PN. ACT-442
120909

Unbundling the Finance and Accounts Sector of NEPA

Overview

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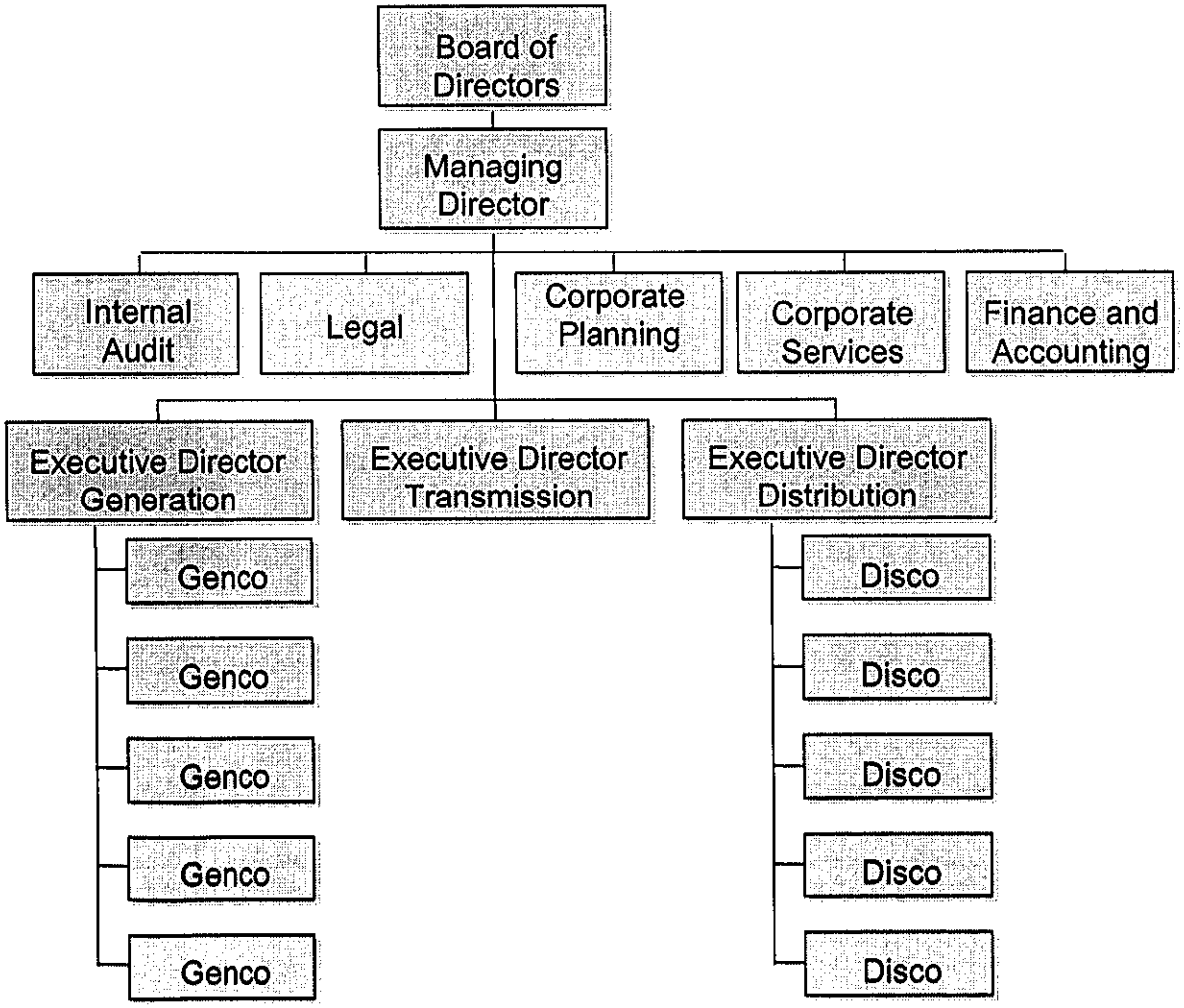
23865-239-115-0005

Overview of Presentation

- Restructuring of the Power Sector
- Restructuring NEPA into Business Units
- Business Unit F&A Functions: Today and Future
- Key Transition Issues
  - Cost Accounting
  - Organization of F&A
  - Capital budgeting
  - Financial planning
  - Revenues and transfer pricing
- Next Steps for Unbundling F&A

NEXANT

Model for NEPA Organization Structure



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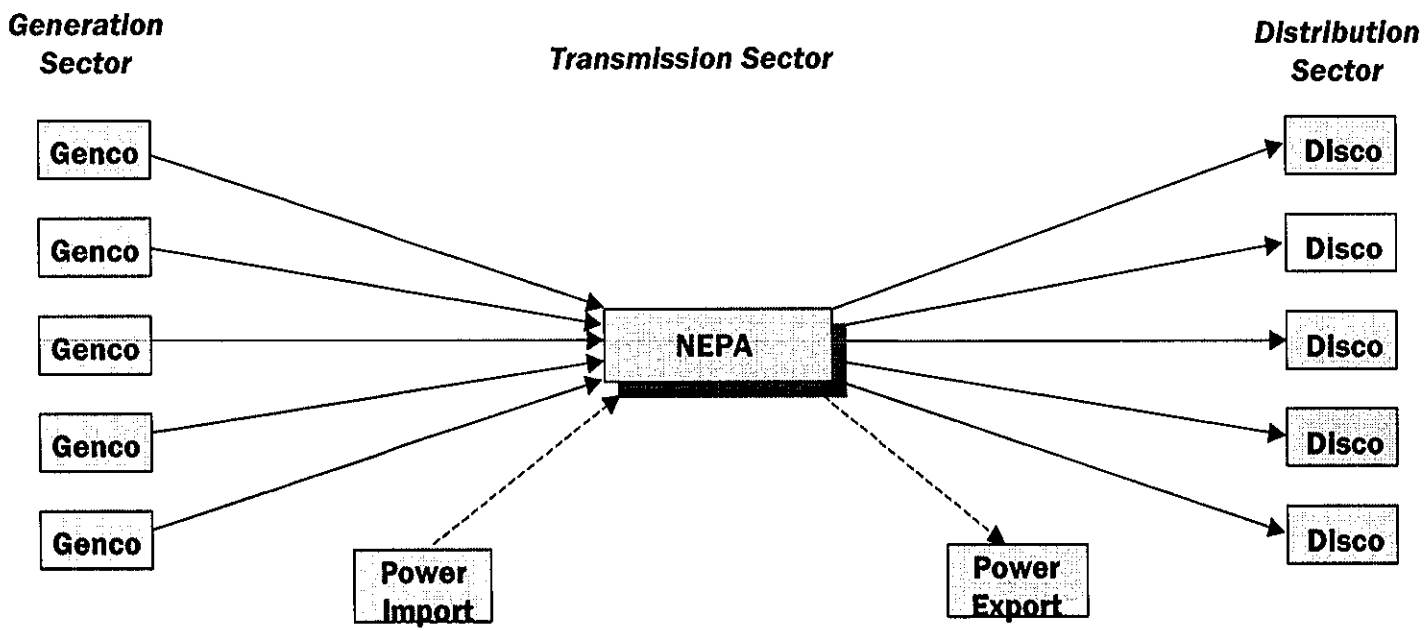
Market Model for Power Sector Privatization



