Regulating the power industry in a regime of incomplete information: lessons from the Indian experience

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Abstract
Establishment of independent regulatory commissions is the central element of the power sector reform in India. Incomplete information is a major difficulty that Indian regulators face while making decisions. This paper identifies information inadequacy under three broad categories: transaction related, accounting related, and performance related. Problems in each of these categories are analysed both for transmission licencees and distribution licencees. It also discusses the approaches taken by the Indian electricity regulators for decision-making in a world of incomplete information and the steps taken to improve the situation. We argue that the regulatory decision-making under information constraints has greatly affected the finances of the regulated utilities and the privatization process. Finally, we suggest some steps such as a standardized accounting policy and regulatory information system for improving information availability.

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Introduction

A central element of the reform and restructuring process of the power industry in India is the establishment of independent, autonomous regulatory bodies at the state level to promote transparency, efficiency, and economy in the operations and management of the power sector. The credibility of the reforms hinges on the proper functioning of the new entities and the commission. For decision-making, the regulators depend mostly on information furnished by the utilities. The regulatory process as adopted in India demands detailed information relating to financial, commercial, and operational aspects of the utility. The scope and importance of the regulatory information in dealing with the rate cases and tariff proposals is not widely understood by the utility or the public. As the regulatory process is new in India, its procedures and principles have only recently been formulated and under these circumstances, compliance with regulatory requirements can, at best, be partial. All the constituents are in a learning process and it will take a few years before a mature, well-established system develops.

Yet, regulatory bodies have to deliver their decisions and cannot wait for adequate information to become available. The utility may not be able to furnish the relevant information to the commission and the regulator has no independent means of getting the required data. Lack of adequate information is the single most important constraint faced by the regulator and has the potential of discrediting and even frustrating the regulatory process itself.

While information-related problems are widespread in most Indian states where reforms have been initiated, the issue has not received any attention outside the tariff orders of the commissions. The objective of this paper is to focus attention on the information constraints within which the commissions function in India and to indicate the effect of such constraints on the regulatory process.

The paper is organized as follows: the first section provides a brief overview of the regulatory structure adopted for the power sector in India; the second discusses the information constraints and the third section presents the effects of such information deficiencies. The fourth section presents the way forward.
Regulatory framework and information requirements of the Indian power sector

All Indian states, where the power sector is being reformed or has been reformed, have so far adopted a single buyer model as the basic market structure (Voll and Rosenzweig 1999; Hunt and Shuttle Worth 1996). In this model, power-generation-related activities of the original state-owned electricity board have been separated from the T&D (transmission and distribution) activities. A few generating companies have been created by transferring generation-related assets of the SEBs (state electricity boards) and some of these generating assets have been privatized as well. At the initial stage, T&D businesses are being carried out by a single state-owned company, which acts as the single buyer of all electricity generated. The distribution business is then spun off to separate distribution companies, which are regulated monopolies within their territorial jurisdiction. The ultimate objective is to privatize these distribution and retail supply businesses, although except in one state (Orissa), not much progress has been made in the privatization process. The market structure adopted in India for the power sector reform is a comparatively simple one, which allows for competition in new generation capacity and introduces regulated monopolies in transmission, distribution, and retail supply.

In terms of regulatory regime, India has chosen the more traditional rate-of-return regulation, with the possibility of departure at the discretion of the regulators. The reform Acts of all states specify Sixth Schedule of the Electricity (Supply) Act, 1948, as the guiding principle for tariff regulation (Dubash and Rajan 2001). The Acts make it obligatory on the part of the licensees to submit an ARR (annual revenue report) to the regulator for approval. The purpose of this report is to apprise the regulator of the utility’s health and of its plans to perform the duties assigned to it under the licence granted by the commission. The report contains both past performance and expectations in the coming year in terms of demand, supply, income, and expenditure. Often this report forms the basis for tariff fixation by the regulators, as any gap between income and expenditure indicates the need for additional funding requirements.

Utilities are required to submit other relevant information as well to the regulators. Most of these requirements are either specified in the Act or in the regulations/guidelines or in the licence conditions. These requirements, inter alia, include
submission of annual audited reports, performance reports, reports of T&D losses, accident reports, customers’ sales billing and collection-related data, load profiles, etc. As tariff regulation is the most important task of regulators, the information required for these activities is of utmost importance to the regulatory commissions.

The information problem can be viewed from two perspectives: incomplete information and asymmetric information. By incomplete information, we mean information that is not available to either the utility or the commission mainly because it has not been generated or collected or maintained. Asymmetric information refers to information that is available to one of the parties (in most cases with the utility) but that party does not share it with others. In this paper, our focus is on incomplete information and not on asymmetric information because the first problem is so widespread that it overshadows the second.

However, we do not suggest that information asymmetry is not a problem in the Indian context. For example, the KERC (Karnataka Electricity Regulatory Commission) (2000) indicates at various places that the licensee was tardy and non-cooperative in providing necessary details, _inter alia_, of power purchase volume, costs, and investment details, most of which is accessible to the utility. Similarly, at various places, the HERC (Haryana Electricity Regulatory Commission) (2000a) faced similar problems with a number of elements, including cost of power from shared utilities such as the BBMB (Bhakra Beas Management Board) and IP station in Delhi, details of agreements for export and import of power with other states or agencies, loans raised/liabilities, and details of supply of free power to employees.

