
RESTRUCTURING THE REGULATORY FRAMEWORK IN DEVELOPING COUNTRIES

Garry E. Vollans

ABSTRACT

Creating a regulatory framework for network sectors such as electricity in developing countries is constrained by lack of regulatory expertise and capital for expansion, a potentially high regulatory burden relative to the size of the sector, small but growing markets and low incomes. Regulatory models designed for electricity sectors in developed economies may not be suitable for developing economies or require serious reengineering to be effective. Unless a number of preparatory measures are in place, any attempt to implement a regulatory regime or reform of a current system is unlikely to succeed if the objective is to create a self-sustaining electricity sector in support of economic growth rather than a drain on budgetary resources. In this paper, five basic regulatory models are outlined with a focus on regulatory objectives and necessary conditions for success. The next section of the paper then illustrates the characteristic steps in the process of transformation from a vertically integrated and publicly administered utility towards a self-sustaining electricity sector directed by market-based incentives and signals in a hypothetical developing country. The associated policy choices at each stage of the process are identified and conclusions drawn regarding possible interim regulatory frameworks. The last section of the paper highlights the considerations in designing a long-term regulatory governance system in a developing country reflecting the presence and/or absence of factors more pertinent to systems in the developed world with a view to designing an efficient and cost effective regulatory process.

An earlier version of this paper was presented at the 26th Annual Conference of the International Association for Energy Economics in Prague, Czech Republic, in June 2003.

Garry E. Vollans is a Senior Consultant with FMP/Flaman Management Partners Ltd., 503-331 Cooper Street, Ottawa ON K2P 0G5 Canada gvollans@fmp.ca

INTRODUCTION

When the developed world is asked for advice on how to promote economic growth, one of the standard replies is to just let market-based systems work. That general policy will lead to efficiency, productivity and rising incomes. The corollary to this advice is that with market-based systems come market failures e.g. natural monopolies, requiring regulation to prevent abuse of market power. The costs of supporting a regulatory system are high but at least in a large economy, the costs can be spread over a large number of consumers/taxpayers. Moreover, the markets in many developing economies may be just too small to support a sufficient number of firms to ensure competition and the economy/income too small to support the burden of an elaborate regulatory administration. That is the question to be addressed in this paper: How might developing economies move towards market-based systems taking account of evident market failures, with the added constraints of small markets and low incomes? A staged approach is outlined, wherein the essential elements of a regulatory governance system appropriate to the local circumstances can be identified.

BACKGROUND

In the developed world, regulatory systems have become quite complex and highly institutionalised, including instances of the right to appeal quasi-judicial regulatory decisions in the judicial system among other types of dispute settlement mechanisms. For much of the developing world, a simple replication of these institutional arrangements exceeds both their financial resources and the requisite types of human capital, at least in the short term. Formally centrally planned economies, moving to market-based commercialisation of their economies, face both of the above constraints, plus the need to restructure former government departments into commercial entities. In both cases, potential domestic and foreign investors need to know the "rules of the game" if they are to invest some of the funds necessary to provide the capital-intensive infrastructure needed to support further development of these economies.

Meanwhile, back in the developed world, considerable effort has been devoted to restructuring and privatising network industries (electricity, transport, telecommunications etc.) to expand the role of the market system in providing these services. Progress has been slow and political debates intense. Former highly vertically integrated monopolies are being unbundled and some market orientated regulatory instruments such as price caps, incentive and yardstick regulations and marketable licences

have been attempted in some jurisdictions. To hold the line on the cost of the regulatory burden in some jurisdictions, a fixed regulatory budget envelope has been proposed to force trade-offs and/or a complex regulatory impact analysis on any new proposed regulations. Both initiatives tend to lead to additional bureaucracy. Nonetheless, while there has been much to do about restructuring regulated industries (usually natural monopolies) and the overall cost of the regulatory burden, there has been little follow-up concerning the consequential potential to restructure the regulators themselves.

In this paper, an attempt will be made to review regulatory theories and institutions to seek out common elements that could be grouped into regulatory umbrellas for potential application in developing economies. The objective is to seek out economies of scope and scale in the regulatory process itself, taking account of the need to install checks and balances to minimise potential corruption and the "paternalistic" desire to foster infant industries. Furthermore, an open and explicit regulatory framework can provide private capital, both domestic and foreign, with a basis upon which longer-term investment decisions can be made to facilitate the potential that market-based systems can play in the development process.¹ Since several sectors of the economy that are often regulated tend to be capital intensive and provide infrastructure support to the development of other sectors, e.g. transport, energy, and telecommunications, they form important building blocks to the development process.

