector development has been established. Similarly in Pakistan, the regulatory environment was transformed through the Bank's assistance to encourage competition and provide sector financing for generation projects.

From a study of complete restructuring by Berlin et al, the following were founded; "it is particularly important that inter-utility competition for customer loads be promoted. The desire to achieve efficient allocation of resources and to stimulate

[7] Primeaux, W. J. Jr "Competition between Electric Utilities" in Moorhouse & Demsetz, ed., ***Electric Power: Deregulation and Public Interest.*** 1995. pp 395-400.
[8] Zardkoohi, A. "Competition in the Production of Electricity" in Moorhouse & Demsetz, ed., ***Electric Power: Deregulation and Public Interest.*** 1995. pp 63-68.

technological innovation demands no less." Berlin et al thus proposed ending vertical integration by separating generation and transmission from distribution.

Weiss (1995), Cohen (2002) also embarked on similar studies and projected the following conclusions; vertical integration and combination utilities are two major barriers to competition in the electricity industry. He suggested two alternative classes of modifications. The first one being to induce "maximum competition," this alternative would require a complete restructuring of the industry as follows:

- The separation of generation-transmission companies from distribution
- The disbanding of combination utilities
- The elimination of public and private territorial restrictions on sales to distributors or large industrial customers
- A general requirement of interconnection and wheeling at reasonable charges
- The elimination of preferential access to federal power and preferential tax and capital-coat treatment for municipals and cooperatives
- The elimination of legal restrictions on entry into bulk power; and
- The limitation of horizontal mergers among generation-transmission companies to cases where the partners are too small to negotiate effectively with other bulk-power products of a region.

However, Weiss (1975) contradicted himself by stating that such a thorough restructuring process is probably neither practical nor politically feasible in the foreseeable future. He thus offers a more reserved set of modifications, which may be easier to attain to induce modified competition.

- The elimination of private and public territorial restrictions on sales for resale and possibly private restrictions on sales to large industrial customers
- A general requirement of interconnection and wheeling;
- Control of horizontal and vertical mergers;

According to Moorhouse & Demsetz (1986), a derivative of such great efforts would be "a further reduction in vertical integration because of the increased access of municipals and cooperatives to power at competitive prices and the increased

competitive pressure on small utilities that are presently integrated." This view point was recently supported by Cohen (2002).

Other specialists, Joskow and Schmalensee (1983) evaluated the cost effectiveness of several scenarios in a vertically integrated utility. One scenario however stood out where one has the South African electricity market in mind. This scenario calls for complete vertical non-integration of the utilities and proposes deregulation of wholesale power transactions. Each sector would be owned and operated by different entities. The ownership and operation of all transmission capacity would be transferred to "a regional power pooling and transmission corporation". Transactions between independent distribution companies and independent generating entities would be free of regulation. Transactions between distribution companies and transmission-pooling entities, however, would be governed by regulation. Gordon (1986) reiterates that retail services would be provided by franchised monopolies, and the retail rates would be subject to state regulation. Coupled to that, a market structure is also being suggested where over time; a multi-market model electricity market framework will ensure that transactions between electricity generators, traders and power purchasers may take place on a variety of platforms, including bilateral deals, power exchange and a balancing market. This is what the South African market will be striving for in the near future...

2.8. An Overview of Reform Proposals

Ongoing concern over electric utility regulation has sparked numerous reform proposals. In his chapter, "Perspectives on reforming electric utility regulation", Gordon proposed a few reform suggestions following his study of the US electricity reform. The basic ideas range from simply deregulating wholesale transactions to total deregulation all of which have potential, these are as follows:

2.8.1. Experiments in Deregulated Wholesaling

By 1995, experimentation on wholesale pricing was allowed to take place in some parts of the United States as well as New Mexico as permitted by the FERC. A lesson

learnt from these experiments was rather unfortunate as it became evident that deregulating wholesale operations will be as hard to implement as any other reform.

2.8.2. Reform by Restructuring

This reform entails the separation of generation from transmission and distribution (and several other reforms, such as eliminating territorial restrictions and sales, removing barriers to entry, and severing gas utilities from electricity companies) (Weiss, 1975). Following the separation of the three phases of electricity operation, the next level involves creating truly independent, preferably numerous electricity producing and supply entities (Weiss, 1975). However, as early as the beginning of the 1980s, concerns were raised over whether restructuring would really lead to deregulation. All reorganization proposals implicitly or explicitly link any changes to relying on the FERC to exercise strong leadership. This proposal demands careful and precise layout of how the separate generating companies would deal with distribution and transmission entities under deregulation.

2.8.3. Total Deregulation

Gordon (1986) and Walter are campaigning for this type of reformation due to the following expected benefits; That total deregulation might avoid all reorganization costs, inevitably some costs might arise. A partial reorganization process would involve significant outlays to transform existing companies into some new form. Competitive pressures on distribution companies could be so much stronger than conventionally recognized and regulation[9]. For instance, retail rates might be designed much more efficiently. Deregulation could increase access to other companies – unleashing prevailing competitive forces will produce a more efficient electric power industry than regulation as currently practiced.

The latter part of the literature gave a broad overview and background of electricity sectors, their current status and reasons for this change. However, the following

[9] Walter J. Primeaux, Jr., "A Reexamination of the Monopoly Market Structure for Electric Utilities" in A. Pjillips, ed., *Promoting Competition in Regulated Markets*, (Washington: Brookings Institution, 1975), pp. 175-200.

paragraphs will look specifically and more comprehensive at experiences through electricity reformation of both developed and developing countries. This still links back to our original intent of setting the scene for the South African market...

2.9. The UK Electricity Industry

The following UK experience accounts were extrapolated mainly from a paper that was managed by Falato & McIntosh from Andersen Consulting (1995) who studied the UK electricity industry six years after its reformation and liberalization. The paper presents the successes of that industry as well as addresses some misconceptions, explaining some of the key issues which have risen during the restructuring process and speculates on the changes and challenges still facing the UK electricity sector six years after reforming.

As sited in many other sources, the 1989 privatization of the UK electricity sector has been one of the most closely observed experiments in the electricity supply industry of the last fifty years. The resulting industry structure and market dynamics has been studied by both governments and electricity utilities around the world. The UK model has been considered for adoption by many countries: in developed countries it has been seen as a possible path towards growth and prosperity in an industry which faces increasingly stagnant home markets; in developing countries it has been seen as the means of attracting much needed foreign capital investment. In all countries the UK model offers hope for better service, lower prices and high supply security (quality of supply).

When the UK government decided to liberalize the electricity sector, their intent was to encourage greater efficiency and increase competition. Central to this goal was the unbundling and privatization of the Central Electricity Generating Board (CEGB), which was at the time the UK's state-owned, monopoly producer and supplier. Furthermore, the aim was to provide customers with greater choice of suppliers, better services and lower prices.

At the time of privatization, skepticism was rife from critics worldwide and the following concerns were raised; would reliability be maintained? Could prices really fall as a result of competitive forces? What would happen to security of supply?

Indeed from the UK point of view, the move to restructure the industry was a bold one, ambitious as well as visionary. They were the pioneers of restructuring in the electricity sector during Margaret Thatcher's government. Through this pilot process, Falato & McIntoch (1995) observed that there was a paradigm shift through the country were utility companies have undergone fundamental change in perspective from that of engineering (wires business) focused to the retail business (customer service) focused ones. According to Cavanagh and Sonstelie (1998), there has been no clear definition of "wires business" as some activities (subject to deregulation) have been lumped together in the past and thus electricity industry restructuring should not only focus on its competitive (retail) business lines but also clarifying the Wires business.

UK electricity utilities are currently operating within a new business mandate: many inefficiencies have been driven out of the system, diversification and cross-order investments have increased and change programmes have nothing short of revolutionized employee attitudes and working practices.

Critics with a close look at this system have realized that the new industry structure has effectively led to a duopoly in generation, since the two main producers, PowerGen and National Power seem to be able to control the marginal price of electricity. From the evidence of the system's efficiency, the skepticism has changed to interest: people curious to find out what actually happened to have this success, how they can learn from this system. Furthermore, many will point out that prices had not fallen (during the first six years following reform), especially for domestic customers. Customers have seen their prices come down and services improve. This is clear in the customer discussion impact.

Although much still remains to be done before the dynamics of the UK electricity market reach a point of stability, at the time of this research, some positive findings

came out; An extremely dynamic environment in which the electricity commodity is traded competitively through both the Pool and an active second-tier market.

2.9.1. Structure of the UK industry:

The resulting industry structure that emerged consisted of twelve Regional Electricity Companies, three generating companies and one grid operator. The Regional Electricity Companies are responsible for carrying out regional distribution and supply activities. In the generation sector, National Power and PowerGen are the two main fuel producers, while nuclear Electric has taken over the country's nuclear assets. The last piece of the puzzle being filled by the National Grid Company (NGC) is responsible for transmission services.

Regulation in the UK electricity market was embodied in the Director General of Electricity Supply (DGES) – the regulator. The regulator's task is essentially to protect the customers and to promote competition in electricity generation and supply. The regulator also sets the price formulae for transmission and distribution grids, the natural monopoly elements of the market. These formulae are incentive-based and ensure that network service providers obtain a fair return on their assets whilst at the same time striving to achieve adequate levels of efficiency and customer service.

The UK chose the "big bang" implementation approach as a reform package. This included; industry unbundling, privatization and introducing competition into the industry, all at once. Perhaps it was possible to take this approach in a developed country such as this one. Certain conditions such as adequate institutional and human capacity existed to ensure that the country adopted to this "big bang" approach to ensure that there was no implementation failure (Turkson). This approach is not advisable for developing countries such as South Africa and they should rather take the gradualist approach of reforming their electricity utility industries. This approach affords the industry to steadily reform with the introduction of unbundling or rationalization, privatization and competition step-by-step in a phased approach to make sure the industry evolves with this process and that the country is able to manage all the changes consecutively.

2.9.2. Impact of competition on UK customers

2.9.2.1. Competition in the supply industry

The introduction of secondary/more suppliers has been highly successful. Typical commercial and small industrial customers have seen a decrease in price since the reform – having the choice to choose suppliers. However, very large customers have seen their price increase by a small percentage due to losses of subsidies which was a privilege days before privatization took place.

However, domestic customers have seen an increase in prices due to the fact that utility limits have fallen, however this was an expected turn of events. In addition, unbundling has resulted in a greater price transparency of the true value of services (sic: cost-reflective) provided by the constituent parts of the industry. In addition, by charging customers different prices at different times of the day (time-of-use), usage patterns may be altered in favour of the cheaper time periods thus giving incentives for demand-side management and efficient use of electricity. The UK utilities have so far shown themselves to be reasonably flexible in tailoring individual contracts to specific load management requirements especially to the very large customers.

2.9.2.2. Service levels

Service levels have improved as the regulator reported, "high level of performance was common to all Regional Electricity Companies". The mandate to Regional Electricity Companies was to offer their customers Guaranteed Standards based on the industry's Standards of Performance in areas such as the timing of connection, visits, meter reading, billing and so on. Stringent rules have been put in place for the Regional Electricity Companies (distributors) to pay a penalty to customers should any of the standard not be met.

In light of the above-mentioned service provided, in 1994 customers saw:

- A 14% drop in the total number of complaints to the regulator on electricity supply

- A 67% fall in disconnections as Regional Electricity Companies encourage new payment methods such as budget and pre-payment schemes, direct debits and standing orders.
- A tightening of Standards of Performance, which guarantee customers a minimum level of service, and the introduction of new standards to encourage energy efficiency.

2.9.2.3. Energy efficiency and the environment

Most generating companies began complying with government emission targets where they are developing environmentally friendly generation.

2.9.2.4. Suppliers and the regulator

Regional Electricity Companies liaison with the Commission regulator to form good working relationships and to adopt a non-confrontational stance with the government. Each Regional Electricity Company has a supply and a distribution arm. Distribution accounts for 80% of the profits. The regulator thus ensured that distribution prices where tightened and under control as soon as privatization was a reality to protect the customer's interest by preventing utilities from making wind-fall profits.

2.9.2.5. Customer's perspective and impact

Cecil Parkinson, Secretary of State for Energy made the following comment in February 1988 regarding the UK restructuring and customer wellbeing; "Decisions about the supply of electricity should be driven by the needs of the customer and competition is the best guarantee of customers' interest"

Electricity customers have seen a steady improvement in benefits since restructuring as discussed, through there are conflicting comments, many do not perceive or realize this.

The regulator stated that: "Customers want high standards of service from electricity companies as well as lower prices...New initiatives to enhance customer service and promote energy efficiency were put in place...there was a substantial progress in the development of competition in supply and generation" Professor Staphen Littlechild, Director General of Electricity Supply.

From the Andersen study, Falato and McIntosh have come up with a comprehensive approach forward for the UK market. That "it will be well into the next decade before the UK electricity industry becomes a truly competitive marketplace; it may take that long for greater competition to develop in generation and for the full impact of retail wheeling to take hold. In the meantime, UK players will have to continually revise their strategies and change their organizations along more customer focused lines whilst ensuring that increasing value is added to both the businesses' consumers and shareholders".

In conclusion, the UK electricity market has come a long way since 1989, but as the regulator has commented in his 1995 annual report "*...there is much that still needs to be done, particularly in further revising distribution and transmission price controls, in establishing more effective competition in generation, and in developing arrangements for the competitive supply market*".

Indeed, this is a good restructuring model for the South African electricity distribution industry to draw from bearing in mind the economic sector and types of customers amongst other aspects. The lights have stayed on in the UK sector at the same time; the country has managed to retain a good reserve margin, which currently stands at 20%. This is a very good system that electricity sectors around the world can learn from and try to imitate. Although for a developing country such as South Africa, these findings seem too good to be true and it would probably take a developing country many more decades to come to get close to a stable, efficient market.

This model is an example of how competition can exist in the electricity industry whilst maintaining security of supply. Even six years after privatization the lights stayed on. Moreover, the industry has also developed long-term security insured through new build by both incumbent producers and new Independent Power

Producers (IPPs). Many countries around the world such as Poland and the US are looking to the UK model as a basis for developing their own competitive market for electricity. The UK system is very complex, so not surprisingly it's got its flaws. Most commodity markets evolve over time.

2.10. Restructuring New Hampshire's Electric Utility Industry

Following the UK restructuring, the Public Utilities Commission produced a paper stipulating the final plan of Hampshire's restructuring initiative. In May 1996, the New Hampshire Legislature directed the Public Utilities Commission to develop a countrywide electric utility restructuring plan that would implement retail choice for all customers by January 1, 1998 (DR 96-150, 1997). The aim was to move towards providing retail customers with the opportunity to purchase electricity from competitive non-utility power suppliers.

This paper stated that the two aspects that must occur in order for retail customers to benefit from the anticipated competition. First, retail electricity service must be unbundled into generation and transmission and distribution. Secondly, the existing market structure must be restructured in a way that provides retail customers with the opportunity to choose their power suppliers.

The paper also considered the responsibilities of the different operational groups in the electricity utility. For the sake of this discussion, the bulk of the discussion will be on the Distribution business…

In a restructured industry, distribution utilities will be responsible for providing non-discriminatory unbundled distribution service to all customers in their designated boundaries. The rates of this service shall continue to be set by the regulator/ Commission. To ensure that the distribution company does not abuse its position by exercising market power, the distribution company may not be an affiliate of any company, which sells a competitive service in its service boundaries.

2.11. Restructuring In Developing Countries

Many developing countries, especially in Africa began restructuring their electricity sectors in the 1980s. Drawing from Cordukes' report (1990), countries such as Ivory Coast, Kenya, Senegal and Zimbabwe embarked on this restructuring initiative long before South Africa had the opportunity and resources to do so.

The common thread in all these countries' electricity sectors was the need to move from wholly owned state corporations (public utilities) to attracting foreign investment in order to breed a more efficient electricity supply industry. The latter is feasible owing to the assistance and guidance from government and electricity authority/regulator; this includes the ministerial approval required for its borrowing, annual budget and tariff changes (Cordukes, 1990). However, no real incentive has been provided by Government to seek private involvement in the sector. This leads to inefficiency in the electricity supply market as seen worldwide. This inevitably involves the unbundling of the three operational functions of electricity utilities, that is, generation, transmission and distribution (Cordukes, 1990).

Another common difficulty is the lack of qualified and experienced personnel to assist in advising and the undertaking of the restructuring process (Cordukes, 1990). Long-term objectives of each country are to eventually have the unbundled operational functions operating autonomously. Increasing their customer base by providing and supplying those potential customers with the basic electricity – fulfilling their social responsibilities.

However some countries' power sectors (such as Sudan) have virtually no legal and regulatory frameworks as not even a tenth of the country had been supplied with electricity. Seems there have been many changes in these electricity sectors, for instance, moving from two companies into one public sector or monopoly as well as the separation of the water and electricity corporations.

At the end, the countries have managed to become more autonomous (not completely) in terms of decision making particularly on financial matters from government control, however as expected in other areas, autonomy is constrained (Cordukes, 1990).

2.11.1."Restructuring eventually leads to Privatization"

In my dissertation proposal, I identified restructuring as a precursor of Privatization. Privatization has rapidly become the dominant political issue (worldwide) in the past few decades (sic: this is not a direct translation). It has taken many forms and guises, all of which reflect a political commitment to 'roll back the public sector' and to 'free market forces'.

According to Heald 1983 and 1984, Privatization has four components and they are as follows: ***Charging*** – involves the (partial) substitution of user charges for tax finance; ***Contracting-out*** represents the substitution of private contractors for in-house production; ***Denationalization and load-shedding*** refer to reductions in the scope of public sector activity, taking forms, respectively, of the sale of public enterprises and the (partial) abandonment of public non-market functions.

Alternatively, liberalization means the removal of statutory prohibitions on the private sector competing against the public sector. According to Heald and Steel (1982), privatization of public sectors is said to contribute towards the following four objectives; it will enhance freedom by extending the sphere of the market and contracting that of the state; it will improve efficiency because private sector organizations are inherently more efficient than public ones; it will reduce the *PSBR*; and it will re-introduce market disciplines missing in the determination of public sector pay.

The principal objectives of privatization appear to be the promotion of a more efficient allocation of resources by encouraging competition and reducing costs, and making the industries more responsive to consumers' needs. 'Public enterprises perform relatively poorly in terms of their competitive position, use labour and capital inefficiently, and are less profitable' (Moore, 1983).

Heald and Steel (1984) briefly studied a review of an experience in the US that arrived at a suggestion that regulation is likely to lead to welfare losses arising from inefficiency in the allocation of resources, to increased bureaucracy and delays in taking decisions, and possibly to relatively high compliance costs.

2.12. The history of the reformation of the South African Electricity Supply Industry and Electricity Distribution Industry

The South African Electricity Supply Industry has been, over much of the last century, dominated by the growth and consolidation of a large and powerful state-owned, vertically integrated monopoly, Eskom (Eberhard, 2003). Eberhard (2003) continues to state that, by the 1980s, poor economic and political pressures on the state-owned enterprises (SOEs), combined with broader economic and political pressures on the apartheid regime, and caused government to look at reforming these institutions. The most prominent reasons were due to poor investment decisions made, from Eskom's side resulting in massive costs to the company and, initially, to the consumer. The principle of operating at "neither a profit nor a loss" was replaced by the need to "provide the system by which the electricity needs of the consumer may be satisfied in the most cost-effective manner, subject to resource constraints and the national interest"[10].

Electricity in South Africa has consistently been amongst the cheapest in the world (see figure 15). This was due to the following two principles; first, South Africa had an abundant reserve of cheap coal – lead to the development of large coal-fired stations producing electricity economically; secondly, as a result of policies of previous political dispensation, the industry has largely ignore the electrification of millions potential (disadvantages) customers who will from now place a financial burden on the electricity industry (James, 1996).

Although the restructuring of the South African electricity (EDI) and the electricity supply (ESI) industries officially began as the nineties approached a close (post 1994

elections), the idea of rationalizing the industry was already rife in the industry before this time and some literature has been have written on this matter. Whilst the generation and transmission components of the industry are relatively consolidated, under one giant corporation Eskom, the distribution level of the industry is highly fragmented (Pickering, 1994, Turkson).

It was thus decided that rationalisation of the EDI prior to the ESI was imperative due to the following inefficiencies; *too many small, non-viable, poorly-run municipal distributors – many problems stemmed from the creation of separate black-local authorities during the past regime. Most of these utilities were not financially viable, and their electricity departments struggled with the lack of capacity, few income-generating industrial customers, and a huge backlog in new connections for low-income consumers. Many still face severe debt problem, including non-payment from customers. Some have had problems paying Eskom* (Turkson). To continue further, investing in and planning for networks is inadequate and the security and reliability of supply is being compromised. These individual distributors are unable to meet the financial demands of the electrification programme. Tariffs, for the same customer categories, vary widely between distributors. With so many inefficiencies troubling the EDI, it is thus no surprise that it is difficult for these utilities to attract skilled, motivated and adequately paid employees in the industry.

Today, the industry is still addressing these issues broad on by the past regimes, thus the need for reformation. To support the latter point which emerged many years ago, Moroeng (2005) reiterated by stating that, there is currently a large number of municipalities plus Eskom in South Africa supplying electricity to consumers – leading to more than 1000 tariffs offered to customers. This leads to the restructuring of the Distribution industry by the National Electricity Regulator whereby Eskom and municipalities will amalgamate to form six independent, financially viable Regional Electricity Distributed (REDs).

[10] Eskom Act, 1987. Government Printer. Pretoria

With inefficiencies came inequalities in the provision of electricity. Little data existed documenting demand from un-connected households (Eberhard, 2003). The inequality issue was noticed when many white South Africans, including farms, had electricity connections while few black households had access, the majority of citizens. This is how the idea of electrification emerged. Dingley (1990) began to map out the possible characteristics of a national electrification programme and argued it would be important to restructure the inefficient distribution industry. Thus, Eskom announced, in 1991, the target of electrifying 700, 000 new households by 1997, because it had excess electricity generating capacity at that time[11].

At the break of democracy Eskom's social responsibility grew significantly. It produced 97 % of the electricity generated in the country and that represented almost 60% of the electricity generated on the entire continent of Africa. However, at that time, about 70% of the South African citizens did not have access to electricity. That meant 23 million people living without the basic need of access to electricity (Pickering, 1994). Thus emphasis was given to electrification, improvements in the distribution industry, and the creation of an independent regulator and the corporatisation of Eskom (in parallel with reforms in other SOEs) (Turkson).

Eskom is the one utility that operates as a monopoly, that is, a government-owned, vertically integrated electricity utility, but like many utilities around the world, is currently undergoing the process of major changes McGregor, 1987; Pickering, 1994; Cordukes, 1990). This is brought about by an imminent government-driven restructuring and rationalization (in a democratic country) of the fragmented and inefficient electricity supply industry (ESI) and future forces such as corporatisation, deregulation, globalization, denationalization and competition in the industry as well as efficient customer service, will all influence the direction taken (Salvoldi, 2001; Pickering, 1994).

Regulation in South Africa is determined by the Electricity Act of 1994, which defines the structures, functions and responsibilities of the Electricity Control Board and thus

[11] Eskom (2001). Annual Report. Johannesburg

assigns the sole right of electricity supply within certain regional and municipal boundaries (Pickering, 1994). Despite the governance efforts in place, there is no clear regulatory regime in South Africa. This leads one to the above-mentioned issue of a fragmented industry – that electricity pricing is the country is uncoordinated and largely a product of the South African past government regime/system.

South Africa, along with many other developing countries, now faced renewed calls for capacity investment. Electricity customers have become used to cheap power from the last generation of plant expansion whose underlying capital is largely depreciated. New capacity will inevitably require higher prices and possibly more stringent standards (Turkson).

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The need to attract foreign direct investment and to counter economic sanctions and pressures that South Africa encounters were identified. To address the above issues, Eskom has recently embarked on a large scale restructuring exercise concentrating only on the Distribution business. From the above statement, it is clear that electricity utilities around the world are not only reforming the distribution sector but also transmission and generation groups. Currently in Eskom, the objective is to first separate the distribution business (customer services) from the rest of Eskom (Wires business). Following the success of the Distribution business, the rest will then follow but it highly unlikely that the transmission business will in future be reformed. Bearing in mind that this restructuring (in the Eskom/South African context) is a precursor to Privatization (the introduction of competition and customer choice of supplier) expected to materialize in more than a decade to come (Cicchetti, 1995; Cohen, 2002; Salvoldi, 2001).

Eskom could produce electricity at such low costs due to the fact that it is a monopoly and unfortunately in monopolies, there is little incentive for development of economically efficient tariffs (i.e. Innovation and service efficiency).

At first glance, the South African Electricity Industry (ESI) has performed well. Eskom supplies electricity at amongst the lowest prices in the world (see ***figure 15***). There may

be specific factors that account for low Eskom prices compared to other international utilities and there may b little hard evidence of superior efficiency (Steyn, 2001).

From the Electricity Pricing perspectives, the role that is expected from the department is to ensure that cost reflective tariffs are in place nationwide. This can be done through rationalizing the current tariff structures as well as to impart this knowledge to relevant stakeholders. The bulk of this dissertation will focus on the Tariff Design Project currently in place in Eskom. The following paragraphs will give an overview on tariffs...

2.13. The History of Electricity Tariffs in the South African context:

One expert on this subject, Shirley Salvoldi (2001) stems from the Distribution Electricity Pricing department in Eskom. Her interests lie in the rationalization of tariff structures and electricity pricing thereof. According to Pickering (1994) and Mountain (1994) politically elected local authorities (such as Eskom), or national authority, independently determine electricity tariff structures and levels. A direct consequence of the latter system of price regulation is the abundance of tariffs and tariff policies in the country, often resulting in obvious contradictions in electricity prices between customers in the same category. Salvoldi (2001) agrees with Pickering (1994) and Mountain (1994) that this lead to the fragmented and un-coordinated electricity industry that we see today.

Evidently there is a need for rational policies in the future on electricity pricing, however, it is imperative that such policies are not only rational but implementable as well – having the end user in mind (Salvoldi, 2001). For this reason, Pickering (1994) has come up with a list of key area that must be addressed by rationalization, they are; (1) the need for electrification; (2) the need for tariff rationalization; (3) demands for affordable tariffs; and (4) the reliance of municipalities (and regional distributors) to provide excess electricity supply.