The reform Acts have provided adequate legal powers to the commissions to deal with problems of asymmetric information. The commissions have the powers of a civil court in respect of the discovery and production of any document or material as evidence, and requisition of any public records. The commissions can authorize entry, search, and seizure of records for any inquiry or proceedings. The licence conditions require the licencees to provide information, failure to comply with such requirements could lead to revocation of the licence. Finally, the Acts empower the commissions to impose fines and penalties for non-compliance with their orders. However, the commissions have rarely exercised such powers so far.
In what follows we concentrate on the information deficiency from the perspective of ARRIs and tariff filings. The problem is quite similar to that in most states but we would draw our examples mostly from Haryana.

**Areas of incomplete information in the Indian power sector**

Inadequate information can be categorized into three broad groups: (1) information on business transactions, (2) accounting data, and (3) performance-related information.

**Accurate information on business transactions**

A well-run business generally has at its disposal all the basic information required to run it, such as the volume of goods purchased, the rates at which the goods are purchased, sales volume, the rate at which products are sold, and a record of customers buying on credit. Without such information, a company cannot know its income, expenses and hence, its profitability. Such a company also cannot conduct cost studies required by the regulator for cost-based tariffs. Unfortunately, even such basic information is often not available to electric utilities in India. The restructuring process accentuates the problem further in some areas.

**Volume of energy sold by bulk supplier and purchased by retail supplier**

In the restructured industry, bulk supply activity is a distinct, regulated business and the licensor is required to maintain records of all relevant transactions. When the utility was vertically integrated, there was no need to record the volume of energy available to the distribution business because it was mainly concerned with sales to consumers. For a bulk supplier, this information is vital and basic. However, a pre-requisite for recording the volume of energy sold by bulk supplier is the installation of meters. This aspect has not received adequate attention in many states at the time of restructuring on account of historical reasons and the fact that a single entity, the SEB, was entrusted with both the transmission and distribution businesses. Even after restructuring, it was perhaps assumed that accurate knowledge of the transactions would not be required immediately. It also appears that the gravity of the problem was underestimated, as it was believed that existing meters installed at the different
substations would provide a good approximation of the required information, often without understanding and assessing the ground realities. Consequently, the licencees were ignorant of and could not provide information on the volume of sales to retail suppliers. The problem was aggravated when the distribution business spun off from TRANSCOs (transmission companies) and a number of distribution and retail supply companies started operating. Although the DISTCOs (distribution companies) may be subsidiaries of the TRANSCO, yet they operate as separate entities and absence of sales information becomes a source of conflict and dispute, besides accounting and disclosure problems.

An example from Haryana will illustrate this problem. In the pre-reforms Haryana system, meters of low accuracy (and hence not suitable for commercial transactions) were installed on the low voltage side of 11 kV substations. The majority of existing meters only record direct energy consumed (kWh), and do not register other parameters such as simultaneous or individual substation maximum demand (kVA), reactive energy, and frequency. Post-reforms, the separation of the T&D systems took place at 33 kV level in accordance with the licences issued by the HERC. Where there is no 33 kV interface level available, this separation takes place downstream of the 66 kV and 132 kV voltage levels. There are about 150 interface points in the Haryana system and if, at each interface as was contemplated, one main meter and one check meter were installed, about 300 interface meters and associated equipment (such as current transformers and potential transformers) would be required. At the 33 kV interface, no meters exist and consequently, the bulk supplier does not know for sure the actual volume of energy delivered nor does the retail supplier know the volume received. In addition, the HVPNl (Haryana Vidyut Prasaran Nigam Ltd), the TRANSCO, cannot either record sub-transmission losses or peak demands of the consumers (i.e., two distribution and retail supply companies). The latter is important for implementing a multi-part bulk supply tariff with a demand charge.

Although the procurement process started in early 1999, there were substantial delays and as of February 2002, meter installation was not complete. The HVPNl requested the commission to allow more time for completing the interface metering activity. The delay in interface meter installations was due to a number of factors, including a funds problem because
of the cancellation of a World Bank loan to Haryana, poor response to bidding, delays in delivery, etc. (HERC 2002).

The Haryana experience shows that it takes time to identify the interface points, prepare specifications, complete the bidding and procurement process, test, install, and commission meters at the interface points. Not only was the time frame unrealistic, but even the revised time frame was not achieved. The commission had to accept this slack data as furnished by the licensee. When interface meters are not in place, the output of the bulk supplier and input of the retail supplier will be at best an educated guess, and such a situation is not conducive to the commercial operation of the power supply business.

Wholesale supply tariff
A related issue is the absence of wholesale supply tariff at which the bulk supplier sells his power to the reseller. Such a tariff is not required in a vertically integrated utility, but for the restructured entity the tariff becomes a necessity. In the absence of an approved tariff, the licensee cannot legally charge for the power sold to the retail supplier. This also hinders segregation of accounts by business activities.

Although the Haryana State Electricity Board was restructured in August 1998 and new T&D licences were issued in February 1999, there was no approved wholesale supply tariff till the commission issued its first tariff order in December 2000. For two years, the transmission utility did not have any legal

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1 The TRANSCO in the single buyer model actually performs two functions, namely wholesale supply and transmission. The nature of the two businesses is completely different with different levels of asset requirement, operating characteristics, and risk management. To be consistent, tariffs should be set separately for bulk supply and transmission. Except for in Haryana, most other states do not distinguish between these two tariffs and the commissions fix a combined tariff, which is often called the bulk supply tariff by the commissions. The term wholesale supply tariffs makes the distinction clear.