THEORIES OF REGULATION (OR RATIONALES FOR REGULATION)

A. To correct for market failures

While there is no widely accepted *general theory of regulation*, there are many partial theories of regulation that explain various types, rationales and objectives of regulation (Strick, 1994). One partial framework that encompasses the majority of regulatory regimes relates to the objective to correct for market failure in the "public interest". This framework assumes that the competitive market-based model would generally yield the most efficient outcome under certain conditions. Where the market "fails" to meet the necessary conditions for whatever reason, regulatory intervention can be used to improve the social welfare results over the unconstrained market-based outcome. This situation is applicable to much of the regulatory intervention in the market place with

¹ Regulatory transparency can also play an important role in reducing non-tariff barriers to foreign trade OECD (2002) p. 7.

the primary objective of correcting three groupings of market failures: natural monopoly, asymmetric information, and externalities. Regulation under these circumstances should increase societal wealth (McFetridge and Lall, 1991) through an increase in overall social welfare:

- Natural monopolies are often capital intensive and exhibit increasing economies of scale and/or scope such as pipelines (both transmission and distribution) and network infrastructure (telecommunications and railroads). One system can provide a specific service at a lower average cost than two or more parallel systems in competition e.g. two water distribution lines down the same street;
- Asymmetric information usually involves situations where the seller has better and/or lower cost access to information on the qualities of the goods and services than the buyer in a commercial transaction e.g. resale of a used automobile, ingredients of prepared food products and insider information in financial transactions. It is also associated with natural monopolies: the incumbent knowledge advantage of the monopoly firm concerning key facilities in network installations and the knowledge advantage of the regulated firm on operational details and costs vis-à-vis the regulator; and
- Externalities (spill over effects) involve situations where not all costs are internalized such as pollution from an industrial process or harvesting of a common resource such as a fishery or forest.

Regulatory instruments are not the only means available to address these situations of market failure but they are often used. Alternatives might include state-owned enterprises to provide the goods and services (e.g. water and waste systems), prohibition with severe penalties (e.g. toxins), subsidies (e.g. to information dissemination), taxation/user fees (e.g. pollution taxes and tradable permits) or self-regulation e.g. professional associations and private insurance.² Where regulation is the instrument selected, there may also be an element of discretion in whether the regulatory regime is light or tight (see section D below).

B. Vested Interest (Chicago School)

An early example of vested interest regulation might be termed the creation of an *unnatural monopoly* - issuing a concession (British East India Company) or franchise (alcohol distribution) as a reward or source of

² Hierarchic governance is another alternative that is sometimes used in situations where market failure is evident. See Midttun (2001) p. 89.

revenues to special interests. On a more general basis, the cost of regulatory decisions can be dispersed over a large number of consumers to the benefit of a much smaller group. In the developed world, examples in use today would include agricultural marketing agencies that might have been originally established to minimize destructive competition. In the developing world, mining and import concessions are sometimes used in this manner to extract benefits for a particular vested interest. This type of regulation may lead to an increase in social welfare but usually just involves redistributing social welfare among groups of producers and consumers.

In the developed world, this use of regulatory instruments is subtler and has been characterized as the "special interest theory of regulation" or the "cartel theory of regulation" (Hirshhorn and Gautrin, 1993). The basis for this theory was laid by Stigler (1971) and expanded by Peltzman (1976) and (1989) and is sometimes referred to as the Chicago school theory of regulation. In brief, vested interests either seek or use regulated status to gain higher profits or other benefits and in return provide political support to those in power. As long as the costs are widely dispersed and the benefits not too blatant, this type of behaviour may be condoned if not accepted by those unknowingly paying the price.

This theory also helps explain the concept of "regulatory capture", whereby over time, those regulated may come to prevail over their regulators to ensure higher profits and other benefits via regulatory decisions. This outcome may result from the reliance regulators must put on the detailed information provided by those regulated and/or that over time they associate their own interests with the general prosperity of the interests regulated. While one might debate the degree to which such forces influence the regulators and those regulated, the concept helps explain why it has been so difficult to effect regulatory reform from within the system - there are vested interests in the status quo among the regulated, the regulators and any consumers benefiting from regulatory decisions such as cross subsidies. These are also tendencies that ought to be kept in mind when designing regulatory governance regimes in developing countries.

