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Regulatory Approach to Tariff Setting in the Power Sector – Power Procurement and Renewable Energy

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GENERATION TARIFF FRAMING UNDER RATE OF RETURN REGULATION FRAMEWORK

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Basics for understanding

- Electricity is not a simple commodity and electricity markets are more complex than other products markets.
- Basic concepts of microeconomics for understanding purpose.
- Fundamental principle of Markets has not changed over the period despite of technological changes
- A market is a place where **buyers** and **sellers** meet to see if deals can be made.

Basics for understanding

- Demand curve gives the marginal value that consumers attach to the commodity

- Typically downward sloping shape of the curve indicates that consumers are usually willing to pay more for additional quantities of a commodity when they have a small amount of this commodity.

- Consumers marginal willingness to pay for the commodity decreases as their consumption increases.

- Two effects contribute to reduction in net surplus- Price higher results in consumption decrease, higher price for reduced consumption

Basics for understanding

- Increasing price reduces demand but by how much. Derivative dq/dπ of demand curve.

- Comparing demands response to price changes for various commodities would be impossible as such price elasticity of demand is used.

- It is the ratio the relative change in demand to relative change in price

Earlier Tariff Regulation for Generators in India

Regulation (Laws/Policies)	Objective	Impact
The Electricity Act,1910	Infrastructural Framework for Supply of Electricity	Attracted Private Capital
The Electricity Act,1948	Creation of SEB Mandated	Ownership in hands of SEB
IPP, 1991	Generation delicensed	Private Investment in Generation
Mega Power Policy,1995	Setting of Mega Power Plants	Capacity Addition
The Electricity (Amendment) Act,1998	Transmission separate activity	Setting up of CTU, STU

Earlier Tariff regulation for Generators in India

Regulation (Laws/Policies)	Objective	Impact
The Regulatory Commissions Act,1998	Provision for creation of Central/State Electricity Regulatory Commissions	Independent Regulatory Mechanism
National Electricity Policy	Competition and Consumer Protection	Investment from multiple players
Electricity Act, 2003	Reliable quality power to consumers at reasonable rates	Investment in Capacity Addition
National Tariff Policy	Tariff Structuring	Attractive tariff for players

Pre Reform Framework-Pre Independence Era

The Electricity Act, 1910

- Structural Framework set for electric supply
- Growth of electricity industry through private licensees.
- Licenses granted by State Governments for supply in a specified area. Legal framework set for laying down wires and other works
- Ensured fair relationship between licensees and consumers.

Pre Reform Framework-Post Independence Era

The Electricity Supply Act, 1948

- To foster growth and development, electric supply was must across country
- Creation of CEA at Centre and SEB at State
- SEBs integrated utility with presence in generation transmission and distribution
- CEA responsible for planning at National level
- NTPC, NHPC set up in 1975
- 1981 integrated transmission.
- 1992 Power Grid set up.

Post Reform Framework-1991-95

Independent Power Producers

- Electricity Laws (Amendment) Act of 1991
- Generation liberalized**.**
- 100% Foreign ownership allowed
- 16% post tax returns on equity guaranteed.
- Full repatriation of profits.

Introduction of Mega Power Policy 1995

- To increase private investments in over 1000 MW generation projects that would supply to more than one state.

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Post Reform Framework-1996-2003

- Common Minimum National Action Programme
- Revised Mega Power Policy with fiscal concession
- Setting of PTC
- Private sector participation allowed in Transmission through amendment in 1998
- Setting up of CTU, STU
- Setting up of Regulatory Commissions.
- CERC issued first IEGC in 2000.