Following that, Pickering proposed the following electricity supply and pricing policies in South Africa (1994):

Just as a teaser, the EPRET project team has proposed a democratic process of creating pricing policies (Pickering, 1994):

- © *Centralise the domestic pricing policy process* – ensure transfer of resources between regions in order to achieve the goal of increased access to;
- © *Involve stakeholders in policy making* –broader range of stakeholder participation in the process than previously done;
- © *Maximise community participation* – having full participation of the community earmarked for electrification projects on making decisions.

2.13.1.Review of Electricity Tariffs

A very interesting topic formulation has surfaced in a regulated monopoly such as South Africa, that is, discussion around tariffs and prices in a restructured industry (Moroeng, 2005). According to Moroeng (2005), Distribution Pricing Advisor, properly structured tariffs and prices are critical to ensure a competitive market survives but at the same time, having to cater for the poor (in terms of subsidies and electrification).

According to the World Bank policy – as stated in OMS 2.25 of March 1977 – the determination of electricity tariffs should be based on two major principles. The first is that tariffs should reflect economic efficiency prices, in terms of the structure and levels of costs for supplying electric power (Salvoldi, 2001; Moereng, 2005). The second principle is that tariffs should be set so as to make power utilities financially viable with an acceptable financial rate of return[12].

A survey done by the US Industry and Energy Department (IEN) on tariffs in developing countries in the 1980s, was conducted in terms of the following criteria; (a) whether

[12] ***A Review of World Bank Lending for Electric Power***. Industry and Energy Department, Energy Series Paper No. 2. March 1988.

tariffs have been based on long run marginal costs and, if not, what the prospects are for these countries adopting economic pricing; (b) how tariff levels in developing countries have changed in constant price terms during the 1980s[13]; and (c) how these tariff levels compare to levels in other countries and the average incremental economic cost of power system expansion during the 1990s in developing countries.

2.13.2.Objectives of Tariffs

The most significant objective of is that in the short term they recover the allowed costs to supply customers in the financial cycle. Though, in the longer term, tariffs should ensure that the recovery of costs from customers is done in the most efficient manner to ensure a sustainable business promoting stable and predictable prices wherever possible. This is probably the most significant challenge for electricity rate design and requires an effective long-term strategy. This strategy should be developed by taking into account the overall business strategy and should ensure that customer needs and requirements are always considered.

From Distribution Pricing point of view, tariff rates and prices thereof should meet customer needs while supporting overall economic efficiency (Moroeng, 2005). On that note, Salvoldi (2001) and Moroeng (2005) hold the same viewpoint that, the ideal electricity tariff's rate components should reflect the cost components of the distributor perfectly in both level and structure. That is, tariffs should cover all costs to supply customers while ensuring that the recovery of costs amongst customers is done in the most efficient manner to create stable and efficient prices. For example, where a cost is time-dependent and variable, the charge should be a time-differentiated variable charge.

However, the process of setting tariff structures, and ultimately tariff levels, is more complicated than simply following the cost drivers. How customers are charged for the

[13] Trends in tariff levels are analyzed in terms of an index in local price terms adjusted by GDP deflators, and an index in US dollar terms adjusted by the UN-MUV index.

different cost components depends on practicalities such as costs to meter complicated rate components and metering and billing system capabilities. Risk, customer needs and long-term strategies for future sustainability also have to be taken into consideration when implementing new tariff structures.

2.13.3.Policy making approach

In the absence of clear and agreed upon national economic and developmental policy goals for South Africa, several project groups have come up with common and accepted electricity pricing principles:

- Tariffs should provide the means to recover adequate revenue so that the business remains profitable and customers can receive an acceptable level of service.
- Tariffs should promote overall economic efficiency – electricity should be priced in such a way that it encourages sustainable, efficient and effective usage of electricity.
- Tariffs should be fair, equitable and transparent – where cross-subsidies exist between customers they should be justifiable and explicit (as well as access to energy services and the fulfillment of basic needs).
- Tariff rates should accurately reflect the cost to supply different customer categories and, where prudent, tariff structures should reflect the nature of costs.
- There should be stability in tariffs in order to facilitate customer choices.
- Tariffs should be sustainable both environmentally and financially.
- There should be a suite of tariffs, which give customers a choice of the most affordable tariff based on usage patterns.

The above, however, may be in conflict, e.g. tariffs cannot be cost-reflective and at the same time have subsidies for affordability purposes. All the above principles must be balanced against the needs of all the stakeholders to develop the most acceptable compromise. In the South African context, the most important goal from the above listed

is "achieving a more equitable position" but the key policy for electricity pricing is to maximise access to the service (Pickering, 1994).

Pickering (1994) attempted to list the policy criteria for evaluating household electricity tariffs, they are; Efficiency in location; Equity; Simplicity, Meeting revenue requirements – crucial for long-term viability of the industry, and other social, political and economic objectives – the redistribution of wealth and the reduction of political conflict around electricity. The designing and selection of tariffs will not be discussed at this point in more detail but in the next chapter of this dissertation.

2.14. Conclusion/ Way Forward

Electricity supply industries worldwide have undergone various reforms, some more successful than others. The choice of the restructuring model primarily depends on the specific characteristics of the country. Past experiences show that competition, both at the generation and retail sectors, are favoured, especially with the view of enhancing consumer welfare. However, what is important is in each market is getting the structure of the markets right before introducing competition. Thus, the South African government should look at realities of the industry and employ a cautious approach by developing policies that are clear and that send correct signals to investors.

Not only is the current restructuring initiative in this young democratic country a direct consequence of globalization but a necessary process that must take place to ensure that electricity supply sector is efficient in the future, that is "always having the customer in mind". Reforms are needed in all the major regulations affecting electric utilities. The above discuss has taken one on a journey of discovering exactly what restructuring of electricity entities entails.

Past experiences, especially from the UK and US reform experiences have been examined and thus the pros and cons of their experiences were "put under a microscope".

The discussion clearly showed that there is no straight or perfect form of restructuring the electricity industry. It seems each country or electricity body/ regulator has their own way of going about restructuring their industries according to their needs, types of customers, way of life and economic status (this includes amount of investment coming into the country).

Again, there is no perfect reformation as seen in this discussion that reformation of an industry can fail or succeed according to the role players and the buy-in they receive from the government and customers. Where a government or a public electricity utility is pushing for restructuring of the utility without the involvement of the customers and giving them a platform to voice out their concerns, the initiative would fail dismally. This is because such an initiative has high economic and social impact on the entire country where the reformation is taking place. The public utilities going into restructuring should properly research their market, especially their types of customers and see how they can accommodate them and have them in mind (as end users) during the process.

Ideas and perspectives of different authors, observers and researchers have been shared and thus it is up to Eskom to choose the most appropriate route for them. It seems the most relevant choices are total deregulation or separating generation from transmission and distribution and deregulating generation.

In the South African context there is a lot of cross-subsidization that is expected from the public utility, Eskom. This restructuring is expected to take another decade – allowing time for flaws during this period. As the South African Electricity Distribution Industry embarks on this major restructuring (separating distribution from transmission and generation groups) – ahead of the Electricity Supply Industry, it is hoped that from the above-mentioned experiences, they will come up with a process that is truly South African and suits the county's context. The EDI can learn a lot from past reform experiences around the world, especially UK model.

In summary, in the South African Electricity Supply Industry, Government wishes to (DME, 2000):

- Keep future electricity prices as low as possible – but economically sustainable. The success of the latter depends on allocative (correct allocation of capital in terms of investment) and productive efficiencies (competition in generation results in improved productivity).
- Unlock economic value – government wishes to increase financial and economic returns from its state-owned enterprises. Government can restructure the ESI in order to optimize the value of the industry financial returns it will receive.
- Broaden economic ownership – South Africa needs to widen the participation of the majority of its people in the economy – promotion of black-owned IPPs.
- Increased foreign direct investment – South Africa has inadequate domestic savings and needs to attract international capital into fixed domestic investment to support the economy.

This dissertation will thus concentrate on the South African Electricity Supply Industry's restructuring process that began in 1997 and mostly concentrating on the future tariff structures that will come up following this process. The dissertation will not attempt to prescribe how Eskom should be regulated or who should regulate it but to keep track of the current restructuring process, its viability, impact on stakeholders and how long it might take to reach stability in terms of tariff structures....

3. CHAPTER 3: RESEARCH METHODOLOGY

3.1. Title

The title of this research was changed. The modified and preferred title is now: ***An evaluation, investigation and recording of the design and implementation of the Cost-based and Tariff Design training programme to align Eskom Distribution for EDI restructuring***

3.2. Background

As the title states; this research is an evaluation of the Electricity Distribution Industry (EDI) restructuring model. As this research progressed, the scope has been narrowed drastically. Instead of concentrating on the EDI restructuring model holistically (with the aid of the EDI Blueprint), the focus in this chapter will be on the implementation of the Cost-based Tariff Design Course, which is being implemented, nationwide throughout the industry. This course forms part of a Tariff Alignment and Cost Based Studies Project that officially launched at the beginning of 2005. The Eskom Distribution Electricity Pricing Department is the custodian for this project – responsible for the planning, sourcing and implementation of the project. Thus, this group welcomed the challenge of transferring their knowledge on Cost-based Tariff design, which they are very familiar and comfortable with. Basically, tariff design and cost of supply studies are integral parts of their everyday work. This team sparked the recognition of this competency at the NER and EDI levels and suggested that knowledge transfer in this domain is critical for the survival of the future REDs. The teams' willingness to make time available over and above their normal work load, building this capacity throughout the country shows their dedication to their work and to Eskom; mostly it shows enthusiasm and pride in their collective job outputs. As this chapter unfolds, it will be clear that this research is based on a natural setting, thus it falls under the observation data source.

3.3. Scope of this research project

To evaluate and analyze the progress of the Tariff Alignment and Cost Based Design Project as a response from the Eskom Distribution Electricity Pricing Department to document these operations in aim of addressing the EDI objectives in providing cost-reflective pricing with transparent subsidies. This research will only focus on phase 1 of the project, the Competency Building phase, which is also, the most important as it lays the foundation for the project holistically.

3.4. Out of Scope

This research will not look at either the impact or influence that the Transmission or Generation groups of Eskom or of the Electricity Supply Industry (ESI) have on the current Electricity Distribution Industry (EDI) restructuring as this is out of scope for the project. The research will not focus on all phases of the Tariff Alignment and Cost-based Design project outside of the workshop environment. It will thus not focus deep into the actual calculations done in the process as well as the data gathering processes that occur during the phases leading to the desired tariff products.

3.5. Introduction

This research would not make any sense if one did not consult with the various EDI restructuring bills and proposals available in the industry. It is interesting to note that the restructuring process has been looming for almost a decade now as is mentioned in earlier documents on the electricity industry. The most prominent of these being the Energy White Paper compiled in 1998 by the DME for industry use and understanding. This document stipulates the important processes and challenges currently facing the industry as well as the vision (way forward) for the years to come. The document suggests a "turn-around" strategy for the industry, moving away from the Apartheid era and mending any discrepancies that the current industry has to manage without putting any blame, the aim is for a better future for the electricity industry as a whole, which should contribute to the wellbeing of the country's economy.

"Energy is the life-blood of development" and "South Africa is a country endowed with abundant energy resources"[14] these were the words proudly expressed by the former Deputy Minister of Minerals and Energy (Mr S Shabangu) and the Minister of Minerals and Energy (Dr P M Maduna) respectively. Indeed this is a land rich in natural resources that should be utilized sensibly to preserve our environment. These energy sources include; fossil fuels such as coal, uranium, liquid fuels and gas. Proper utilization of these sources can help uplift the socio-economic development of the country as well as providing the necessary infrastructural economic base for the country to become an attractive host for foreign investments in the energy sector. In terms of improvement, energy can help to address the poverty facing the previously disadvantaged in this country (especially those living in the rural areas) and increasing access to basic needs so as to allow people the freedom of self-development. This leads to the issue of sustainable development and how each citizen of this country should be equipped to sustain their family efficiently through better energy use in the future.

To reinforce the latter, the former minister also declared, in the Energy White Paper (1998) that "Government is committed to the promotion of access to affordable and sustainable energy services for small businesses, disadvantages households, small farms, schools, clinics, rural areas and wide range of other community establishments". Following such a pledge, Eskom had to ensure that its future policies and procedures are in line with government's obligations. However, the above-mentioned commitments by government cannot be done until the EDI is reformed. Therefore, Eskom Distribution realized the importance of meeting the customer needs, ensuring that they are catered for by availing electricity to all citizens at affordable prices and at the same time increasing the standard of living for all citizens. The latter was a highly socialist viewpoint and it would be interesting to see how feasible this is in light of the new restructuring bill – demanding cost-reflective tariffs.

[14] Department of Minerals and Energy. White Paper on the Energy Policy of the Republic of South Africa. 1998.

The following is a detailed account of some of the challenges facing the distribution pricing business area that need to be addressed with the restructuring of the EDI. Before making the final proposals to address the problem, Cabinet consulted with some stakeholders and finally adopted the Electricity Restructuring Interdepartmental Committee's (ERIC's) recommendations in spring of 1997 and incorporated them into the June 1998 "Draft Energy White Paper". The following concerns were raised:

- Approximately 40% of all homes in South Africa, and the majority of schools and clinics do not have access to electricity.
- The many distributors (Eskom plus Municipalities) are causing an imbalance in the EDI system mainly due to the fact that many Municipalities are not financially viable, resulting in low efficiencies, high costs and wide disparities in tariffs (that is thousands of tariffs nationwide). The aim of rationalization is thus to drastically reduce the number of distributors.
- The EDI continues to experience high levels of non-payment (via domestic customers) coupled with electricity theft, resulting in increased arrears and payment defaults.
- Electricity is used inefficiently and ignorantly, thus customers are wasting these scarce energy and capital resources.
- Despite all the above-mentioned challenges, South Africa has to maintain the competitive advantage of low, stable and cost-reflective electricity prices as well as achieve environmental sustainability. This because of the government's goals to maximize the potential for adequate, reliable, and low cost electricity to serve the people and industries in the country. Thus, the objective is to improve social equity by specifically addressing the energy requirements of the poor.

Following the proposal made by the cabinet (ERIC report, 1996), the South African government approved the restructuring of the EDI through the EDI Holdings Company in the interim before financially viable, independent regional electricity distributors (REDs) are in place. The ERIC report (1998) also proposed that these REDs be subsidiaries of the EDI Holdings Company until they are independent. However, this transition is not without complexity as it requires that the Eskom Distribution division be separated

completely from Eskom Holdings and be merged, with municipalities to form the six independent REDs.

The above proposal lead to the splitting of the transition process into phases[15]. **Phase 1**: Establishing the EDI Holdings Company and the subsequent appointment of the Board and key officials (see Figure 8) – as discussed, EDI Holdings Company will oversee the separation of the Distribution group from Eskom, parallel to the alignment of its operations (as well as Local Authorities') to align with the predetermined REDs. **Phase 2** Ring fencing of the Distribution business. This includes the transfer of municipal electricity distribution – this is where Eskom's Distribution operations, assets and activities, as well as those of Local Authority in the REDs will merge and became subsidiaries of the Holdings Company (see Figure 9). At the end of this stage, the staffing of the RED management board should have begun as well as the finalization of the initial regulatory environment for the REDs. **Phase 3**: RED establishment: The disbandment of the EDI Holdings Company and the formation of independent REDs – once the amalgamation of local authorities and Eskom Distribution have proceeded and the REDs are healthy and viable, the Holdings Company will be disbanded and each RED allowed to mature independently (Figure 10). This is coupled with the phased transfer of businesses to the REDs. Following their establishment, the REDs would remain under the control of the Holdings Company for a further 3 or more years, and weaker REDs will receive transitional financial support. All six REDs are meant to achieve financial dependence well within 5 years after their establishment.

[15] Electricity Restructuring Inter-Departmental Committee (ERIC), October 1996, Meeting South Africa's Electricity Distribution Challenges, Preliminary Report on the Restructuring and Financing of South Africa's Distribution Industry.

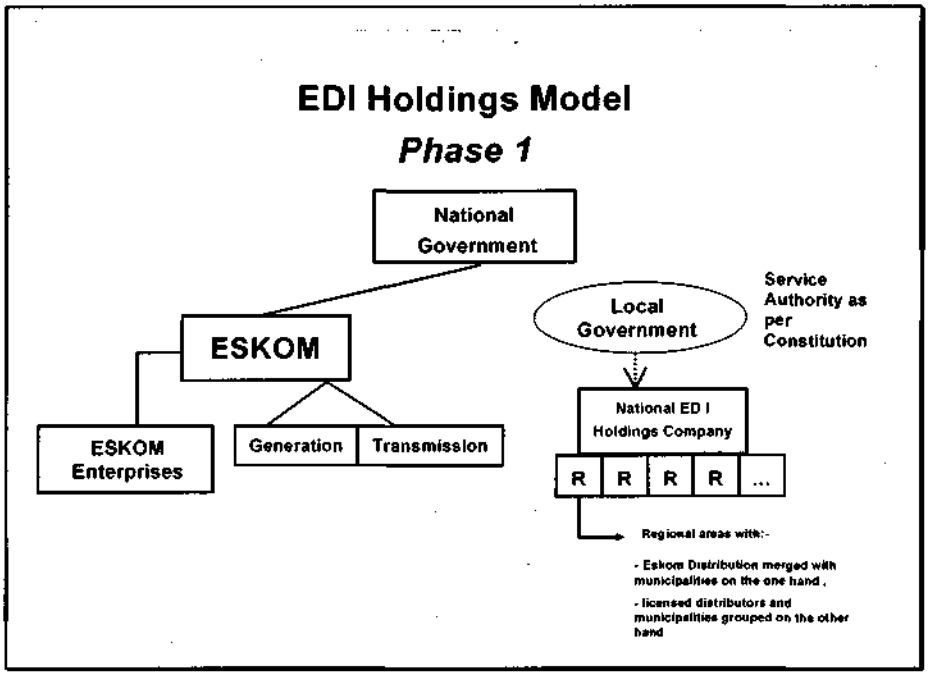

Figure 8: Phase 1 – Establishment of the EDI Holdings Company

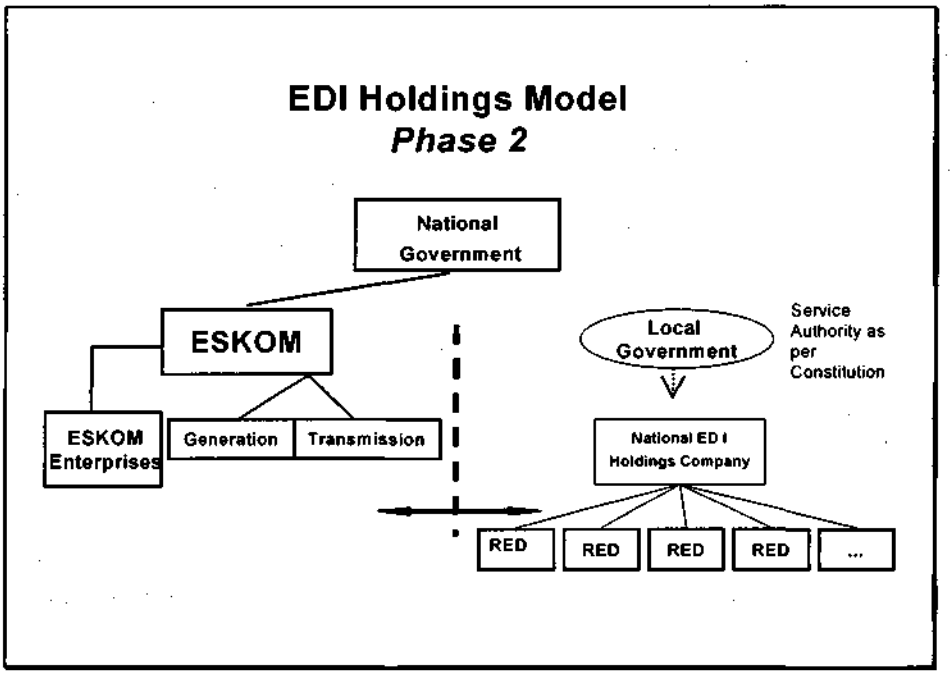

Figure 9: Phase 2 – Transfer of municipal electricity distribution

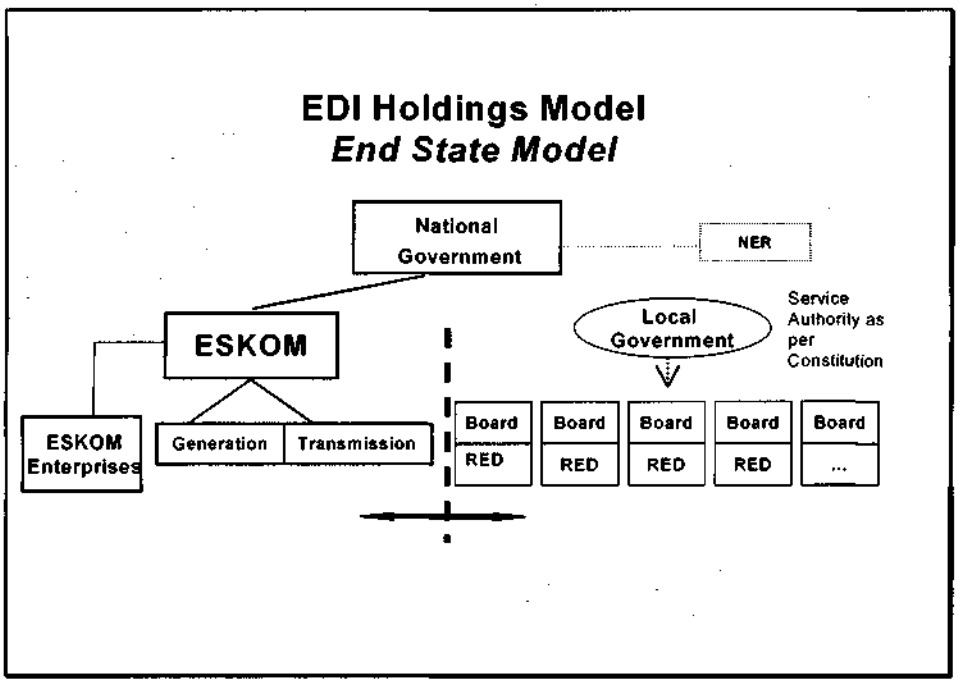

Figure 10: Phase 3 - Depicts the possibility of the disbandment of the EDI Holdings Company in the future followed by the formation of REDs

(Source for figures 1, 2, 3: Calls for Proposal: The Electricity Distribution Industry Restructuring Project)

3.6. The South African Electricity Sector

As discussed, South Africa has a fairly strong energy supply industry. However, the electricity supply sector comprise of Eskom as the monopoly (single largest) distributor and a number of Municipal entities (about 237), which supply or distribute electricity to the smaller (domestic) customers. According to the Energy White Paper (1998), a greater percentage of the electrical energy product in South Africa is generated by Eskom and thus transported over its national transmission network to distributors countrywide. However, the scope of this dissertation will focus mainly on the Distribution Business as stipulated in the last chapter. As discussed earlier, in this research, the above-described electricity supply industry is highly fragmented, hence the current restructuring process taking place in the Electricity Supply Industry (EDI). This restructuring is the root cause of various interventions taking place in the Eskom Distribution group. This discussion shall now focus on the interventions of the Eskom Distribution Pricing department.

The relevance of the previously mentioned objectives to Pricing is "the wide disparity in the prices paid by the various customer categories" (Energy White Paper, 1998) that cannot be fully explained by the costs associated with serving these categories. The Energy White Paper (1998) also imply that "without explicit or transparent funding mechanisms there is a great risk that in times of tight resources many distributors will not be able to fund their targets. Moreover, because electrification is a national objective, cross-regional subsidation should be considered as an equitable way to fund the electrification program." One should also bear in mind that without alternative funding (from Government, private investors, IPPs) and pricing mechanisms, the EDI will experience financial bankruptcy as well as substantial increases in the tariff (James, 1996).

This directs one to the issue of building capacity in the tariff and cost of supply design activities of the distribution business – one of the key objectives mentioned in the DME project proposal (1999). In terms of the audience who will be responsible for this function in the future REDs, the suitable persons should have a great understanding of the EDI market and industry and it is imperative that through that understanding, one builds a good understanding of their customers and customer base. One should also be aware of their customer's capabilities, their specific needs and what they can afford.

3.7. The EDI – past, present and the future...

"*Electricity supply throughout the world is undergoing a revolution*", Guernsey and Company, 1994 echo's the discussion in the literature review chapter. It is not surprising that electricity utilities world-wide experience the same pressures originating from global markets and new government legislation where foreign investment is suddenly welcomed into the countries to help fund power sector expansion and development as well as the possibility of innovation through "fresh and unbiased eyes". Most importantly, this new way of tackling industry irregularities, forces utilities such as Eskom to see themselves as (taxable) businesses – that will be without any governmental support in the future and should thus act accordingly with respect to global alignment.

In this respect, the Multi Market Model (MMM) approach that has been suggested for the South African market (discussed in the previous chapter), aimed at increasing competition amongst the future regional electricity distributors (REDs) where customers will have the freedom to choose their supplier (s) in future. The author is however, skeptical of the probability of the proposed MMM model in the South African context – this point will be elaborated later during the discussion chapter. On that note, one would like to put on the socialist's hat and board a journey of discovery to unravel this issue (pertaining to the tariff designing aspect) and see how tangible it can be in the future…

3.8. "The EDI Challenges – the drive for the South African restructuring"

In order to set the scene for this research chapter, I would like to review the South African EDI market with a brief overview of the existing status quo of the EDI and the challenges currently facing the industry. This is to aid in linking this chapter back to the literature review chapter as well as have more elaboration in terms of the Pricing matters that are of focal point.

According to the ERIC report (1996), the distribution of electricity is currently undertaken by Eskom, about 240 local municipalities, now much less, and thirteen other (private) distributors. The municipalities collectively service about 60% of total customers directly, and about 40% of total sales volume. These municipal or local authorities generally supply to customers in their local government areas. However, these municipal distributors differ significantly in customer density, size and type of customer base, geographic spread, financial base and effectiveness.