2 It took about two years to issue the first tariff order for a number of reasons: (1) the utility did not file any tariff application until it was directed by the commission in mid-2000 (HERC 2000a); (2) the political changes in the state in 1999 slowed the reform process; and (3) there is some confusion over whether the commission could unilaterally impose a tariff when the utility did not ask for any. In any case, the Commission perhaps did not wish to take such a step at the initial stage of the reform. Moreover, as the bulk supply cost of power is a pass through as far as the DISTCOMs are concerned, even high cost power purchases made between February 1999 and December 2000 by the licensee did not have regulatory scrutiny or approval.
basis for the power supply cost and earning in the absence of an approved bulk supply tariff. A similar situation prevailed in some other reformed entities as well.

Transmission losses
Transmission loss, which is the difference between energy input to the system and the energy output from the transmission system, remains a guess due to the lack of interface meters. Theoretically, it is possible to estimate losses using load-flow analyses but accurate analysis would require transmission system information and loading data, which would not be available in the absence of accurate meters.

Transmission loss is important for tariff purposes and also for loss reduction plans and investment plans required for system improvement. Even a distinction between inter-state transmission losses (e.g. losses taking place in transmitting power from out-of-state generating stations to the Haryana system) and intra-state transmission losses (e.g. losses within the Haryana system) is desirable because inter-state loss reduction is not in the hands of the state TRANSCO, but it is responsible for the intra-state system. Accurate information on intra-state transmission losses is important for various reasons: (1) deciding an action plan for loss reduction if losses are high; (2) deciding appropriate tariffs for transmission and bulk supply activities; and (3) correctly determining sales volumes.

Bringing down transmission losses to internationally/nationally acceptable levels requires an investment plan that would augment the transmission system. However, until all interface meters are in place, it will be difficult to determine how much needs to be invested and to assess the impact of planned investment for the reduction of transmission losses.

System information
This is a problem specific to Haryana as there is no proper SLDC (state load dispatch centre) in the state. There is no real-time monitoring of the system and information flow between SLDC and substations. The recording of system information and communication with the constituents are both poor. An SLDC has been under construction for the past few years but has not yet become operational. This also raises doubts about the accuracy and credibility of the information on operating conditions furnished to the commission.
Total sales and sales to consumer categories by retail suppliers
It is common knowledge now that sales data reported by the SEBs were fabricated. Non-metered supply to a large section of consumers, existence of a large number of defective meters, inaccurate and irregular meter readings, poor record keeping, and wrong billing are some of the main reasons for their critical financial situation. Restructuring the SEB by separating the wholesale and retail activities aggravated the information problem because the retail supplier does not know the energy input to its system in absence of interface meters and the sales information has not improved due to no improvement in retail metering. When both the input and the output are unknown, retail supplier can only guess about the sales volumes (in total and by consumer category) and, therefore, the revenues that will result from proposed tariffs.

Metered sales volumes often constitute a small portion of the consumption in many states in India. The HVPNIL submissions in 1999 indicated that only about 41% of the energy consumed in the state was metered. The balance, 59%, comprises non-metered agricultural consumption and losses (technical and non-technical). In Karnataka, which is considered a better managed utility, the metered sales in 2000 was less than 40% (KERC 2000 p.9). In absolute numbers, the meter-less or defective meter connections could lie between a few hundred thousand in smaller utilities (as in Orissa) to more than a few million in bigger SEBs (like Karnataka). The estimated consumption based on load factor or usage pattern is often biased and unrealistic because the key assumptions about load factor or usage pattern are essentially guesses. The estimated non-metered supply is doubtful and cannot be accurate and hence, loss figures are also unreliable.

Detailed information about usage by consumer category
There are other lacunae in sales- and revenue-related information as well. Inadequate and manual record keeping does not allow disaggregation of consumption and revenue by subcategories; nor does it provide information on segregation of consumers by minimum charges and revenue earned from these charges. Many of these problems are historical. However, the urgency to remedy the situation is also lacking in the newly
restructured companies. Manual record keeping at the working level and poor level of computerization lead to inefficient storage, retrieval, flow, and management of information. The consumer's details are often not updated regularly; consequently the omission and commission error is substantial. There is no procedure for maintaining information on a feeder level arranged by poles, which would allow easy verification of consumers and facilitate delivery of electricity bills. Lack of managerial control over linesmen and local staff further complicates the issues and leaves room for manipulation and corrupt practices. A limited study undertaken by the DVB (Delhi Vidyut Board) through an independent agency has brought out a number of inefficiencies in meter end management and updating of record. The aggregate provisional billing for DVB was 20%–30%; there are problems of incomplete or wrong database, incorrect readings, and several other anomalies.³ It demonstrated that about 10%–15% improvement in revenues can come from proper meter end record keeping and collating of data of each consumer category.

Even in a situation where the database is poor, the information is doubtful, and accurate cost studies are not available, the regulators still have the obligation to make decisions; however these decisions may turn out to be sub-optimal due to reliance in part on value judgments. Only improvement in metering and record keeping can alleviate the problem.