Post Reform Framework-2003 onwards

Electricity Act 2003

- 10.06.2003. Provides legal framework for reforms and restructuring.
- Replaced the earlier laws
- Liberal framework for development of industry, promoting competition, protecting consumers interest, supply of electricity to all areas, rationalization of tariff, ensuring transparent policies and promotion of efficiency among others.
- Trading, open access in transmission/distribution(in phased manner)

ELECTRICITY Act 2003 Segmental Impact

Segment	Objective	Impact
Generation	1.Delicensed 2. Liberalization in Captive power policy	1.More number of participants in generation 2. Increased generation from captive .
Transmission	Open access	Efficient transfer, choice of customer
Distribution	1.Open access in phased manner 2. Penalties for power theft	1.Choice to buyer 2. Loss reduction

Electricity Act 2003 - Tariff

Section 61. (Tariff regulations):

The Appropriate Commission shall, subject to the provisions of this Act, specify the terms and conditions for the determination of tariff, and in doing so, shall be guided by the following, namely:-

(a) the principles and methodologies specified by the Central Commission for determination of the tariff applicable to generating companies and transmission licensees;

(b) the generation, transmission, distribution and supply of electricity are conducted on commercial principles;

(c) the factors which would encourage competition, efficiency, economical use of the resources, good performance and optimum investments;

Electricity Act 2003 - Tariff

(d) safeguarding of consumers' interest and at the same time, recovery of the cost of electricity in a reasonable manner;

(e) the principles rewarding efficiency in performance;

(f) multi year tariff principles;

1[(g) that the tariff progressively reflects the cost of supply of electricity and also, reduces cross-subsidies in the manner specified by the Appropriate Commission;] (15.06.2007)

(h) the promotion of co-generation and generation of electricity from renewable sources of energy;

(i) the National Electricity Policy and tariff policy:

Electricity Act 2003 - Tariff

Section 62. (Determination of Tariff):

(1) The Appropriate Commission shall determine the tariff in accordance with the provisions of this Act for –

(a) supply of electricity by a generating company to a distribution licensee:

Provided that the Appropriate Commission may, in case of shortage of supply of electricity, fix the minimum and maximum ceiling of tariff for sale or purchase of electricity in pursuance of an agreement, entered into between a generating company and a licensee or between licensees, for a period not exceeding one year to ensure reasonable prices of electricity;

Electricity Act 2003 - Tariff

(b) transmission of electricity ;

(c) wheeling of electricity;

(d) retail sale of electricity:

Provided that in case of distribution of electricity in the same area by two or more distribution licensees, the Appropriate Commission may, for promoting competition among distribution licensees, fix only maximum ceiling of tariff for retail sale of electricity.

(2) The Appropriate Commission may require a licensee or a generating company to furnish separate details, as may be specified in respect of generation, transmission and distribution for determination of tariff.

Electricity Act 2003 - Tariff

(3) The Appropriate Commission shall not, while determining the tariff under this Act, show undue preference to any consumer of electricity but may differentiate according to the consumer's load factor, power factor, voltage, total consumption of electricity during any specified period or the time at which the supply is required or the geographical position of any area, the nature of supply and the purpose for which the supply is required.

(4) No tariff or part of any tariff may ordinarily be amended, more frequently than once in any financial year, except in respect of any changes expressly permitted under the terms of any fuel surcharge formula as may be specified.

Electricity Act 2003 - Tariff

(5) The Commission may require a licensee or a generating company to comply with such procedures as may be specified for calculating the expected revenues from the tariff and charges which he or it is permitted to recover.

(6) If any licensee or a generating company recovers a price or charge exceeding the tariff determined under this section, the excess amount shall be recoverable by the person who has paid such price or charge along with interest equivalent to the bank rate without prejudice to any other liability incurred by the licensee.

Electricity Act 2003 - Tariff

Section 63. (Determination of Tariff by Bidding Process):

Notwithstanding anything contained in section 62, the Appropriate Commission shall adopt the tariff if such tariff has been determined through transparent process of bidding in accordance with the guidelines issued by the Central Government.

OPTIONS IN REGULATORY METHODS

There are a variety of methods for tariff regulation as reviewed below. The choice of the method is dictated by factors like effectiveness of the method in achieving tariff objectives, appropriateness, in the light of the existing methods being used for the purpose and administrative convenience given the existing infrastructure and information systems.