The latter discrepancies posed a huge crisis in this industry and need to be addressed promptly; these include (DME Calls for Proposal, December, 1999):

- The vast numbers of municipalities drive the fragmentation of the EDI.
- This leads to substantial differences in the financial condition of municipal distributors, therefore unsustainable as a business.

- The increasing number of municipalities and customers unable to pay Eskom and so are the incidences of poor quality of supply and service.
- Disparities in prices paid by the various customer categories and the cost of serving these categories.
- Economies of scale, skill and specialization, which are not applied by smaller distributors - unregulated.
- The uneven distribution of electrification needs across regions with some distributors not being able to fund their electrification targets and thus placing the national electrification programme at risk.

Furthermore, various institutions such as the EDI Holdings Company and the NER through the Discussion Document (1996) have taken some approach towards the "future" objectives subsequent to the restructuring and in light of the above challenges:

- Introducing competition into the industry
- Giving (large) customers the right to choose their electricity supplier (s) (sic: this would be what is know as "the multi market model" (MMM));
- Ensure agreed to electrification targets are met,
- Provide low-cost electricity,
- Facilitate better price equality,
- Improve the financial health of the industry,
- Improve quality of service and supply,
- Permitting open, non-discriminatory access to the transmission system;
- Encouraging private sector participation in the industry (sic: public-private partnership)
- Attract and retain competent employees (sic: via Tariff Design workshops).

3.9. Electricity Distribution industry and its relation to Electricity Pricing

Since the implementation of the EDI restructuring project, there has been criticism from the public on the justification and sustainability of this project. However, project history, supplied in the DME Calls for Proposal document (1999) states that investigations and deliberations of the project began in 1992. And prior to that (during the eighties), the idea was on some people and institution's "minds" and was still under discussion. This was long before South Africa became a democratic country opening non-prejudice possibilities towards any racial or financial aspects of the business. It was only in April 1997, after long research and deliberations, that the recommendations of the Electricity Restructuring Interdepartmental Committee (ERIC) were considered by parliament with the following proposals:

- To consolidate the electricity distribution industry into the maximum number of financially viable and independent regional distributors;
- To introduce cost-reflective tariffs, an electrification levy, and a capped tax for part funding of municipal services, all fully transparent.

It is said that these measures must translate into an electricity supply industry that is financially viable, technically healthy and well managed. In other words, one that is capable of being the engine for growth, development and prosperity for South Africa. Thus, turning the economy around, in a positive direction...

The second note as proposed by the ERIC (1996) is particularly interesting for the Distribution Pricing group as they have already began working towards this objective of setting up cost-reflective tariff structures by undertaking proper and accurate cost of supply studies. This involves the extraction of customer, network and financial data to assist in the calculations of the cost of supply of services. It is obvious from the latter statements that the move towards cost-reflective tariff structures would begin with the cooperation of people from all three fraternities; finance, engineering and customer service and quality data is key. In terms of transparency pertaining to tariffs, this involves

publicizing of the price increases or decreases as well as subsidies that each customer pays or receives. Alongside, is the responsibility of open and honest communications with customers – the sharing of the breakdown of charges per tariff or any other changes done to the existing tariffs – this promotes transparency. This communication strategy can be done via any media source such as the internet and newspapers, or in a more direct way, to large customers, incorporating this information in the customer bills as well as individual letters.

With that in mind, the Distribution Pricing group developed the Cost-based tariff design simulation-training course. This is to address the objective (stipulated in literature), "to attract and retain competent employees" to cater for the need of REDs as specified. The Cost-based tariff design course is a knowledge transfer tool to ensure that the basic understanding of the tariff design process is uniform nationwide.

It is imperative to understand the regulation of electricity in South Africa. Eskom has been regulated since the 1990's by the National Electricity Regulator (NER) now called NERSA, the National Energy Regulator of South Africa. It is however unusual for a regulated industry to undergo reformation as regulation ensures industry stability. However, regulation in South Africa, unlike international experience, has been there for a long while but it seems to have been more focused onto Eskom. This means a more lightly applied regulatory paradigm. This is amplified by the fact that other legislation governs them; the Municipal Financial Management Act (MFMA).

Some speculation on the future role of the regulator in light of the many changes:
According to Eberhard (2003), the role of the regulator will change as the ESI is restructured to introduce competition. South Africa has already established a broad competition (anti-trust) policy and legislative framework, which is captured in the Competitions Act (1998). The regulator is interested in price regulation to achieve three primary objectives, namely; financing, efficiency and equity. These were explained further in the Pricing principles stated in the review chapter.

A memorandum of understanding was concluded between NERSA and the Competition Commission in 2002. It makes provision for the establishment of a joint working group that will demarcate more clearly their respective jurisdictions and functions. NERSA will thus continue to regulate the natural monopoly components of the industry, viz. the transmission and distribution wires. It is also likely to assume responsibility for the market surveillance and then to work with the Competitions Commission around any problems or challenges concerning market power and abuse (Eberhard, 2000).

3.10. Tariff Alignment and Cost-based Design (pilot) Project – Pricing perspective

3.10.1. Project Background and introduction:

After examining the many reports, documents, proposals and blueprints (mentioned earlier) on the EDI restructuring, the Eskom Distribution Electricity Pricing department team, with the support of the EDI Holdings Company, analyzed their position in the business to come to the realization of a need for a Tariff Alignment and Cost-based project.

To further motivate their cause, they identified some key issues which they considered required immediate attention and thus should be addressed in anticipation for the implementation of future REDs:[16]:

- Eskom and local authorities (per RED boundary) to begin discussions on the move towards a common tariff framework as required by NERSA.
- Once a common ground is reached, it is imperative that a generic tariff design methodology exists throughout the country
- There must be alignment/understanding of this generic methodology – that calls for combined training sessions with all RED stakeholders.

[16] Tariff Alignment and Cost based Design Project Overview presentation, June 2005. Half-day introduction Module: Understanding the EDI environment and Simulation introduction.

- Competency Building and Skills Transfer must take place during this process.
- With all the above attended to, it is important for the business leaders to ensure that there is retention of the core critical skills (whether trained at the workshops or acquired from experience) as there is already a void for such skills in the entire industry.

During the "buy-in" or the marketing phase of the project, the latter were presented to all stakeholders during introductory sessions. During these presentations, the Eskom Distribution Electricity Pricing project team pledged to find solutions to address the above-mentioned key issues. Following from the above-mentioned key issues to be addressed by the proposed pilot project, the Eskom Distribution Electricity Pricing project team offered the following stance to the industry to address these issues:

The Eskom Distribution Electricity Pricing team will assume a stance where they assist regions in the development of a RED tariff restructuring plan (Tariff Alignment presentation, 2005):

- that will consist of:
    - Cost of Supply (COS) studies per RED, in accordance with the procedure set out in NRS058[17] standard
    - RED tariff structures – appropriately designed and based on cost of supply
    - A RED Tariff Implementation Plan taking cognisance of the impact of the new tariffs on customers.
- that will lead to:
    - Competency building and knowledge transfer to the RED employees
    - Better understanding of the fundamentals of tariffs
    - A better understanding of data necessary to design tariffs per RED
    - The latter should thus lead to better customer service delivery in the long run

[17] NRS058 standard is a document that sets out the cost of supply methodology for application in the ESI.

3.10.2.Rationale for information sharing

The Eskom Distribution Electricity Pricing team has to date been working independently on ensuring tariff structures are in place annually. This entails; reviewing of tariffs, cost of supply studies, collection of data from all regions, and lastly, presenting their proposals (on changes, modifications or price structural changes) to the National Energy Regulator of South Africa (NERSA). This, as one can imagine, is a daunting task for a small group of intellects to undertake, thus the team has been under a lot of strain due to the lack of knowledge in the business, that is, the lack of resources who know the fundamentals of this process. The latter scenario has been in place for too long, hence the decision to re-distribute this scarce knowledge as wide as possible in the distribution industry. According to Compass (an Organisational Development (OD) specialist), OD is concerned with trying to build capacity within a certain group of people to raise their morale and the feeling of recognition in an organisational setup. This reiterates the objective of retention of employees through this training intervention. From the latter discussion, it is clear that this intervention has a much broader future vision that will indefinitely benefit the entire country financially and will align with global approaches.

3.10.3.Summary of all Tariff Alignment Project Phases (pilot)

Before one continues to elaborate on the focus of this paper, the Cost-based tariff design course, it is necessary that one also reflects on the entire project to see holistically how all the systems relate and interact with each other (as well as focus on the sample population).

There are several steps to be followed in this project (inclusive of the simulations course) for one to arrive at the "end-state". As we embark on this journey into the Tariff Alignment and Cost-based Design project, one should bear in mind that the project is operating under the notion that the EDI restructuring "end-state" is a fully rationalised distribution business in South Africa. The latter scenario requires the delivery of tariff design knowledge and training thereof throughout the country to ensure that these skills

are available per RED and can be utilised where necessary. This will allow for efficient governance of future distributors, and one should realise that the implications of such an intervention could in turn, contribute to improving our economy. A bold statement to make, though it is based on the concept that the distributors will be financially viable in the (near) future, without financial assistance from government. This implies that the only revenue income distributors will receive would be through customer payments, which would be managed independently (and efficiently), ensuring that customers are constantly satisfied with services received.

Below is an overview of the Tariff Alignment and Cost-Based Design pilot project over a five-year period (not absolute but subject to change) – see Figure 11. Following that is a summary of each phase together with its expected outcomes. As the process progresses or evolves, one will notice that the complexities of the project also increase. As the project evolves, the following become apparent; the expected impact in future tariff planning and not forgetting the impact of the ultimate RED structures on this project (success and completion). This can only be determined as soon as a final decision (expected March, 2005) is in place on RED boundaries and confirmed through the legislative framework for RED formation[18].

[18] City Power – Johannesburg, 2005.

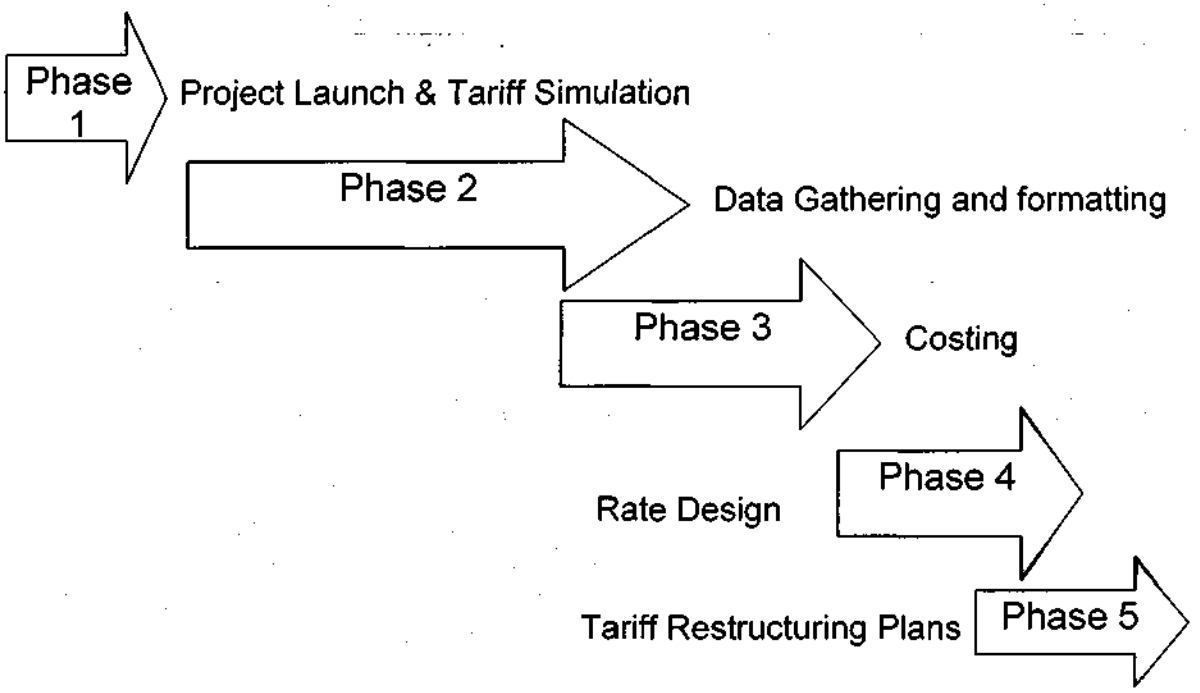

Figure 11: Tariff Alignment and Cost-based Design pilot project overview

As stipulated in the above-figure, the Tariff Alignment and Cost-based (pilot) project is separated into five phases as stipulated in the above Figure 11. There are essentially, two elements; Competency Building and RED Tariff Design and Implementation. Below is a brief description of each element with its different phases. This will clearly highlight what each phase entails. For the holistic view of the project and its elements, refer to the attached (***Annexure B & C***). The following information was collated from various stakeholder management workshops held by the Eskom Distribution Pricing Department team to introduce the concept and get stakeholder buy-in and support.

3.10.3.1. COMPONENT 1: COMPETENCY BUILDING

Phase 1: Project launch & Tariff Simulation course

This is otherwise termed the "Competency Building" phase where members of the project team undertake on skills transfer sessions throughout the industry. The mode of skills transfer utilized during these sessions is a Simulation programme to assist the target audience in understanding the process. The simulation programme is based on practical tariff design processes to illustrate the full process and how each tariff design step

unfolds. During these simulation workshops or training sessions, both the target audience and the training team are expected to; analyse existing methodologies and tariffs as well as analyse the systems used to obtain data in order to execute the cost of supply studies.

3.10.3.2. COMPONENT 2: RED TARIFF DESIGN AND IMPLEMENTATION

Phase 2: Data Gathering and formatting

After attending the training workshops, participants are given templates (i.e. empty tables and spreadsheets) and (computer) models within two weeks of the workshop to use in their specific environments. These templates and models are there to assist the participants in acquiring and formatting their own regional/entity data. The data includes; network, customer and financial data. This exercise should not only involve pricing representatives but also engage with finance and engineering employees to help collect the relevant data per entity. This ensures that there is support in regions within relevant departments (tariff design role-players) in terms of this initiative, including the ability to access data systems. Regions/entities are thus given approximately two months to collate the required information after which the Eskom Distribution Pricing Department will have follow up sessions per region to discuss the origin of the data, its accuracy and the rationale of using such data. The Eskom Distribution Pricing Department team mainly assists in the areas where data is not readily available. It also assists the participants to interpret their own data and capture it in the proposed template.

Phase 3: Costing

This phase marks the beginning of regional or entity visits by the Eskom Distribution Pricing Team (subject matter experts) where they, together with regional custodians, review and analyse the collected data by embarking on a cleanup process if the data is unsatisfactory. Costs allocation studies (using cost allocation models) are also done by the participants with the assistance of the Eskom Distribution Pricing Team. These visits are seen mostly as mentorship programmes where the "students" are assisted with data assumptions at their workplaces to reinforce their practical training already equipped with the academic background from the workshops. It is thus imperative that the project team

only works with target audience that has participated in the workshops to avoid wasting time, as all parties should have the same perception. Evidently such intense mentorship activities require some dedication and (unspecified) time spent with participants in their specific environments discussing their specific stumbling blocks and formulating solutions.

Phase 4: Rate Design

Once the costs have been allocated and the design team is satisfied, costs are converted into tariffs. The team now comprises the project team plus the regional participant; it is then termed the "Workgroup". At this point, the workgroup has the opportunity to discuss the design philosophy of each tariff structure and decide on the most appropriate tariff structure. This exercise is practically executed by participants so they have a total learning experience through these sessions. The engineering staff is thus required to participate in designing of the network (Distribution use of system – DUOS) components of tariffs. Following this session, the participant should have a further understanding of data requirements and the tariff methodology itself as well as a complete set of tariffs and should identify possible subsidies that should be applied in his/her region. The "student" must also understand the revenue impact for each large customer and all small customer impacts at each tariff level. To ensure further learning takes place, these sessions are mostly done as open sessions per region to discuss their tariff design choices.

Phase 5: Tariff Restructuring Plans

During this phase, participants are given a chance to reflect on their designed tariff structures in order to understand the implications on their customers. Each region or entity is thus expected, at this stage, to prepare and develop a detailed Tariff Implementation Plan, specifying timelines for each expected outcome. The plans however require the approval of NERSA; this would require the submission of a plan by the participants as well as a presentation of the plan. If the regulator is satisfied with the (presented) plan, approval will be obtained and the plan can be executed in the region or entity. This process will be repeated if any structural changes are made to tariffs.

With the latter project background, one can thus view the scope of the project from which emanates the project team's assumptions and the expected regional responsibilities:

3.10.4. The Scope of the Project implementation:

- To skill participants to do their own Cost of Supply studies per entity
- To enable each entity to embark on their own tariff design
- Other related charges such as; Wires charges or Distribution Use of System (DUOS) charges should flow from these results
- Other adhoc services of the wires or engineering business will not be handled (although acquired skills can be applied)
- The implementation of the training learnt by participants once they are back in their "shells" or workplace

3.10.5. The training team:

The team is comprised of competent people that stem from Distribution Corporate Pricing plus two facilitation experts from Business Today Consultancy Company. The Distribution team comprises of Mr Phillip Marais (Tariff design & Cost based specialist), Mr Robert Smith (Cost based & Computer Simulation Specialist), Mr Adriaan De Kok (Senior Consultant Pricing Analyst), this team was under the leadership and guidance of Mr Deon Conradie, the Senior Pricing Manager as directed by Ms Thandi Mazibuko (EDI Holdings). Ms Lerato Legoete, the author was unofficially appointed, the "Project Coordinator" in May 2005 – see the MS Project Plan provided in ***Annexure B*** (for more detail) which is updated regularly subject to the monthly scheduled workshops taking place and where there are changes that were not envisaged earlier...

3.10.6. Assumptions by the Project team (core pricing team):

- High level project involvement & support
- Data will be obtained from other business areas (e.g. Finance, Engineering) with full support
- Engineering staff involved to provide network data
- Financial ring-fencing of the electricity business, of all entities participating
- Participants to involve other staff in project and handle all communication
- Current models in use will be used to enable capacity building – Excel and Access based

3.10.7. The target audience:

The target audience include all future RED role players, that is; the NER, EDI, local authorities and Eskom but specifically; Network Services engineers, Finance employees, Electricity Pricing, Meter readers and Customer Service employees.

3.10.8. Regional Responsibilities with regard to project:

Although, the regions or (future) REDs are the customers in this regard, there are certain outputs expected of them in terms of cost-based tariff design so that the Eskom Distribution Electricity Pricing project team can monitor, support and guide each RED through the Tariff Alignment and Cost-based process. This involves the establishment of 'regional' tariff working groups to ensure that the 'Regional' team (Eskom and Metro/Municipalities for that RED):

- Fully participate in all the phases of the tariff alignment and cost-based design process,
- Have a thorough understanding of cost allocation and tariff setting methodologies,
- Will carry the responsibility for regional co-ordination, data collection and cost allocation as well as cooperate with other role players in the tariff design process.
- Will be responsible to calculate the costs and tariffs per RED.

3.11. Future Tariff Structures

Tariffs include the following; cost basis, unbundling, transparency and non-discrimination. The REDs need to launch their business on a sound basis in terms of tariffs, however, the EDI Holdings Company has subsequently approved that each RED (once formed) continue with the same tariff structures until "the company" is in a position to prepare and produce a consolidated tariff plan and structures – see ***figure 12***. This means in essence that, when the REDs are formed, Eskom and local authorities or municipalities involved per RED boundary would both be allowed to continue with their respectable tariff structures (customer base and revenue thereof) until the REDs are stable enough to allow for full transfer of assets, customers and employees by both "contributors". However, during this era of industry uncertainties (in terms of the RED transition), the Eskom Distribution Electricity Pricing project team is faced with the daunting task of encouraging current regions to take this learning opportunity of design their tariffs using data based on their specific cost of supply studies. This initiative is not only a platform for information sharing but also aimed at preparing those individuals who will be accountable for designing tariffs in future RED boundaries and to make them aware that it will be the region's prerogative to use what they have learnt from this pilot project or not.

The proposal from the Pricing project team as well as the EDI Holdings Company is that, once the REDs are stable, thereafter, REDs should move to the integrated/ rationalized RED tariff structures, again, under the impression that EDI restructuring would go fully. Clearly this can only take place through a phased-in approach, that is, over a certain time period based on the costs and financial stability per RED – *see* Figure 12 below. The implications of regions or entities designing their own tariff structures in future however, means that the accountability per RED increases, as head office assistance will be limited. Despite the accountability for tariff plans and structures, REDs need to look at their own sales/load/price forecasting (both short & long term) as well as purchasing contracts.

This chapter will only focus on Phase 1 of the project, its implementation and outcomes thereof, which is Competency Building. As one reads through this chapter, one should bear in mind that the coordination of all the above-mentioned phases is a great challenge. Therefore also consider the complexities that accompany the entire Tariff Alignment and Cost-based project and the implementation of phase 1. The difficulty encountered during the Competency Building phase is with the proper alignment of all six regional workshops by avoiding coincidental workshops as well as with the implementation of the rest of the project phases. It is thus the duty of the Project Coordinator to avoid the latter while compiling the Project Plan (figure by communicating such difficulties to the project team.

The proposed process that will lead to the implementation of RED structures and predetermined timelines – subsequent to RED formation

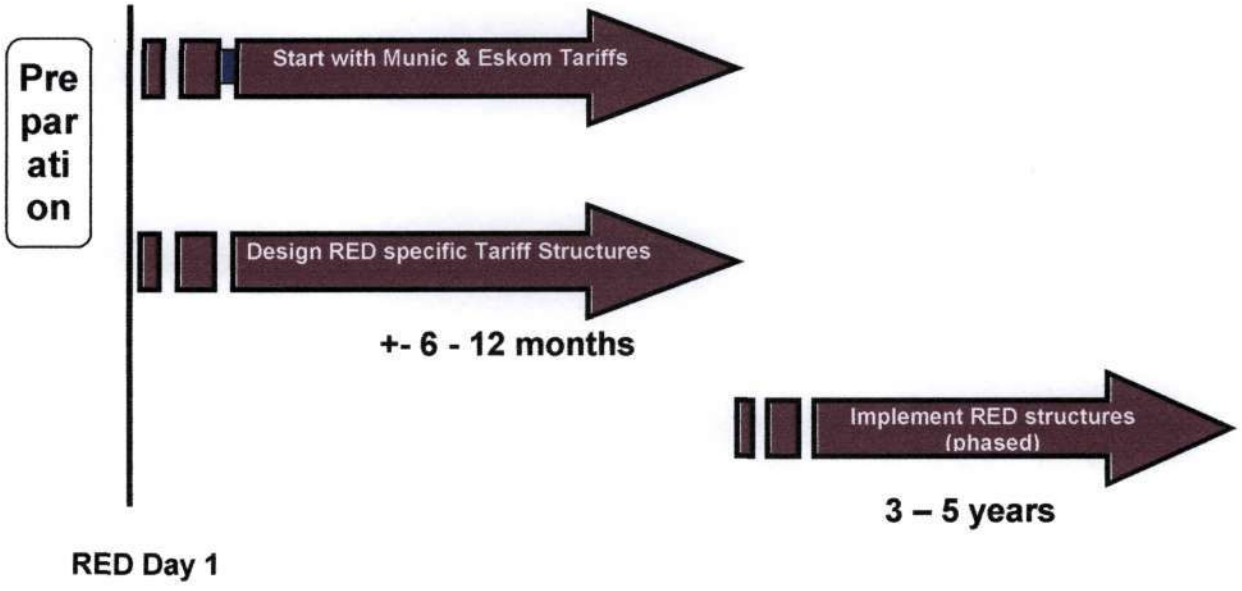

Figure 12: The overview of the Tariff Alignment and Cost-based Design pilot project over a five-year period

3.12. COMPETENCY BUILDING PHASE (phase 1)

Concerns with the future Tariff structures and external factors facing the project

This project is compelled to consider certain proposals made by the government and regulatory levels. That is, the external pressures arising from various documents such as; the DME Energy White Paper (1998) – via the energy custodian, the EDI Blueprint or the sponsor's bible (from the EDI Holdings Company) and from the regulator's side (NER Discussion Document (1996)). The latter references should be of no surprise as they have been repeatedly discussed and cited throughout this chapter.

These documents discuss the dynamics relevant to and responsible for the establishment of this project (amongst others). They include the following; the rationalization, reduction and amalgamation of the many tariffs in the industry. In turn, the Eskom Distribution Electricity Pricing department team has interpreted the latter as the need to move towards the same; tariff structures, tariff categories or classes, chargeable tariff components unique cost-reflective price levels and policy application for the same customer type. The latter represents the equity side of Eskom; however, these tariffs must also be sound and understandable to the "common" customer, this goal also links up with the transparency issue proposed by the ERIC (1996) discussed earlier. Are these not contradictory statements? I will now bury this issue for a while and continue to discuss the project...

3.13. The Tariff Alignment and Cost Based Design Course

3.13.1. Background on the course...

A need analysis study was done throughout the Distribution business to assess the competency gaps that need to be filled before Eskom employees can comfortably move into the REDs. In Electricity Pricing, Tariff Design was identified as a scarce skill and thus, capacity should be built. There is an urgency to increase this skill in Distribution

because tariff design is currently done centrally by the Eskom Distribution Pricing team for all regional customer classes. This team is located at the Head office and comprises a few individuals with attractive specialised skills that compliment each other. These skills enable them to undertake this project.

It is thus logical that the Eskom Distribution Pricing team takes on this challenge, as they are the main source of information to compile such a training programme. With the identification of the need (through needs analysis) came the commitment from the team. Soon afterwards, the EDI Holdings Company was contacted via the retail custodian (Ms Thandi Mazibuko) and negotiations began with the hope of attaining ultimate support. The consultation exercise was a success because the EDI Holdings was impressed by the project proposal, agreed to sponsor the project and a partnership was formed.