C. Regulation as a Policy or Administrative Instrument

This type or use of regulation has been called *social regulation* (Economic Council of Canada, 1979) and ranges from broad regulation of health, safety and environmental matters to narrow pet control regulations and is usually a form of hierarchic governance. There may be a net change in social welfare but measurement of the output benefits is so beset with difficulty that the results are inevitably rough at best. Efforts at regulatory

reform in these areas generally focus on reducing the costs of regulation, introducing incentive mechanisms, and subcontracting some functions to private firms (Midttun (2001)).

Whether by design or convenience, such regulations (e.g. safety and environment) are often applied or policed by both an agency having an economy-wide mandate and agencies directly regulating particular sectors (e.g. pipelines), leading to potential overlap and duplication. There are many cases where there are crossovers among the three types of regulation. For example, a regulated natural monopoly (electricity distribution) may set tariffs at the behest of the regulator to cross-subsidize rural customers (vested interest) at the expense of urban consumers to meet a social policy directive of the administration, whether explicit or implicit. Cross-subsidization across classes of customers is often used to achieve specific objectives such as income redistribution (Strick, 1994). Other examples of cross subsidies would include large/small consumers, business/individual, industrial development tariffs, discriminatory standards, bulk/packaged shipments, foreign/domestic, etc. In each case, the discrimination would presumably meet the requirement of being in the "public interest". Such use of regulatory instruments is often referred to as *Universal Service Obligations (USO's)* e.g. carrier of last resort, lifeline tariffs or handicap access obligations.

A secondary perceived benefit from an administrative perspective arises from the fact that such equivalent to "tax and spend" measures do not generally form part of the standard government fiscal/budget process. Such considerations can form an important part of the decision making process in developing nations facing an inefficient tax administration system and a relatively poor tax base. They might also explain the inertia in undertaking regulatory reform in developed countries.

A corollary use of regulatory institutions relates to the ability of the executive to refer an issue to a regulatory agency for technical "advice". This measure not only provides the potential for some expert advice but also gets a political "hot potato" off the immediate agenda for a more considered response. On the other hand, some would argue that there should be some distance between the regulators and "special interests" voiced through elected officials to avoid regulatory capture of another kind (OECD, 2001).

A more structured use of regulation as a policy instrument relates to its use to promote particular industrial or regional development initiatives or to maintain certain cultural or social objectives that are in the "public interest". Examples of special cases leading to use of regulatory instruments include "strategic commodities", perhaps a particularly important export commodity; the perceived need to manage windfall

profits arising from an external price shock (e.g. oil prices in 1973); or a third party making a purchase decision such as for medical services (Breyer, 1990). Such uses can be incorporated into the formal mandate of the regulatory agency at the outset or may arise incrementally through a series of regulatory decisions over time that eventually form a specific consideration in weighing the "public interest". Thus, while the original regulatory mandate might have been to correct a market failure e.g. potential abuse of monopoly power, the subsequent "add-ons" for policy or administrative reasons add more complicating factors in efforts to reform the regulatory process and to minimize regulatory overlap across agencies and jurisdictions.

D. Light Regulation

A particularly interesting regulatory regime that may have direct relevance to small developing economies is the so-called "light-handed" regulation as practiced in Germany and New Zealand (OECD, 1999). In the latter, the over-arching framework is established by the competition law to minimize anti-competitive behaviour, especially abuse of dominant market power and collusion to restrict competition. Rather than industry specific regulators, the relevant Ministry requires mandatory dissemination of information (including reporting of segmented accounting of integrated operations) to increase market transparency. Market participants are encouraged to negotiate contractual terms and conditions for facilities access and labour market conditions. There is an explicit threat that if the light regulation process fails to achieve a satisfactory outcome, tight regulation may be imposed³. Disputes between contracting parties go through dispute resolution processes with ultimate appeal to the High Court (McTigue, 1998). While rough edges are still undergoing improvements and the approach may be easier to apply in a unitary government situation, there are elements that have application elsewhere. In particular, the Australian reliance on a federal competition law that applies across all industry, supplemented by industry specific regulation at the state level, provides a case in point (OECD, 1999).

