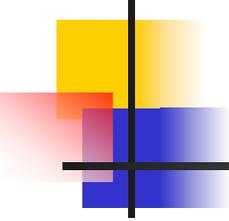


International Trends and Nigeria Context

Range of options for regulatory reform
and industry restructuring

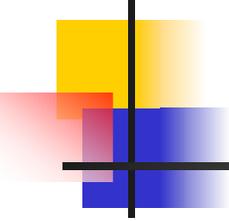
Policy Module B1

Ron Eachus



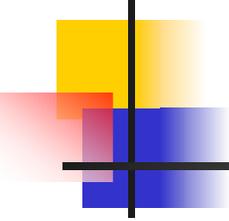
Key Characteristics of Electricity

- Demand is highly variable
- Hard to store
- It seeks the path of least resistance
- Supply and demand must always be in balance
- “Not just another commodity”
 - Invested with the public interest



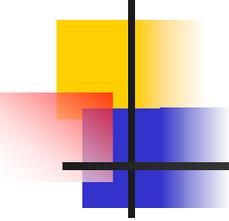
Market Design Elements

- How much generation is competitive and unregulated?
 - Depends on energy market mechanisms
- How is the energy market organized?
- How are tariffs set for transmission and system operator?
- Which customers are eligible for third party access to supply?
- How are tariffs set for captive customers?



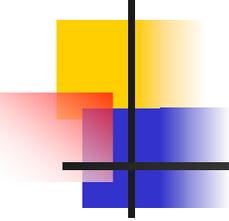
Market Approaches

- Single Buyer
 - Wholesale power is purchased and sold to retail distribution companies by single buyer
- Open Access and bilateral trade



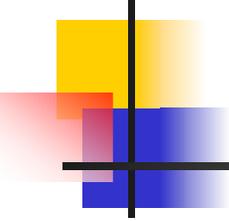
Market Power

- Related to market share
 - With larger share, a generator is more likely to lower output or raise price
 - The gain from what it does sell is greater than the risk of selling less
 - A large number of companies increases the degree of competition



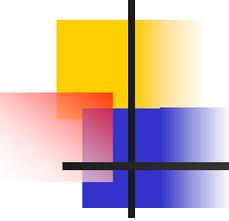
Market Mechanisms

- Power Pools: Generators offer price & quantity
 - Cost-based
 - Pre-determined variable costs
 - Generator paid the system marginal price plus capacity payment
 - Limits freedom of generator to set price
 - Lower volatility
 - Price-based
 - Generator free to offer any price
 - Can have day ahead and real time market
 - Higher volatility
 - Higher risk of market abuse



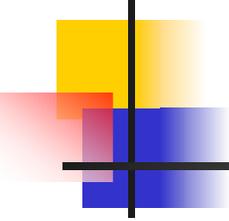
Market Mechanisms

- Bi-lateral contracts
 - Sellers/buyers freely enter into contracts
 - System operator determines differences between actual and contract
 - Balancing market establishes price
 - Accompanied by voluntary power exchange for day ahead and real time market run by System Operator



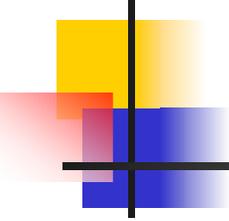
Dispatch of Generation

- Central
 - Related to mandatory pools
 - More integration of transmission and generation
 - Allows application of nodal pricing
- Self-Dispatch
 - Generators decide on own dispatch
 - Related to bilateral contracts



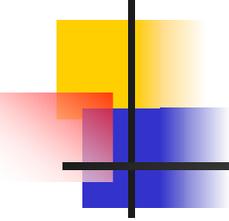
Power Pool or Bi-lateral?

- Power Pools
 - Prices tend to be more volatile
 - More expensive to set up
 - More optimal outcomes
- Bi-lateral Contracts
 - More straightforward
 - Less expensive to set up
- Bi-lateral can work in parallel with power pool



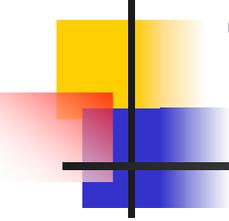
Cost-based or Price-based Pool?