Rate of Return + Cost of Service;

Marginal Cost based Price;

Performance Based Regulation (PBR);

RPI-X;

Competitive Bidding;

OPTIONS IN REGULATORY METHODS

Rate of Return + Cost of Service;

Rate-of-return regulation is a system for setting the prices charged by government-regulated monopolies. The main premise is that monopolies must charge the same price that would ideally prevail in a perfectly-competitive market, equal to the efficient costs of production, plus a market-determined rate of return on capital.

OPTIONS IN REGULATORY METHODS

Rate of Return Regulation (RoR)/ Cost of Service

The rate of return approach requires the determination of allowable costs, a rate base and the rate of return to be allowed on the rate base. The rate base is the capital amount on which a return is allowed. Typically the rate base represents the historic cost of the assets employed, less the accumulated depreciation of the asset

The data requirements for carrying out RoR regulation are the historic costs of investments (in the Indian system the gross block) together with the variable costs incurred in the test year. The test year is generally taken as the latest financial year for which complete data is available.

This form of regulation has a number of distinct advantages:

a) It provides predictable, steady returns for the utility, which is conducive to making further investments.

b) The method is conceptually simple and unambiguous, generally making use of historic accounting data.

OPTIONS IN REGULATORY METHODS

c) It is perceived to be fair. The cost of the electricity service is related directly to the actual asset base, with the end user paying for the facilities used. Today's user pays for the system built to date.

d) It is a traditional approach, used over many years, and is familiar to electric utilities, users and regulatory agencies.

The strengths of this form of regulation like its simplicity and predictability, also create its limitations.

a) Once an investment is made it tends to remain in the rate base and earns a return, even if the investment becomes non productive due to future developments, resulting in "stranded costs".

b) Since the rate of return and the rate base are the two main variables in the determination of the return to the utility. There is a tendency to over invest. Higher the investment, higher the rate base and hence the return to the investor.

c) The process is backward looking. The end user pays the historic cost and there are no price signals regarding future costs. This is not conducive to the efficient use of energy.

OPTIONS IN REGULATORY METHODS

d) Historic book values may not provide sufficient revenue for future investments and may result in inadequate investment for future needs.

e) This is an intrusive form of regulation. It provides little incentive for the supplier to reduce costs and make efficiency gains. Since the net return to the utility is fixed any reduction in costs or increase in revenue are passed through to consumers.

f) Due to its intrusive nature the transaction costs are high The period of tariff review tends to be short. The nature of review is detailed as regulators have to overcome the inherent problem of information asymmetry between the regulated and the regulator

Generation – Economics and Pricing (Tariff)

UNDERSTANDING GENERATION

- Converting one form of energy into electrical energy
- Fossil fuel –Combustion – Heat –Steam Cycle-Electric Energy
- Hydro Power – Potential Energy-Kinetic Energy-Electric Energy

For conversion one needs investment

Investment creates Capacity (MW)

Both Capacity and Energy are flows, price of which can be measured in Rs/MWh or Rs/Kwh

Generation – Economics and Pricing (Tariff)

Creating Capacity from an Investor's Perspective

An investor will finance a production facility provided it earns a satisfactory profit over its lifetime (revenues should exceed the cost of construction & operation including maintenance)

Further the profit from the facility should be larger than profit from any other venture having similar degree of risk

Long run marginal cost (including expected returns) is computed and weighed against forecasted prices at which output can be sold

Generation – Economics and Pricing (Tariff)

In practice this is more complex than simplified statement because of uncertainties in estimating both

Construction delays, fuel price fluctuation estimation can affect LRMC

Forecasted sales may get affected by demand change, entry of competitors, technological advances

One way to eliminate/minimize these risks is to have upstream (fuel) and downstream (demand) contracts as owner has very little control (except in case when mines as well as distribution is also in portfolio)

Various techniques such as discounted cash flow analysis are used for assessment

Generation – Economics and Pricing (Tariff)

Creating Capacity from an Customer's Perspective

Consumers also expect reliability when they purchase electrical energy (energy delivery when demanded and not at some other time)

Increase in generation capacity margin improves reliability

Market based expansion? Supplementation through central mechanism

Market for electrical energy, Capacity payments, Capacity Market, Reliability contract.