E. Self-Regulation

Self-regulation is an interesting concept that can provide cost-effective alternative or adjunct to light regulation with the added benefit

³ Tight regulation refers to formal sector regulation by a sector agency with a formal legislated mandate and process rather than a state-controlled corporation exercising self regulation.

that costs are internalized to the product or service regulated. There are many types of self-regulation across many sectors of the economy (Yilmaz, 1998). Examples range from product safety (Underwriters Laboratories), standards associations, professional associations, kosher or halal food designation, consumer associations, business councils, insurance companies, etc. In general, they help resolve the market failure problem of asymmetric information - where the seller has much better information than the purchaser, or where legal redress would be too expensive in relation to the loss incurred. Third-party insurance against inferior goods and services provides a potentially cost-effective means to outsource the costs of inspecting for defects and inferior quality, a particularly costly endeavour in large engineering projects. The insurance industry can also serve to police against safety and workplace hazards in small and medium enterprises to reduce its own financial risks.

"Broadly, voluntary alternatives to state regulation allow markets to work, ensuring that there are legal or other remedies for those who may suffer from the actions of others, and permit market-based forms of protection, such as insurance, voluntary enforcement of standards and perhaps voluntary standard-setting to flourish. The results are 'imperfect' but so are all conceivable outcomes." (Blundell and Robinson, 2000)

Detractors argue that, particularly with professional associations, self regulation provides the ultimate opportunity for regulatory capture, using the regime to restrict entry, augment profits, and limit price competition and slow cost-saving innovation to serve their vested interests (Ogus, 1998).

Self-regulation may provide developing countries with relatively low cost regulatory mechanisms that could be installed fairly quickly through international cooperation agreements and minimize the draw on scarce human capital resources with regulatory expertise in these countries.

THE REGULATORY FUNCTION

To summarize, the above discussion on various types of regulation was meant to outline the broad alternatives available to a developing nation moving to market-based systems to deliver basic services to consumers in areas such as natural monopolies requiring special governance. Functions that were previously subsumed into Ministries or state-owned corporations require new institutional arrangements and governance structures. There is no model formula for the restructuring process in either the developing or developed world. Each jurisdiction

must weigh the alternatives and associated implications as the process develops within each political context. Even if a consensus approach could be reached at a point in time and place, new factors will arise requiring consideration.⁴

Based on the experience in the developed world, there may be some regulatory elements to be emulated and/or avoided. The fact that the developing world is starting with less institutional baggage in the regulatory compartment may make implementation somewhat easier since there would be fewer regulatory vested interests to assuage. Of course, the developing world encompasses another set of institutional baggage. In the next section, a conceptual regulatory framework will be outlined to identify the necessary functions in a "light regulatory" mode, reflecting one of the constraints of developing countries - a lack of traditional regulatory expertise. The suggested approach envisages moving in stages without a full commitment to moving to a fully market-based system until better system information is developed during the transition process.

ECONOMIC REGULATION OF A NATURAL MONOPOLY: A STAGED APPROACH

Using electricity as an example (because all developing economies have an electricity sector, even if only a single generator and a distribution system in urban areas), a number of typical characteristics can be identified. The sector is highly integrated vertically and is often tied closely to the government, both administratively and through governance. Even where corporatized (separate books), these links are tight and usually require support from the central budget. As a result, operating costs are high reflecting overstaffing, input purchase and site constraints, old capital equipment (high maintenance), high line losses (both technical and theft), poor bill collection procedures, and generally poor system reliability. The following sections outline a staged approach for a developing country to move towards a market-based system for determining investment priorities and wholesale prices in the electricity sector, reflecting local human resources and institutions, while phasing out the government's direct management role in the sector.

⁴ One of the indirect benefits of the market-based system is the perpetual incentive to find improvements in service delivery (both quality and cost) to the final consumer. It is important that a regulatory intervention undertaken to correct a perceived problem does not discourage the potential discovery of an even better solution through the interaction of market forces. See Vaughn (2001).

FIRST STAGE: DEFINING THE SITUATION

In order to evaluate whether a full or partial market-based system might be appropriate, a number of steps need to be taken to obtain basic information that could be used to improve the management of the system if nothing more. If not already in place, the accounts should be arranged to identify the operating costs for each segment of the enterprise - generation (by station), transmission (by grid), system operation, distribution and other (e.g. system planning, headquarters functions, non-electricity business activities etc.)⁵ Any outstanding contracts or agreements with independent power producers, state owned enterprises, export/import/swap arrangements, purchase/sales contracts, committed capital expenditures, debt structure etc. would need to be identified. In all likelihood, the system operator will already have identified most of the operating capabilities and constraints of the system for hour-to-hour operations. If not already in place, a detailed monitoring and reporting process is required on the reliability of the operating system. It will be necessary to arrive at some basis for realistic transfer prices between segments to have a reasonable estimate for the cost of losses. The most difficult component to estimate may well prove to be the costs of transmission. The simple cost-of-service approach (expected average costs) would provide a first approximation as long as the transmission system were unconstrained and these costs might be used as the initial basis for setting access charges in a more market-based system.⁶