- World Bank report recommends cost-based or bi-lateral contracts for smaller power systems
 - Bid or price-based spot markets too risky for smaller systems
 - Lack of sufficient bidders to maintain effective competition



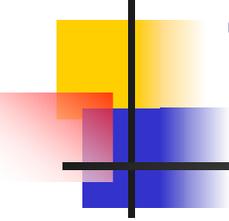
Licensing

- License is a form of contract
- Balances several factors
 - Certainty for investor
 - Accountability for performance
 - Flexibility for changing circumstances and national priorities over time
- Reflects the market structure



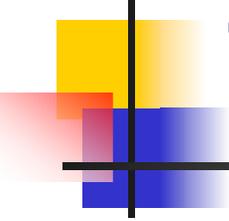
Types of Licensing

- In Perpetuity
 - Awarded only once at outset
 - Competitively awarded
 - Needs specific, comprehensive terms and conditions
 - Long term future hard to anticipate
 - Needs mechanism for adaptation to changing circumstances



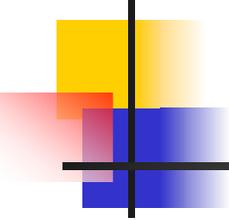
Types of Licensing

- Recurrent Short Term
 - Shorter interval (3-4 years)
 - Fewer contingencies needed
 - Emphasis on short term performance
 - Need asset transfer process
 - Need assurance of recovery of investments upon transfer
 - Encourages investment in long-life assets



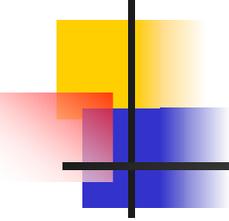
Types of Licensing

- Intermediate Term
 - Ten years or longer
 - Competitive bid again on renewal
 - Method of transfer of assets
 - Mechanism for settling disputes at time of renewal



Licensing Issues

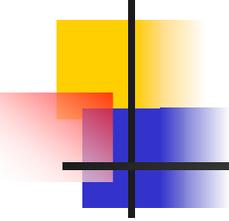
- What functions should be licensed?
- Who issues the license and sets terms and conditions?
 - Regulator
 - Ministry
- Length of licenses
- Method of award
 - Application
 - Competition
 - Depends on nature of license
- Prerequisites
 - Sufficient financing
 - Assets



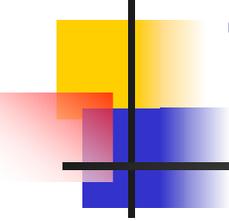
Licensing Issues

- Should license pricing mechanism?
- Terms and Conditions
 - Performance standards
 - Codes of conduct
 - Information Requirements
- Ability to amend
- Penalties
 - Ability to cancel
- Public involvement
- Fees to support regulatory structure

All Regulation is Incentive Regulation

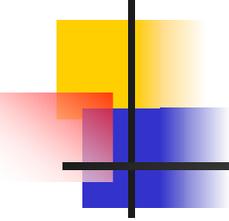


- Incentive usually apply to behavior in the period between rate reviews
 - “Regulatory Lag”
- A regulated company is always in between rate reviews
- Regulators need to understand the incentives and disincentives in different regulatory schemes



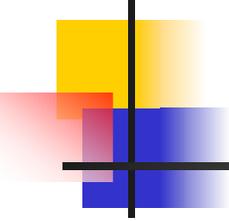
Tariff Design Objectives

- Economically efficient prices
- Sufficient revenue to cover costs plus new investments
- Practical Considerations
 - Simple
 - Understandable
 - Acceptable to public
 - Easily Administered



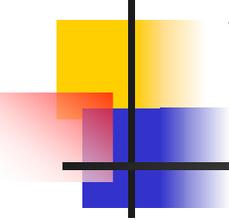
Cost of Service Tariffs

- Costs plus reasonable rate of return
- Singular assessment of company
 - Allowable costs
 - Cost of capital
- $RR = E + d + T + [r \times (I - D)]$
- If “lag” time short, incentives suppressed
- Incentive to build and to sell
- Disincentive to encourage energy efficiency
 - Profits come from selling more kwh