Generation – Economics and Pricing (Tariff)

Factors affecting the decision to create capacity.

- Government Policies
- Regulatory Framework
- Site selection, requirements, layout etc. (Greenfield project, Extension project etc)
- Input conditions (coal, water, seismic zone, soil, infrastructure condition)

Technology Selection

- Technological considerations (Design, Specifications, Margins, Redundancies, operational/maintenance needs)
- EPC / Multiple packages (coordination & risks)
- Commercial aspects

Generation – Economics and Pricing (Tariff)

Once capacity is created economics lies in ensuring Refund of Capital and Return on capital meeting all other expenses.

COST OF GENERATION

- Total Cost = Fixed Cost (FC) + Variable Cost (VC)
- Fixed Cost is related to investment and the economic returns/profits to be earned.
- Also included in FC are Depreciation, Operation and Maintenance expenditure, interest on working capital etc.

FC is independent of level of production

VC is the cost of fuel & depends on level of Production

More the number of units produced lesser will be the FC per unit. As such capacity utilization is important

Generation – Economics and Pricing (Tariff)

MARGINAL COST

- The Change in Total Cost when output is increased by one unit
- Marginal Cost is constant when VC is linear

MARGINAL COST ESTIMATION

Costing fuel conversion into electricity:

In the short run marginal cost of generation

Cost of coal (landed) Rs./MT

Heat content of fuel Kcal/Kg.

Conversion of fuel heat into electricity (Kcal to kwh)

Regulations

Set of Rules decided upfront in consultation with all stakeholders which specifies parameters including that of incentives and penalties.

Procedure for Framing Regulations

CERC 2019-24 Regulation

- Consultation Paper http://www.cercind.gov.in/2018/draft_reg/AP.pdf
- Comments http://cercind.gov.in/2019/draft_reg/StakeholdersDraft%20Tariff%20Reg2019/35_Udupi%20Power/CERC%20Draft%20Regulations%202019%20-%20All%20Comments%20-%2028.01.2019%20(4).pdf
- Draft Regulations http://cercind.gov.in/2018/draft_reg/Draft%20Notification_Tariff%20Regulations,%202019.pdf
- Comments http://cercind.gov.in/2019/draft_reg/StakeholdersDraft%20Tariff%20Reg2019/80_KSEB%20Ltd/Comments%20of%20KSEBL%20on%20draft%20Tariff%20Regulations%202019-24.pdf
- Final Regulations

http://www.cercind.gov.in/2019/regulation/Tariff%20Regulations-2019.pdf

CERC 2019-24 Regulation

- CAPITAL COST : REGULATION 19

- (1) The Capital cost of the generating station or the transmission system, as the case may be, as determined by the Commission after prudence check in accordance with these regulations shall form the basis for determination of tariff for existing and new projects.

- (2) The Capital Cost of a new project shall include the following:

- (a)The expenditure incurred or projected to be incurred up to the date of commercial operation of the project;

- (b)Interest during construction and financing charges, on the loans (i) being equal to 70% of the funds deployed, in the event of the actual equity in excess of 30% of the funds deployed, by treating the excess equity as normative loan, or (ii) being equal to the actual amount of loan in the event of the actual equity less than 30% of the funds deployed;

- (c)Any gain or loss on account of foreign exchange risk variation pertaining to the loan amount availed during the construction period;