Private Genco ownership encouraged

State Transco monopoly required

Private Disco ownership encouraged

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New Institutions for Privatization

- Restructured NEPA
  - Pre-privatization: Semi-Autonomous Business Units
  - Post-privatization: Transco, Discos and Gencos
- Privatization Agency
- Policy-setting Body (EPIC, Ministry)
- Regulatory Body
- Power Procurement Agency (interim)
- NEPA Corporate Planning and Strategy Group

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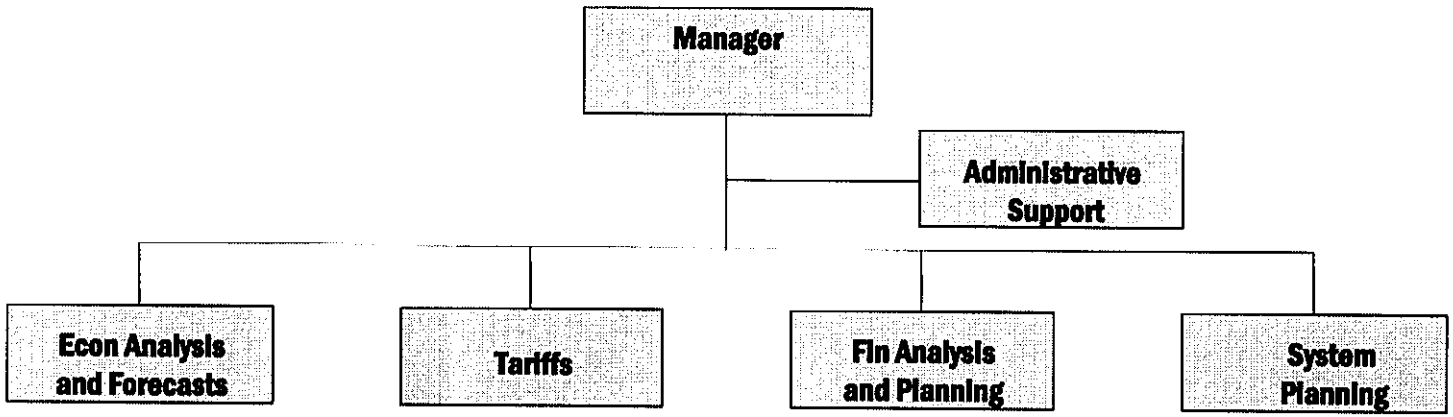
Corporate Planning and Strategy Group at HQ



Basic Functions

- Strategic planning (including preparing the corporate business plan)
- Economic forecasting and analysis
- Tariff analysis and design
- Financial analysis and planning
- System planning
- Impact analyses

Possible Special projects

- Action plan implementation
- Budget and funds allocation to the line organization
- MIS design and implementation
- IT system strengthening
- Job description process
- Rural electrification funding
- Negotiation with IPPs
- Negotiation with fuel suppliers
- Liaison with government and financiers

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Business Units

- Definitions
  - Operating unit – a cost center subject to headquarters administrative controls
  - Business unit – a semi-autonomous profit center with formalized relations with other units
- During the transition to restructuring and privatization, NEPA may create business units
  - Generation Regions or Plants
  - National Grid (Transmission and Dispatch)
  - Distribution and Marketing Zones

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Establishing Business Units

- Decentralizing for operational efficiency
- New functions required at BU level
- Transfer pricing
- BU Incentive Mechanisms for:
  - Cost efficiency
  - Customer service
  - Safety and environment

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Business Unit F&A Functions Today versus Future

Today	Corporate/Private
Cost Accounting	Cost Accounting *
Expense Budgeting	Expense Budgeting
Limited Capital Budgeting	Capital Budgeting *
Consolidate Trial Balances	Consolidate Trial Balances
	Revenue Accounting *
	Demand Forecasting *
	Financial Planning *
	Financing
	Financial Reporting *
	Treasury
Limited Cash Management	Cash Management
Cash Receipt Accounting	Cash Receipt Accounting
Internal Audit	Internal Audit

* Functions requiring new processes to be implemented at the business unit level during transition to unbundling.

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Key Transition Issues for Establishing Business Units

- Unbundling costs
- Capital budgeting
- Financial planning
- Revenues and transfer pricing
- Organization of F&A Groups at Business Units

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Cost Accounting Key Issues

- Balance Sheet Allocation to Business Units
  - Fixed Assets out of overall asset base
  - Liabilities
  - Shared services
    - Between Business Units in same sector
    - From BU's in other sectors
    - From Administration (Headquarters)
  - Administration costs
    - Operating costs
    - Fixed assets

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Cost Accounting Main Point

- Need to develop an allocation methodology for all centrally accounted costs, assets and liabilities.

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Capital Budgeting Key Issues

- Development of capital spending plan at BU level
- Economic evaluation of capital and expense projects and programs
- Methodology of centralized allocation of overall capital budget (during transition to privatization)
  - Prioritization based on BU plans (bottom up)
  - Prioritization based on relative marginal cost of service by division (G, T & D/M)

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Capital Budgeting Main Point

- Capital budget should be allocated to meet corporate mission and objectives.

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Financial Planning Key Issues

- Optimizing development plans
  - Demand forecasting at Business Units
  - Least-cost planning
- Determining financial requirements on a forecast basis using financial modeling
- Estimating costs to "run the business" and compensate investors ("revenue requirements")
- Integration of financial plan with BU budget

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Financial Planning Main Point

- Management capability for financial planning at the business unit level should be strengthened to ensure the success of unbundling.

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Revenues and Transfer Pricing Key Issues

- Methodology for transfer pricing by sector (G, T & D/M)
  - Expense component
  - Capital component
  - Billing determinants
- Transition to cost-based transfer pricing
- Business Unit Incentive Mechanisms to complement transfer pricing

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Revenues and Transfer Pricing Key Issues

- Process for revenue transfers between BU's
  - Debit and credit notes
  - Bill determination based on metered power flows
  - End-of-year reconciliation of forecast versus actual
  - Process integration of capital budgeting with transfer price setting

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Organization of F&A Key Issues

- Skills and job descriptions
- Responsibilities of F&A staff at BU level
- Delegation of authority to BU's
- New processes
  - Information flow
  - Procedures
  - Financial reporting
  - Computerization
- Managing the Transition

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Organization of F&A Main Point

- F&A organization should be restructured to accommodate new activities to be introduced at the Business Unit level.