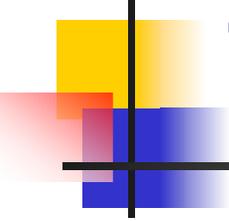
Performance Based Regulation

- Better performance leads to higher rewards
- Typically longer periods between rate reviews
- Common elements
 - Caps on either price or revenue
 - Index to formal indicator like CPI or RPI
 - Minus assumed productivity factor "x"
 - A "Z" factor for events outside scope of control
- $Cap2 = Cap1 (1-X) +/-Z$
- Often includes a sharing mechanism



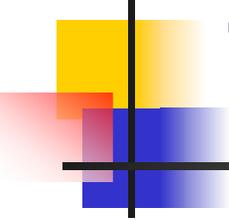
Yardstick/Benchmark

- Prices decoupled from reported costs of individual company
- Determined by relative performance to other companies
- Different input and output measures
 - Input (labor, capital)
 - Assumes ability to operate at equal efficiency while substituting between input and output
- Methodologies differ by mathematical techniques and data requirements
 - Partial – one dimensional
 - Index – aggregate input and output variables
 - Frontier – sample of companies



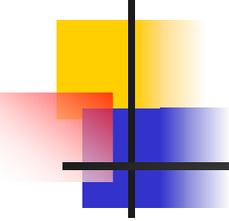
Tariff Design Issues

- Conflict between embedded costs and marginal costs
- Allocation of costs
 - Among customer classes
 - Between types of costs
 - Fixed or variable costs
- Customers who cause the costs should pay the costs
- No undue discrimination
- Minimize distortions



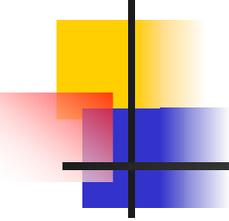
Tariff Considerations

- Combination of expertise and reasonable judgment
 - Fairness
 - Demand elasticity
 - Rate shock
 - Impact on low-income
 - Impact of environmental externalities



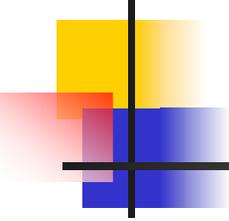
Service Quality

- In vertical integrated utility all main functions performed by one utility
- In unbundled structure, responsibility is spread over number of companies
- Two Basic Elements:
 - Quality of transmission and distribution networks
 - Volume of available generation
- Either maintain existing level of service quality or achieve higher level



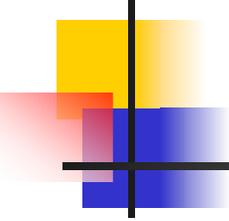
Service Quality & Costs

- Price and Quality bound together
- Performance Standards especially important under PBR
 - A company can increase its profits by reducing its investment in service quality
- Higher quality involves higher costs
- Could mean greater efficiency as well
 - Reduce technical and commercial losses
- Customers more willing to accept higher costs if associated with better service



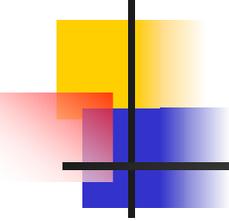
Service Quality Measurements

- Power Quality
 - Voltage level
 - Frequency of supply
- Commercial Quality
 - Response times
 - At-fault complaints
- Continuity of Supply
 - Number and length of outages
- Others
 - Customer Satisfaction surveys



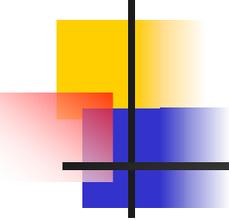
Steps to Assure Compliance

- Inclusion of relevant standards in tariff or license
- Public exposure of performance
- Penalties/Rewards
 - Financial
 - Cause for cancellation of license
- Inclusion of additional costs in tariff
- Work with companies to set reasonable standards and timetables



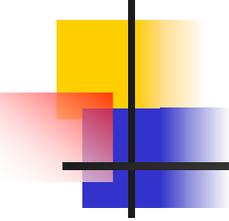
Subsidies

- Defining Subsidies
 - Rate differential not related to costs
 - Relationship of rate to long run marginal costs
 - Relationship to consumption
 - Responsibility for cost recovery