With this background information in hand (no small task), one could then come up with a first approximation of the additive current costs necessary to deliver a kWh to a final consumer, ignoring any trade flows and costs of capital, from the point of generation. Alternatively, given a current delivered price, a net return to the generator before capital costs could be calculated based on average costs per segment. This later figure is unlikely to match the current costs of generation, but it would indicate the nature and magnitude of the problems (deficits/surpluses) involved in moving towards a market-based system. While only international trade prices for inputs and outputs are likely to be market-based, the budget draw for each segment of the industry will be identified. The bulk of the

⁵ The book value of the equipment in place represents "sunk costs", but would be interesting to have, particularly if any of the assets have been securitized as loan collateral or are otherwise financially encumbered. These could be viewed as the equivalent of stranded costs.

⁶ See Hogan (1999) for a description of how transmission congestion costs can be established in real-time using spot market location (node) prices in the Pennsylvania-New Jersey-Maryland (PJM) Interconnection.

human resources required to this point are of the accounting nature. Having defined the extent of the adjustments necessary to cover costs by segment, the process could remain stalled at this stage until a specific mandate and/or the political will to further reform the system is in place. For example, if social or fiscal policy priorities require that rural electrification or lifeline tariffs for the poor must be delivered through cross subsidies rather than through direct budgetary appropriations for such purposes, it will prove difficult to move forward to the next stage.

SECOND STAGE: COMMERCIALIZATION

a) On-going Operations

At this stage, the basic costs of service by segment have been identified, along with any anomalies such as tied purchase contracts. There would be little incentive for operators to minimize costs other than budgetary constraints but the information garnered could be used to instil greater cost consciousness. Operators of the government-owned facilities should be specifically mandated to operate on a commercial (profit maximizing basis) and to settle all accounts on a normal commercial basis e.g. 30 days. A cost-of-service approach with a normal return on the (agreed upon) rate base could be used to determine the initial tariffs for transfer prices. To maintain short-term incentives to minimize costs (x-efficiency, Utton 1986), there are off-the-shelf tools such as price caps, yardstick comparisons, profit sharing etc. that could be used to approximate market incentives. These are the same cost inefficiencies associated with tight rate-of-return regulation. A companion performance standard on operations is the quality of the service provided which can be measured. Specific performance targets should be negotiated with facility managers and actively monitored with hard data from the system operator. The objective here is to instil commercial sensitivities in staff with regard to costs and quality of service provided on current operations. This step could employ negotiated performance rewards with senior management to break the civil service mould of behaviour and pay scales.

Concurrently, authorities need to provide strong signals (speeches, information brochures, press releases etc.) to final consumers that their electricity service is being commercialized. In developed countries, lower eventual prices and retail wheeling were sometimes promised, probably leading to unwarranted expectations. To avoid this type of mistake, expectations regarding the commercialization of the electricity sector should focus on the longer term potential to improve the quality and extent of service. Any necessary price increases will be mitigated by a serious

effort to minimize losses and theft from the distribution system. While prices may increase, there will also be a quality of service improvement with lower associated costs to the consumer for extra equipment to provide interruption backup and power surge protection for sensitive equipment for example. It is strongly advised that the problems of the poor be addressed directly rather than through the electricity service and that a public awareness effort be implemented to explain these shifts in approach.⁷

Historical capital costs of facilities in place are unlikely to bear any resemblance to replacement cost or market value. One approach would be to treat the facilities as a sunk cost with only a salvage value and focus on cash flow from current operations after maintenance and repairs. Any new capital expenditures for expansion and/or renovation would have to meet strict criteria in terms of rate of return and system reliability. At best, this system would maintain the status quo unless there are some considerable cost efficiencies arising from reduced losses (theft) throughout the system and other serious cost reductions such as staff (feather bedding/nepotism) reductions.⁸ This treatment of historical capital costs is the equivalent of treating them as stranded costs with the taxpayer assuming responsibility for them.