CERC 2019-24 Regulation

- (d)Interest during construction and incidental expenditure during construction as computed in accordance with these regulations;
- (e)Capitalised initial spares subject to the ceiling rates in accordance with these regulations;
- (f)Expenditure on account of additional capitalization and de-capitalisation determined in accordance with these regulations;
- (g)Adjustment of revenue due to sale of infirm power in excess of fuel cost prior to the date of commercial operation as specified under Regulation 7 of these regulations;
- (h)Adjustment of revenue earned by the transmission licensee by using the assets before the date of commercial operation;
- (i)Capital expenditure on account of ash disposal and utilization including handling and transportation facility;
- (j)Capital expenditure incurred towards railway infrastructure and its augmentation for transportation of coal upto the receiving end of the generating station but does not include the transportation cost and any other appurtenant cost paid to the railway;

CERC 2019-24 Regulation

- (k)Capital expenditure on account of biomass handling equipment and facilities, for co-firing;
- (l)Capital expenditure on account of emission control system necessary to meet the revised emission standards and sewage treatment plant; (m)Expenditure on account of fulfilment of any conditions for obtaining environment clearance for the project;
- (n)Expenditure on account of change in law and force majeure events; and
- (o)Capital cost incurred or projected to be incurred by a thermal generating station, on account of implementation of the norms under Perform, Achieve and Trade (PAT) scheme of Government of India shall be considered by the Commission subject to sharing of benefits accrued under the PAT scheme with the beneficiaries.

CERC 2019-24 Regulation

(3) The Capital cost of an existing project shall include the following:

(a)Capital cost admitted by the Commission prior to 1.4.2019 duly trued up by excluding liability, if any, as on 1.4.2019;

(b)Additional capitalization and de-capitalization for the respective year of tariff as determined in accordance with these regulations;

(c)Capital expenditure on account of renovation and modernisation as admitted by this Commission in accordance with these regulations;

(d)Capital expenditure on account of ash disposal and utilization including handling and transportation facility;

(e)Capital expenditure incurred towards railway infrastructure and its augmentation for transportation of coal upto the receiving end of generating station but does not include the transportation cost and any other appurtenant cost paid to the railway; and

CERC 2019-24 Regulation

(f)Capital cost incurred or projected to be incurred by a thermal generating station, on account of implementation of the norms under Perform, Achieve and Trade (PAT) scheme of Government of India shall be considered by the Commission subject to sharing of benefits accrued under the PAT scheme with the beneficiaries.

(4) The capital cost in case of existing or new hydro generating station shall also include: (a)cost of approved rehabilitation and resettlement (R&R) plan of the project in conformity with National R&R Policy and R&R package as approved; and (b)cost of the developer's 10% contribution towards Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) and Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY) project in the affected area.

(5)The following shall be excluded from the capital cost of the existing and new projects:

(a)The assets forming part of the project, but not in use, as declared in the tariff petition;

CERC 2019-24 Regulation

(b)De-capitalised Assets after the date of commercial operation on account of replacement or removal on account of obsolescence or shifting from one project to another project: Provided that in case replacement of transmission asset is recommended by Regional Power Committee, such asset shall be de-capitalised only after its redeployment; Provided further that unless shifting of an asset from one project to another is of permanent nature, there shall be no de-capitalization of the concerned assets.

(c)In case of hydro generating stations, any expenditure incurred or committed to be incurred by a project developer for getting the project site allotted by the State Government by following a transparent process;

(d)Proportionate cost of land of the existing project which is being used for generating power from generating station based on renewable energy; and

(e)Any grant received from the Central or State Government or any statutory body or authority for the execution of the project which does not carry any liability of repayment.

CERC 2019-24 Regulation

LIKE WISE REGULATIONS ON ALL FACTORS

- DEBT EQUITY RATIO [REGULATION 18]
- PRUDENCE CHECK OF CAPITAL COST [REGULATION 20]
- IDC AND IEDC [REGULATION 21]
- CONTROLLABLE AND UNCONTROLLABLE FACTORS [REGULATION 22]
- INITIAL SPARES [REGULATION 23]
- ACE WITHIN ORIGINAL SCOPE AND CUT OFF DATE [REGULATION 24]
- ACE WITHIN ORIGINAL SCOPE AND AFTER CUT OFF DATE [REGULATION 25]
- ACE BEYOND ORIGINAL SCOPE [REGULATION 26]