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Next Steps

- Conduct pilot program for F&A unbundling for one Business Unit
- Replicate pilot program to all Business Units

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Summary

- F&A organization will be increasingly decentralized to the Business Units
- Finance and accounting systems should reflect unbundled company structure
- New F&A functions will be required at the Business Unit level
- The F&A organization will play a leadership role in the gradual introduction of Business Units

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F&A Organisational Unbundling

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F&A Organisational Unbundling

- NEPA undergoing functional unbundling
- Unbundled F&A organisational structure driven by two fundamental principals:
  - Should be reflective of NEPA's unbundled functional structure
  - Should be reflective of the functions to be performed
- Therefore, function defines F&A's form

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F&A Organisational Unbundling International Comparison

- What will a future F&A organisation look like?
- Examine comparable utilities for examples of unbundled F&A organisations
- Nexant has advised on functional unbundling world-wide, including
  - Central Europe (various)
  - India
  - Vietnam
- Today's case study is Vietnam

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Vietnam
Power Sector Overview

- Vietnam's power sector comprises:
  - State owned power authority (EVN) comprising:
    - Headquarters functions
    - Generation
    - Transmission
  - 6 distribution companies (PCs)

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Vietnam
Power Sector Overview

- Nexant advised on the financial unbundling of EVN and the PCs
- The over-riding objective was to restructure the PCs for maximum autonomy because:
  - Of the size of the country
  - Of the diversity within the country
- Similar to the situation facing NEPA

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Vietnam
F&A Restructuring at EVN

- Unbundling of F&A Department into separate departments as follows:
  - General Accounting Department
  - Management Accounting Department
  - Treasury Department (Financial Department)
- Departments to be under the direct control and management of the Deputy General Director for Finance at EVN

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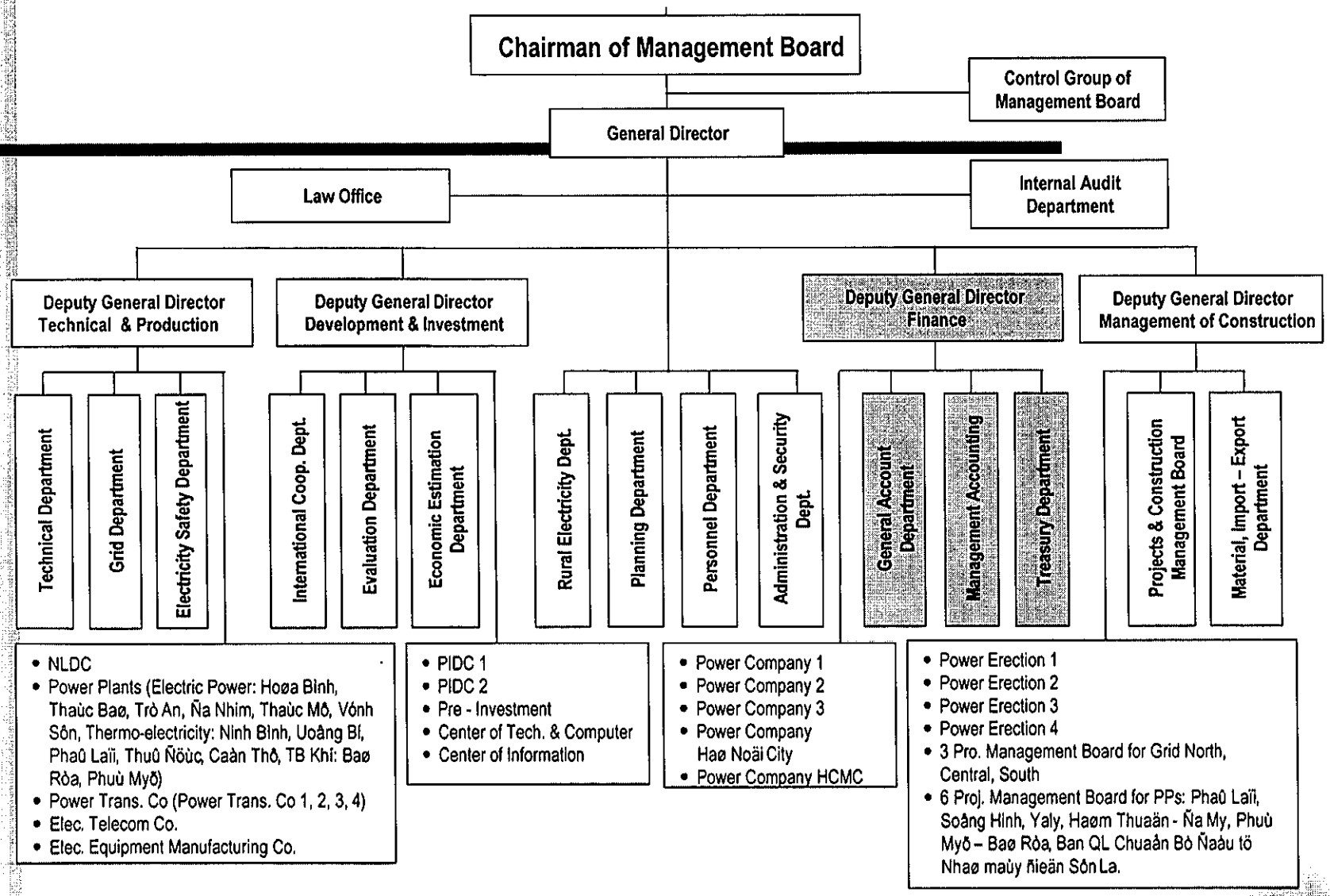
Organization Chart of EVN