Distribution losses
Distribution losses are determined by the difference between the energy input to the distribution system and the billed sales volume. Losses cannot be determined properly when the energy input to the system and energy output from the system are not known. Some attempts have been made to use feeder-level loss studies as an alternative approach. The KERC (2000) reported 11-kV feeder-level studies for the determination of distribution losses. The ÖERC (2002) has also reported feeder-level pilot studies for loss assessment.

A different approach is being used in Delhi, which is an aggregate measure of AT&C (aggregate technical and commercial) loss. It measures losses as the difference between the input energy and the energy realized (i.e. billed energy multiplied by

³Report by Dr L R Rajagopal, SANDS Utility Services Private Limited, Chennai.
collection efficiency). The government decides the AT&C loss as a policy measure (GNCTD 2001). The concept itself is unconventional in that it combines technical and financial aspects and requires all the basic information used in determining traditional T&D losses and revenue collection. The DERC (Delhi Electricity Regulatory Commission) observed, 'The commission is of the view that it has to strike a balance between an ideal requirement and also a practical approach keeping in view the ground realities...as per the policy direction.' Although the proponents of this approach considered that it would have positive effects for privatization process in Delhi, yet the fundamental issue remains that fixing AT&C loss levels through policy directives or bidding removes the regulatory discretion regarding loss determination but does not resolve the measurement problem for verification purposes.

It is clear that the lack of transaction-related information is a serious problem in many reformed utilities. Commissions are regularly facing a situation where even basic information about utility transactions is not available. To an outsider, such a situation may appear bizarre in the 21st century.

**Disclosure of true and fair financial position of companies**

Disintegrating any vertically integrated company requires disaggregation of the company’s assets and liabilities along functional lines, implying that from a composite account for the entire business, separate accounts have to be prepared for each newly created entity. In India, the transfer of assets and liabilities from the parent to the successor companies was done by issuing transfer schemes notifications. The opening balance of the successor entity was thus available for the purpose of drawing up balance sheets. Yet, this is not a substitute for the separation of accounts by business activities because all other accounting information must be derived from the original accounts. Several issues related to accounting information are discussed below.

**Provisional nature of accounts**

The balance sheets accompanying the transfer schemes were provisional for a certain period because either the accounts for the appropriate period were not available, or audited accounts

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4 Para 2.6.3.4 of the DERC order, February 2002.
were not available or proper segregation of certain common assets and liabilities was not possible at the time of notifying the transfer schemes. Finalization of accounts often takes considerable time; for example in Orissa, the Second Transfer Scheme was notified in November 1998 when the distribution companies were spun off from the TRANSCO. But the audited accounts of GRIDCO (Grid Corporation of Orissa) since 1998/99 were not yet finalized and the accounts of the four distribution companies since their inception are provisional (GoO 2001). The delay in finalization of accounts poses particular problems to the commissions, as the very basis of their decision-making becomes shaky.

The choice of notification dates can also complicate the problem. When bifurcation takes place in the middle of a financial year, accounts are required to be prepared for partial years. For example, in Haryana the transfer of HSEB assets to TRANSCO and GENCO took place on 14 August 1998 and the transfer of distribution assets from TRANSCO took place on 30 June 1999. This required preparation of HSEB accounts for the year up to 14 August and in the second case, accounts for T&D businesses were to be prepared for part of the year up to 30 June. Consequently, the accounting and auditing activities multiplied several times, resulting in delays.

Lack of business-wise disaggregated information
Separate accounting information in respect of restructured entities is required for proper monitoring and regulation. When one licensee performs more than one function, separate accounts have to be maintained for each activity (e.g. transmission and bulk supply, distribution and retail supply). Such separation of accounts requires identification of assets and liabilities belonging to each activity, their appropriate valuation, separation of income and expenses relating to each activity, etc. Joint costs, if any, have to be properly allocated. These disaggregated accounts are required for proper fixation of tariffs for each regulated activity. This applies to T&D licensees.

While utilities start maintaining accounts for the licence they hold, activity-wise separate accounts are often not maintained. Even after five years of reforms and the benefit of continued support of international consultants, GRIDCO in Orissa has not yet been able to segregate the transmission and bulk supply business accounts, although its licence required such a separation.
within one year of functioning. The same situation prevails in the four distribution licencees who failed to separate retail supply and distribution businesses. The situation is similar in all other states. To our knowledge, only Haryana utilities have accomplished this target so far.

In the absence of activity-wise accounting information, no commission with the exception of Haryana ventured in disaggregated tariffs at the activity level (i.e., separate tariffs for transmission, bulk supply, distribution, and retail supply). Haryana has set up separate wholesale tariff, transmission tariff, retail supply tariffs and wheeling charges at the distribution level.

Apart from this, the work of competing the restructuring of accounts leaves some crucial issues undecided; for example, asset values are not authenticated and an asset category-wise break-up is unavailable. The lack of information on important elements of the ARR has its own implications.

Other problems with accounting information
Commissions faced a number of other problems related to accounting information. A few such problems are listed below.

- **Lack of break-up of assets by broad categories** In some states, assets were revalued at the time of restructuring. Contrary to the general practice of revaluing each asset individually to arrive at the revalued asset, the net value of the fixed asset was revalued *en bloc* in order to balance the assets with liabilities. Consequently, no asset-wise break-up or even asset category-wise is available. The validity of the functional break-up of assets shown by the utilities in its accounts also cannot be verified, unless the revaluation of individual assets is carried out by the utility.