b) System Expansion

Given an exogenous need to upgrade or expand the system during this interim period, there would be a requirement to raise funds from private investors, debt markets and/or the budget. Without some form of "tight" regulatory regime, a government might be able to negotiate a build, operate, transfer deal with a private operator with some sort of sovereign guarantee, but that would be moving away from a self-sustaining market-based system and difficult to arrange. For example, if an independent producer could build a new generation station and deliver power at lower cost than current stations, it could recover the investment plus a return and leave the plant behind thereafter. Such cases are unlikely to be numerous. With the availability of realistic operating cost data on segmented operations however, it would be possible to rank "high priority" projects on a financial rate of return basis to strictly ration the scarce resources available, reinforcing the importance attached to commercial criteria. In

⁷ This policy prescription has also been made for OECD countries. See OECD (2001)

⁸ It would also be necessary to impose a strict mandate on interim facility managers to minimize costs with both incentives and penalties for not meeting objectives. Otherwise, their expectation that the central budget will bail them out in the end will prevail.

this vein, any projects undertaken should be tendered to commercial contractors in a transparent process to the extent possible to reinforce the commercial image of the sector.

At this point in the transition process (say 1 to 2 years), there would still be no formal regulatory agencies and decisions are still largely made on a command and control basis. It is unlikely that there would be enough generating stations operating to make competitive bidding effective, but the system operator would nevertheless be expected to schedule generation into the grid (pool) on a least-cost basis,⁹ subject to operating constraints. Reams of system operating cost data would be available for analysis and provide the basis for negotiations with potential new independent power producers to expand or replace base load capacity.¹⁰

Negotiations could also commence with another potential source of competition in power generation for peaking purposes. In developing countries, there are often many back-up generators (usually diesel) in place because of the frequent power interruptions. Each individual station might appear insignificant but with sufficient participation, the aggregate could make a contribution to peaking requirements in particular on relatively short notice. For example, a commercial contract would guarantee payment for avoided cost at that location for a deemed load not taken (load shedding) with notice from the system operator of say, 1/2 hour for a period not to exceed say, 3 hours. The hotel, hospital, factory owner etc. could earn a short-term return on a sunken cost investment and in the process, relieve a peaking requirement. Current personnel are already normally quite capable of meeting the operating requirements because of their experience with power interruptions. Such arrangements could also be applied to new distributed generation facilities, including industrial co-generation and would be fully compatible with a full blown competitive process based on location (node) marginal cost pricing if that were the eventual outcome (Hogan, 2002).

It is unlikely that the operators of the segmented parts of the former integrated electrical industry will have wrung enough cost reductions (x-efficiency) out of their operations to fully offset other cost increases and there may be a demand to adjust transfer prices accordingly where major discrepancies are evident. Rather than establish the equivalent of a regulatory agency (with its attendant costs and life of its own),

⁹ Absent capital costs, base plants could be bid to run as long as operational (variable) costs were covered.

¹⁰ Data from the system's operator could also be used to identify the three conditions necessary to abuse of market power: bid prices above marginal cost, output below capacity and significant affiliate output (unlikely). See Harvey et al. (1996)

consideration might be given to setting up a "cost review panel" with a strong accounting bias to pass judgement on the case presented by the operators, somewhat akin to the role of outside auditors. It would not need to be a permanent fixture of the administration and it might include foreign members to provide either expertise and/or a perception of independence. If some permanence were deemed beneficial, then the panel could be set up as an umbrella agency with capacity to evaluate cost pass through requests from other network industries such as telecommunications, railroads, pipelines, water works etc. to spread out the administration costs.¹¹

The above discussion was formulated as if all the facilities were state-owned. If any private operators such as power producers (upstream or downstream) felt that there had been unequal access to facilities or other such abuse, reference could be made to the above panel or some other body such as the equivalent of a competition bureau if in existence. It is virtually inconceivable that there could be any abuse of market power of the type identified in the California power market at this stage, since this would require significant affiliate output (Joskow and Kahn, 2002). If all generators were paid a pool price (adjusted for delivery location on the grid) there would be an incentive to minimize costs and conceivably generate a profit at each station. Distributors and large industrial consumers would be charged the pool price plus an average charge to cover the costs of the transmission system and the system operator.

As an aside, the facilities operators might also have been charged with the requirement to make their facilities cost efficient to maximize the potential value for possible privatization. As mentioned above, more transparent transfer prices would also facilitate valuations by potential purchasers undertaking due diligence. If they were to be sold, the potential for abuse of market power would need to be evaluated but tight regulation would not necessarily be required in consequence as per the New Zealand model (Government of New Zealand, 2002). The objectives of this stage are all commercial: cost efficiency, familiarity with negotiating contracts, improved service and improving the value of assets for potential privatization. Human resource requirements for accountants would continue with a greater need for engineering cost analyses of system constraints and potential technical efficiencies through system optimization.