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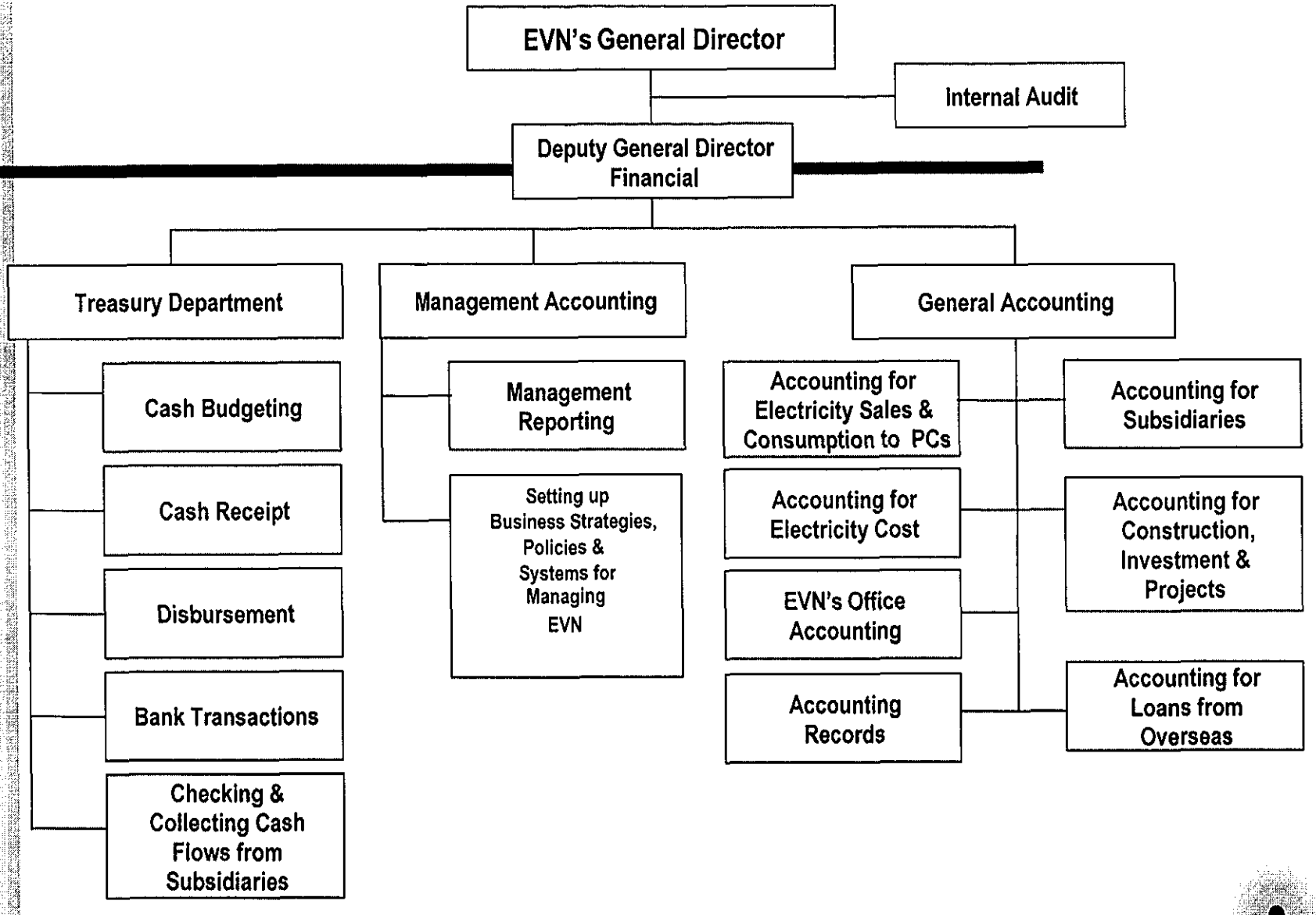
Financial & Accounting Organization Structure At EVN (Proposed)



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Vietnam
F&A restructuring at PCs

- Unbundling of F&A Department into separate departments as follows :
  - General Accounting Department
  - Management Accounting Department
  - Treasury Department (Financial Department)
  - Customer Accounting Department
- Departments to be under the responsibility of a Deputy Financial Director

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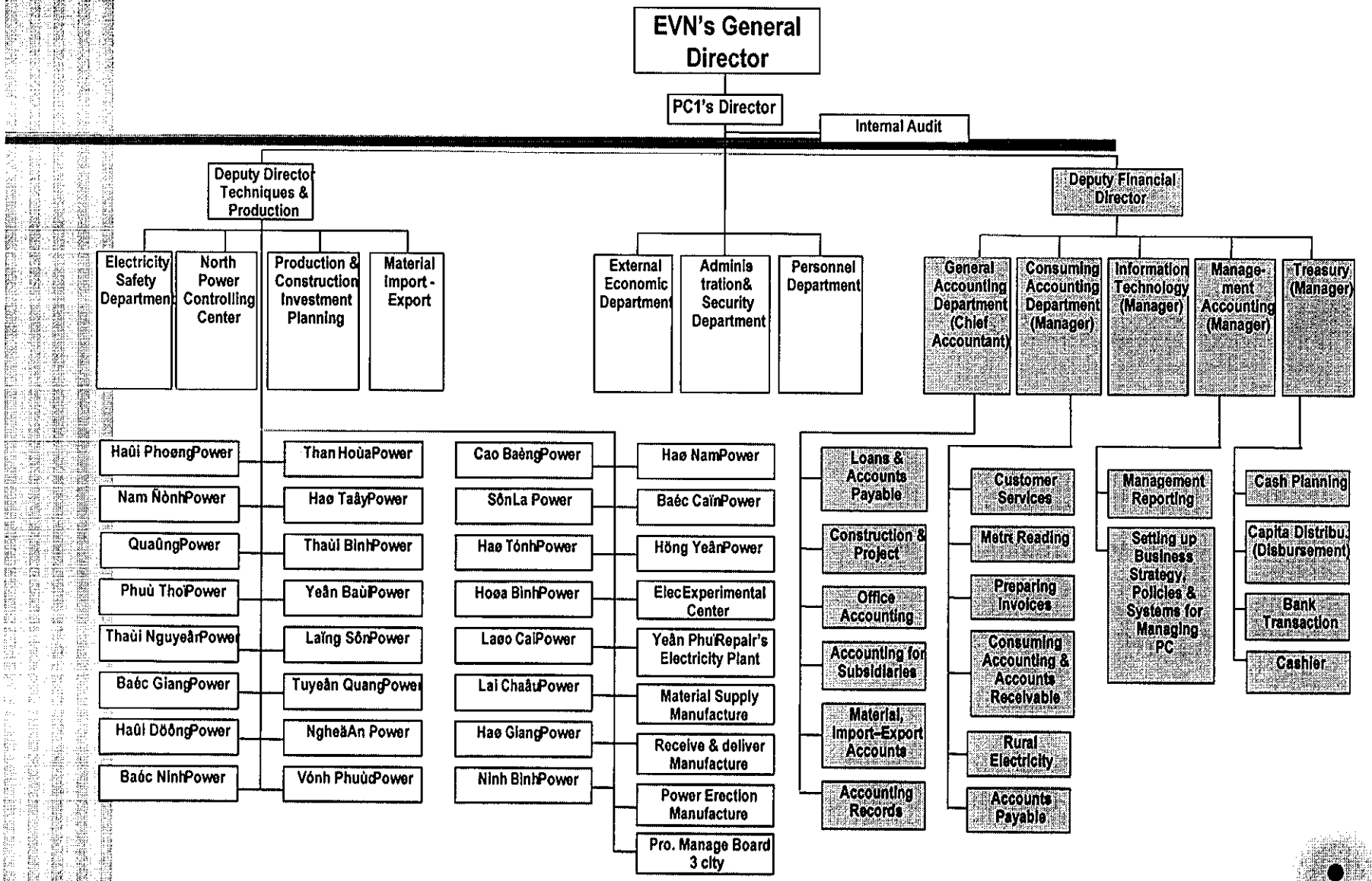
Organization Chart of PC