The eagerness of the EDI Holdings Company to sponsor the project was based on the fact that the project was in line with the EDI's objectives, as well as the Government's plan to equip employees with skills that will ensure their survival in the proposed REDs. This kind of intervention is necessary in a restructuring environment and can also help the Distribution business to retain employees and their commitment to the organization[19]. The agreement was made at the end of 2004, that was, to launch a "pilot" project using a prototype of target people and evaluate its success at the end of the Competency Building pilot phase (envisaged 2005).

Following the sponsorship of EDI Holdings and obtaining a mandate and support, this collaboration encouraged the project team to ensure some prerequisites were in place by putting together an accountability profile prior to project implementation (as presented in the introductory sessions):

- Approval by management of all stakeholders (local)
- The proposed REDs to support this initiative by assigning resources for training – this ensures the empowerment of their employees.

[19] Refer to EDI Holdings restructuring objectives

- The proposed REDs to take accountability for data – to implement the practical work at their specific workplaces as per training sessions
- More or less full time allocation of some resources to the tariff design/competency building project per RED.

After confirming support from all other stakeholders, the aim is to involve all employees from relevant "RED" stakeholders in this initiative. The stakeholders involved here include employees from the following organizations; Eskom Distribution, Municipalities, National Energy Regulator of South Africa and EDI Holdings itself. There seems to be a major gap in the industry in terms of the Tariff Design skills. The following discussion will focus on the Tariff Design Course, the processes involved, the planning and implementation thereof as well as the evaluation of the delegates' feedback.

3.13.2. Hypothesis of the Tariff Design Course

To build capacity in the six Distribution regions (and their surrounding local authorities) prior to RED formation, to position and empower regional staff, to obtain the National Electricity Regulator's (NER) and Eskom direction to develop and implement regional tariffs whilst moving towards different (but regulated) RED tariff structures. This intervention is thus aimed at addressing the lack of tariff design knowledge in the industry as a whole, by introducing and exposing delegates to the practical work done during cost of supply studies that eventually leads to the design of tariffs.

The chosen mode of facilitation was workshops. This method of facilitation has been chosen on the grounds that it is more interactive and allows open and active learning to take place. It is assumed that it is more interactive and thus participants will be able to interact with each other (in groups or within the class context). This will create the opportunity and space for learning from one another. These workshops thus provide interactive access to the simulation program, which contains all information and data necessary to put together a simulated design tariff. This data is actual customer, financial and network data extrapolated from existing data within the industry.

The workshops are thus a mix of lecture, demonstration and hands-on investigations and deliberations. The hands-on investigations are done by the participants to exercise the theoretical background that is shared with them on the simulation program. A case study approach is adopted here whilst the participants are modeling their own tariffs, because they attempt to solve their own problems encountered during the process (with the help of the training team). At the end, they should have a number of scenarios and thus can extrapolate which is the most feasible. This exercise provides one with the content and context for developing and understanding of tariffs, their categories and subsidies thereof. At the end of each five-day workshop, participants should be able to apply the theory and methods learnt in these workshops back in their local settings.

Objectives of the workshops with regard to delegates learning outcomes:

- To impart a good understanding of cost allocation methodologies
- Participants to execute all activities of cost allocation and tariff design after attending the workshops (including regional co-ordination and data collection)
- This should enable participants in future to independently calculate the costs and tariffs per entity or region

To summarise the Competency Building phase: ***Please note that a region will be considered empowered with respect to competence when its people, in addition to carrying out their normal tasks in each of the functions, are able to perform roles transferred to it from Corporate and Head Office, and newly identified organizational roles, in order to operate as a fully autonomous entity***[20]

3.13.3. The simulation programme

The computer simulation programme discussed before, is now being utilised in the Tariff Design Workshops – the OD intervention of choice for Distribution Pricing. The presentation of this course is a dual effort, as both Pricing specialists (from the Eskom Distribution Electricity Pricing team) and consultants attempt the work together. Because the facilitators were not subject matter experts in the tariff design field, it was decided

that the core-pricing experts (from the Distribution Electricity Pricing team) also be involved in these workshops. This opinion is on the basis that, a Pricing specialist needs to be present (especially on the first day of the workshops) to recap on the project overview (done in the half-day introductory session) as well as the tariff design steps that delegates are expected to complete in the five days. Another critical reason is that the Pricing specialists can interact directly with fellow delegates (who stem from the same industry) where (technical) help is needed. With all role players in place and in support of this project, the project was bound to succeed when implemented.

Below is a graphical illustration of the high-level simulation programme and its respective step-by-step processes. For a glimpse of what the simulation programme looks like, see the Annexure D...

The simulation programme entails a few steps:

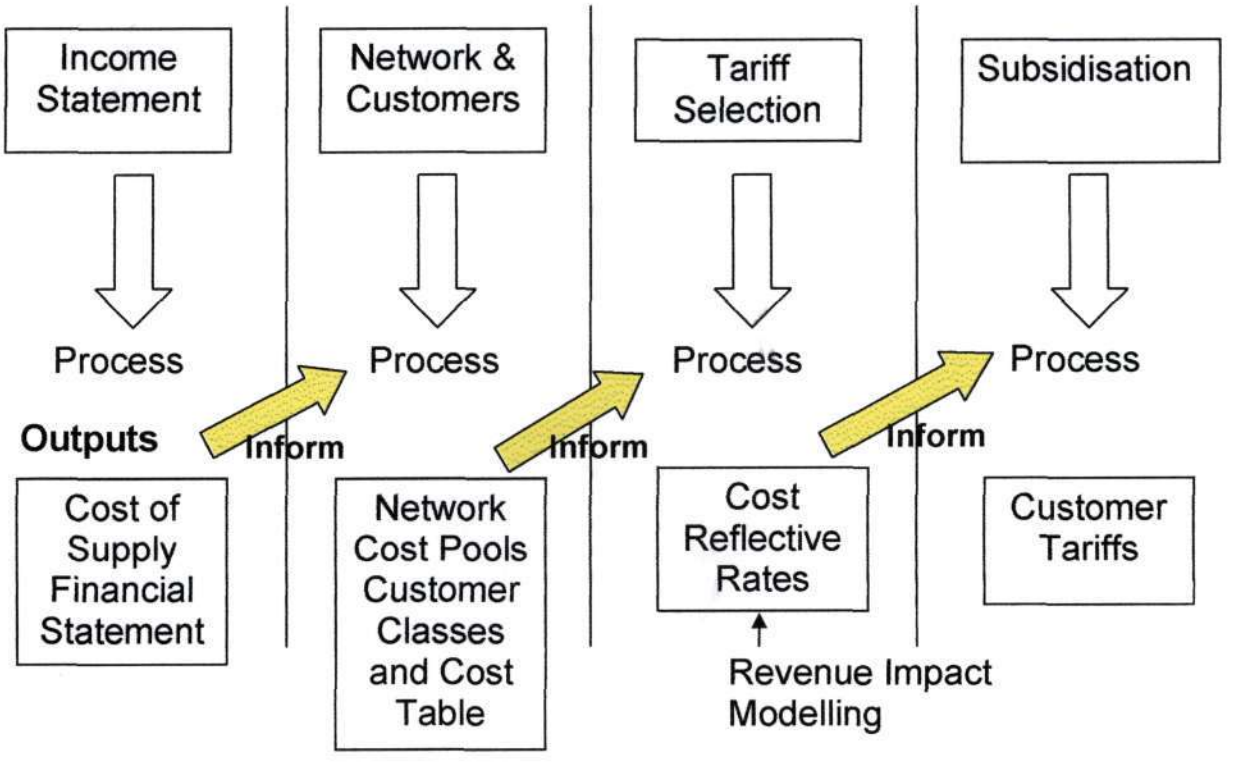

Figure 13: High level Tariff Design Programme - utilized in the Cost-based tariff design Courses via simulation

[20] Programme 726: Capacity Building presentation for Northern Region by Ken Hall. 28 October 2005.

The tariff design programme promulgates many step-by-step analysis phases as depicted in Figure 13 above. Basically, the objective in designing a tariff structure is to go from an income statement (supplied by Distribution Finance) to a Customer Tariff. There are many other steps in between which participants get an opportunity to tackle ending up with a Cost Table. The Income Statement and resultant Cost Table are supplied in Annexure E for one's perusal to see what the "raw" data looks like in comparison to the Cost Table that is the product. This particular Cost Table also shows tariff component breakdown for different customer categories. This is, in essence, the Tariff as it depicts all the components, which eventually appear in customer tariffs (in their bill statements). The Cost Table represents the outputs from the "Costing" exercise as it expresses cost categories per cost allocation. According to Muisha Fred from NUR, costing involves determining the value of resources consumed in the provision of services. Its role is to act as a benchmark against which pricing and production decisions can be made.

3.13.4. Student motivation

A learning environment is created at these sessions for the obvious reasons that the target audience is group of mature adults who might actually teach the training team some aspects about the business. Thus the participants are made to feel "secure" in these workshops and this should encourage them to do the following:

- Instil personal confidence and respect for others
- Model and encourage constructive criticism
- Value individual opinions and
- Provide opportunities for self-direction and leadership
- Think deeply about a problem
- Share that thinking with others to hear their perspectives
- Listen to their critiques
- Build on those experiences towards a solution (s)

3.13.5. The testing of the intervention and implementation

Tariff Design simulation workshops are presented nationwide with Distribution as the target audience (already discussed). Both the Distribution Electricity Pricing team and Business Today consultants are involved in each training session. This type of collaboration is necessary because the consultants cannot run the workshops independently of the Distribution Electricity Pricing team (Pricing specialists), as they would not be able to answer and guide the delegates through some of the difficult processes encountered during tariff design. There are complex calculations and technical concepts that only the pricing specialists can clarify due to their level of experience in their respectable roles in the Distribution business and thus can relate to and better assist their regional colleagues.

3.13.6. Progress to date and outcomes

To date (October 2005), the Competency Building phase of the pilot has been completed in all designated Eskom regions. That is, Cape Town (RED 1), Bloemfontein (proposed RED2), East London (proposed RED3), Johannesburg (proposed RED4), Durban (proposed RED5) and Pretoria (proposed RED6). The intervention dates for the listed regions are stipulated in the provided Project Plan – done on MS Project Software (Annexure B – figure 17 & 18). Course evaluation forms were distributed after each five-day workshop per region and hence feedback was received from the delegates and their take on the five-day workshop they have undergone. See feedback summary under results.

3.14. Evaluation of the research methodology

3.14.1. Data collection approach

This chapter sets out the collection, selection and analysis of the Competency Building data – once the "fieldwork" is officially collected. The chosen and most appropriate

method to use is qualitative as there is so much to discuss about this project rather than gathering samples and attempting to use statistics in the analysis – this was briefly discussed in the first chapter. Since the project was a "group effort" (involving the Eskom Distribution Electricity Pricing department project team), data was actively collected with the help and support of the entire team in order to document their efforts and assist prospective individuals who intend to enter this field in future, in short, to leave a legacy (in these exciting times in South Africa) for the benefit of the entire country and our growing economy.

Although the research will be action-orientated, it will also be qualitative, "the methodology of an emerging design based on experiences of individuals in a natural setting" (Creswell, 1994; Creswell, 2003; Merriam, 1988). That is, this research will be based on emerging aspects and development of the above-mentioned project in the Eskom Distribution Electricity Pricing department. Even though quantitative information will not be utilized in this research, some information on data acquisition and cost of supply studies will be quantitative. The latter quantitative data includes financial, customer and economic data, which is out of scope for this project phase. The research will thus involve a qualitative method approach (Creswell, 2003) as there is a great possibility of utilizing both approaches to have a holistic view of the "rationalization" of tariff structures in future REDs. To be more specific, surveys and interviews will be conducted with the relevant audience that arises from the various stakeholder groups affected by the simulation workshops.

Looking at the problem context and the grouping of Systems Methodologies, it is plain that this research will take a soft systems approach, considering all the uncertainties with the current transformation process – these dynamics already discussed in previous chapters. The holistic analysis of the system together with its tribulations has revealed much complexity bearing in mind that the EDI restructuring project affects many stakeholders and the future success of the project depends on the relationship between the different stakeholders (who have to get buy-in). It is thus appropriate to consider that the systems methodology in this research as Complex-Pluralist (Flood & Jackson, 1991).

This approach will assist the writer to identify and understand the system that is of focus, in the context of the "tariff rationalization" project as part of the greater EDI restructuring environment. To further understand the nature and problem of the system in hope of resolving the problem or at least get to the gist of the problem. From the latter discussion, one anticipates an interactive planning process for this project, which is visibly a soft systems approach (Flood & Jackson, 1991; Gill & Johnson, 2002). The intent here is to start with a problem situation that is unstructured (Flood & Jackson, 1991; Gill & Johnson, 2002), that is, looking at the lack of tariff design knowledge in the regional customer service, engineering and financial departments.

On the whole, the entire EDI industry is in disorder and this intervention is thus expected to repair the current problem facing the industry by producing one specific method or model of designing tariffs (via the Simulation programme), using a target audience. This problem needs to be addressed and alleviated within a certain time period (that is, before RED amalgamation) with the hope that support will be consistent from other departments. There are many interdependencies in this project, that is, stakeholders that depend on the success of this project, ultimately affecting the success of the future REDS and their ability to handle their tariff structures, purchasing of their energy and forecasting of the sales and prices. The intent of this research is to report on "Evaluative findings" – where one would provide evidence for the outcome, benefits or impact of the Tariff Design Workshop interventions.

3.14.2. Evaluation Strategies and reason for the use of a particular methodology

According to the writer, the type(s) of evaluation strategies that are appropriate for this project include; qualitative/anthropological and participant-orientated models. Qualitative evaluation strategy is where the project is evaluated in terms of the value of subjective human interpretation. That is, examining the reactions of stakeholders (during the project) on the proposal and whether they agree that it is in Eskom's best interest to remain a

public entity in future or join in the municipal entity, i.e. RED formation – leading to the integration of organisational cultures and the alteration of employees and management mental models (Schwartz, 1991). This includes associated strategies such as; naturalistic or 'Fourth Generation', quality and relevance of the project approaches (Owen, 1999; Zadek). The other type of evaluation strategies being the Participant-orientated model emphasises participants and their importance in the evaluation process (Flood & Jackson, 1991; Jackson, 1991; Owen, 1999). In this case, the project team is faced with the task of renegotiating with or getting the buy-in/trust of the stakeholders to remind them of the benefit and significance of the restructuring process for the good of the whole distribution industry.

The researcher or writer here acts as a (participant-observer) as she interacts regularly with the target audience that happen to be the research subjects. The advantage of such interface is that one has had the opportunity to participate in one of the five-day workshops (in Cape Town) as well as being part of the project team as the project coordinator. According to Mouton (2001) and other sources of qualitative research methodologies, the latter is an example of, "participant observation in natural field setting"[21]. The research methodology used in this research thus involved hands on involvement of the researcher with the subjects.

As this is an emerging and dynamic project which is unfolding as the research progresses, interventions do not always evolve as planned and thus as the researcher, one has to be updated with recent occurrences so that one can have mitigation strategies in place to counteract these uncertainties and ensure that one is on track in terms of the research subject matter. The uncertainties of the project were actually welcomed by the researcher without any reservations due to the challenge of tackling the emerging issues. The unexpected outcomes thus created room for learning and one had the opportunity to reflect on the learning outcomes in the research discussion. Thus this research is not to develop new measuring instruments such as design, construction and piloting (Mouton,

[21] Qualitative Social Science Research Methodology. http://faculty.ncwc.edu/toconnor/308/3081ect09.htm

2001) but more on capturing the fieldwork/ data from the outcome of this pilot project as well as analysis and interpretation of the data.

The pilot project has not been suitably documented beforehand for public usage or the information per se. Dynamics such as sensitivity issues and reservations and resistance towards the reality of the REDs (which still exist) could be attributed for this delay. Thus this document is there to eliminate the dilemma that the project team might face, that is, of losing track of all their efforts to date. All the primary data is directly collected from the pilot project.

3.14.3. Sample size

As stated, a prototype of employees from the target population was used as a sample to test the pilot phase. The sample was about twenty participants per workshop session that is twenty times six regions plus two extra workshops; one specifically for the finance group and one generic one – both comprising of twenty participants. Another constraint that dictated the specified number of attendees was that, because this is a sponsored initiative, there was limited space in all workshops per regional boundary. That means that about half of the groups comprised Eskom employees and the rest were from municipalities, metros or the NER. That equates to about sixty Eskom employees who were exposed to the world of tariff design. This might sound like a large number of participants (to the untrained ear) from Eskom's side but it is a very small percentage of Distribution employees in need of this exposure in the business.

The sponsorship and support of the EDI Holdings Company was a contributing factor to the success of this project. Note that the generic workshop is one where delegates from around the country can attend due to the fact that they could not attend previously scheduled training sessions and a number of other constraints. It is also the last opportunity to redeem oneself and gather the required knowledge while these pilot interventions are under the sponsorship of the EDI Holdings Company (no cost to the regions), a luxury which will be forfeited at the start of the following year (2006).

As the academics elaborate, *the emphasis of this research will be social science as the subjects of the study are people and the project itself and one is using measures such as the questionnaires to analyse the pilot project's outcome*. Mouton (2001) also spells out in his review that when using the chosen qualitative research method, "it is imperative that you document your data collection process as accurately as possible as a historical record for yourself and other possible researchers (in future)". The emerging data from this research will thus be stored or archived (as intellectual property) and disseminated nationally with permission and mandate.

One would recognise by now that the researchers main duty here is keeping track of the fieldwork as a form of quality control. "*By keeping a record of the main decisions and events during the fieldwork process, you construct a historical record of the whole process to which you can return later if necessary*". The latter statement captured by Mouton (2001) summarises the whole intent of this research as discussed earlier. This involves; keeping record of the participants in the fieldwork and keeping track of factors that negatively influence the fieldwork. The latter form part of qualitative research where the researcher tends to keep field notes as they participate in the fieldwork – in "natural" settings (Mouton, 2001).

4. CHAPTER 4: ANALYSIS OF RESULTS AND DISCUSSION

4.1. The results

4.1.1. Attendance of the sample/ targeted audience

Most of the pilot sample or invitees honoured the privilege by attending the courses. In light of that outcome, it is relatively easy in this project to collect data from 90 – 99% of the sample group due to the small group utilised for the pilot. This made data gathering a relatively painless exercise and due to the team's familiarity with their subjects as well as their dedication to access the correct data to ensure project success.

The discrepancy here is where the targeted audience fail to attend the workshops, without any explanations as to their absence – this is the reason for the minuscule gap in the data coverage. The information was well channelled and unambiguous due to the small sample target audience. As mentioned, the allowed set was a maximum of twenty attendees per workshop/ training session (inclusive of all role-players).

4.1.2. Feedback from delegates:

Following the interventions, all students were given questionnaires, that is, "Course Evaluation" forms to allow each participant the freedom to express themselves about the workshops and reflect on the learning experience in the sessions. An example of the Course Evaluation form is provided in ***Annexure F*** as well as some feedback forms from various regions. After each session, a consolidation of all participants' comments per region was put together, allowing the project team to absorb the evaluation during the discussion sessions held after each session. This feedback has been provided in the annexure for information. This workshop period is spanned from June 2005 to September 2005.

4.1.2.1. Positive Feedback

The following is a summary of the key positive comments from participants and their learning outcomes:

- The training team was complimented on the excellent work done and delegates were impressed by the "very illustrative and well built/ structured" model.
- Delegates realised that (technical) steps such as, weighting of components, network and cost allocation and grouping of customers are not as easy as they sound but are perfected through nifty practice and ingeniousness.
- Most delegates enjoyed the hands on approach (using the computer simulation programme) as it helped to conceptualise the Tariff Design concepts.
- It was also useful and insightful; each team was expected to have a presentation (to the regulator) of their designed Tariffs. This was a reflection exercise which gave team members the confidence to explain and defend their tariff outcomes in terms of customer benefits.
- "The interaction between employees from competitive organisations was a first and useful ideas on differing methodologies of tariff design were expressed. This leads to learning opportunities for all."
- Delegates had an eye opening experience where they saw where they fit into the distribution business and how important their individual roles are in their designated departments as they have the potential to affect all business aspects. This calls for the importance of disseminating quality information (at a given time-period) needed for input in the process of designing tariffs. They were able to see the big picture and how it is important for each individual to do their jobs efficiently in future as not to delay the tariff design process, which takes about six months to be completed.
- This intervention increased the delegates' understanding of the business in so much that delegates requested that they receive more on-job training in this aspect as well as mentorship programmes to guide them in becoming specialists in this business area over the long run.

- The delegates learnt to appreciate the hard work that goes into designing tariffs, how one has to have an overall knowledge of the business and in addition, an idea of the expected achievements and goals in terms of the tariffs structures.
- Many delegates also experienced a culture shock, by realising the complexity and in-depth knowledge needed in order for one to design tariffs. This awareness brought them to an understanding and appreciation for the people currently undertaking this task in their region. This meant that each individual still had a lot to learn regarding this aspect of the business.
- Delegates seemed to be impressed by the holistic, step-by-step and logical approach that this course/ workshop follow over the five days as well as re-enforcing of the learning process. This feedback indicates that most delegates left the workshops inspired and motivated to improve in their jobs (especially with providing quality data to the next person in the chain) as well as to go out there and promote the importance of cost-reflective tariffs.
- An important point raised here was that one should do careful investigation and research when collecting and consolidating data before setting up tariffs; while doing this, one should ensure synergy between the different role players (in their region) who give input into the Tariff Design process.

4.1.2.2. Negative Feedback

The following is a summary of the key customer (positive) comments and their learning outcomes:

- Delegates had a lot to say about the simulation programme itself. The fact that there were software discrepancies with some of the laptop computers used at these workshops. The problem identified here was that some laptops' software was not compatible with this cost-based simulation programme. These problematic laptops were those that belonged to delegates who volunteered them at the beginning of the course and thus they were not checked for compatibility prior to the course.

- Complaints were raised about the length of the workshops (five days); some complaint it was not enough while other said it was too long!
- Concerns about the suitability of the target audience and if it was relevant for some of the people who attended to have undergone such intense tariff design training.
- Some delegates were uncomfortable with the group sizes that they were placed in (there were 5 – 6 people in a group comprising of delegates from different entities)! These delegates believe that if the groups were smaller, then this would allow more participation and understanding by individuals.
- Some complaints about the (fast) pace of the workshops and that those delegates not good at utilising the Microsoft excel programme should be considered.
- Problems with the software is that although the actual course is in perfect consistent steps, the software somewhat delay the smooth running of the course as it is inconsistent with some data missing here and there.
- Another concern mentioned was that delegates would have liked to know their fellow team members beforehand (via introduction and scope of work) and would have liked to be informed of the end-goal, that is, the presentation to the "NER" expected from all groups at the end of each five-day course…

4.1.3. Delegates pledges to improve in their workplace

The latter learning outcomes have motivated the delegates to improve aspects of their job outputs by applying what they have learnt in their own work environments;

- To ensure better documentation of information and strive to collect the required information (which is lacking) on time. (There are gaps in regional data that needs to be curbed soon).
- On the above-note, to concentrate on data management (ensuring to collect quality data) and customer responses or queries.
- To be better at assisting customers with information by informing customers of the different tariffs available and by explaining the rationale behind those tariffs.

- To be more sensitive on the impact of cost of supply study results on customers when designing tariff structures, therefore designing cost reflective tariffs.
- Those that are not directly involved in tariff design, pledged to be more appreciative of the pricing department, data gathering, cost of supply studies, and so on.

4.1.4. Future possibilities to address concerns

The following are the aspects are out of scope for this pilot project, thus could not be addressed (at this point) but will be taken into consideration in future:

- This is a highly advanced course, thus there are certain pre-requisites that each delegate should go through before attending these workshops. Firstly, the targeted audience should be at a certain educational or practical level. Obvious knowledge required includes; the use of a calculator (number converting etc), advanced or intermediate excel knowledge, knowledge of statistics (using excel), detail orientation, analysis techniques.
- The distribution of the software package to each individual to be used to apply tariff design principles learnt upon return to their workstations. (This cannot be done currently because this model is still under construction and is not yet perfected – reviewed after every course (as discussed) and all copyrights and intellectual property of this product belongs with Distribution Pricing until direction is given through EDI Holdings Company).
- The attendance of the workshops by all members involved in the cost of supply study per region or entity.
- Group dynamics – the training team has no power to control the delegates' behaviour towards employees from other organisations or their willingness to work in a group or their level of comfortability to work with people from different organisations.

4.1.5. The learning outcomes that evolved as the workshops progressed

There is a belief that an intervention of such magnitude cannot just go by within an organization or a certain industry without having some sort of impact on its subjects: that is a paradigm shift (mindset) amongst the participants (as well as the training team itself).

Below are some points that should be highlighted in the business following this intervention:

- Fellow delegates will learn to work independent of head office assistance to design their own tariff structures in the future.
- Participants experienced a culture shock having to work with employees from other competing entities. However, most of them quickly adjusted (had a shift in mindsets) and managed to cooperate with each other during these Tariff Design workshops.
- The Pricing experts or SMEs have learnt throughout this whole project (from conception phase up to now) to share their knowledge generously with others (without hesitation) in turn empowering the participants.

4.2. Discussion Overview

The last chapter focuses on the Competency Building phase, which is the foundation for the entire Tariff Alignment and Cost-based Tariff Design (five-year) project. The project consists of other phases that have to be completed. Following the feedback received from participants from all regional workshop interventions, it is thus appropriate to analyse these results in order to establish the validity and success of the competency building implemented. From these results, recommendations should naturally follow. When exploring the comments, one has to bear in mind that this feedback is not only one-sided, from an Eskom perspective, but from all over the industry, which includes; Municipalities as well as the employees from the regulator who attended the workshops.

From the feedback, it is clear that all regions that have undergone these workshops have been impressed by the workshops. Some good comments were received. Both the Eskom Distribution Pricing team and consultants have put in a lot of effort to arrive at the final product presented to the participants. This seems to be well accepted by the audience. The analysis of these comments when executed by the project team raises their morale because they realise the good that their project is imparting throughout the industry and the amount of knowledge transfer that actually take place with their interaction with participants per region. All this realisation become reflection exercises that lead to continuous learning not only for the participants who are there to become knowledgeable in the tariff design subject but also the "training team" when updating and continuously revamping the simulation programme taking each feedback comment into consideration.