- **Depreciation expense** Lack of asset-wise break-up also affects the depreciation calculation because the rate of depreciation varies for different categories of assets. The use of an average rate by the utility is also questionable. Further, since no depreciation is charged on land, the value of land has to be subtracted from the gross fixed assets before depreciation is calculated. In the absence of relevant information, it is possible that the licencee is charging inappropriate depreciation to its revenue requirement and accordingly, the tariff set on that revenue requirement may be inappropriate.

- **Life of assets** At the time of restructuring, various assets had different remaining useful lives depending on the date of
commissioning, rate of use, and the working condition at that time. This also required determination of the rate at which the assets were to be retired annually. After restructuring, when the asset value is revalued, the question of whether an asset is to be considered as new or old arises. Both the rate of depreciation and its recovery will vary depending on whether the asset is considered new or old. The problem has not been addressed and the depreciation has been allowed on prevailing rates, although objectors have often questioned such practices.

- *Lack of asset registers*  
  Post reform, utilities whose assets were revalued found it difficult to maintain asset registers. As OERC (2002) indicates, the licencees in Orissa are not maintaining proper asset registers because of difficulties with opening balance disaggregation.

- *Absence of loan details*  
  The transfer schemes provide the aggregate debt liability of a successor company but do not provide instrument-wise details of loans. As a result, it is not known how the loans taken by utility have been distributed to successor companies and who is responsible for discharging which type of loans. The absence of such details hinders verification of interest liability of individual licencees.

**Inadequate performance-related information**

One of the tasks of the commission is to promote efficiency, economy, and safety in the use of electricity in the state, especially with regard to quality, continuity, and reliability of service. Monitoring the quality of service provided by a licensee, therefore, constitutes a major regulatory task. For monitoring and evaluating performance of the utility, certain information is required. While SEBs were not required to disclose such performance-related information to the public, under the Reform Act it is the commission's duty to make such information public. Parameters for measuring the quality of service include supply interruptions, voltage and frequency of supply, accidents, etc. However, due to poor record keeping and inadequate record maintenance, adequate information is not available. Information is not available even in the case of most important indicators of technical performance. The following points would show how the situation is in respect of performance-related information.

- **System outage**  
  An outage in the distribution system can be a scheduled maintenance outage, an unscheduled maintenance
outage (i.e. the system is taken out for maintenance before it has broken down) or a forced outage (i.e. where the system is out of service due to a breakdown). Record keeping of each outage is important for monitoring system performance. For a meaningful analysis of system outage, information is also required on the loss of transmission or distribution capacity due to the outages, the area affected by it, whether the outage required rescheduling of generation or power purchase commitments, etc. Such detailed information is not available.

- **Supply interruption** Intermittent interruptions can be due to an outage in a generating station, in one or more elements of the transmission system, or due to restrictions imposed on the system as a load regulating measure. The number and duration of such interruptions are but measures of continuity of supply. However, such information is recorded manually at substations and often does not include interruptions due to load regulation. The data are voluminous and compilation is difficult due to lack of computerization. A meaningful analysis would also require the number of consumers affected, estimated load lost, and the estimated sales lost.

- **Supply voltage and frequency** Information about frequency excursions and voltage fluctuations points to the performance of the utility in fulfilling its obligation to supply quality power to consumers. No or little data is available on time periods when voltage was beyond the prescribed limits in the distribution network. Such information is normally available at distribution and transmission substations but in the manual form implying that for all practical purposes, the information is difficult to retrieve and process.

- **Consumer satisfaction related information** The commission’s duty is to keep in mind the interest of consumers. In the pre-reforms era, although there were internal mechanisms for handling consumer complaints and grievances, the system lacked transparency. Generally, complaint centres are poorly equipped, complaints are not properly recorded or attended to; connections are not released on time and reasons for delay are rarely intimated; bills arrive late and consumer satisfaction is poor. Due to increase in the number of connections per sub-division, consumer files are not properly maintained. The history sheet of consumers meant for providing such information as date of connection, sanctioned load, extension of load if any, pattern of consumption, security, and
advance consumption deposits is not available for review and monitoring by higher authorities.

**Effects of incomplete information on the regulatory process**

The above discussion indicates the current reality faced by utilities and the regulators. Lack of accurate information affects the regulatory process. The regulator is in a paradoxical situation. On one hand, if the regulator takes a rigid position and requires the licencee to furnish such details, the commission will be considered a stumbling block in the reform process. The utility and others would consider that the regulator is too demanding and is imposing unnecessary regulatory compliance costs. On the other hand, if the regulator takes a lenient view and accepts the utility’s submissions without questioning, the credibility of the regulator is affected, because in the eyes of the public, the commission appears to be biased towards the utility and is not effective as an independent body capable of enforcing its decisions. Further, if the commission uses its own judgement, it is accused of using ‘ad-hoc’ data and of being unjust to the licencee.

The results of constrained decision-making are manifested in a number of areas. As utilities are immediately hit by the decisions of regulatory commissions, their financial health captures the effects to a large extent. The financial health of most of reformed utilities remains precarious and there is hardly any visible improvement. Poor financial health is a major disincentive for the utilities to improve as they struggle to manage their routine operations in a cash-strapped situation.