¹¹ Schwarz and Satola (2000) pp. 30-32 provides an overview of a multi-sector regulatory approach.

STAGE THREE: WHOLESALE COMPETITION

The next stage (say 2-3 years) would involve possibly moving the wholesale market to prices based on location marginal costs. Generators (both upstream and downstream) would already have the experience of bidding and selling into the pool on an average least-cost (fob) basis. Local distribution operators would continue to bid their load schedules (quantity only) as required by the system operator e.g. 7 day rolling forecast and next 48 ½ hour period schedule. The system operator would also have the dynamic operational constraints of the network and the associated shadow marginal costs for transmission to meet the load requirements. (These implicit marginal location costs may already be in use to calculate the "avoided costs" for purchases from downstream generators.) This pricing basis could be extended to give generators a netback price adjusted for transmission constraints. Historical marginal costs by location (node) could also be used to demonstrate to wholesale customers (local distribution lines and large industrial clients) how their bills would have looked if they had been buying on a marginal cost (cif) basis from the grid – the next step towards market-based prices. These data and examples could form the starting point for negotiations and consultations towards market-based pricing in the wholesale market.¹² The transmission grid, system operator and local distribution lines would remain natural monopolies in any case, potentially subject to "tight regulation" if privatized. The information required for dynamic investment decisions in the transmission grid would be available from the shadow marginal costs, along with comparisons of upstream and distributed generation alternatives.

In this scenario, the basis for a market-based electricity sector at the wholesale level will have been created. There may not be sufficient participants to ensure effective competition in upstream generation initially but potentially, imports, downstream generation and new entrants could enhance the breadth of the market place. Even without private sector participation, there should be incentives in place to ensure that facility operators strive to minimize costs and make the sector self-sustaining financially. While some sceptics might argue that is impossible for a public employee to run an organization efficiently, it should be possible with the appropriate mandate, performance objectives and incentives to

¹² Longer term direct purchase contracts between generators and larger customers who wanted to hedge their input costs would be facilitated in this context. A corresponding financial transmission right for the same quantity would provide a hedge on the implicit transmission differential (see Hogan (2002)).

ensure a reasonable outcome for the benefit of both consumers and taxpayers.

At this point, the final "off ramp" on the road to a market-based system is at hand. Some tough political decisions may be required but the associated costs and benefits would be available for analysis. For example, any remaining explicit or implicit consumer subsidies to ratepayers could be phased out or left as a direct transfer from the central budget. Any difficulties experienced in shedding unnecessary costs of operation (e.g. featherbedding labour, tied purchase contracts for supplies, sloppy billing practices, theft etc.) would reduce the marketability of the assets and the potential asset value. The probable realizations on the privatization of sector asset components would be available and potential purchasers would have a more transparent basis for their offers, including the risk of administrative expropriation through regulation.¹³ The basic choice remaining is one of turning the electricity sector into a self-sustaining part of the national infrastructure making tax contributions or continuing to tax other segments of the economy to cover the shortfalls. The ownership could be government, private or mixed but the marketplace signals and information would be there to form the basis for informed decisions and investments. None of the three stages require extensive tight sector regulation to make the system work effectively if political considerations preclude moving further than any one of the above stages. If any of the assets were in private hands, it might help to improve transparency if there were an explicit dispute settlement mechanism.

STAGE FOUR: REGULATORY GOVERNANCE

A formal regulatory governance system would only be required if a significant portion of the electricity sector facilities were in private hands and even then it might be only light-handed. If negotiated contracts were used to govern most commercial transactions, a dispute settlement mechanism would be required at a minimum but not of necessity a regulatory agency.¹⁴

The system operator requires professional management, technical expertise and computational capacity. Rather than privately owned, it

¹³ It might be argued that the regulatory regime should be in place before privatization so that both consumers and producers would have some assurance that their interests would be protected. Smith (1997) p. 4. Light regulation initially could still provide those assurances and provide an opportunity to acquire more regulatory expertise in a multi-sector regulatory context.

¹⁴ One of the often overlooked advantages of market transactions is their self-regulating nature – the infamous "unseen hand".

might be set up as a not for profit organization with management reporting to a Board of Governors with representatives from among the stakeholders for example. The mandate is essentially technical: managing and scheduling short term system operations; identifying operational constraints in the system; and calculating the shadow prices of those constraints. There should be no net benefit to the system operator associated with any operational decisions to avoid conflict of interest.