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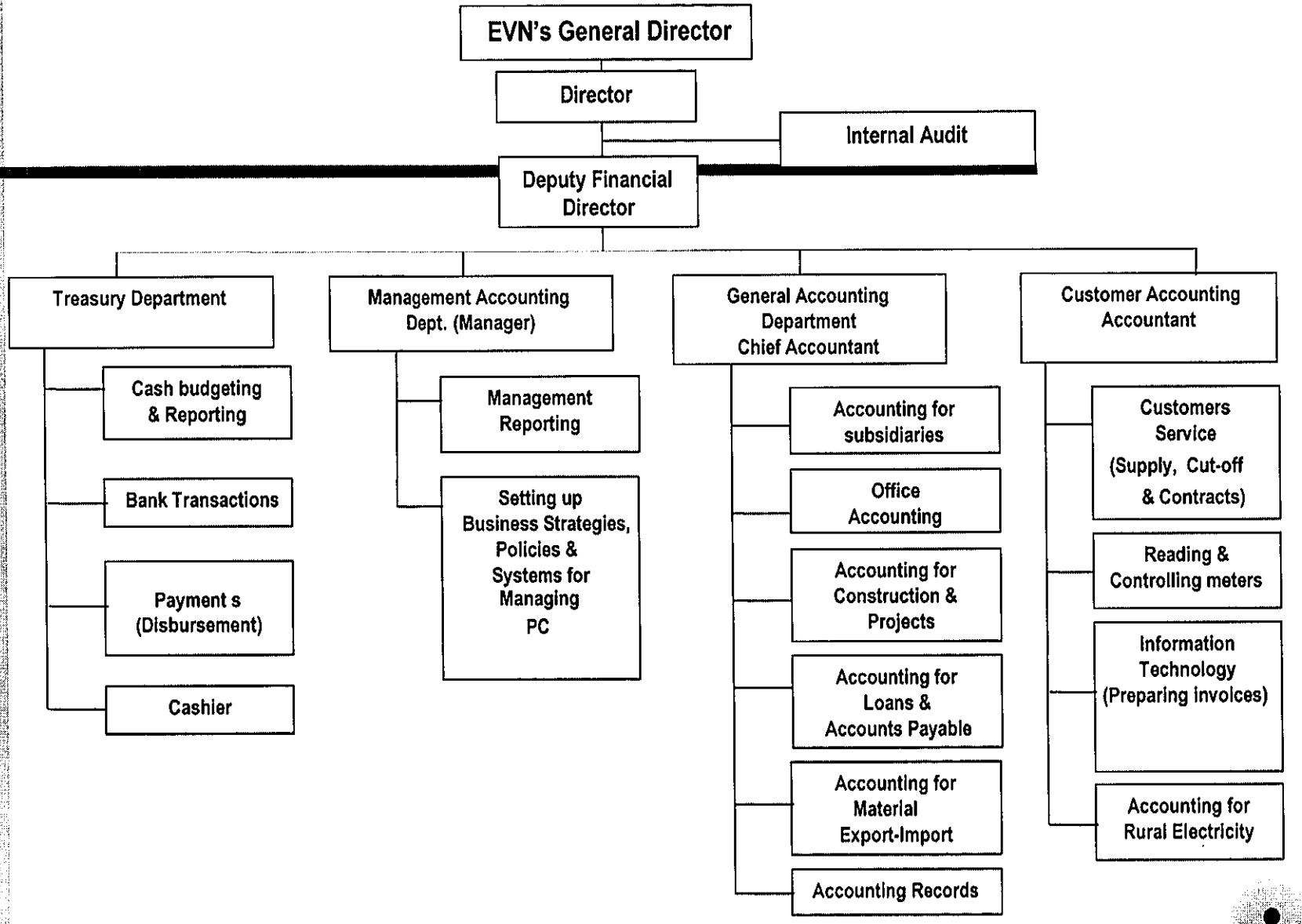
Financial & Accounting Organization Structure At PCs)



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Vietnam
F&A Restructuring at PCs

- What conclusions can we make?
- Autonomy requires significant F&A activities at:
  - Zones for Distribution and Marketing
  - Transmission sector
  - Regions for the Generation Sector

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NEPA's Unbundled F&A Organisational Structure

- Two aspects to be considered in unbundling the F&A function:
  - The overall F&A structure within NEPA
    - Influenced by the functional organisational structure
  - The internal structure of the F&A departments
    - Influenced by the functions to be performed

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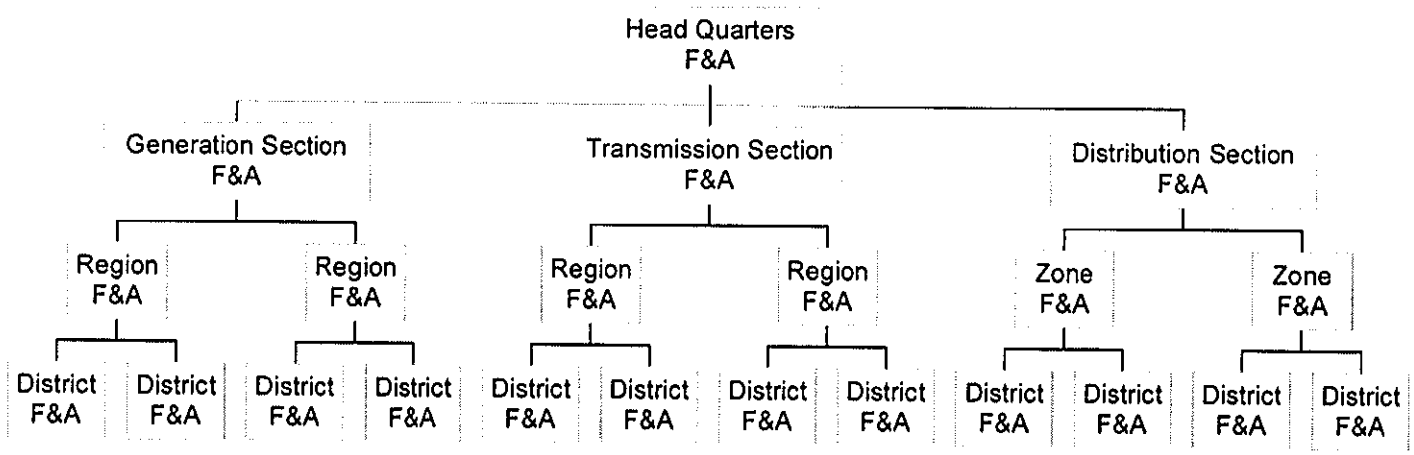
Reflecting the Functional Organisational Structure

- The proposed F&A organisational structure is reflective of NEPA's unbundled functional structure



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Reflecting Functions to Be Performed

- The functions required of F&A at each of the different sectors, and at each tier of the hierarchy, will be different
- Therefore, the internal organisational structure of the F&A departments, at each of the sectors, at each of the levels of the hierarchy, will be different

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Reflective of the Functions to Be Performed