Another victim of the lack of accurate information is the privatization of the utility business. An investor requires true and fair disclosure of the status of the business to be acquired; lack of information fails to generate confidence. An investor is also concerned with the regulatory body’s decision-making, which affects the financial viability of investments and the expectation of returns. In the absence of adequate information, it is difficult for the regulator to establish a credibly consistent approach to its regulatory decisions, and this increases the investor’s perception of regulatory risk. Compared with alternative investment options, the electricity business does not look attractive to an investor in such a situation.

In the following paragraphs, we describe the approaches taken by the commissions for decision-making in the face of incomplete information and for improving information availability.
Approaches used for decision-making in a regime of incomplete information

Most commissions have used a combination of the following approaches when faced with the problem of incomplete information:

- Allowed additional time or specific waivers in respect of information supply
- Accepted the submissions made by licensees
- Replaced licensees’ assumptions by the commission’s assumptions
- Used data from alternative sources
- Used value judgements.

Indian electricity regulatory commissions have accepted, either explicitly or implicitly, the licensees’ request for waiver, for either delayed submission or deferred submission of certain information. HERC (2000a) and HERC (2000b) provide a detailed list of such waivers. A perusal of the waivers granted shows that the licensee pleaded for waivers for a large number of reasons: difficulty in retrieval of information (manual retrieval of data on accidents, application for new connection, etc.), problems originating from forecasting models (which used annual data instead of six-monthly data as required by the commission), physical or technical constraints (such as non-existent metering systems), inappropriate existing systems (accounting practices), and so on. The HERC granted waivers on an annual basis but often the information situation did not improve.

The tariff orders of various commissions reveal that all commissions have normally accepted a part of the submissions made by the licensees. These include demand forecasts, estimates for less important cost items (such as administrative and general expenses), etc. Demand forecasting requires good estimates of the distribution of consumers within each category by usage level, connected load, and load factor. In the absence of such information, Indian utilities use simple average growth rates for demand estimates, which is a crude method of forecasting. Although many tariff orders note that the methodology and the assumptions regarding such forecasts remain questionable, the commissions are not in a better position to provide alternative forecasts and eventually accept the licensees’ forecasts.

The estimation of consumption in case of unmetered or defective meter supplies has turned out to be a major issue in the Indian context. Commissions have differed with the views of the
licensure in many cases and replaced the licencees’ assumptions with their own. For example, the agricultural consumption has been substantially reduced from that estimated by the licensee (HERC 2000b) in the first tariff order of the HERC. The KERC in its first tariff order used data from a study carried out by the R&D department of the licensee to decide the agricultural consumption (KERC 2000). While all commissions provide some justification in support of their decisions, the basis for alternative assumptions is often based on a gut feeling rather than hard evidence.

Since the beginning of power sector reforms in India, the issue of T&D losses has become a controversial subject. Two aspects of T&D losses required the commission’s decision when losses were above acceptable levels: (1) treatment of the allowed losses (what should be the allowed loss level that will be taken as the basis for setting electricity tariffs) and (2) treatment of the difference between the allowed and actual losses (how should the costs be associated with the difference between the allowed and actual losses recovered).

Disallowing high power losses in tariffs benefits consumers in the short term, but increases the revenue gap of the licensor, thereby contributing to additional deterioration in the quality of service. Consequently, consumers ultimately pay in the form of financial losses incurred due to unavailable power or voltage or frequency fluctuations. On the other hand, if the tariff is based on high loss levels, consumers are affected immediately and the utility has no incentive to reduce losses. The commission has the onerous task of balancing the two opposing forces in a world of imperfect information.

The OERC started the practice of setting tariffs based on what the commission thought was an acceptable level of T&D losses. This practice of value judgement-based treatment of T&D losses was used as an important regulatory control mechanism. The OERC in its initial tariff orders disallowed recovery of costs beyond this approved level of losses by disallowing power procurement costs. In subsequent orders, the GRIDCO was allowed to recover its actual power purchase costs but the revenue requirement of distribution licencees were based on the normative loss level. This led to a cash-trap situation, where the DISTCOs were perennially unable to foot the bills for bulk power supplied to them by GRIDCO. The combined effect of this situation was that GRIDCO suffered financially as its dues
to the generators stood at 12.4 billion rupees and borrowings at 27.5 billion rupees in April 2001. Since its financial condition worsened, the Government of Orissa had to seek assistance to bail out GRIDCO through a financial restructuring plan to the Government of India.

Other state commissions found the Orissa approach suitable and started to emulate it. Notable exceptions were the HERC and the APERC (Andhra Pradesh Electricity Regulatory Commission). In its first tariff order, the HERC provisionally re-determined the loss level, which was higher than that claimed by the licencee. The entire loss was not passed on to the consumer through increased tariffs but the commission spelt out a mechanism for sharing of costs (HERC 2000b). The HERC took the pragmatic approach of accepting reality instead of covering it up and taking corrective action. Pleasing the consumers by keeping tariffs low would have been a populist move but it would have surely damaged the financial strength of licencees. The decision has started bearing fruits, as one licencee has recently come out of the red.

The APERC accepted the loss level submitted by the licencee and avoided the loss determination problem. The commission increased tariffs steeply in certain categories but did not allow the entire loss to be passed on to the consumer. To bridge the shortfall in revenue, the commission asked the licencee to economize on its expenses by better performing.