4.3. Discussion on Workshop Feedback

The overall feedback received was positive and one gets the impression that delegates eventually reached the level of excitement of the team, as they were aware of the benefits of these workshops beforehand. Initially, on arrival to the training courses, the observation is the non-motivation of the target audience because they somewhat felt forced by their management to attends these workshops. However, as the days progressed, most participants began to realise the relevance of this course as they viewed themselves in the value chain – the input and impact they can have into such a length process. Participants were thus surprised of how much learning they were experiencing – because the initial attitude was that "one has been in Eskom/ municipality for a long time and there is nothing one does not know about the distribution industry". As expected, not all feedback can be positive, thus there were some negatives that balanced out the positive – see "response to feedback queries" below and the data collection chapter.

From the commentary and feedback, it is evident that delegates found the course somewhat complex and challenging even for those employees who have previously been exposed to tariff design and came with a "know all" attitude! This highlights that some

learning took place during the workshops that proves that knowledge was transferred as expected and thus the workshops were successful for all involved.
According to the introductory presentation, the following are the skills required for one to survive these intense workshops and beyond (i.e., at their workplace):

- To run the model,
    - a fair knowledge of Microsoft Access & Excel
- To draw out data for various analyses or make modifications to the Model
    - a very good knowledge of Microsoft Access & Excel
    - a very good knowledge of Data Structures, Databases and Data Queries
- Participants should have good analytical ability

The logical conclusion here is that, individuals who will in future be involved in tariff design and cost of supply studies ought to be the very best (in the business) with the highest experience and acknowledgements, understanding and utter most respect of the Distributions business.

4.4. A look at the "training team" and reasons for their success

The set of "training groups", that is, the core pricing team plus the consultancy team, manage to work together in synergy to generate such a well presented simulation programme. The writer, after experiencing the training workshops first hand would like to add that she was impressed by the overall course outlook both from the simulation and facilitation sides. The success of these workshops is not only accredited to the fact they work well together. In order to maintain the momentum and success of the workshops, the training team carefully analyse and dissect the feedback received from fellow participants after each 5-day training session. The simulation programme and overall workshops are thus improved making sure to take the issues raised by participants into consideration for the next training session. From this feedback, the team assesses where to improve the course so as to meet the "customer" requirements as well as to close any gaps observed during the workshops, particularly software inconveniences.

This is necessary to ensure that the programme is constantly improved and enhanced for the next intervention. This is a continuous process that will take place until the team is satisfied with their product and believe that it is professional and presentable. This is most likely to happen after the pilot phase (envisaged to be end of 2005) so that it can be distributed in the industry for utilisation. These updating exercises have thus become learning points for the team, especially the Pricing team, in terms of enhancing their facilitation skills and being open-minded by accepting and taking into consideration participants' critics and comments (seeing that they are colleagues under normal circumstances). This project stems from the Retail (training) project that set out to empower regional staff and to ensure that the target audience receives training modules that have relevance to the business, the efficiency of training and that ultimately value is added to the overall business. Thus the Tariff Design training addresses these objectives and is in line with the overall intent.

Below is some discussion and analysis on the feedback "Evaluation forms" and recommendations to the team. To look closely at the requests, suggestions and general comments that came through following the attendance of each course per region. However, one is of the opinion that some of these requests seem unreasonable given the amount of effort that goes into preparing just one five-day workshop session and thus would like to discuss and explain the implications of implementing some of these "customer" requests from the project team's perspective:

4.5. Response to the Negative Feedback Queries

Having **smaller working groups** during the workshops – this would mean allocating (in general) smaller numbers of participants attending workshops per session. Currently, the stance from the EDI Holdings Company was to involve as many people as possible with a role to play in the tariff design process per region, with the hope of building a widespread understanding of this aspect of the business. Thus the request can only be done in the future when the future of this programme has been determined by the EDI Holdings or future RED Chief Executive Officers (CEOs).

The **allocation of computers to every single delegate** attending these workshops: In order to execute this request, the budget would have to be discussed at length with the sponsor or this would be unreasonable and difficult to put into practice! However, this is a good idea, which might well be feasible. This request requires the training team invest on about ten laptops. If the proposed laptops are duly in place for utilization during these workshops, or entire project, they should be updated constantly with the latest simulation model, the correct software package that should be compatible with the simulation model. Implementing this idea might cause the training team to work more professionally and efficiently with minimum technical hiccups during the workshops. These computers can thus be loaded with the simulation model beforehand instead of wasting time at the beginning of the course loading the participants' computers.

An alternative and more drastic option to increasing the project budget to cater for the buying of laptops would be, for the business to make it a ruling that all persons involved in Cost of Supply studies are presented with a laptop. If this becomes the standard in the industry, then it would make it easier for the training team and for efficiency of the workshops, as each participant would bring their laptops along which can then be used during the workshops. This essentially shifts the budget elsewhere in the business and does not put too much strain on the training (and Tariff Alignment and Cost-based Design project) budget. This certainly has long-term consequences and rewards to the fellow cost of supply personnel who will utilise these "tools" in their workplace daily.

The **length of the workshops:** it is not a good idea for the training team to allow participants to influence them on shortening or lengthening the allocated workshop time span. The allocated time is sufficient because it was trialled and tested before the beginning of pilot project to ensure that the participants get all the required information during these workshops and return to their workstations with a sense of achievement (with grasping of concepts) and some satisfaction – that these workshops are worthwhile. Thus, no more or no less time should be allocated, if delegates feel that it is not enough, they should consider that the follow up (coaching) sessions would reinforce the knowledge. It has been acknowledged that all delegates will undoubtedly need on-job

coaching/ training for a certain time period (completing of phase 1 to phase 5) before they can become tariff design and cost of supply experts, this has been built into the plan subsequent to the Competency Building Phase (see Project Plan Figure 17).

4.6. The overall learning experience as an Organisational Development exercise

The overall learning outcome was in observing the evident paradigm shift that occurred amongst the participants as they realised their fortunes of being identified and nominated to be part of this pilot group to receive first hand and professional training. Employees who were invited to these interventions were not all directly involved in tariff design in their regions but came from both the Retail and Wires businesses of the Electricity sector. The goal of the Competency Building phase of the project was to prepare and present Tariff Alignment and Cost-based Design Workshops to all Engineering (Wires) and Customer services (Retail) employees as permitted and recommended by EDI Holdings Company. At this point (pilot phase) the audience comprised a wide range of role players in the tariff design process (as mentioned previously) not just those who will eventually (physically) partake in the development of regional/ entity/ RED tariff structures.

Due to the anticipated merger of Eskom Distribution regions with municipalities in the future REDs, there was a willingness to tolerate other organisational cultures which made it easier for participants to work together during these workshops. EDI Holdings, as the project sponsor had proposed that these interventions encompass all the role players or stakeholders of the future REDs as they are responsible for managing all aspects of the EDI restructuring process. As previously discussed, most of the information used to design the training programme was extracted from the Eskom Distribution Electricity Pricing Department to produce a reasonable, logical and practical programme that can be utilised for capacity building in the distribution industry. This is a new challenge for all RED role players (Eskom and municipal employees) because there has previously been very little interaction regarding tariff design between the different distributors in the country. This is one of the paradigm changes that the participants have to undergo.

According to the Action Research Model[22], the core processes in this intervention included; political and technical systems while the core competencies involved were; team work (consultants and pricing team), attitudes/ paradigm change, problem solving, skills transfer, innovation and technologies. Political, economic and cultural forces also impact on the interventions.

In essence, this project is a type of Organizational Development (OD) or change management initiative as it is in place to change Distribution employees' perspectives about designing tariffs. It also aims to equip the person who should be accountable for this process in future REDs. The learning outcomes from the training team itself were significant. The realization that the common Retail or Customer Service employee (who constantly liaises with the customer directly or indirectly on the bill and tariffs charged), is unaware of the complexities of the tariff design process. One is however, in two minds about this issue. On the one hand it may be that the employees have been ignorant in their comfort zones" (going about their own business) or on the other hand, some blame should be directed to the Business Structure (vertical integration) which has not given enough exposure to these employees. To address the above issue, leadership should step in there ensuring that they flatten their management styles to create more friendly and democratic working environments.

In one article written by the University Associates[23], it was stated that Organisational Development companies or departments are usually called into an organisation to come up with a change intervention. The first step is to assess an organisation's needs by researching the issues surrounding them and then guiding the organisation to the appropriate technique that will result in a positive change. However, in this particular project, the project team had already done all the above work beforehand as they took accountability for the smooth operations of these workshops. This motivated the team to come up with the tariff design computer simulation that is in place today. The exercise of putting the programme on "paper" so to say was a case of extracting the minds of the

[22] Notes on Search Conferences – OD reader, Leadership Centre. University of Kwazulu Natal.

[23] University Associates article. Retrieved 1 August, 2005, 2005,

Eskom Distribution Electricity Pricing team and thus the intellectual property accumulated through this project belongs to Eskom. (*For the latter reason, note that information being disseminated in this research is confidential due to the sensitivity of procedures stipulated and copyrights issues.)*

This leads one to the concerns raised by Organisational Development connoisseurs[24]; that *OD is only as effective as the skilled professionals undertaking the training.* However, as discussed, the Eskom Distribution Electricity Pricing team are available at all times during the workshops so as to avoid the failure of these interventions by handing over the programme to external consultants and not following through with the implementation. Fortunately, it was acknowledged earlier, that such negligence in respect of one's intellectual property could cause major hiccups in the success of the product. One is thus in favour of the dynamics of this project team and how each role player executes their role in the project efficiently, eventually interacting efficiently with each other to create a winning recipe. In support of the latter, it would be interesting to look at Dr Trudy Sopp's[25] commentary that "*The skill of the professional can leave an organisation in better condition or unfortunately, in a less desirable state than before the intervention was implemented.*" Thus with the level of skill and professionalism exercised during this project, there is security around the endless use of the very best skilled experts in the business (until they decide otherwise).

4.7. Discussion on the success of the workshops

As discussed in my assumptions in the last chapter, workshops are more effective as the mode of knowledge transfer because they are more interactive. The feedback received from the participants clearly indicates the learning that participants experienced through these innovative as well as interactive five-day sessions. A collaborative teaching approach was taken during these workshops using both active and passive approaches. That is, lecturing, presenting and learner engagement – constructed through participants' dialogue and interactions. According to the intellectuals on workshop design, it appears

[24] OD Debate: reflecting on organisations and development. Vol 7. 3 June 2000
[25] Sopp, T. Interview on Organisation Development. 2004.

that, workshops that have a balance between passive and active learning tends to appeal to a wide range of participants because the different forms of learning changes the pace of the workshops, thus maintaining interest, and accommodates a wide range of different learning styles. In a rich learning environment, facilitators recognize the central role of creativity and engage students in exploring ideas and issues, challenging traditional assumptions, solving problems, and constructing knowledge rather than just memorizing it[26]. The latter just about summarises the aim and expected outcomes from the Tariff Design workshops. It seems that, because participants were given a chance to freely express their abilities to produce the most sensible tariffs taking their group member's opinions and experiences into cognisance.

The workshop facilitators, the Business Today team, plan, organise, co-ordinate, facilitate, control and structure the workshops. In other words, they are responsible for the whole workshop process, at the same time, involving the Distribution Electricity Pricing project team. The latter thus contribute all techniques (technical) needed to support the process. The facilitators must thus be natural motivators to encourage and influence the participant group to work towards a common goal.

A crucial factor that contributed to the success of these workshops was the personality and style of the facilitators. *An effective facilitator seeks to understand participants' backgrounds and point of view, and has the expertise to balance responding to participants' needs and moving a workshop forward. Above all, an effective facilitator conveys genuine enthusiasm*[27]. The Distribution Electricity Pricing project team were fortunate enough to collaborate with such professional, humble and approachable couple of witty facilitators who were warm towards the students. According to the workshop planner guide, the relationships developed between the facilitator and the participants and between the participants themselves are very important. These relationships structure the

[26] Taken from a website for "The Art of Teaching the Arts" – Workshop 5 Creating Rich Learning Environments.
[27] Workshop Planner. Activity 1: The role of the Facilitator. www.unesco.org/education/DTT/dtt/plan_01_1bod.

power dynamics of the learning environment. As a result, they influence the atmosphere for group learning by determining the level of involvement of the participants, which in turn determines how individuals contribute and participate during the workshops. Positive and open relationships thus help participants to assume ownership of a workshop, to create personal meanings, and to move towards self-directed learning.

In designing a course for adults, the comfort of the learning environment and the learning culture of the facilitator are significant factors in creating a supportive learning environment. It is a fact that adults (because they have certain expectations) learn better if they feel good in their surroundings, are comfortable with the learning and facilitation processes and can see that their learning needs are being met. Thus the chosen venues were inspected beforehand by the course coordinator to ensure that they address the physical factors of the target audience, as well as workshop requirements. The venues per region were spacious with sufficient lighting, desk and chair arranged for group interaction (four desks of five chairs) and also suitable for computer access – which was the main interaction tools for one to have access to the simulation programme during these workshops.

Teamwork was very much encouraged in these workshops, this to build self-confidence and allow for "organisational learning" where learning takes place in a consolidated group of people rather than individually. When that happens, a sense of togetherness is built within the team and thus team members begin to feel that they understand each other and thus can relate. Team work and participation in these workshops was also important in preparing participants for the work outputs expected of them in their specific environments after attending these courses. As discussed, the project phases that continue after the competency building phase require regional or entity workgroups to be formed to begin "mini" Tariff Alignment and Cost-based Design projects in their specific environments. These minor projects will be run by workgroups who have to support each other by constantly supplying relevant and quality data that will assist in the formation of tariffs. To summarise, the facilitator (and the Distribution Electricity Pricing team) have achieved; "Teaching and Learning for a Sustainable Future for use in locally/nationally

relevant ways". For full detail of the mini projects' expected outputs, refer to Component 2: RED Tariff Design and Implementation of the Tariff Alignment and Cost-based Design Project, to see the breakdown of all phases.

The psychological factors were also addressed by facilitator professionalism and ensuring that the Distribution Electricity Pricing project team members began the workshops with a background overview presentation so as to keep the audience comfortable and that everyone starts off with a shared understanding of problems that need to be tackled during the next five days. The purpose of these introductory presentation (following from the half-day project launches) were to reiterate messages presented previously for those who attended, ensuring that everyone has the same vision of the expected workshop outcomes and the future thereof. Such orientation is necessary because adults like to know what is going on, what to expect, and when the coffee/lunch breaks are. Participants were also informed of the flexibility of the breaks that it was up to them to decide when to go for these breaks (during the specified periods). This enhanced their feelings of involvement and ownership of the workshops.

Participants we also given a chance to share their past experiences to their fellow team members to help them build the trust and openness that are prerequisites to engagement and new learning. This brought out the respect of participants towards each other and their individual intelligence, which could bring some light into the given task. Team members would thus "network" in this manner and would collectively respect individual experience and intelligence, where all responses would be encouraged, supported and valued. Surely, facilitators learnt a lot from these workshops because they are not Tariff Design experts? They created a learning environment in which the participants felt safe and intellectually stimulated. This allowed the facilitators to tap into the wealth of knowledge that their participants could offer. The same goes for the Distribution Electricity Pricing project team.

"*As long as there were people asking each other questions, we have had constructivist classrooms. Constructivism, the study of learning, is about how we all make sense of our*

world, and that really hasn't changed"[28]. If one looks closely, the latter learning represents constructivist learning. In such and environment, participants are given opportunities to practice and enhance their abilities to organise and structure knowledge through reflection on experience and interaction with others. This type of learning environment is thus most effective and best suited for adults because it is grounded in the experiences of the participants, and engages them in active rather than passive learning. During such active learning, participants are encouraged to use active techniques (real-world problem solving) to create more knowledge (especially of their working environment) and then reflect on and discuss what they are doing and how their understanding is changing. The understanding of one's working environment was particularly tested at these workshops during the "presentations to the regulator". All participant groups were encouraged to build 30-minute presentations from all information that came out of their tariff design process, to discuss and explain to the entire group, their tariff outcomes, future expectations and the impact on customers.

I believe that participants were fully supported during the five days (with the help of the facilitators, Distribution Electricity Pricing team and simulation programme) thus building up to the moment where they had to present their outcomes. They were provided with tools such as problem-solving and inquiry-based learning activities with which to formulate and test their ideas, draw their own conclusions and deductions, and pool and convey their knowledge in a recipient of information to an active participant in the learning process. Constructivism transforms the student from a passive recipient of information to an active participant in the learning process. Constructivism is also often misconstrued as a learning theory that compels students to "reinvent the wheel". After analysis of the Tariff Alignment and cost-based workshops, the following benefits of a constructivist approach were extrapolated; it develops thinking and problem-solving skills, communication and social skills, promotes intrinsic motivation to learn and most importantly, helps students transfer skills to the real world.

[28] Jacqueline Grennan Brooks (1999). Concept to Classroom Interview. Quoted at www.thirteen.org/edonline/concepts2class/constructivism

4.8. Discussion on the workshops, the project and the EDI intent

One should remember that the issue here (as discussed earlier), is that there are many tariffs in the country which need to be reduced. However, the major predicament for the Eskom Distribution Pricing Department is with the current disparity of Tariff structures and the way in which the EDI will eventually move towards different RED tariffs. There should be a reduction in the number of tariffs that exist in the industry. The solution to this problem will be a challenging task on its own. The current stance is that all REDs should in future use the same tariff design objectives (as stipulated in the "Rationalisation of Tariffs" document, April 2005). The intent here is that national tariffs need to be rationalised into cost-reflective structures that will be beneficial to the country's economy in the long run. This intervention is thus not to resolve conflict amongst groups within the company but to build capacity of relevant employees that will in future be instrumental in the process of tariff design, therefore in a way resolving individual conflicts in terms of job security and self worth.

There are obvious constraints with addressing some of the challenges as stipulated in the Energy White Paper (1998). Addressing the tariff disparity for instance there is a huge problem that tariffs are not controlled or monitored, as some utilities are not regulated as strictly as Eskom is. Some difficulties that this industry is facing include business running at a loss due to some customer categories. The careless and ignorant use of electricity also does not improve the difficult situation. In my opinion, this calls for wide educational customer campaigns in order to get their buy-in and understanding of the losses coupled to such behaviour. Another solution is thus to enhance the efficiency and competitiveness of the South African economy by providing low-cost and high quality energy inputs to industrial, mining and other sectors. In many respects, statements made around the industry about cost-reflective but affordable prices are contradictory. The chief executive officer of the EDI Holdings Company, Ms P Nzimande also added that "people will need to understand that the business is there to make money, but that they also need to balance that with ensuring that the poor benefit[29]". The latter statement

[29] EDI discussions with ESI Africa. 2003

emphasizes the factors affecting pricing decisions in most countries. These include; organizational goals, product and customer mix, price/demand relationship, competitors and markets, peak and off peak and cost (of service)[30].

Going back to the assumptions discussed at the proposal stages of this research, one was under the impression that the EDI would be fully restructured with the end state being the six regional electricity distributors (REDs) which will be responsible for the distribution of electricity to consumers within their respective boundaries – with the elimination of the Eskom Distribution division and the numerous number of municipalities.

However, with the municipal elections on the horizon, March 2006, there has been a change in stance of the EDI restructuring or the RED model as we know it. Yes, the EDI has been clouded by uncertainties from the beginning mostly due to the bad management of stakeholders. Institutions such as the South African organized labour have been opposing this reform as they saw it as a sure route to privatization, which could trigger price increases in the sector and lead to job losses. This is in total disagreement to the opinions of the free market economists that, under competition; productivity grows, costs and prices decrease, and innovation and product diversity flourish (MIIU, 2003). To summarise the organized labour representatives' position: "*If it ain't broke, why fix it?*" Municipalities themselves were concerned that this restructuring initiative would impact negatively on their financial viability as they use the revenue generated through electricity sales to cross-subsidize the provision of other services such as water and sanitation.

The current stance, October 2005, is that the REDs will be governed locally under the Municipal Financial Management Act (MFMA), which is in line with current municipal governance, but not Eskom's (van der Merwe). With this emergence, Eskom has indicated its reluctance to join the REDs in that light as it has been operating as a Public entity governed by the Public Finance Management Act (PFMA). The following

[30] Service Costing and pricing, by Muisha Fred, NUR

alternative was thus put together to address this situation: there will be six Metro REDs that form plus one National RED.

The challenges that Eskom Distribution is facing (and those in future) in terms of the reformation of the industry are immense. Eskom Distribution has many more difficulties to face such as non-payment of customers and municipalities themselves as well as the issue of anti-privatization institutions such as the Soweto Crisis Centre (SCC) always ready to sabotage and criticize any good that Eskom initiates and unfortunately, these leaders have followers to which they are feeding incorrect and sensationalized information. Yes, Eskom is aware of the country's ailing economy in terms of the lack of affordance of basic needs by most of the country's citizens.

However, some journalists such as Napolean Jaff (2003) are under the impression that the ongoing restructuring in the energy sector seems to be oblivious to the realities of rural areas. This is indeed a reality in South Africa and in this regard, Eskom has set up the Electrification Programme (in partnership with the government) where it electrifies citizens without prior electricity (with the target of electrifying the entire country in mind) to improve their lives. This electricity is for low usage customers and thus monthly payments are very low. It may seem that one is going off tangent a bit, but to ignore this issue would not be an injustice to this discussion from a socialist point of view. It should also be noted that because the electrification programme is a huge part of Eskom's social upliftment plan (driven by Distribution), it has up until year 2000, funded the entire initiative, either through internal subsidies or through transfers to an electrification fund that the National Electricity Regulatory allocated to municipalities (Eberhard, 2003). "*The electricity industry (especially Eskom) has been able to fund and cross-subsidise this massive electrification programme, largely because there is a substantial industrial customer base that accounts for the bulk of electricity sales*". This has been possible because Eskom makes most of its profits from the sale of electricity to its large mining and industrial customers who consistently pay their electricity bills, as well as the bulk sales to municipalities.

However, there is a need to place some restrictions on the industry to avoid such malicious attacks from uninformed citizens and groups by ensuring proper stakeholder management initiatives takes place within the industry. This is part and parcel of the tariff transparency issue, which calls for the unbundling of each tariff component. With the upcoming March 2006 Municipal elections looming, these elections may themselves be a reason not to make any significant changes in the EDI to avoid local authority campaigners from trashing the restructuring initiative and using it for political gain amongst citizens at grass root level.

On 14 September 2005, Cabinet announced: "It was agreed that six metro REDs needed to be set up as soon as possible after the local government elections, and that other areas would be covered under separate local REDs or a national distributor. Eskom will continue to play a critical role particularly in the national RED"[31]. The latter statement is vague in itself not giving any direction to Eskom, this lack of clarity set Eskom on a mission to seek clarity on the final resolution through meeting with key stakeholders such as the Department of Public Enterprises, Department of Minerals and Energy, National Treasury, EDI Holdings etc. The Eskom internal announcement also mentioned that the proposed National Distributor should be formed by June 2007. However, key issues still need to be clarified in terms of the role of Eskom in this National Distributor, the legal documents that govern it and the establishment process.

The latter statement is worthy of note but also disturbing at this stage of the "restructuring" process! By this time, according to the initial RED "end-state" about three REDs should have been in place by now already working towards a common vision, preparing for the transfer of assets, liabilities and customers from participating entities. Now, the plans are being shifted by 18 months discarding the idea of six independent distributors! Clearly if a National Distributor is formed, this would mean that the smaller distributors would still have access to assistance from a "public entity" which will assist them where necessary, especially financially! This would lead us to the exact predicament the industry is currently facing – the example of Eskom (big brother) and the

[31] Cabinet Statement on the REDs, Eskom Top Management Bulletin No. 109

municipalities. Municipalities are taking advantage of Eskom's success by not paying for services that Eskom provides them. This is in line with the first RED (in Cape Town) that was formed in June 2005 but there has not been any progression in that regard. Eskom supports the transfer of the Distribution business in the Metro area but almost six months into the new entity, negotiations of the principles of asset/ business transfer are still taking place between Eskom Western Region and the City of Cape Town Metro. This means that Eskom Distribution staff members, assets, liabilities still belong to Eskom. The only advance made so far was the operating agreement between the RED and Eskom (1 July 2005) and no transfer of customers has been done. The reason being that it will take place *when certain Suspensive Conditions and Legislative Exemptions are met.*

The conflicting messages coming from the stakeholders have currently placed the Distribution Business in a state of turmoil, for lack of a better word, and uncertainties are ruling the industry because of the speculation and possibility of the EDI proposal not materializing as planned. Rumours span that the proposed and expected route might not be six REDs anymore but many variations of the initial proposal! The possibility is that there will be six "Metro REDs" which will be municipal entities plus a "National RED" likely to be the existing Distribution of Eskom, will remain a public entity. This opens room for exploitation of the situation as cases such as where some smaller municipalities refusing to join a RED (as stipulated by government) and opting for the alternative of becoming independent entities of those "regional" boundaries to avoid revenue (and maybe reputation) losses. The only puzzling issue is that, in most cases, these are ailing municipalities (not sure if they can be able to counteract their financial burdens). The danger of such is that this might potentially lead the EDI back into the same predicament it is facing now! Where there are many small distributors (municipal entities), each with their own set of tariffs and leading to many tariff structures.