The transmission function is also basically technical, serving to maintain and upgrade the grid. Management performance indicators will need to include capital cost minimization (the Averch-Johnson effect associated with traditional tight rate-of-return regulation (Strick, 1994)) to counteract the tendency to recommend quantity and quality capacity building, both in the primary activity and related services such as telecommunications. Transmission represents a small proportion of the final delivered cost but has great potential to capture economies of scope among customers with fluctuating loads. Dynamic investment criteria are provided by the marginal location cost differentials calculated by the system operator and should provide a firm basis for allocating funds for transmission system upgrades and expansion.

The distribution function (wires) is a natural monopoly potentially subject to regulation if privatized. During the transition phases, there is a need to diminish losses (including theft) and other inefficiencies. The potential commercial risk of purchasing power on a wholesale marginal cost (real time) basis for resale at fixed average rates could be largely offset through wheeling contracts for large customers and long term purchase contracts with generators for small customers. Further, as technology evolves and metering costs decline, real-time pricing at the retail level might also prove feasible in both developed and developing economies. Ideally, explicit funding for USO's and mandated customer subsidies would be identified.

If a regulatory requirement is necessary, first consideration should be given to a multi-sector (umbrella agency) for network/infrastructure industries taking account of local factors such as corruption, competition, size of economy, self-regulation, lack of competition and/or contract laws, and weak property rights. Examples of light regulation in the developed world offer insights but any system must be compatible with local circumstances. It is normally easier to add tighter regulation than the reverse. The objective would be to minimize the bureaucratic costs (dead-weight losses) to society associated with tight regulation in developed economies and the *tar baby effect* of regulatory actions building upon previous regulatory decisions (Utton, 1986).

SUMMARY AND CONCLUSION

From the above, it seems apparent that a simple policy prescription to let markets work cannot be effective without many caveats. The transmission grid, system operator and distribution lines are all natural monopolies. While generation and final sales are potentially competitive segments of the electricity network, the markets may lack sufficient breadth to preclude opportunistic behaviour. While some jurisdictions in the developed world are moving towards more market-based electricity sectors, tight regulation is generally used to control the natural monopoly components of the sector with a few notable exceptions. Replicating these regulatory systems in developing countries represents a much higher proportion of the delivered cost of electricity in those economies. Furthermore, the tradition of "arm's length" regulation and the associated human capital expertise are not normally abundant, further increasing the potential costs of following that example.

Five groupings of regulatory regimes were described above to provide context to a discussion of how developing countries might move to make their electricity sector a contributor to economic growth as opposed to a drain on national income. Where necessary conditions prevail, market-based systems provide a largely self-regulating means to deliver goods and services cost efficiently. For a number of reasons, the natural monopoly segments of the electricity sector will likely remain more or less controlled in virtually all developed and developing economies in the world. The tight regulatory model typically employed in some developed countries is not necessarily appropriate to developing countries.

Recognizing these constraints, an alternative path towards a market-based electricity sector for developing economies is portrayed. It envisages a staged approach over several years without an initial commitment to eventually move fully to a market-based system (including marginal location cost pricing), avoiding in the process (hopefully) some of the errors evident in the transitions underway in some developed economies. The process envisaged would not obviate the need to make some difficult political decisions but it would facilitate the estimation of associated costs and benefits through greater transparency. For example, the cost of forcing the sector to use a domestic feedstock such as coal vs. imported fuels would be more evident. The tradeoffs involved in using electricity tariffs as a social welfare measure with the associated free riders as compared to a more targeted delivery mechanism would be easier to identify. The additional transparency associated with segmented operations would help identify and hinder opportunistic behaviour tendencies within the administration. To conclude, most of the cost

efficiency benefits associated with a market-based electricity sector could be introduced in developing economies without an undo regulatory burden. Enhancing the potential use of private capital to maintain and expand the sector infrastructure would free scarce foreign aid resources for other economic development and assistance projects. The process outlined above should also be applicable in other infrastructure areas of the economy with natural monopoly elements such as pipelines, water works, and telecommunications providing economies of scale for a possible umbrella regulatory agency. Lastly, the staged blueprint approach to the process provides considerable flexibility to reflect local circumstances such as the extent of electrification, income levels and income distribution patterns in individual countries.

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