CERC 2019-24 Regulation

- ACE ON ACCOUNT OF R&M [REGULATION 27]
- SPECIAL ALLOWANCE FOR COAL BASED/LIGNITE FIRED THERMAL GENERATING STATION [REGULATION 28]
- ACE ON ACCOUNT OF REVISED EMMISSION STANDARD [REGULATION 29]
- RETURN ON EQUITY [REGULATION 30]
- TAX ON RETURN ON EQUITY [REGULATION 31]
- INTEREST ON LOAN CAPITAL [REGULATION 32]
- DEPRECIATION [REGULATION 33]
- INTEREST ON WORKING CAPITAL [REGULATION 34]
- OPERATION AND MAINTENANCE EXPENSES [REGULATION 35]

CERC 2019-24 Regulation

Components of Tariff

- Capacity Charge (for recovery of annual fixed cost consisting of the components specified to in regulation 15)

- Energy Charge [REGULATION 16]Energy charges shall be derived on the basis of the landed fuel cost (LFC) of a generating station (excluding hydro) and shall consist of the following cost:

(a) Landed Fuel Cost of primary fuel;

(b) Cost of secondary fuel oil consumption; and

(c)Cost of limestone or any other reagent, as applicable

Other Options in Regulatory Methods

- Performance Based Regulation (PBR)

- Recent trends have been towards more "light handed" regulation i.e. least interference by the regulators. PBR moves away from the RoR method by providing incentives for the utility to improve efficiency and reduce costs. Rather than prescribe a return, the utility is given a set of performance criteria to follow. Performance criteria may include both operational and financial criteria. The return to the utility depends upon performance. Over achievement of the performance criteria can increase returns for the utility while underachievement will decrease returns. Performance targets are set using historic data, trends of system costs and operational characteristics. The establishment of an extensive data base for benchmarking performance criteria on the basis of industry best practice is an essential component for effective regulation under this method. A form of PBR is in actual use in India, where tariffs are based on normative parameters.

Other Options in Regulatory Methods

- This method has been used extensively in the US but there is a movement away as in California
- In some jurisdictions the rate of return is allowed on revalued assets. This tends to push up tariffs and is not widely used. This method is being used in England and Wales and is being considered elsewhere, e.g. Ontario and Alberta, Canada
- Performance criteria might include such items as, number of hours of system degradation(down time) losses expressed as a % of energy produced, expenditure on O&M, number of employees per 1000 consumers, lost time due to accidents, etc.
- Hybrid and sliding scale methods in PBR
- **The hybrid method of PBR combines some of the best features of ROR and PBR. The hybrid approach combines elements of both the methods to suit local conditions. For some elements of tariff, performance bench marking could be applied, whereas with respect to other elements, the historic cost and rate of return may be applied. This would be effectively a refinement of the existing norm based ROR system.**

Other Options in Regulatory Methods

- This is a variation of the PBR method under which the performance criteria do not remain fixed but change over time. The purpose is to allow time to the utility to take the appropriate corrective steps before a tightening of the performance criteria.
- RPI-X This is the least intrusive form of regulation which has been extensively applied in the UK. It imposes a price cap which, over the tariff period, can be crossed only to the extent of the retail price inflation (RPI). This inflation rate is not fully available as an add-on to the price cap for the utility. It is reduced by a pre-determined efficiency gain (X). The strength of the scheme derives from the flexibility it affords to the utility to incur costs and take actions as is commercially feasible so long as the objectives of good quality supply are met within the capped price.

Other Options in Regulatory Methods

The problem is how to retain this simplicity in design, while at the same time ensuring that an appropriate price (sufficient for financial viability without being generous),is allowed, for generating stations of different fuel types, ages, technology and siting. In transmission the issue would be to price transmission of energy irrespective of the age of the line, the capacity and technology. The ROR type of approach would try and establish a unique price for these classes of generators. The RPI minus X approach is more aggregative and prices services rather than technologies or fuel usage. It leaves these choices to the utility. Hence, under this system, old stations may lose on operational parameters but gain on total cost due to depreciated rate bases. For the application of this method the following critical decisions have to be taken by the regulator.