The current stance from government is that the Municipal Finance Act (MFMA), in favour of Metro REDs, will govern all REDs (see ***figure 14***). This might be interpreted as a revocation of the total rationalization proposal if there is a national RED in place. This does not only affect the Tariff alignment and cost-based design programme but all

Competency Building initiatives that were in place in preparation of the REDs. From a tariff design point of view, this will mean that individual municipalities will not need to do their own tariff design in the near future. ***Thus two scenarios will be explored here that will impact on the future of this project;***

Changed Competency Building Focus due to the Changed RED end state

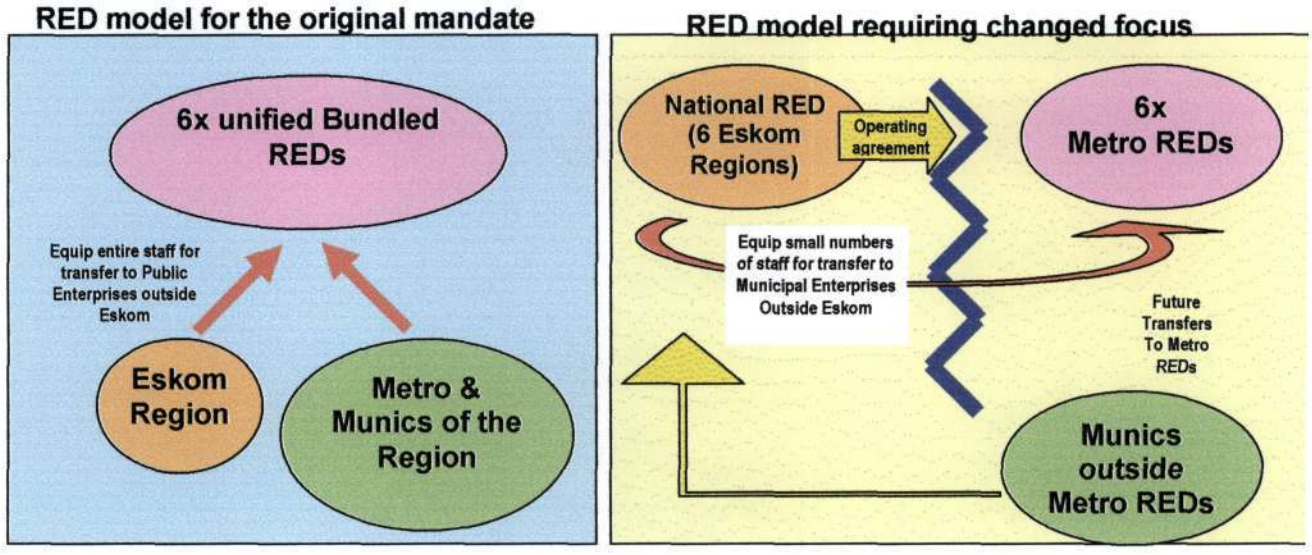

Figure 14: Depicts the probable structure of the Electricity Distribution Industry 2006

However, with a National RED in the pipeline, entities and their representatives are under the impression that they would not have to be completely independent. This particularly looking at the tariff structures, some of the entities that participated in the Tariff Design and Cost-Based Course have become uninterested in designing their own tariffs because of the envisaged National RED. The feeling is that "what would be the purpose of the National RED if we design our own tariffs?" People around the industry are speculating that "the industry would remain as is because it has been operating efficiently without the reform". With that collective mindset, it seems all efforts done to align with the formation of REDs have been a futile! However, that mindset should not be allowed to linger for long because it will poison the good work done to date to address the DME objectives for a brighter future.

The answer to addressing such gibberish is proper "Stakeholder Management". This includes regular consultation with all stakeholders, including the customer who has the power to reject or accept any stance taken by the industry. We have to bear in mind that the customers are the ones who will ultimately bring in revenue into the industry through electricity sales. I have to now speak as a socialist as this brings one to the issue of the dual economy that exists currently in South Africa. The African National Congress National General Council in their discussions in held 2005, came up with a unanimous stance to address the "two-economy divide" challenges broadly by underpinning sustained reform and transformation of major sectors and key domestic economic markets, including the electricity sector. The chosen approach to resolving these issues involve focused state-led interventions to ensure the integration of the two economies, poverty alleviation, job creation and, most importantly, sustained economic growth[32].

On the issue of the proposed multi market model (MMM), I would like to argue from a socialist's point of view; one can thus not ignore the president's speech on the two economies in South Africa. *The South African society is characterized by socio-economic dualism: a dominant First Economy that is at the cutting edge, globally integrated and with capacity to export manufactured goods, services and primary commodities. Alongside this economy is another that is marginalized, exists at the edges, consists of large numbers of unemployed and the "unemployable", and does not benefit from progress in the First Economy.* (Sic: this essentially describes the most common types of citizens in this country; that is, higher class with economic power and the poverty stricken lower class). *The Second Economy denotes the condition of the modern, industrial economy. These are people without steady income based on their own economic activity. They are households or individuals with no steady employment and without an income-generating asset of their own that can practically be "realized" as capital or collateral*[33].

[32] ANC National General Council, Discussion Document, 29 June – 3 July 2005.
[33] City Power – Johannesburg. The Second Decade of Local Democracy: Towards Accelerated Service Delivery.

The proposal thus far only recommends wholesale competition where multiple generators compete to sell electricity to the large customers (utilizing greater than 100 GWh). This proposal also recommends that prices be set by the market (at the generation level); however, tariffs should be regulated for the Distribution business on a cost-of-service basis (Galen, 1998; Cavanagh & Sonstelie, 1998). This means taking service directly from Eskom and bypassing municipal authorities or REDs. Galen (1998) in his analysis of the South African Electricity Supply Industry also states that, the latter proposal acknowledges that large customers should not have to pay the above-cost tariffs presently charged by municipalities, and they should have access to adequate and reliable supply.

The high costs offered to large customers are to some extent, caused by cross subsidizing other essential services. This is a large factor in terms of municipal operations and is suggested that this requires significant financial restructuring and ring fencing, prior to amalgamation and RED formation. Eskom Distribution Electricity Pricing Department has already begun giving large customers the flexibility to choose their suppliers by introducing a cost-based, unbundled and transparent tariff called the Wholesale Electricity Pricing System (WEPS) where a customer has a choice of receiving a breakdown of the tariff components they are charged for in their bill stipulating all charges as well as subsidies they contributed to. This specialized service is to ensure that the tariff reflects the underlying cost of service and that it is sufficiently unbundled so that customers do not pay for facilities, which are not part of their service package. Most importantly, it is to ensure that distribution customers have the best quality service to minimize complaints about Eskom's efficiency.

Retail competition is not being considered now, but if one examines the distribution industry closely, it will be evident that this disorder in tariff disparities and especially municipalities not being able to pay Eskom for services, is not only caused by mismanagement by the previous regime but also caused by the non-payment of residential customers. These customer categories make up a very small percentage of Eskom's total revenue but are the bulk of customers that are under the jurisdiction of municipalities. This is the root cause of the number of ailing local authorities that the

industry is facing, leading to the statement that in the words of the Minister of Minerals and Energy, the South African EDI is in "financial crisis".

The underlying message here was that "the EDI as a whole is fragmented and should be restructured as it is not good for the rest of the ESI". Many of the municipalities are loss-making entities as a result of inefficiencies, lack of capacity, theft, and a history of non-payment. It is thus not surprising that the root cause is at the "grass-roots", the customers serviced by municipalities. Most of the Eskom sales do not come from these customers but municipalities are legally bound to service them, something they solely cannot accomplish because of revenue tribulations. These customers are constantly boycotting the local authorities without really understanding the real problem because of ignorance and miseducation. These are the motives for Eskom's interest in the social upliftment of citizens, such issues can be addressed. Thus the role of regulation in this model would be on establishing market structures and market institutions which can assure the greatest level of competition and the greatest choice for customers, including pricing, service quality, and consumer protection (MIIU, 2003).

This socio-economic dualism affects the country in more ways than one can imagine, thus it certainly has an impact on the proposed restructuring of the electricity distribution industry, in this context, tariff restructuring. That is, full rationalization of tariffs that calls for cost-reflective and the reduction (even elimination) of subsidies. In essence (as discussed), this means that only large or contestable customers (First Economy – will remain Eskom customers) will be have the luxury of choosing preferred supplier. The feeling is that if privatization is introduced following restructuring process, this cannot satisfy the energy demands in rural areas. However, enough time is needed in each case to learn and build capacity (human and institutional) to operate the proposed models. The question now stands that in light of the predicament our country is in, what is the feasibility and future of this model? Will tariffs ever be fully rationalized seeing that most customers who cannot afford basic electricity are in rural areas?

One must always bear in mind the requests made by institutions such as SALGA and the Independent Municipal and Allied Trade Union (IMATU)? The concerns raised include the fact that, no matter which direction the EDI restructuring takes, it should not affect customers' costs or access to energy services. That is, they will not accept increased prices for service delivery nor will they accept less than perfect treatment of all customers. They propose that the government continues to supply customers without any revenue increase or cutting of electricity lines due to nonpayment. This poses a problem for the future REDs to be able to operate as companies as they will be running at a loss if they succumb to public cries! Are the REDs wrong in denying the (greater) customers of these rights? Who will take over the social responsibility (and development) of providing free basic electricity and electrification? I suppose the "National RED" which will be the most financially stable and comprising mostly of Eskom.

The Congress of South African Trade Unions (Cosatu) presented their opposing views on the Electricity Supply Industry (ESI) restructuring proposals as stipulated in the White Paper (1998). In essence, they opposed privatization and argued that Eskom should remain a vertically-integrated, publicly-owned utility and should be used as an agent of government to provide low-cost electricity services to all, especially the poor. They supported rationalization of the distribution industry, but into a single national distributor[34]. It is good at this point to note that the euphoria around falling prices in competitive markets is misunderstood; low price and high security of supply are conflicting objectives. However, the Cosatu institute fails to realize the possible benefits of introducing markets into the industry, these include; encouraging the right type of and level of capital investment; more efficient and productive use of assets; more efficient allocation of resources; technical and operational innovation; improved customer service and more demand side management in the market (Kee, 2003).

Such statements emphasize the need for proper stakeholder involvement in all "project" phases as government and any reports written on restructuring have made a pledge to

[34] Tinto, E. Restructuring South Africa's Electricity Supply Industry. 2002. MPhil. University of Cape town.

service and supply electricity to the poor, regardless of the restructuring initiative. The electrification programme demonstrates that the meeting of social goals and public benefits is independent of industry structure. It was driven by the advent of democracy and political commitment to provide and will continue despite the pending unbundling of the electricity market in South Africa and possible privatization. Explicit policy and regulatory instruments have been put in place to ensure the continued commitment to universal access to electricity in South Africa (Eberhard, 2003; James, 1996). This would certainly make tariff calculations much easier and less complicated because it would involve minimal subsidation (as rural customers receive the most subsidies, with higher losses and it costs more for Eskom to supply these customer categories).

To view the tariff differentials that exist currently for Eskom customers, see Figure 16: in the Annexure that depicts all existing tariffs available for Eskom Distribution customers. While studying this figure, please note the following; rural tariffs are; Landrate, Ruraflex and Nightsave Rural. Note the bar charts and see the great difference between the costs of service and the actual price that these rural customers are charged. Thus future tariff designers, given the above-mentioned possibility in the REDs, will see a decrease in the number of tariff structures which they have to design and one's opinion is that applying rural tariff structures is usually a difficult task and once eliminated from the overall outputs, would be less challenging.

The way forward is thus to promote rural electrification as it has the tendency of enhancing economic development and reducing rural migration towards the urban areas (Jaff, 2003). This clearly shows that the economic benefits for rural areas are tremendous because they will not only decrease the influx of rural people into cities in search of "milk and honey", but it also allow access to information and communication (through media), education, better health services and improved security for the rural citizens. Eskom considers electrification to be an effective instrument in redressing poverty, inequality and unemployment through economic growth. According to James (1996), Eskom has taken a stance to encourage and facilitate the rural people in participatory electrification programmes in their communities.

4.9. Financial impact and justification on the REDs:

To conclude this chapter, it would be wise to look at the areas of concern raised by the PriceWaterhouse Coopers (PWC) 1998 report about the financial aspects (interesting to the Eskom Distribution Electricity Pricing department) of the restructuring. Before going further into the discussion, it would be wise to look at pricing objectives – apart from tariffs. *Pricing refers to the process of determining a figure at which products or services will be exchanged in the market place*[35]. The PWC report states that there will need to be a sizeable price increase (in South Africa) to the average level of some tariffs particularly to domestic and agricultural customers, to bring them up to the initial estimates of sustainable Long Run Average Incremental costs (LRAIC) levels. The LRAIC measure is probably the used because it can provide a close approximation to marginal cost.

"Our initial analysis indicates that a broadly viable distribution industry as a whole can be achieved, but that this depends crucially on...key assumptions:[36]

- ***Prices: financial viability requires significant price increases (around 50%) for domestic customers, in most REDs. Such tariffs would be in line with our initial estimates of the "correct" LRAIC prices for such customers.***
- ***Generally prices to commercial, agricultural and industrial customers should remain broadly at current levels (in real terms), in some cases, should initially decrease from the average tariffs currently charged by some municipal distributors. However, for most REDs over the period from 2001 to 2010, prices are expected to increase in real terms though only to a relatively minor extent. This is explained by the fact that for most REDs the average cost of distribution is increasing in real terms as more low consumption "electrification" customers are added.***
- ***Adjustments in tariff levels of this sort will need to be introduced gradually, over a number of years. This is both to smooth the financial impact on the***

[35] Service Costing and pricing, by Muisha Fred, NUR
[36] PriceWaterhouse Coopers, Electricity Distribution Industry Restructuring Project, Department of Minerals and Energy Affairs, available at www.dme.gov.za

relevant customers, and to prevent tariff "shocks" becoming a significant obstacle to the whole of the EDI reform process.

- ***The detrimental impact on RED finances will, to some extent, be lessened by also phasing-in any reductions in prices to some commercial and industrial customers.***
- ***The net effect will, however, be to weaken the financial position of the REDs from that the reported above, over the phase-in period (likely to be 5 years).***
- ***The impact of this is most likely to be felt by government in its role of equity holder.***
- ***As price adjustments are phased-in over time, so will be the return on equity towards its target rate.***

Electricity prices, and especially changes to prices, have always been much debated in South Africa, to the extent that the debate becomes highly emotive. However, the South African electricity supply industry is facing possible capacity shortage, forecasted to reach its peak by 2007 after a prolonged period of surplus capacity. In his article in the ESI Africa Magazine (2003), Tino Espinherira states that the electricity prices (which are currently low – see ***figure 15*** below), are one of the primary contributors to the conditions necessary to earn an acceptable rate of return on investment for prospective independent power producers (IPPs). It appears that, these IPPs are the answers to the creation of more power stations, thus providing Eskom with energy. Thus the primary policy challenge is to design an industry structure that provides the incentives to optimise investment efficiencies in the future[37].

[37] National Energy Regulator. National Integrated Resource Plan. 2002. Pretoria

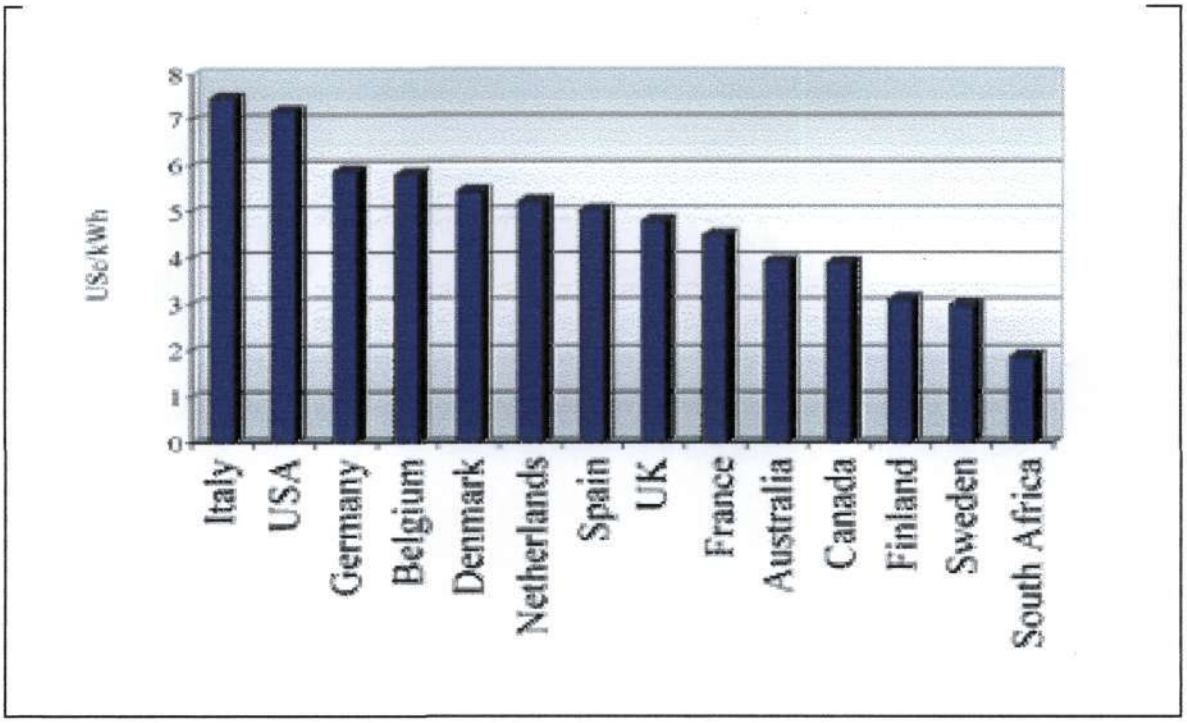

Figure 15: Depicts the comparison of electricity prices around the world. Taken from Espinheira's article for ESI Africa Magazine in 2003

Prices are an important means to achieve policy objectives. Cost-reflectivity, flexibility of prices and competitive pressures are also factors to be considered. Thus price floors and ceiling, together with unbundling of the various services, have been considered for addressing the issue of unfair competition if it comes up in the future[38].

According to Espinheira (2003), the current debates around electricity tariffs are not only of interest to South Africa, but we should not forget the neighbouring countries, many of whom are linked to South Africa through a regional transmission network. The African continent as a whole is faced with the problem of sustainable energy development. *Botwsana, Namibia, Zimbabwe, Lesotho and Swaziland are importers of South African electricity.* As an important input to their economies, they are keenly watching the South African price of electricity, which is of great importance, as it is the need for a timely decision on building new generation capacity (Espinheira, 2003). The latter might seem irrelevant for the main topic being discussed in this dissertation, but it is important to

[38] Service Costing and pricing, by Muisha Fred, NUR

point out such drawbacks in other Eskom divisions (which are part of the ESI restructuring) that greatly affect electricity tariffs and the direction that the Eskom Distribution Electricity Department is moving towards regarding tariffs in the future.

Moreover, developments in electricity prices are not only of interest to electricity utilities but one has to mention that electricity is already subject to fierce competition from other forms of energy such as coal, diesel and fuel oil (as insinuated in the Energy White Paper (1998)), with the possibility of natural gas emerging onto this scene. Suppliers of these alternative energy sources are also closely monitoring any advance in the electricity industry with keen interest. To them, if it emerges that building capacity in the generation sector of the electricity industry brings about a higher price of electricity, this would represent the opportunity to convert (loyal) electricity consumers to their products, thereby growing their share in the energy pie (Espinheira, 2003). The probability for the occurrence of the latter situation is great unless Eskom ensures that there is a balance between energy supply and demand in the country and entire industry.

This emphasises the need to design cost reflective tariffs taking into consideration the difference in load factors, as to ensure that there is no wastage of energy. It is thus good to notice that domestic customers are generally more expensive to supply than commercial or industrial customers. This was extrapolated from an exhaustive comparison study of electricity tariffs by SAD-ELEC, a regional energy consultancy, in their 2003 annual report, "Electricity Prices in Southern and East Africa". A note of caution that needs to be made here is that, domestic customers are thus still being subsidised by other customer classes and it is amazing how Eskom Distribution still manages to operate on a true commercial footing. This is more reason to rationalise the tariff structures to reflect the true cost of providing the service and transparency of subsidies that each customer contributes to. Eskom has recently unbundled these subsidies and published them transparently to their large customers on their monthly bills.

However, Eskom is now keen to see prices rise to levels that can support the new investment that is necessary. Analysts have begun to understand that current prices are

economically unsustainable (Econ, 2002). It is no surprise that prices in this country are set to increase because Eskom supplies electricity at amongst the lowest prices in the world (see ***figure 15***) because it has consistently made a positive return on assets (Eberhard, 2003). But the burning question is whether this is sustainable into the future. Certainly, Eskom raises finances through commercial debt, mostly through issuing bonds that are well supported by local and international capital markets[39]. However, the current low electricity prices exist primarily as a result of investment contradiction after a previous period of wasteful over-investment.

The latter explains why many stakeholders have up to now believed that Eskom operates efficiently – because current low prices create a false complacency. Is Eskom supplying such cheap prices at the cost of reliable and quality of supply? Eberhard (2003) discusses that the primary reason for the reformation of the entire Electricity Supply Industry (ESI) in this country is the desire to improve investment and operational efficiencies that blight the performance of monopoly utilities. This is coupled with the rationale that the major drivers for power sector reforms are inefficiencies in the sector and lack of capital to expand and rehabilitate existing systems (Turkson). Thus in light of the above reasoning and the findings from Price Waterhouse Coopers (PWC) report, Eskom is now keen to see prices rise to levels that can support the new investment that is now necessary. Analysts have begun to understand that current prices are economically unsustainable[40]. However, the primary policy challenge is to design an industry structure that provides the incentives to optimise investment efficiencies in the future[41].

In light of the above-discussion, REDs will not only have to deal with incompetence in the tariff design sector but one can also envisage a few more challenges for the future tariff designers. They are as follows[42]:

- **Data capacity** – that is the reliability and quality of data acquired per entity as well as the level of detail of the data to be modelled. The information technology department

[39] Eskom Annual Reports
[40] Econ. Electricity Price Scenarios for South Africa. A report to the Department of Minerals and Energy, South Africa. 2002. Oslo
[41] National Energy Regulator. 2002. National Integrated Resource Plan. Pretoria

of Eskom should commit themselves to audit and manage tariffs, especially in terms of verifying changes to customer information and the download process[43].

- **Design and implementation of low-cost and effective** tariffs that induce the regulated entity to achieve the social objectives. This is unavoidable as the cheap electricity currently supplied in the industry is still unaffordable to most South Africans.
- The **dynamic nature of electricity entities** – their pricing decisions, as with their investment decisions are not only set at a single point in time but over a period of time, and
- The prospect of **earning profits** in the future (autonomous structures) – necessary for the entity to invest and avoid making a loss.

The next chapter will also look at the future of the Cost-based and Tariff Design workshops following the pilot phase – to be completed in November 2005. Questions to ask include; who will carry out the legacy of training into the second year, let alone the future? Will the training team remain intact as is? How will the industry ensure that the training team from Eskom Distribution Electricity Pricing remain committed to the course and mitigate for retention strategies, as this is one group of indispensable people? Will the consultant facilitators ever be able to present these workshops independent of the Eskom Distribution Electricity Pricing team?

[42] Service Costing and pricing, by Muisha Fred, NUR
[43] Electricity Sales System, 10 October 2005

5. CHAPTER 5: CONCLUSION AND RECOMMENDATION

5.1. The future tariff design candidate

Paragraph 4.3 in the previous chapter discussed the ideal Cost-based and Tariff Design workshop candidates and future tariff designer. However, with the complexity of this specialised skill, it is obvious that it is not only those "model" characteristics that will sustain one in the tariff design sector but one should also be willing to take on the everyday challenges that go with the task as well as the required dedication. Thus, attitude is key for these individuals. This criterion is not only based on academic qualifications but also on the potential of the key persons earmarked for these posts, as well as the ability to work hard. In the next chapter, recommendations will be discussed. The question should be asked; what the industry can do to better accommodate these participants. This would certainly be appropriate for the success of the future training workshops that will benefit those employees who did not have the opportunity to attend the pilot phase.

On the matter of the course feedback or evaluation forms, one should remember that the feedback on the Cost-based and Tariff Design workshops was from a well-rounded audience/ source/ population group as it encompasses representatives from around the industry. Thus, one should get an overall idea of the opinions around in the industry based on these delegates' experiences, in turn; they are expressing their views on the holistic EDI restructuring initiative without even detecting it. So, one is happy with the overall feedback received and believes that if taken into consideration, they can make a difference in satisfying the target audience as well as the course trainers themselves. The point made here is that it is important that trainers understand their audience in order to have a better learning and conducive environment.

The major lessons learnt from these interventions was that a Cost based and Tariff Design specialist needs to be a well rounded person with an in-depth knowledge of tariffs, tariff structures and most importantly, the Distribution business as a whole.

It is important to remember that any restructuring brings about change, which in turn causes uncertainties in employees who will ultimately be affected by the process. Because the human resources aspects are critical for success in any restructuring, it needs to be addressed effectively and professionally so as not to disrupt or hinder the process of change. The latter was the logic of the Competency Building project that emerged in the Eskom Distribution Electricity Pricing group. The project would to build capacity in the Tariff Design sector thus gaining the confidence of employees in the Customer Service (and Engineering) sector, especially those ear-marked for involvement in tariff design in the future. This aimed to address and remove the inconsistencies in skills level that exist within the Eskom Distribution group.

As previously mentioned, there are many issues currently facing the EDI as identified in the DME Energy White Paper (1998) and the DME Calls for Proposal EDI restructuring project (1999). However, issues pertaining to pricing were identified as follows;

- to ensure agreed-to electrification targets are met,
- to provide low-cost electricity,
- to facilitate better price equality (cost-reflectivity) and
- to improve the financial health of the industry.

The tariff design workshops exist to attract and attain competent employees. Tariff design is the foundation that will underpin the drive for the above-listed Pricing objectives, which in turn will translate into restructured tariffs in the industry.

As already indicated, the electricity industry worldwide has been moving away from vertically integrated, stable, monopoly structures to horizontally organized, more volatile and competitive structures (Galen, November 1998). The proposed future competitive market mentioned earlier is only anticipated once the REDs are stable, healthy and

financially viable; this will be coupled with the disintegration of the EDI Holdings Company. The driving forces behind competition have been the following;

- the desires to reduce costs,
- reduce prices to end-users,
- improve service quality,
- and/ or enhance availability of supply, thereby benefiting the entire economy.