- Actions:
  - Determining the functions to be performed at each of the sectors, at each level of the hierarchy
  - Implementing new processes including:
    - Information flows
    - Policies and procedures
    - Reporting
  - Determining the staffing, job responsibilities and job descriptions

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Reflective of the Functions to Be Performed

Functions to be Performed

- Demand Forecasting
- Financial Planning
- Preparing Financial Statements
- Determining Cost of Service
- Evaluating Capital Projects
- Corporate Guidelines to Project Evaluation
- Capital Budgeting

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NEW F & A FUNCTIONS AT REBUNDLED BUSINESS UNITS

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Sales and Demand Forecasting

- Importance to Distribution Zones (Business Units)
- Processes used
- Data required
- Output from forecasts

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Importance to Zones

- Demand forecasts
  - New construction or upgrades
  - Voltage profiles
  - Capital budget allocations
  - Substation transformer replacements
  - Allocation of costs for tariff design
  - Provide information relative to new capacity requirements

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Importance to Zones

- Sales forecasts (kwhr)
  - Distribution zone loss calculation
  - Revenue estimation
  - Provide input into operating budget
  - Provide input into financial planning model

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Processes Used

- Trend analysis
- Econometric modeling

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Data Requirements

- Trend analysis
  - Historical aggregate sales/demands
  - Factors which may be different in future
- Econometric analysis
  - Historical factors which affect sales/demand
  - Forecasts of these factors

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Output from Forecasts

- Peak demand and sales by circuit
- Aggregate zonal peak demand and sales

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Reporting Requirements

- Types of reports
- Purposes of reports

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Types of reports

- Financial
  - Income Statement
  - Balance Sheet
  - Cash Flow Statement
- Non-financial
  - Revenue Estimates
  - Budget monitoring/reconciliations
  - Operations information
  - Collection rates
  - Loss reporting

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Income Statement

Revenues	9,500,000.00
Expenses	
Cost of generation	3,700,000.00
Cost of transmission	966,000.00
Cost of distribution	2,600,000.00
Depreciation	1,200,000.00
Other operation costs	87,000.00
Total operation costs	8,553,000.00
Operating Income	947,000.00
Income Taxes	189,400.00
Net Income	747,600.00
Dividends to stockholders	300,000.00
Additions to retained Earnings	447,600.00

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Balance Sheet

ASSETS	
Current assets	
Cash and cash equivalents	65,000.00
Inventories	140,000.00
Accounts receivable	45,000.00
Subtotal	250,000.00
Fixed assets	500,000,000.00
Less depreciation	175,000,000.00
Net Fixed assets	325,000,000.00
Total Assets	325,250,000.00
LIABILITIES	
Current liabilities	
Short term debt (bank loans)	100,000.00
Accounts payable	75,000.00
Current year of long term debt	800,000.00
Subtotal	975,000.00
Long Term Liabilities	
Long term debt	150,000,000.00
Common stock	174,275,000.00
Total Liabilities	325,250,000.00

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Financial Planning

- Definition
- Process
- Applications

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Financial Planning

- Definition:
  - Methodology to estimate future financial impacts resulting from management decisions
  - Not a budget
  - Contains estimates of revenues, operating costs and capital costs

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Financial Planning

- Process
- Uses budget as starting point
- Can be manually estimated but most often computer model used
- Mathematical relationships developed between input parameters and desired financial results

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Financial Planning

- Input parameters
  - Sales and demand forecasts
  - Estimates of tariff adjustments
  - Financial limitations
  - Financial requirements (loan conditionalities)
  - Inflation estimates
  - Interest rate estimates

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Financial Planning

- Applications
  - Used to warn of unforeseen consequences of today's decisions
  - Managers can be proactive rather than reactive
  - Gives managers tool to estimate impacts of alternative decisions
  - Can provide basis for advance budgeting

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New F&A Functions at the Business Units

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Overview of Presentation

- Determining Cost-of-service
- Evaluating Capital Projects
- Guidelines for Project Evaluation
- Capital Budgeting

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Cost-of-Service Revenue Requirements

The RR formula is:

RR = D + E + T + I + r(AB)

D = depreciation

E = expense (fuel, labor etc.)

T = taxes

I = insurance

r(AB) = return on asset base (profit and interest)

AB = asset base: fixed asset value - accumulated depreciation + working capital

Note: Need to revalue and index net asset value.

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Cost-of-service Depreciation

- Depreciation is the expense of systematically returning capital to the investors as an asset declines in value
- Utility depreciation methods are *regulated*
- Types of depreciation
  - Physical
  - Functional (reduced need for an asset)
  - Inflation-related
- Most common depreciation method is *straight line*

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Cost-of-service Return on Equity

■ Minimum for equity:	12%
■ US large, publicly traded	15%
■ Volatile	18%
■ Small company	22-25%
■ High risk	33%
■ Government agency	varies

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Cost-of-service: Estimating BU Revenue Requirements

- Pure embedded cost approach, usually for past 12 months (historic)
  - Weakness: past does not predict future
  - Weakness: requires adjustment in case of high inflation
- "Test year" for a period in the future (forward looking)
  - Strength: anticipates the future costs to own and operate the business

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Evaluating Capital Projects Basics

- Capital investments are funded by investors who are reimbursed over time for the capital they invested.
  - Depreciation
  - Return on equity
- A dollar of capital is more costly to consumers than a dollar of expense.
  - Tax impacts
  - Cost of capital

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Evaluating Capital Projects Costs and Benefits

- Costs
  - Capital Cost
  - Operations and Maintenance Expense
  - Environmental costs
- Benefits
  - Improved system reliability
    Example: transmission line
  - Reduced costs of generation
    Example: power plant rehabilitation
  - Improved system operations
    Example: metering and control
- Intangible costs and benefits
- Major investments justify sophisticated computer-base economic modeling

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Evaluating Capital Projects Marginal Cost Analysis

- System marginal cost measures the opportunity cost for some capital projects
  - Example: Transmission line reconductoring to reduce transmission losses
- LRMC can be used as a measure of the benefit of such projects
- A commonly used cost-benefit approach for evaluating capital projects is to compare:
  - Level annual revenue requirements (cost) with
  - Long run marginal cost (benefit)

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Evaluating Capital Projects Projects that Impact Sales

- Impact of increased or lost sales is measured by the difference between the sales price and the incremental cost of the sale
- If tariffs = LRMC, the utility company has no incentive for increasing or decreasing sales
- In Nigeria, tariffs are less than LRMC. Therefore NEPA has an economic disincentive to expand the system for the purpose of increasing sales.