Other Options in Regulatory Methods

- (a) How should the price cap be determined? Determination of the base year price can be complex since the regulator must decide to what extent current inefficiencies should be allowed. However the decision is no different than that required under a PBR regime while setting performance criteria.
- (b) Which indices are to be used for inflation? In India, there are the wholesale price index (WPI), the consumer price indices (CPI) for agricultural labour, and the CPI for industrial workers. The latter has historically been higher than the former. Which of these is appropriate? There is also the problem of continuity and representativeness of the indices. If the basket of goods, measured for calculating the index changes, the continuity of application of the indices is lost. In the light of these factors would it be more appropriate to use a specially devised inflation formula rather than an existing index?
- (c) Determination of the X factor, the proxy for efficiency improvements, is similarly complex. Time series data for the actual costs and efficiencies of a range of stations and transmission lines would be required to devise the X factor. Decisions would also be required on the sharing of efficiency gains between the utility and consumers.

Other Options in Regulatory Methods

Competitive Bidding

This is an alternative to tariff determination. Under the mega-project-policy, government has specified that this method would be followed for the determination of tariffs. This is a market based approach and hence avoids scrutiny of costs, revenues, etc. which is necessary in other methods of tariff determination. Successful adoption of this method presupposes the existence of competitive forces at the bidding stage.

Marginal Cost based Pricing Methods

From a theoretical perspective, marginal cost pricing methods provide the most appropriate signals for the pricing of electricity. Marginal pricing sends out a clear signal to the supplier and end user regarding the true value of the power being consumed. Marginal cost pricing emphasises future economic signals rather than relying on financial signals based on today's performance and historic financial costs. Long run Marginal Cost is the future cost of power which takes account of additional investments, consequent capacities, and projected variable costs. Short run Marginal Cost is the variable cost of incremental production. The data requirements for the determination of the LRMC are the energy production and capital costs of all future plants included in the long-term expansion plan.

Other Options in Regulatory Methods

To determine the LRMC, the system expansion plan needs to be defined in terms of investment costs, variable costs and power and energy production. This is generally carried out with an investment horizon of 20 to 25 years. The calculation of long run Marginal Cost Pricing is a necessary tool for estimating the efficiency of current tariffs. If the current price being paid to suppliers is lower than the LRMC, then a careful evaluation of the revenues being earned by them is necessary, to ensure that the utilities are being left with sufficient investible resources. Conversely, if the LRMC is less than the current prices paid to suppliers they are probably being over compensated. Short-run Marginal Cost captures only the operating cost and ignores fixed cost which are 'sunk' and cannot be changed in the short-term. Hence it provides appropriate signals to system operators for the despatch of energy and to users for the use of energy. The rational user will always ensure that the incremental value added or the incremental "utility" of the use of energy is higher than the short run marginal cost of energy.

Other Options in Regulatory Methods

While providing a good theoretical basis for the determination of tariffs, there are a number of disadvantages to the marginal costing approach, most of the disadvantages relate to the practicality of the method. A number of assumptions used in the least cost expansion plan may be controversial and contestable. Some examples are uncertainties inherent in the energy and demand forecasts, system planning assumptions, unit costs used to establish the investment plan, size of the system or the discount rate. Marginal cost based tariff may be difficult to reconcile with the actual costs encountered in the system. The method uses economic, rather than financial concepts and so may overstate or understate financial requirements. In periods of falling capital costs the LRMC will decrease which may become lower than the costs required to recoup historic costs. Similarly in periods of escalating costs LRMC will tend to overstate the price required to recoup historic costs. This does not apply where the marginal price is determined through a bidding system, such as in the power pool in UK.

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Thank You

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