The author is of the view; it would be a great injustice for the industry to rush this process as it would leave the industry in its current fragmented state. It is proposed that a proper restructured industry will materialize in about a decade from now. This proposal is in line with global trends of the vision that *electric utilities will be operating more and more in a competitive environment in the future*[44]. One foresees that the competition will not only be amongst the predetermined REDs but naturally from alternative sources, as stipulated in the DME Energy White Paper (1998), such as; self generation, cogeneration, retail wheeling, or switching to alternative fuel products such as gas, hydro power etc. As a response to this, Guernsey (1994) proposed that, *utilities may respond to these changes by adjusting their products and service mix as well as providing more flexibility to their customers.*

Before moving forward, let us revisit the main reasons which were the driving forces for the global restructuring revolution. Galen (1998) shares the following thoughts: *First, where the cost of new electricity generation is often significantly below the average embedded cost of existing utility-owned generation new suppliers seek to enter electricity markets to compete with incumbent utilities. Second, as the need for new capital investment arises, governments are less willing than before to bear all the investment risk of acquiring new resources and private investors do not wish to lend to entities with limited and/or uncertain cash flow.* Thus through privatization, investment risk can be shifted to the private sector along with the rewards possible for taking the risk (Galen, 1998). Currently, operating and investment decisions are driven by price signals because

[44] Guernsey and Company, Chapter 18 – ***Tariff Structure and Ratemaking: What the future may hold*** in, Tariff Structure and Analysis Course Manual. 1994. Vol 1. pg 18.6.

of the ominous possibility of financial failure. According to Guernsey's (1994) view of what the future holds globally for tariff structures and ratemaking; the development of flexible pricing will require an understanding of the customer's value (to the utility) in terms of service level received from the utility. To seal this point, Guernsey (1994) made the following comments; "*A utility responsive to market conditions (and changes) and offers rate options and flexible market-orientated services can maintain customer satisfaction and profitability without shifting substantial costs to customers*".

5.2. What Is The Future For The Tariff Alignment Course?

Let us now review the "project beginnings" and thus we can move on to evaluating and recommending what the future holds for this project. Initially, the project model was based on the EDI Blueprint stance of 2005. The proposal stated that once restructuring was completed, the end state would be six regulated regional distributors (REDs) formed within eighteen months of the year in question. These REDs were envisaged to become financially viable and will service customers within their respective boundaries, making their own decisions and operating as autonomous tax paying companies. All this was covered in the introductory chapter as well as some in the review chapter.

5.2.1. What will happen specifically with the training sessions?

The simulation workshops will thus become part of national training initiative, specifically in Eskom where there is a huge "market" demand for it. The training interventions will be documented, captured and reported as part of the overall Distribution businesses' training and will be scheduled in the same way as other training interventions available on the intranet "Zenzele" for Eskom employees to book themselves accordingly. However, because the current project is a pilot and sponsored by the EDI Holdings Company, it is an interim arrangement where participants need not budget and pay for these interventions. The latter will thus be required once the pilot phase is complete.

In light of the completion of the Competency Building phase, the remaining project phases have to continue whether REDs are formed as planned or not. This is in terms of the regional visits that begin at Phase 3: Costing (as explained earlier), to ensure that each "pilot" region or entity eventually reach the final project phase or tariff design goal where they would have a tariff plan in place for submission and presentation to the regulator. There is thus a possibility that this project (however much organized it is), may not achieve all its objectives, especially in terms of full rationalization of tariffs. This has already been accepted by the Eskom Distribution Electricity Pricing project team, which will explore mitigation strategies in the coming year, based on these emerging issues.

To conclude on the issue of challenges facing the tariff design sector of the future REDs, one recommends that the available data be shared within the business and regulator audits be done internally per entity by relevant departments, including the finance department before presentation to the regulator. This can promote and improve regulation, as the regulator has no idea of the validity of the data submitted to them; they can only identify discrepancies where they pick up any abnormalities.

As discussed in earlier chapters, the EDI reform should be done in no less than a decade. The gradualism approach rather than the big-bang approach is advisable to implement the reform "package". It would not be wise to introduce, unbundling, privatization and competitions into the industry all at the same time, especially in South Africa. According to Turkson, this approach has worked previously in countries such as the UK, Chile and Argentina because certain conditions such as adequate institutional and human capacity existed to adopt the "big-bang" approach to implement their reform. In this respect, a gradualist approach to reforming the electricity industry in South Africa is more appropriate. This involves phasing in of the implementation plans in a way that it is safeguarding to the institutions. To further emphasise the need for the gradualist approach, Turkson points out the following; *the dearth of relevant institutions and human capacity and inadequate experience to deal with the complexities of a competitive power sector.*

To wind up this discussion, one should consider the following; the EDI restructuring process has been slow and frustrated by the complex web of political interests at local government level, serious resistance from organized labour and the fear of loss of the control of an important infrastructure service. These socio-economic and political pressures have thus contributed to the slow pace that the distribution industry has taken and should also be credited to the reform process being complex and exasperating. This is so because Eskom is still seen as an important instrument of governmental policy, a well-performing infrastructural industry that supports government's economic and social programmes. "The energy sector initiative seeks to promote the consumption of electricity by many citizens around the country who have previously been deprived of this basic service. Thus government still experiences ambivalence and doubts around embarking on a path of full unbundling, competition and privatization" (Eberhard, 2000). Despite the above principles, "the process of reform in this sector continues and government's intent is to create a more efficient industry in the form of new, commercially-run, public corporations. Any further delay in this overhaul process may mean extensive new government investment to address reliability concerns".

Decentralized supply seems to be the way out! Contrary to that, as discussed earlier, *as long as electricity is a key factor in socio-economic development, it is necessary for government to continue to intervene in ensuring that electricity reaches the majority of people as to fulfill its social objective* (Jaff, 2003). This is a huge concern for the Eskom Distribution Electricity Pricing group. Clearly, the REDs model adopted by government would not represent a barrier to permitting future competition in wholesale supply. Nor would it necessarily be a barrier to some level of retail competition. As stated, electrification programmes are independent of the electricity entities structure and will thus continue regardless of the direction followed by the EDI. But the burning issue now is how government will ensure this? How will they get the commitment of these Distributors (who will be struggling with building empires on solid financial grounds) to commit time and resources to social upliftment?

The decentralized route that our electricity industry is moving towards is not widely appreciated locally. This research has lead one to conclude that there is a fear in the industry that tariffs that might emerge from these "private" distributors might not be subject to social considerations (as seen in international trends) and hence not compatible to the level of income in the South African population. To attempt to answer the question posed at the proposal phase of this research; it seems likely that, in the South African context where poverty is an endemic, many people, especially in rural areas, cannot have access to electricity when it is delivered on commercial basis. This would be a misfortune, as it would not address Eskom and NEPAD's vision; "*Electricity for all*" and perhaps that aspect should be separated from the industry restructuring to ensure that it takes place. The latter statement was made on the grounds that, this vision will remain an illusion in our country if profitability remains the guiding rule for supplying electricity and new avenues for decentralized energy production are promoted.

However, one proposes that as South Africans we have to put our trust in the government to make correct decisions for the country not only to correct the mistakes of the past but to ensure that a legacy is left for the future; that is, long term sustainability and economic growth especially in terms of using the correct and generic tariff design methodologies as well as taking all considerations discussed here into account.

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Electronic (internet sources)

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http://compcom.co.za/resources/June%202003/pages/03.htm

7. ANNEXURE

Annexure A: A comparison of electricity price levels and costs in Eskom

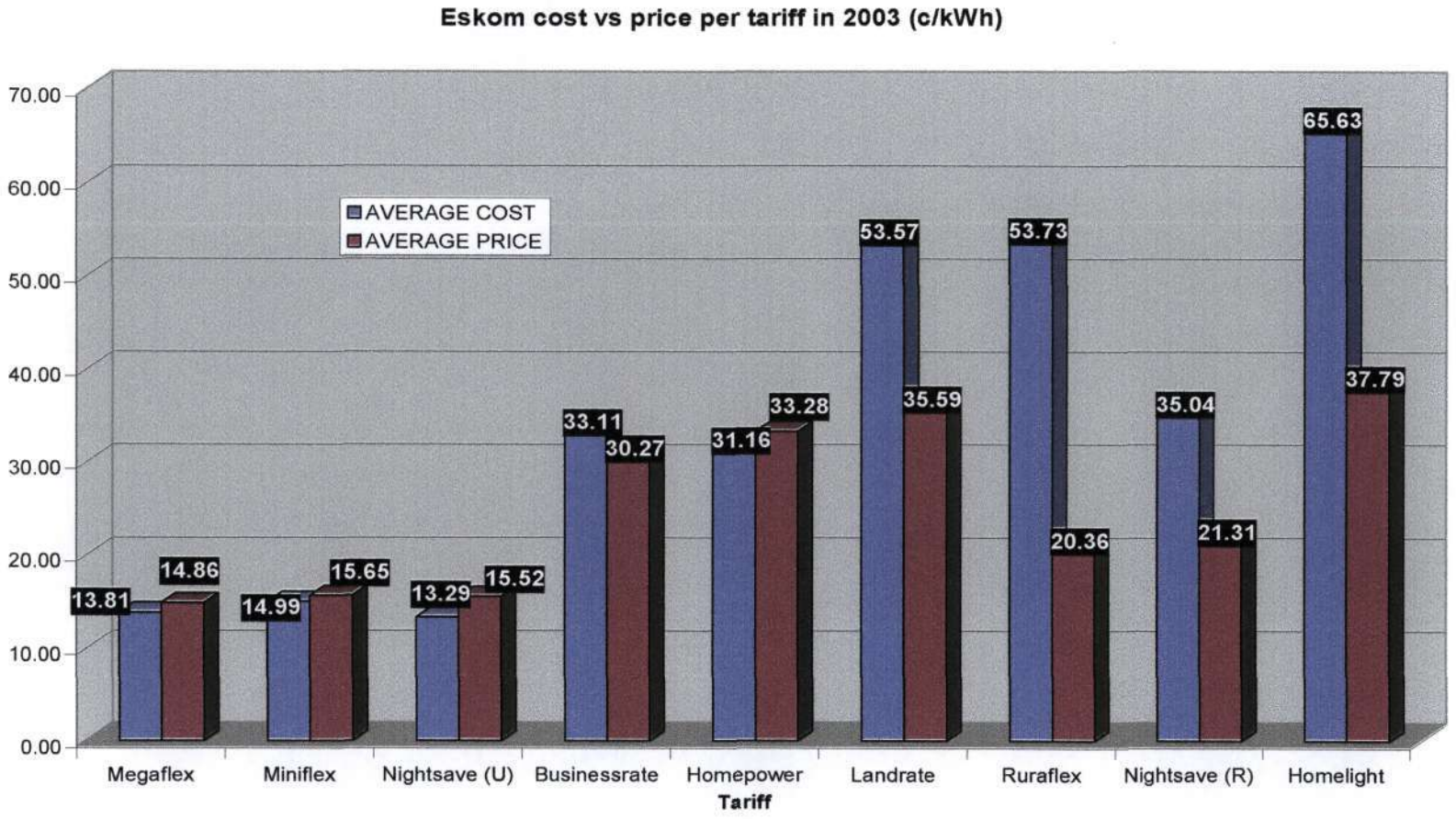


Figure 16: Depicts the comparison of the actual average cost to Eskom in supplying its customer base (on different tariff structures) versus the average price that is charged to customers

Annexure B: Tariff Alignment and Cost-based Design Project plan

ID	Task Name	Duration	Start	Finish	Predecessors
1	TARIFF DESIGN PROJECT	231 days?	Mon 1/3/05	Mon 11/21/05	
2					
3	COMPETENCY BUILDING COMPONENT	1 day?	Mon 1/3/05	Mon 1/3/05	
4	PHASE 1: PROJECT LAUNCH	235 days	Mon 1/3/05	Fri 11/25/05	
5	Understanding the EDI/ Project pilot	41.5 days	Wed 2/2/05	Thu 3/31/05	
12	Simulation introduction	119.5 days	Mon 1/3/05	Fri 6/17/05	
19	Competency Building (tariff design workshop)	184 days	Tue 3/15/05	Fri 11/25/05	
28					
29	RED TARIFF DESIGN & IMPLEMENTATION	1 day?	Mon 1/3/05	Mon 1/3/05	
30	PHASE 2: DATA GATHERING & PURIFICATION	240 days?	Mon 1/3/05	Fri 12/2/05	
31	Data gathering and purification	237 days?	Mon 1/3/05	Tue 11/29/05	
53	Data acquisition cont...	240 days?	Mon 1/3/05	Fri 12/2/05	
75					
76	PHASE 3: COST OF SUPPLY STUDY	1 day?	Mon 1/3/05	Mon 1/3/05	
77	DERIVE COST OF SUPPLY	1 day?	Mon 1/3/05	Mon 1/3/05	
78	RED 3: East London (Nelson Mandela Metro)	4 days	Mon 12/12/05	Thu 12/15/05	
79	ACQUIRE FINANCIAL, WHOLESALE ELECTRICITY PRICING & NETWORK DATA	2.5 days	Mon 12/12/05	Wed 12/14/05	
85	MAINTAIN COST OF SUPPLY METHODOLOGY MODEL	1.5 days	Wed 12/14/05	Thu 12/15/05	
88	DEVELOP COST OF SUPPLY MATRIX MODEL	1 day	Thu 12/15/05	Thu 12/15/05	
94					
95	PHASE 4: TARIFF DESIGN	1 day?	Mon 1/3/05	Mon 1/3/05	
96	DESIGN TARIFF STRUCTURES	1 day?	Mon 1/3/05	Mon 1/3/05	
100	RESEARCH CUSTOMER & BUSINESS TARIFF REQUIREMENTS	1 day?	Mon 1/3/05	Mon 1/3/05	
107					
108	PHASE 5: RATE DESIGN/ CALCULATION	1 day?	Mon 1/3/05	Mon 1/3/05	
109	DEFINE NEW TARIFF STRUCTURES	1 day?	Mon 1/3/05	Mon 1/3/05	
112	CALCULATE RATES FOR TARIFFS	1 day?	Mon 1/3/05	Mon 1/3/05	
119					
120	PHASE 6: POST RED IMPLEMENTATION	1 day?	Mon 1/3/05	Mon 1/3/05	
121	SCALE RATES TO BE REVENUE NEUTRAL & ADJUST FOR SUBSIDIES	1 day?	Mon 1/3/05	Mon 1/3/05	
129	ANALYSE IMPACT OF TARIFF RATES ON CUSTOMERS	1 day?	Mon 1/3/05	Mon 1/3/05	
135	MANAGE TARIFF STAKEHOLDERS	1 day?	Mon 1/3/05	Mon 1/3/05	
141	RECALCULATE RATES WITH PRICE INCREASE	1 day?	Mon 1/3/05	Mon 1/3/05	
143					
144	ADMINISTRATION	1 day?	Mon 1/3/05	Mon 1/3/05	
145	Cost control	1 day?	Mon 1/3/05	Mon 1/3/05	
146	Update project plan	1 day?	Mon 1/3/05	Mon 1/3/05	
147	Informing target audience	1 day?	Mon 1/3/05	Mon 1/3/05	
148	Liaison with 726 Competency Building	1 day?	Mon 1/3/05	Mon 1/3/05	

Figure 17: Tariff Alignment and Cost-based pilot project plan depicting the different phases (©Eskom Distribution Pricing Department, 2005)

A more detailed plan in terms of tariff design outputs

ID	Task Name	Duration	Start	Finish
1	**Tariff Design**	**138 days**	**Mon 2/3/03**	**Sun 8/10/03**
2	**Acquire & Manage Customer Data**	**57.5 days**	**Mon 2/3/03**	**Mon 4/21/03**
3	**Acquire 12 months customer data**	**25 days**	**Mon 2/3/03**	**Wed 3/5/03**
8	**Clean & Validate customer load data**	**22 days**	**Thu 3/6/03**	**Fri 4/4/03**
14	**Determine forecasted monthly customer data**	**48.5 days**	**Thu 2/13/03**	**Mon 4/21/03**
24	**Derive Cost of Supply**	**78 days**	**Mon 2/3/03**	**Mon 5/19/03**
25	**Acquire Financial, Wholesale Electricity Pricing & Network Data**	**78 days**	**Mon 2/3/03**	**Mon 5/19/03**
26	**Define financial wholesale & network data requirements**	**0.5 days**	**Mon 2/3/03**	**Mon 2/3/03**
30	**Obtain Financial Data**	**55 days**	**Tue 3/4/03**	**Mon 5/19/03**
34	**Request Network Cost Data**	**18 days**	**Mon 2/17/03**	**Tue 3/11/03**
37	**Obtain Wholesale data**	**36.5 days**	**Mon 3/3/03**	**Tue 4/22/03**
41	**Develop Cost of Supply Matrix**	**18.5 days**	**Fri 4/18/03**	**Wed 5/14/03**
47	**Design Tariff structures**	**80 days**	**Mon 2/3/03**	**Wed 5/21/03**
48	**Research customer & Business tariff requirements**	**1.5 days**	**Mon 2/3/03**	**Tue 2/4/03**
52	**Define new tariff structures**	**15 days**	**Thu 5/1/03**	**Wed 5/21/03**
55	**Calculate rates for tariffs**	**98 days**	**Mon 2/3/03**	**Mon 6/16/03**
56	**Maintain tariff rates model**	**29 days**	**Mon 3/3/03**	**Thu 4/10/03**
59	**Scale rates to be revenue neutral & adjust for subsidies**	**20 days**	**Thu 5/15/03**	**Wed 6/11/03**
66	**Analyse impact of tariff rates on customers**	**98 days**	**Mon 2/3/03**	**Mon 6/16/03**
72	Compile Pricing Plan Document	43 days	Mon 3/31/03	Wed 5/28/03
73	**Eskom Approval Process**	**125 days**	**Mon 2/3/03**	**Thu 7/24/03**
74	Tariff Design Meetings	0 days	Mon 2/3/03	Mon 2/3/03
75	DSPC	0 days	Thu 5/29/03	Thu 5/29/03
76	PIC 1	0 days	Mon 6/23/03	Mon 6/23/03
77	EXCO	0 days	Tue 7/8/03	Tue 7/8/03
78	Eskom Board Meeting	0 days	Thu 7/24/03	Thu 7/24/03
79	NER Rates Submission	0 days	Thu 7/24/03	Thu 7/24/03
80	NER Tariff Committee	0 days	Wed 7/30/03	Wed 7/30/03
81	Promulgation	0 days	Sun 8/10/03	Sun 8/10/03

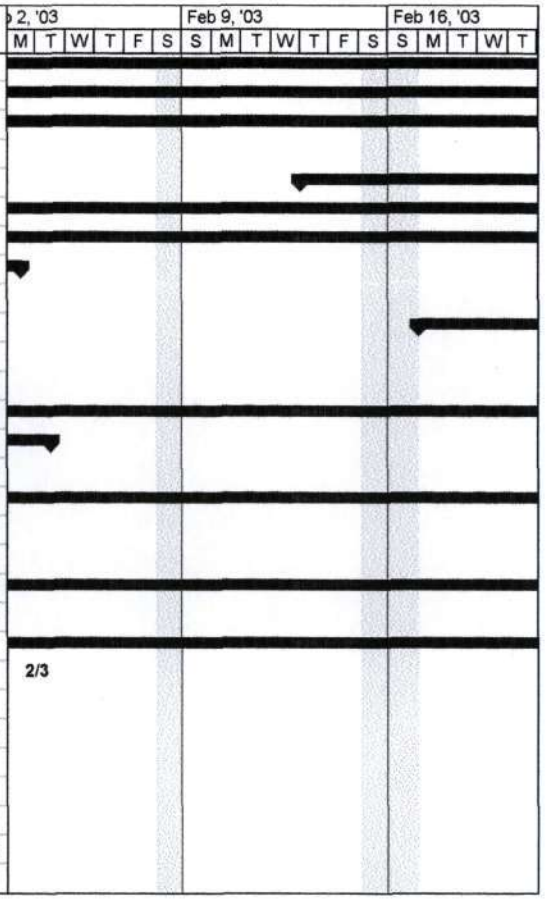


Figure 18: A generic detailed Tariff design plan that sets out all the various steps of the process (©Eskom Distribution Pricing Department, 2003)

See the Project Process Guide below from which the above plan was derived (© Eskom Key Value Chain within the Develop and Market Products and Services Key, 2003)…

Level 3: Acquire & manage customer load profile data

Acquire & manage customer load profile data Model

Acquire & manage customer load profile data Detail - (L3)

Level 4: Acquire customer load & non load data

Acquire customer load & non load data Model

Acquire customer load & non load data Detail - (L4)

Level 3: Research typical customer load profile

Research typical customer load profile Model

Research typical customer load profile Detail - (L3)

Level 4: Perform load profile statistical analysis

Perform load profile statistical analysis Model

Perform load profile statistical analysis Detail - (L4)

Level 3: Derive cost of supply

Derive cost of supply Model

Derive cost of supply Detail - (L3)

Level 4: Maintain cost of supply methodology

Maintain cost of supply methodology Model

Maintain cost of supply methodology Detail - (L4)

Level 4: Acquire financial, wholesale electricity pricing & network data

Acquire financial, wholesale electricity pricing & network data Model

Acquire financial, wholesale electricity pricing & network data Detail - (L4)

Level 4: Develop cost of supply matrix

Develop cost of supply matrix Model

Develop cost of supply matrix Detail - (L4)

Level 3: Design tariff structures

Design tariff structures Model

Design tariff structures Detail - (L3)

Level 4: Research customer & business tariff requirements

Research customer & business tariff requirements Model

Research customer & business tariff requirements Detail - (L4)

Level 4: Define new tariff structures

Define new tariff structures Model

Define new tariff structures Detail - (L4)

Level 3: Calculate rates for tariffs

Calculate rates for tariffs Model

Calculate rates for tariffs Detail - (L3)

Level 4: Maintain tariff rates model

Maintain tariff rates model Model

Maintain tariff rates model Detail - (L4)

Level 4: Scale rates to be revenue neutral & adjust for subsidies

Scale rates to be revenue neutral & adjust for subsidies Model

Scale rates to be revenue neutral & adjust for subsidies Detail - (L4)

Level 4: Analyse impact of tariff rates on customers

Analyse impact of tariff rates on customers Model

Analyse impact of tariff rates on customers Detail - (L4)

Level 3: Manage tariff stakeholders

Manage tariff stakeholders Model

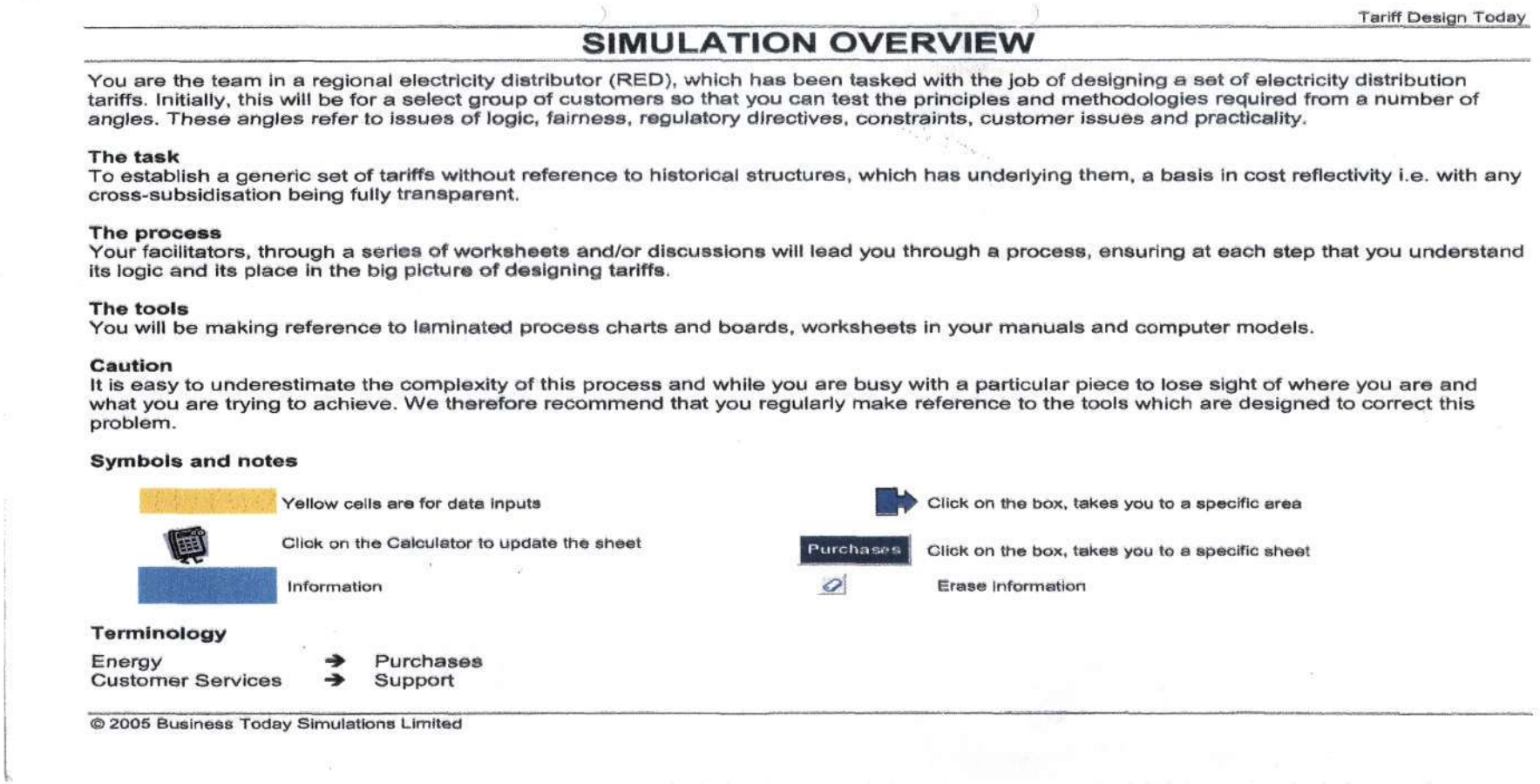
Manage tariff stakeholders Detail - (L3)

Level 4: Recalculate rates with price increase

Recalculate rates with price increase Model

Recalculate rates with price increase Detail - (L4)

Annexure D: SIMULATION OVERVIEW: A LOOK AT THE APPEARANCE OF THE COMPUTER BASED COURSE



Tariff Design Today

SIMULATION OVERVIEW

You are the team in a regional electricity distributor (RED), which has been tasked with the job of designing a set of electricity distribution tariffs. Initially, this will be for a select group of customers so that you can test the principles and methodologies required from a number of angles. These angles refer to issues of logic, fairness, regulatory directives, constraints, customer issues and practicality.