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Guidelines for Project Evaluation

- Headquarters disseminates project evaluation guidelines to Business Units
- Guidelines may cover:
  - Recommended approaches for economic evaluation of projects
  - Evaluation of other factors (e.g. environmental impact)
- Examples
  - Manual of Economic Analysis
  - System power value tables
- Guidelines help Business Units prioritize capital budgets

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Guidelines for Project Evaluation

- Basic Concepts
  - Time Value of Money
  - Cost of Capital
  - "Fixed charge rate"
- Economic Analysis Techniques
  - Net Present Value
  - Escalation
  - Level Annual Revenue Requirements
  - Payback Analysis
- Economic Analysis for Specific Applications
  - Costs and Benefits of System Improvements
  - Capital Investments
  - Alternatives that Impact Sales

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Capital Budgeting

- Central allocation of overall capital budget (during transition to privatization)
  - Prioritization based on BU plans (bottom up)
  - Prioritization based on relative marginal cost of service by division (G, T & D/M)
- Preparing the Business Unit Capital Budget

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Summary

- Need to know the costs of owning and operating
- Need to implement new processes for:
  - Forecasting cost-of-service
  - Evaluating capital projects
  - Developing capital budgets
- Headquarters can assist BU's by disseminating guidelines for economic evaluation of projects

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PILOT STUDY FOR UNBUNDLING & TRANSFER PRICING

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Pilot Study: Unbundling & Transfer Pricing

Outline of Presentation

- What is a Cost-of Service Study?
- How to conduct a Cost-of-Service Study
- Revenue Requirements Calculations
- Transfer Pricing
- Marginal Cost based Cost-of-Service Study

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What is a Cost-of-Service Study?

- A Cost-of-Service (COS) study provides an accepted and realistic measurement of the cost of supplying electricity, and provides a breakdown of costs by key utility functions – Generation, Transmission, and Distribution

- Types of Cost-of-Service Studies
  - Embedded cost-of-service study
  - Marginal cost based cost-of-service study

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Types of Cost-of-Service Study

- Embedded COS study
  - An embedded COS study is based on "embedded" or historical costs of supplying electricity. This method provides a realistic measure of the "actual"cost of providing electricity.
  - An embedded COS study is based on meeting the current revenue requirements to supply electricity.
  - This method is widely used by utilities. It is especially well-suited to utilities that have adequate capacity and reserve margin, and do not expect a large growth in load demand with the associated need for large capital expenditures.

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Types of Cost-of-Service Study

- Marginal cost based COS study
  - A marginal cost based COS study is based on the "marginal" cost of supplying power, or the cost of providing an additional unit of energy or demand at the margin or peak. This method provides a realistic measure of the cost of meeting an additional unit of customer demand and effectively captures the "future" costs of supplying electricity.
  - The marginal cost based COS is not based on revenue requirements to supply electricity
  - This method is especially well-suited to utilities that expect the need for adding new capacity to meet load demand.

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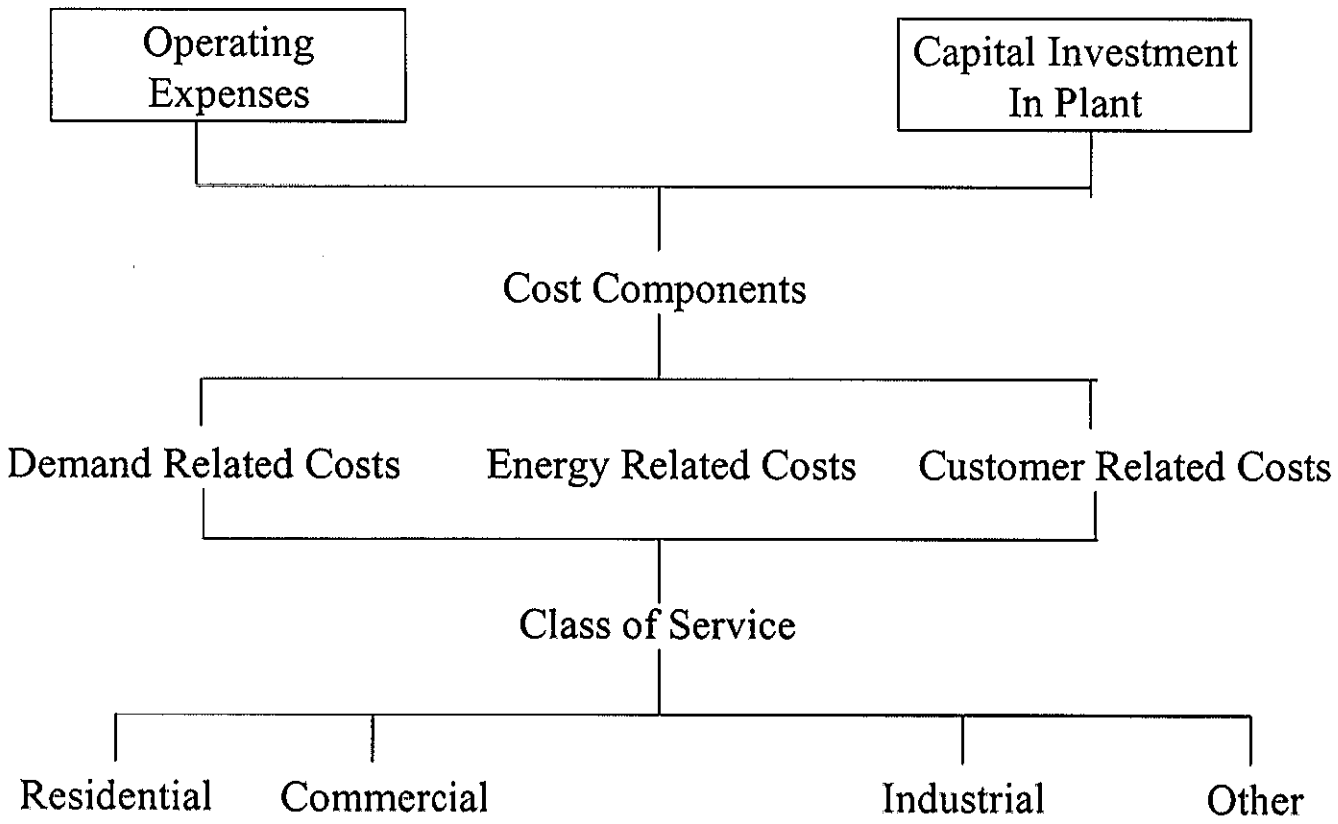
Average Cost of Service Study



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Basic Tasks in an Average Cost-of-Service Study

Gather and Assemble Data → Compute Demand Allocation Factors

Compute Energy Allocation Factors → Compute Customer Allocation Factors

Analyze the Electric System → Functionalize Electric Plant Investment

Classify Electric Plant Investment to Cost Components

Funtionalize Operating Costs → Classify Operating Expenses to Cost Components

Allocate Plant Cost to Customer Rate Class → Allocate Operating Expenses to Customer Rate Class

Allocate Revenues to Customer Rate Class → Determine Rate of Return for Customer Rate Class

Determine Revenue Adjustments for Customer Rate Class → Derive Average Unit Costs For Rate Design

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Steps in Conducting a Cost-of-Service Study