In practice, the regulator may never have all the desired information. The regulator would always be handicapped by the problem of asymmetric information (i.e. the utility will always have more information than the regulator). In the early stages of restructuring of the SEBs the problem of information inadequacy and of internal inconsistency will exist. The regulator will have to make 'cautious' decisions in order to overcome the difficulty of slack and insufficient information. Both the utility and the regulator will have to work out a time frame within which the form and consistency of the information must be ensured. The regulators will then be based on fairly accurate data and can stand the test of the review as allowed to the utility as well as the consumers.

Approaches taken by commissions to improve information availability

The four approaches that were taken by commissions, to improve information availability can be identified as follows.
- Issue directives on specific areas
- Subject the utilities to humiliation in public hearings
- Impose fines for inadequate and untimely information submissions
- Assist utilities in resolving the problem.

All the commissions have resorted to issuing a number of directives to licencees in their tariff orders and have asked the licencees to comply with the directive within a specified time frame. The directives often cover a wide range of issues starting from submitting a status report or plan of action for certain specified activities to conducting surveys and studies.

Some commissions monitor the progress made in complying with the directives regularly. However, it is noticed that the compliance rate is quite low, as licencees request extensions. In at least one case, the implementation of the directives were challenged in the court and a temporary stay was obtained.5 The case has since been withdrawn and both the commission and the concerned utility entered into a dialogue to resolve the problem.

Although issuing directives is an easy approach, this administrative mechanism has limited efficacy. If issuing orders were effective, things would have improved even when the government controlled the utilities directly. The directives have created a mistrust between the utility and the commission, because the utilities feel that the commissions are encroaching upon their sphere of work and interfering with their operations. Some commissions have issued large numbers of directives justifying the view of the utilities.

All commissions follow a transparent approach in decision-making and subject filings to public scrutiny. Licensees faced awkward questions at public hearings and were embarrassed in the absence of ready answers but public humiliation did not result in improved information and the utilities have become adept at handling the situation now.

In at least two cases (MERC and KERC), financial penalties have been imposed on the licencee for failure to provide detailed

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5 Karnataka High Court order dated 7 March 2001 on MFA no. 865/2001 between the KPTCL and the KERC. The KPTCL sought stay in respect of some directions (on directives 4, 6 and 13 on page 85, directives annexed at pages 145 and 146 of the order and the direction in respect of compensation to consumers), which was granted by the Court.
information. However, the legality of these fines is doubtful, as the regulations require separate proceedings for imposition of fines.

The KERC commissioned a number of studies on its own to assist the licencees come to grips with the new environment. Two such studies were a cost of service study and a loss study. The consultants engaged by the commission developed a model for determining theembedded cost of service. Similarly, a study was conducted to determine the loss level in the T&D systems. The results were discussed with the licensee and the commission intended to use these models for tariff setting. Here the commission took on the role of a guide.

It appears that the commission’s approach has been to seek information when reviewing tariff applications. A systematic effort at monitoring progress is absent. Also, prioritization of information has not been done and as a result, important information does not flow to the commission even after a number of years of reforms. For example, every commission stresses on metering but no commensurate effort is being taken to ensure that meter records are properly taken and new meters are not being tampered with in connivance with the staff of the utility or the contractor.

No method of verification has been developed to check the accuracy of the claims of the licenced. No commission has so far relied on economic principles in dealing with information inadequacy. Commissions have not provided any incentive for improvement of information.

**Way forward**

A number of lessons can be learnt from the experience gained so far. These lessons are applicable to different stages of power sector reform: (1) pre-reorganization phase, (2) transition period management, and (3) a common approach to resolve the information problem.

**Suggestions for pre-reorganization phase**

The experience gained so far should benefit states that are contemplating power sector reforms. The following are some suggestions to improve the information availability in a state where reforms are under way.

1. The issue of interface meters at the wholesale business level should be considered before reorganizing the industry. Identification of interface points and verification of metering
status should be given importance. It needs to be ensured that upon reorganization, even utilities with two different licences (wholesale and retail supply) can perform commercially.

2 The reorganization should preferably be made effective from the beginning of the financial year or at least at the middle of the financial year (say, from 1 October) because of the practical problems in preparing detailed information under each head for a part financial year and making corresponding year or period comparison difficult. This reduces preparation of financial statements and reports for incomplete years.

3 Wherever asset revaluation and financial re-engineering is required, adequate details should be annexed to the transfer schemes providing the rationale, mechanism, and procedures so that no confusion or disputes arise in the future. As the transfer scheme enjoys the status of delegated legislation, providing additional details would also make the process more transparent.

4 Functional separation of activities along with separation of accounts and finances within the electricity boards prior to reorganization would also be helpful.

5 Unmetered consumption is the most contentious issue, and the commissions are stressing on 100% metering. Because this requires investments, phasing and prioritization will be necessary. The issue of unmetered sale of power to any special category will have to be resolved by the commission till all sales become metered. In this case, an approach similar to the one adopted by the HERC will have to be taken. The commission analysed unmetered consumption in detail and some arrangements was devised to manage the issue till metering was complete.

Suggestions for management in the transition period
Given the severity of the problem in the power sector and the dilapidated condition of infrastructure and practices, the reorganized industry would have to work over a period of time to improve the situation. This period, during which information availability would remain constrained could be considered the transition period. All stakeholders should agree on a plan of action for managing this transition period. We suggest three broad areas of focus.