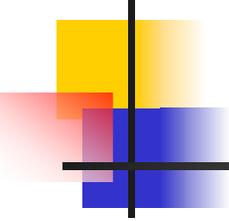
Subsidy Objectives

- Ensure a basic level of service
- Bridge adjustment to increase acceptance of higher tariffs
- Facilitate payment discipline and reduce losses
- Enable poor to receive services without sacrificing other essential needs
- Extending services to remote areas



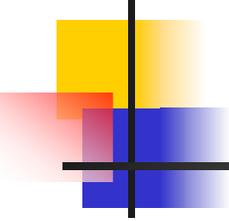
Potential Problems with Subsidies

- Distorts consumption patterns
- Shifts costs
- Divert limited supplies
- Promote uneconomic by-pass
- Impair credit-worthiness and ability to attract investors



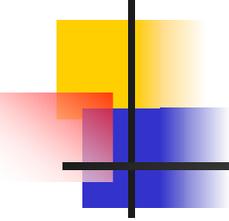
Low-income Subsidy Delivery Mechanisms

- No disconnection for delinquents
- Across-the Board subsidy
- Lifeline Tariff
- Price Discount for Privileged Customers
- Compensation for use above a Burden Limit
 - Actual use or normative
- Other Earmarked Cash Transfers for low income households
- Non-earmarked Cash Transfers



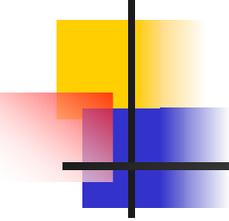
Evaluation of Low-income Subsidy Delivery Mechanisms

- Criteria
 - Coverage: Extent to which poor are being reached
 - Targeting: Share of subsidy that goes to poor
 - Predictability of benefit
 - Extent of price distortions and other unintended side-effects
 - Administrative simplicity
- Not all of same importance
- Mechanisms that perform well in some criteria tend to perform poorly in others



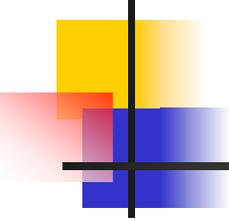
Some Historic Difficulties in Power Sector Reform

- Average national tariffs when distribution companies have different cost structures
 - Embeds subsidies in the distribution system
 - Reduces value to investors
 - Makes new investment more difficult under PBR
 - Could encourage by-pass
 - Examples: Hungary, Romania



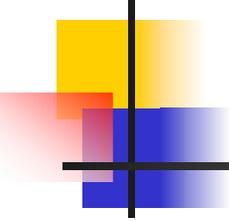
Historic Difficulty

- Lack of autonomy for regulator
 - Undermines professionalism of staff
 - Undermines public and investor confidence in regulator and process
 - Examples: Hungary, Georgia



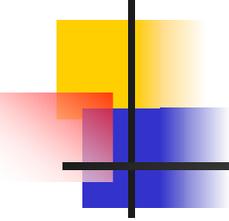
Historic Difficulty

- License terms and conditions specified in detail in laws or Ministerial decree leaving regulator with little opportunity to amend or impose conditions
 - Can affect ability to impose service quality standards
 - Example: Lithuania



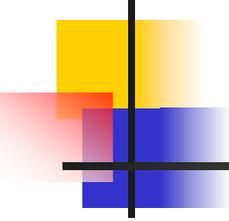
Historic Difficulty

- Carrying out privatization without consultation with regulator or consideration of regulatory policy
 - Can increase risk to investor
 - Can increase costs to consumer
 - Can lead to agreements that restrict regulators flexibility or ability to determine tariffs
- Often driven by priorities of international donor or lender



Historic Difficulty

- Lack of will to gradually raise tariffs to costs or to enforce payment obligations
 - Can't improve infrastructure because can't cover costs
 - Can't privatize because can't cover costs
 - Continued lack of investment means continued technical and commercial losses and increased supply costs
 - Example: Kyrgyzstan, Tajikistan



Historic Difficulty

- Unbundling before mechanisms in place for unbundled enterprises to transact business
 - Inadequate metering between transmission and distribution networks
 - Inability to track system losses
 - Increased disputes over compensation
 - Example: Kyrgyzstan