The task
To establish a generic set of tariffs without reference to historical structures, which has underlying them, a basis in cost reflectivity i.e. with any cross-subsidisation being fully transparent.

The process
Your facilitators, through a series of worksheets and/or discussions will lead you through a process, ensuring at each step that you understand its logic and its place in the big picture of designing tariffs.

The tools
You will be making reference to laminated process charts and boards, worksheets in your manuals and computer models.

Caution
It is easy to underestimate the complexity of this process and while you are busy with a particular piece to lose sight of where you are and what you are trying to achieve. We therefore recommend that you regularly make reference to the tools which are designed to correct this problem.

Symbols and notes

Yellow cells are for data inputs

Click on the Calculator to update the sheet

Information

Click on the box, takes you to a specific area

Purchases — Click on the box, takes you to a specific sheet

Erase Information

Terminology

Energy → Purchases
Customer Services → Support

Figure 19: Depicts the participant's first encountered information during the Tariff Design Corses (source: Student Manual)

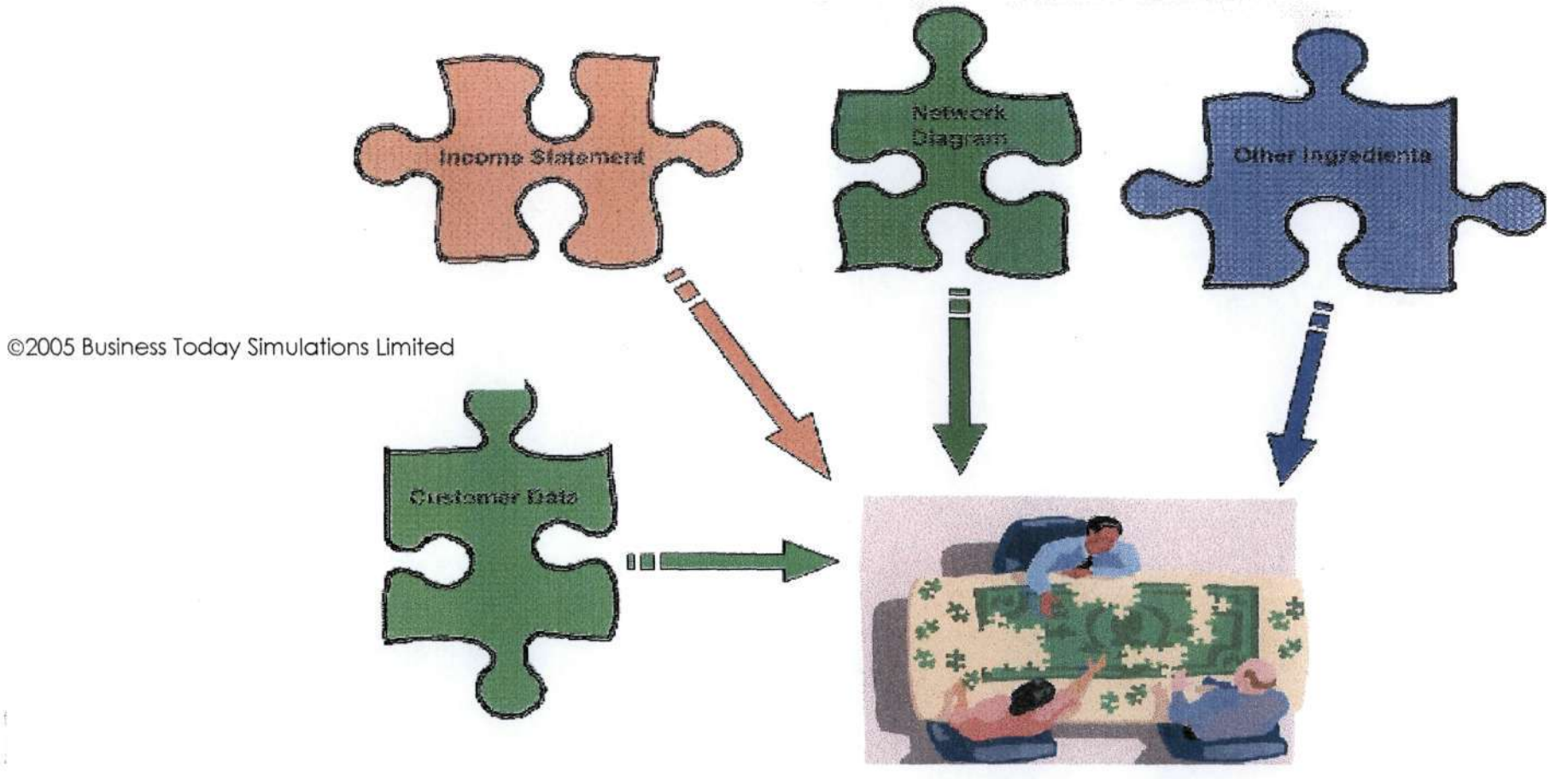
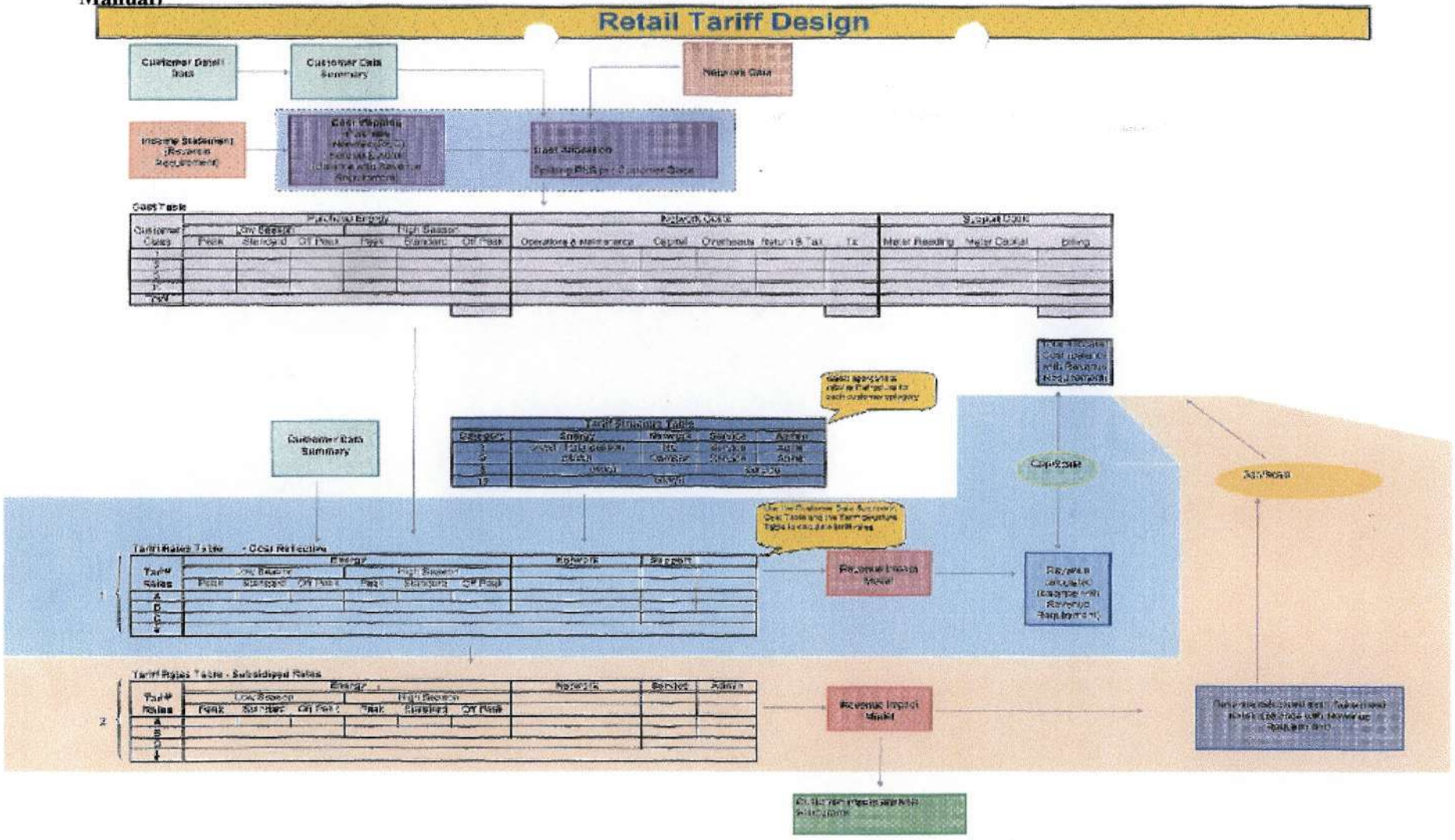


Figure 20: Depicts the three most important data needed to put together the pieces for tariff design (source: Student Manual)

Figure 21: Depicts the overview of all phases involved in tariff design ultimately ending with the final product - the tariff (source: Student Manual)



Annexure E: TARIFF DESIGN SIMULATION MODEL

As discussed in the write up, the simulation model basically allows participant students to go from an Income Statement received from Distribution Finance to a Cost Table which is a breakdown of all costs charged to the customers per category…

Overview

Income Statement

Revenue					**R**	**-77,670,000**
	External Energy Purchases			R 45,048,000		
	External Network Purchases			R 3,883,000		
Cost of sales					**R**	**48,931,000**
	Network Operations		R 1,417,500			
	Field Services		R 2,227,500			
	Engineering Overheads		R 1,989,000			
	Customer Service		R 1,140,700			
	Customer Service (Systems & Infrastructure)		R 979,500			
	Contract Meter Reading		R 737,000			
	Marketing		R 222,000			
		Agricultural R 100,000				
		Commercial R 48,000				
		Residential R 74,000				
	Information Management		R 555,000			
	Human Recources		R 506,600			
	Finance Department		R 972,800			
	Fleet Management		R 547,200			
	Billing		R 694,100			
	General Expenses			R 11,988,900		
	Depreciation - Distribution Network		R 5,062,400			
	Depreciation - Meter Capital		R 1,620,000			
	Depreciation - Buildings		R 756,300			
	Depreciation - Transport equipment		R 582,800			
	Depreciation - Computer equipment		R 389,000			
	Depreciation			R 8,410,500		
Operating Cost					**R**	**20,399,400**
	Bank Charges			R 39,800		
	Interest received - Late payments			R -198,700		
	Interest paid - Capital Loans			R 1,615,000		
Interest & Finance Charges					**R**	**1,456,100**
	Bad Debt			R 523,700		
Abnormal Cost					**R**	**523,700**
Net Income before Tax					**R**	**-6,359,800**
SA Normal Tax					**R**	**2,703,900**
Return/Profit after Tax					**R**	**-3,655,900**

As approved by NER for 2005

Figure 22: An example of an Income Statement necessary at the beginning of any tariff design exercise (©Eskom Distribution Pricing Department, 2005)

The following is picture of a Cost Table depicting the different customer categories

Cost Table		Purchase Cost						Network Cost				
		High Demand			Low Demand			Transmission	Capital	O&M	Engineering Overheads	Engineering Profit + TAX
		P	S	O	P	S	O	R/kVA	R/kVA	R/kVA	R/kVA	R/kVA
Category 1	High - 132kV - 100% - 80% - Agriculture / Commercial / Industrial / Mining / Traction	R 2,428,091	R 1,517,401	R 1,012,778	R 1,832,023	R 2,772,224	R 2,603,565	R 165,073	R 281,579	R 154,955	R 216,401	R 261,352
Category 2	High - 66kV / 44kV - 80% - 20% - Agriculture / Commercial / Industrial / Mining / Traction	R 3,639,383	R 2,424,921	R 885,046	R 2,953,995	R 3,365,599	R 1,965,626	R 359,604	R 613,406	R 337,563	R 471,419	R 569,342
Category 3	High - 22kV / 11kV - 80% - 20% - Agriculture / Commercial / Industrial / Mining / Traction	R 1,318,471	R 894,932	R 597,047	R 871,298	R 1,510,822	R 1,433,512	R 395,423	R 674,505	R 371,186	R 518,375	R 626,052
Category 4	High - 500V - 20% - 0% - Agriculture / Commercial / Industrial / Mining / Traction	R 154,722	R 94,753	R 27,979	R 104,613	R 180,926	R 70,508	R 92,892	R 158,454	R 87,199	R 121,776	R 147,071
Category 5	Low - 22kV / 11kV - 80% - 20% - Agriculture / Commercial / Industrial / Mining / Traction	R 109,223	R 53,538	R 3,993	R 72,662	R 94,802	R 14,427	R 148,059	R 252,556	R 138,984	R 194,096	R 234,414
Category 6	Low - 500V - 20% - 0% - Agriculture / Commercial / Industrial / Mining / Traction	R 527,261	R 302,040	R 133,681	R 511,563	R 818,132	R 496,495	R 751,927	R 1,282,625	R 705,840	R 985,731	R 1,190,488
Category 7	High - 500V - <= 500kWh - Residential	R 805,306	R 442,941	R 233,133	R 533,836	R 886,258	R 608,758	R 969,047	R 1,652,984	R 909,652	R 1,270,362	R 1,534,242
Category 8	High - 500V - > 500kWh - Residential	R 484,975	R 266,750	R 140,398	R 267,763	R 444,532	R 305,343	R 279,477	R 476,727	R 262,347	R 366,377	R 442,481
Category 9	Low - 500V - <= 500kWh - Residential	R 170,056	R 93,535	R 49,230	R 110,782	R 183,917	R 126,330	R 450,950	R 769,222	R 423,310	R 591,168	R 713,965
Category 10	Low - 500V - > 500kWh - Residential	R 248,800	R 136,847	R 72,027	R 167,965	R 278,884	R 191,562	R 270,548	R 461,495	R 253,965	R 354,671	R 428,344
		R 9,886,289	R 6,227,659	R 3,155,313	R 7,426,520	R 10,536,095	R 7,816,125	R 3,883,000	R 6,623,553	R 3,645,000	R 5,090,376	R 6,147,751
						Total Purchases	R 45,048,000					R 25,369,680
						Target Purchases	R 45,048,000					
						Difference	R (0)					

Purchase Costs	R	45,048,000
Customer Service Overheads, Profit, Tax & Abnormal Cost	R	2,818,572
Engineering Overheads	R	5,090,376
Network Cost TX	R	3,883,000
Network Cost DX	R	6,623,553
Network Cost O&M	R	3,645,000
Engineering Profit & Tax	R	6,147,751
Support Costs - Meter Reading	R	737,000
Support Costs - Meter Capital	R	1,620,000
Support Costs - Billing	R	694,100
Support Costs - Cust Service	R	1,140,700
Support Costs - Marketing	R	222,000
Total	**R**	**77,670,052**
Revenue Requirement - Target	**R**	**77,670,000**
Difference	**R**	**52**
		0.00%

Figure 23: Depicts the cost table from which the actual tariff structures can be determined (this picture only shows the purchase & network costs against different customer categories/ voltage levels)

Cost Table		Support Costs - Customer Service - R/Premise			Support Costs - Marketing - R/Premise			Support Costs - Meter Capital - R/Premise		
		Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
Category 1	High - 132kV - 100% - 80% - Agriculture / Commercial / Industrial / Mining / Traction			R 16,754						R 4,288
Category 2	High - 66kV / 44kV - 80% - 20% - Agriculture / Commercial / Industrial / Mining / Traction			R 67,014						R 17,152
Category 3	High - 22kV / 11kV - 80% - 20% - Agriculture / Commercial / Industrial / Mining / Traction		R 16,754	R 50,261					R 399	R 9,068
Category 4	High - 500V - 20% - 0% - Agriculture / Commercial / Industrial / Mining / Traction	R 3,874	R 16,754		R 47,480			R 16,894	R 357	
Category 5	Low - 22kV / 11kV - 80% - 20% - Agriculture / Commercial / Industrial / Mining / Traction			R 16,754						R 4,288
Category 6	Low - 500V - 20% - 0% - Agriculture / Commercial / Industrial / Mining / Traction	R 12,114	R 83,768	R 16,754	R 99,478	R 868	R 174	R 81,644	R 5,978	R 492
Category 7	High - 500V - <= 500kWh - Residential	R 595,351			R 52,454			R 1,039,978		
Category 8	High - 500V - > 500kWh - Residential	R 52,420			R 4,618			R 55,015		
Category 9	Low - 500V - <= 500kWh - Residential	R 182,353			R 16,066			R 318,539		
Category 10	Low - 500V - > 500kWh - Residential	R 9,779			R 862			R 65,907		
		R 855,890	R 117,275	R 167,535	R 220,958	R 868	R 174	R 1,577,978	R 6,735	R 35,287
				R 1,140,700			R 222,000			R 1,620,000

Purchase Costs	R	45,048,000
Customer Service Overheads, Profit, Tax & Abnormal Cost	R	2,818,572
Engineering Overheads	R	5,090,376
Network Cost TX	R	3,883,000
Network Cost DX	R	6,623,553
Network Cost O&M	R	3,645,000
Engineering Profit & Tax	R	6,147,751
Support Costs - Meter Reading	R	737,000
Support Costs - Meter Capital	R	1,620,000
Support Costs - Billing	R	694,100
Support Costs - Cust Service	R	1,140,700
Support Costs - Marketing	R	222,000
Total	**R**	**77,670,052**
Revenue Requirement - Target	**R**	**77,670,000**
Difference	**R**	**52**

Figure 24: Depicts the cost table from which the actual tariff structure (s) can be derived (this picture shows the various support costs)

Annexure F: Feedback Evaluation forms

COURSE EVALUATION

DATE: _____

YOUR NAME: _____

1. What parts of this programme did you find useful?

2. What parts did you not find useful?

3. What will you do differently in your job as a result of your experience on this course?

4. Would you change anything in the course to benefit future delegates?

COURSE EVALUATION
27 June – 01 July 2005

1. **What parts of this programme did you find useful?**
   - Organisation and management of learning environment industry simulation and the approval process by the regulator.
   - Shift focus to correct cost allocation. Network allocation. Classification of customer has an impact on your revenue. Tariff design is complex and one must combine economic realities.
   - Cost allocation. Weighing of components. Grouping of customers.
   - Allocating costs related to energy provision, grouping consumer to categories. Selection of relevant Tariffs.
   - I am fairly new in Tariff design but the whole course was designed in such a way that every step was useful.
   - Great way of learning because it does not highlight just one specific part.
   - Applying the costs onto similar group of customers concept and how the learned of running of entire model was very practical.
   - The unpacking of the income statement into cost of supply statement.
   - The program as a whole was very useful in fact I will forward you a request (as discussed) to have additional people.
   - Cost allocation – manage costs so that they can be reinforced.
   - Almost everything it elaborates on cost reflective Tariff designed and areas a big room for learning.
   - The last reflective part of designing Tariffs.
   - The totals packaging appreciate the hand copies of the presentations and the defined step by step approach to keep you on track all the time.
   - Basically everything especially the importance of the "technical" stuff and the integration between that and finance.
   - Income statement cost mapping and cost allocation.

2. **What parts did you not find useful?**
   - All parts are relevant and need to include other industry role players like NER and DME.
   - Removing the formula bins which make our tasks a little longer than it could have been.
   - Every part was useful.
   - More. But sometimes if felt that there is information missing.
   - The fact that we could not go back and change certain grouping to see the impact on the customers.
   - The cost mapping approach on network cost and grouping and Tariffs election.
   - I would say not useful but very difficult in categorising of customers into buckets.
   - I think the course or parts as stated above is very useful and interred and there is no part that can be identified as not useful.
   - Copying and pasting on excel laborious is time consuming even though it teaches us a bit more about excel but does not add value to the course.

3. **What will you do differently in your job as a result of your experience on this course?**
   - Apply all the applications of costing and involve different departments encourage customer services to have people who will supply quality data to the designers as we find with network planning and finance.

COURSE EVALUATION
11 - 15 July 2005

1. **What parts of this programme did you find useful?**
   - The whole course the links between different stakeholders (departments). The effects the decision on cost of supply has on the customer.
   - Break-up of cost. Recovery of costs and outcome of decisions.
   - Putting the costs together from different Tariffs. Dividing costs to the relevant customers.
   - Cost separation. Classification of customer. Determining your network. Reduced diagram (I now have a better understanding of the NRS) designing Tariffs and analysing the impact on customers (I now have a better understanding of Tariffs I enjoyed the course very much it was very practical).
   - Better idea of how Tariffs are designed.
   - All parts – congratulations to the training team excellently done.
   - Everything was useful and interesting.
   - Hands on learning process.
   - Mapping cost. Tariff selection and usage. Forecast versus actual.
   - The whole of this programme was useful time constringe cause that the program run over short period, would like to see more of the detail work behind it.
   - The total programme.
   - The whole setup was useful as previously the Tariff structures were not done anyway near this.
   - The total programme.
   - The whole programme was useful because of its applicability to the current project I am involved in.
   - Structure and approach well built the model is well built and very illustrative of Tariff building process.

2. **What parts did you not find useful?**
   - Would made like to see what would happen if certain changes on the initial choices (groupings /categories) were made with a second run.
   - Pool of network initially because I reasoned more technically than financially.

3. **What will you do differently in your job as a result of your experience on this course?**
   - When preparing the cost mapping statement, assess the reasonability of assumptions I will make in allocation should overheads costs.
   - Pool customers. Calculate recovery costs and subsidies. Look at load factors and load profile for our T.O.U customers.
   - Make sure that all the costs are identified and apportioned correctly to the different customers.
   - Previously used consultant for Tariff design in future will be able to do it ourselves and saving council money. Will in conjunction with treasure gather all necessary in format for Tariff design.
   - Yes definitely I have gained a lot of knowledge that I am going to implement. I have a better understanding of Tariffs.
   - Gather and sort the data better and store it in a better way so that it will be easy to get information.
   - Try and convince our treasurer and I.T departments that we cannot work separately.

COURSE EVALUATION
22 – 26 August 2005

1. **What parts of this programme did you find useful?**
   - The network mapping and voltage level and density breakdown, support cost mapping and breakdown. Great group and team dynamics.
   - The whole course was very interesting explanation of a few technical issues.
   - Everything.
   - Categories of customers. Importance of subsidies. Method used to allocate cost.
   - Costing is important in this process.
   - The re-enforcing of the learning process.
   - Costing and Tariff impact.
   - Emphasis on costs.
   - Process on line (the way in which Tariff design needs to be approached to achieve cost reflective Tariffs). actual Tariff design in the simulation method.
   - Well structured step by step process.
   - All of it was interesting and useful.
   - The practical part of the course finding out what happens through the whole process.
   - Income statement. Classification of costs. Subsidies and Tariff categories.
   - Cost mapping, customer categorization and clarification of Tariff selection, network diagrams and pooling subsidization.
   - The whole impacting of the design process.
   - Everything coming from a financial environment, I have gained better understanding.

2. **What parts did you not find useful?**
   - The number converting.
   - All parts were important and useful.
   - Understanding the technical ride of electricity more and understanding of how the Tariffs were calculated.

3. **What will you do differently in your job as a result of your experience on this course?**
   - Better understanding of decision making.
   - Gather assets register is more cost reflective.
   - Work hard in ensuring that the data is reliable.
   - Insist on availed data (reliable).
   - The importance of data collection.
   - Aware of detailed cost breakdown and its impacts.
   - Improved understanding of process and practical issues – more able to regulate effectively both Eskom and local authorities. Guide local authorities / red Tariff setting.
   - At least now I know what happens to the cost of supply study once we completed it in the region I now realise the impact of our costing decisions and assumptions.
   - Analysis of cost.
   - The amount of data to be included, customer categorization, Tariff selection and subsidizing.
   - Create a passion for Tariff design and better rates to our customers.
   - From a financial point of view must ensure that the assets of a company must be in place in order to start calculating the Tariff structure.

COURSE EVALUATION
05 – 08 September 2005

1. **What parts of this programme did you find useful?**
   - Preparation of the presentation this forced us to review the whole process.
   - This course brought understanding in Tariff design and what desires the ultimate approval of Tariff by the NER therefore all parts of the programmes provided useful learning for me.
   - The complete process of arriving at cost reflective Tariffs and the "complexity" therefore the "merging" of thinking process amongst team members.
   - How to begin Tariff. To cost allocate from. Cost mapping. Cost table and network data.
   - Finding out that there is a structured way to design Tariffs. Working through the process of just lectures. Having to prepare a presentation.
   - Process of identifying cost in detail for Tariff design and implementation and discussion around options available (learnt some computer and excel capabilities) interaction with delegates was pleasant.
   - Designing Tariff structures.
   - Everything was useful.
   - The entire course was very useful, now under the basis of Tariff design.
   - All had fun together with learning.
   - This programme was a real eye opener. There are Tariffs in peace and an annual inflation included is applied every year with no reflection.
   - Every part is done with flow.
   - Using a comprehensive model (very detailed). Sharing ideas with other entities.
   - All aspects presented.
   - The interaction between members from different atelier.

2. **What parts did you not find useful?**
   - How the networks or customers of Tariffs are categories and the impact it has on the different customers.
   - Lunch.

3. **What will you do differently in your job as a result of your experience on this course?**
   - Various aspects of our network and asset costs need to be looked at.
   - We are currently reviewing our Tariff this has provided vital information and learning that will assist in finalising the Tariffs.
   - Map costs as per the guidelines used in the course.
   - Look differently at the year and financial statements and linked these to your knowledge gained here in order to see the "real term" effect of applying knowledge into practice.
   - To collect all customer data summary, network data. Try and calculate Tariff using same method. Categories customers. Choose which Tariff they can call to.
   - Nothing as it is no longer my job to actually do these things. I will however be encouraging other smaller municipalities to become aware of the process and to take part in future courses.
   - My job does not involve Tariff design but I may need to represent treasury in future deliberations.
   - Obtain all the relevant information on our customers and apply or compare our Tariff structure.