1 Prioritization of information requirement The OERC was the first to issue comprehensive guidelines for tariff and other
Regulating the power industry in a regime of incomplete information

filings. Other commissions have also issued similar guidelines. In a situation where very basic information is not available, compliance with such detailed guidelines cannot be expected and is corroborated by the Orissa experience. Besides, there could be a significant cost in establishing data generation and collection systems.

Both sides have to recognize and appreciate each others problems and should arrive at a list of prioritized information requirement. The thumb rule suggests that 20% vital information would be enough to satisfy 80% of the requirements and this 20% should be targeted rather than the remaining 80%, which would contribute to only 20% of the requirements. To our knowledge, no attempt towards prioritizing data requirement has been made so far. It would be a significant achievement if the availability of at least vital information can be ensured.

For example, no regulatory commission has so far pressed for marginal cost analysis for tariff purposes, although the tariff guidelines invariably include this as a requirement. Similarly, the waivers granted by the HERC in its first tariff order indicate that substation loading data at the transmission-distribution interface, energy audits, performance-related information (such as voltage fluctuations, frequency excursions, accidents, etc.), inter-state transmission loss, etc. could not be supplied by the licensee (HERC [2000a]; HERC [2000b]). While these are important, clearly they were not absolutely necessary, otherwise the commission could not have granted waivers.

States with newly reformed power sectors should resist the temptation of borrowing or following the prescription of other reformed states. Each should look at its specific needs and decide on the vital information requirements. It would also help if agreed procedures could be set up for dealing with the information problem for the interim period.

2 Phased target for full information availability A clear road map is required for ensuring better compliance with information requirement. To improve the situation, investments would be required both for physical and human capital and immediate improvements cannot be expected. The commissions and utilities could agree on an action plan with provision for sufficient funding and managerial supervision. Such a phased target could also be linked to performance incentives.
3 Incentives for improvements in utility data systems

Commissions have so far relied on traditional routes of administrative directives for bringing improvements. Experience so far indicates that results are not encouraging. Innovative ways need to be tried. One option would be reliance on economic instruments such as incentives. For example, instead of directing the installation of certain quantities of meters, the licensee could be offered an additional return on investment or on capital base for achieving different levels of targets. Moreover, the focus should be on the entire information system and not just a particular element. For example, just meter installation is not enough to ensure improvement in data systems. Regular meter reading, accurate billing, and management control systems of this chain are equally important. The consumer’s cooperation is also essential and the pilot study in Orissa indicates that the management of human resources and public relations could be determining factors.

Common approach to resolve the information problem

These suggestions are applicable to other states where the reforms have progressed to some extent. The following common suggestions could be considered for resolving the problem.

1 Unified accounting framework

Commissions are prescribing guidelines for the accounting policy to be followed by the licensee. Although the framework is more or less the same, there may be variations in the details. The policy may also be different for distribution licensees and transmission licensees and further refinement may be needed if separate accounts are to be maintained by the bulk supply licensee, transmission licensee, distribution licensee, and retail supply licensee. A common accounting policy in the basic areas of the utility’s accounting in this regard may avoid duplication of work and divergence in policies. It will also promote better comparison of data among utilities. This idea can be extended further to develop a unified system of accounts specifically for regulating the utilities. In this connection, the FoIR (Forum of Indian Regulators) can take the lead in undertaking or entrusting a study to define areas of minimum common data and suggest a common approach to the regulatory commission for collecting information. Such examples are available elsewhere (e.g. in the US, the National Association of
Regulatory Utility Commissioners has developed a detailed system. This will not only facilitate data generation but also render verification easier.

2 RIMS (Regulatory Information Management System) The second step in the same direction would be to set up an MIS for regulatory purposes. Once accounting practices are standardized, a significant section of the MIS can have a common structure. This is because the accounting and tariff-related information contributes more than 60% of the data requirement of a regulatory body. Some other modules such as those dealing with technical, legal, and consumer affairs are also likely to have certain common features across states. A common RIMS, at least to a significant extent, appears to be a logical extension of the common approach.

3 MIS development for the utilities Experience from Orissa suggests that merely developing the database for the commission is not enough to make it operational. Similar developments have to follow in the utilities, otherwise data would not flow in the desired form at the desired time. A standardized approach can be adopted for database development for the utilities as well.

4 Hands-off approach to regulation The present form of regulation is known as heavy-handed regulation. The international trend in regulation has moved to lighter forms of regulation, which are less intensive in information requirement. Some commissions such the APERC, the UPERC, and the OERC have initiated some steps in this direction. Further development in this direction could reduce information requirement somewhat. Yet, no regulation could succeed unless basic information such as volume of sales, revenue earned, etc. are known with certainty.

Conclusion

Information plays a vital role in the regulation of the power sector. There is widespread lack of information in this sector in India and regulators constantly face problems because of it. This affects their decision-making, which, in turn, affects the performance of the sector. We have suggested a number of steps that could be taken to improve the situation.

We believe that all the stakeholders should recognize the gravity of the problem and act constructively to ameliorate the problem. Instantaneous changes are unlikely to come. Concerted
efforts and greater coordination would be required for better information availability in the interest of sector reforms.

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