- Organize for conducting a COS study
  - Decide on a "Test Year"
  - Obtain information required for a COS study
    - Customer billing and load demand information
    - Finance and accounting information
    - Financial forecasts, etc.
- Adjust test year revenues and costs

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Steps in Conducting a Cost-of-Service Study

- Develop allocation factors for functionalizing costs
  - Demand allocation factors
  - Energy allocation factors
  - Customer allocation factors
  - Revenue allocation factors
  - Other allocation factors
- Develop allocation factors for classifying costs
  - For allocating generation, transmission and distribution costs

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Steps in Conducting a Cost-of-Service Study

- Unbundle or Functionalize costs
  - Generation
  - Transmission; by voltage level if required
  - Distribution; by voltage level if required
  - Customer function
  - Administrative and general
- Determine Revenue Requirements for each sector
- Compare revenue requirements with income from billings and other sources

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Steps in Conducting a Cost-of-Service Study

- Classify costs and revenue requirements by:
  - Demand
  - Energy
  - Customers

Utility Function	Demand	Energy	Customer
Generation	x	x	
Transmission	x		
Distribution	x		x
Customer service			x
Administrative and General	x	x	x

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Steps in Conducting a Cost-of-Service Study

- Unitize classified costs
  - Naira/kWh
  - Naira/kW
  - Naira/customer

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Information Needs for a COS Study

- Customer information
  - Breakdown of number of customers
  - Brakdown of utility sales (kWh)
- Generation information
  - Generation, power purchased, power exported
- Tariffs for each rate class

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Information Needs for a COS Study

- Financial information
  - Revenues from electricity sales and other income
  - Operating expenses by sector and function
  - Assets, liabilities and depreciation
  - Material stocks and inventory
  - Working capital
  - Capital improvements from sales revenues
  - Cost of capital, return on asset base, taxes, etc.

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Information Needs for a COS Study

- Customer Demand information
  - System load demand and load profile
  - Customer peak demand and load profile

- Demand forecasts
  - Load forecasts for 5-10 years
  - Generation, transmission and distribution expansion schemes

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Applications of Cost-of-Service Study

- Provides a realistic estimate of the cost of supplying electricity by function
- Provides a measure of the relative performance of utility business units
- Can be used to develop performance based incentive schemes
- Can be used to measure the "profitability" of supplying power to customers in specific rate classes
- COS studies are used to develop equitable rates

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Utility Revenue Requirements

- The revenue requirements of a utility are defined as the revenues required to pay for demand and energy costs, operate and maintain equipment, pay general and administrative costs, build and replace capital facilities, and provide a return on investment for the utility owners

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Utility Revenue Requirements

Utility revenue requirements are calculated as:

$$RR = E + D + T + P\&I + r(AB), \text{ where}$$

RR	=	Revenue requirement
E	=	Expenses
D	=	Depreciation
T	=	Taxes
P&I	=	Principal and interest on debt
r(AB)	=	Return on asset base

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Utility Revenue Requirements

Operations and Maintenance Expenses	
Generation Expenses	10,000,000.0
Transmission Expenses	500,000.0
Distribution Expenses	2,000,000.0
Customer Service Expenses	1,000,000.0
Administrative and General Expenses	1,000,000.0
Total Operations and Maintenance Expenses	14,500,000.0
Liabilities (incld. Taxes)	2,000,000.0
Capital Improvements from Revenues (renewals, replacements and betterments)	2,000,000.0
Return on Asset Base	1,000,000.0
Total Test Year Revenue Requirements	19,500,000.0

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Revenue Requirements

Revenue Requirements Sheet

Production
- Operations
  - Fuel
  - Other Production Operation Expenses
  - Purchased Power
  - Other Purchased Power Expenses
    - Total Operations
- Maintenance, Total
  - Total Production

Transmission
- Operations
  - Transmission Of Electricity By Others
  - Other Expenses
    - Total Operations
- Maintenance, Total
  - Total Transmission

Distribution
- Operations
  - Meter Expenses
  - Other Expenses
    - Total Operations
- Maintenance
  - Meter Expenses
  - Other Expenses
    - Total Maintenance
      - Total Distribution

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Revenue Requirements

Revenue Requirements Sheet

Customer Accounts
- Meter Reading
- Customer Records And Collection Exp.
- Other Customer Accounts
  - Total Customer Accounts

Sales Expense
- Load Mgmt / Conservation Programs
- Advertising Expenses
  - Sales Expense, Total

Administrative & General, Total

Total Operation And Maintenance Exp.

Other Income And Expenses
- Other Income (Deductions)
  - Other Income (Loss)
  - Income (Loss) Related To Legal Actions
  - Other Credits (Expenses)
    - Total Other Income (Deductions)
- Debt Service Payments
  - Revenue Bond
  - Mortgage Bond
    - Total Debt Service Payments
- Allowance for Capital Additions
- Allowance For Construction Reserves
- Transfers To Other Funds
- Transfers In-Lieu Of Taxes
- Services Provided To Town
  - Total Other Income And Expenses

Total Revenue Requirements

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Transfer Pricing

- Transfer prices are a reflection of the true cost of services provided between business units

- In the Pilot study, the revenue requirements for each of the generation, transmission and distribution sectors will be used as a proxy for transfer prices between the business units.

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Transfer Pricing

- Per unit demand and energy based transfer prices will be computed using the COS cost allocation methodology

- Development of performance based transfer prices will also be explored

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What are Marginal Costs?

- Marginal cost can be defined as the incremental cost an electric utility incurs to provide an incremental unit of capacity or energy at any given period of time
  - Marginal costs vary over time and are higher at peak load periods as compared to off-peak periods
  - Marginal costs are strongly influenced by the type of capacity (coal, gas, hydro, etc.) used to meet the demand

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Marginal Cost Calculations Methods

- Marginal Generation Capacity Costs
  - "Peaker Deferral" method
  - Forward-Backward method
  - Generation Resource Plan Expansion or System Optimization method
- Marginal Transmission Capacity Cost
  - Projected Embedded Analysis
    - Functional subtraction approach
    - Engineering approach
  - System Planning Approach

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Marginal Cost Calculations Methods

- Marginal Distribution Capacity Cost
  - Demand-related marginal distribution capacity costs
    - Systems approach
    - Engineering approach
  - Customer-related marginal distribution capacity costs
    - Minimum systems method
    - Zero-intercept method
    - Engineering method

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Marginal Cost Calculations Methods

- Marginal Generation Energy Costs
  - Using utility production costing models
  - Using historical data
- Marginal Transmission and Distribution Energy Costs
  - These are minimal and can be ignored

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Applications of Marginal Cost Studies

- Marginal costs provide a true reflection of the costs incurred by a utility to meet additional demand in capacity and energy.
- Marginal costs allocated to different time periods can be used in optimal dispatch of power plants.
- Marginal costs can be used in determining tariffs that send the right price signals to customers.
- Marginal costs can be used to evaluate alternative expansion plans and develop optimal and cost-effective capital investments plans.

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