Ghana's Incentive Regulatory Regime; Does it promote investments?

PURC/WP/2022/03

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Executive Summary

Investment in electricity networks, as regulated natural monopolies, is an important regulatory and energy policy priority. Regulators around the world are seeking ways to enhance incentives for electricity utilities to invest, while being cost and productive efficient in their operations. As a result, regulators adopt different incentive mechanisms to ensure that utilities undertake sufficient investment to be efficient in their operations.

This study therefore reviews the common regulatory incentive mechanisms adopted by regulators in a bid to incentivize utilities. Drawing on the economic regulation and incentive regulation literature, the study illustrates the various regulatory incentive approaches used by regulators worldwide, and key attributes for a regulator to consider before implementation.

Along with the reasonable returns provided by rate of return regulations, the study identified five other additional regulatory incentive instruments adopted by regulators to promote investment, incentivize utilities to improve their service quality, and promote cost efficiency. Regulatory incentive plans reviewed in the study include price caps; sliding scale (profit-sharing); menu of sliding scales; rate cases and rate case moratoriums; and benchmarking (yardstick) incentive regulatory mechanisms.

For the PURC, such review allows some tentative suggestions for the design of practical incentive regimes to be developed, taking into account Ghana's peculiar electricity and economic structure. An understanding of such regulatory incentive plans, and how they relate to promoting investments needed in the electricity sector, will also afford the Commission an opportunity to consider designing regimes able to promote the necessary investment in the sector.

Based on findings from the review, the study concluded that more research needs to be done by the PURC on the performance of incentive regulation mechanisms applied to the electricity sector. Any future considerations by the Commission therefore of adopting regulatory incentives, should aim at the gradual development of a rigorous analysis of incentives directly applicable to the challenges and circumstances of the structure of the Ghanaian economy and electricity sector. Additionally, the design and implementation of incentive regulation schemes in Ghana may have to take certain socio-economic and political concerns into consideration.

It is also important to ensure that whatever regulatory incentive portfolio is considered, should be kept as simple as possible and be transparent to limit compliance costs and minimize distortions to incentives for investment. Overall, the best incentive regulation plan will vary according to regulatory goals, institutional and technological factors, the nature of information asymmetry between the Regulator and the regulated distribution utilities, the commitment of both the Regulator and the regulated utilities in adopting innovative approaches of regulation.

It is recommended that the Commission adopts a hybrid approach of combining a cost-plus revenue requirement and performance-based incentive regulation for the provision of quality services coupled with a price cap mechanism on tariffs over a specific period.

1. Introduction

Over the last thirty years several network industries, historically characterized as state-owned, have been privatized, restructured, and undergone some reforms typically involving the vertical separation (ownership or functional) of potentially competitive segments. In Ghana, some of these industry reforms include the telecommunications and energy sectors (electricity, oil and gas), which continue to be subject to price, network access, service quality, and entry regulations.[1] In several countries, an important part of the reform agenda especially in the electricity sector included the introduction of incentive regulation mechanisms for the regulated sectors, as an alternative to the traditional cost-of-service or rate-of-return regulation (which adjusts rates to compensate utilities for costs of capital, labour, and materials in general rate cases).[2]

The traditional rate-of-return regulatory approach was often criticized for its lack of incentives in minimizing costs and tendency to encourage too much investment in capital.[3,4] Therefore, as electricity sectors underwent major reforms, rate-of-return was eventually replaced, or in many cases, balanced with incentive regulation schemes to constrain the market power of utilities and encourage efficiency.[5] The expectation was that incentive regulation mechanisms would provide more powerful incentives for electricity utilities to reduce costs, improve service quality in a cost effective way, stimulate innovation with the introduction of new products and services, and stimulate efficient investment in the pricing of access to network infrastructure services.[6]

Electricity networks are capital intensive. The electricity sector of Ghana is no different requiring network expansion. In recent years, the integration of renewable energy resources, enabling demand side participation and adoption of new technologies such as deployment of smart meters and smart grids has necessitated significant amounts of investments. This has placed the issue of network investment at the heart of recent energy policies and regulations (*see National Energy Policy, Ghana Renewable Energy Master Plan*) in the power sector of Ghana. The objective is to ensure sufficient investment in maintaining and modernizing the grid, while avoiding inefficiency in capital expenditures to help protect end-users against high electricity tariffs.

Investment in electricity networks, are however, not driven by market signals where decisions are based on expected returns being higher than the incurred cost of capital.[7] Instead, electricity network companies respond to the regulatory framework and incentives; government policies and institutional constraints.[8] As a result, regulators adopt various incentive mechanisms to encourage investment in maintaining and modernizing the grid. Consequently, identifying the main drivers of investments can help a regulator (such as PURC) to understand responsiveness of the electricity sector to regulatory incentives; and more effectively tackle the issue of investments using incentive regulation. Moreover, the incentive for utilities to invest depends critically on expectations of the future pricing policy which must be considered by the regulator.[9]

As Ghana's economic regulator of the electricity sector, PURC's chosen regulatory framework is a hybrid methodology that combines cost-plus (rate of return/cost-of-service) revenue requirement principles and a performance-based incentive mechanism (multi-year price-cap) to enable regulated utilities realize approved revenue requirements and to improve quality of service delivery to consumers. The rate of return is used to establish initial prices for access to the network

and then reverts to a price cap regime over the regulatory period. The objective of hybrid schemes is mainly to offset the weaknesses of one regulatory mechanism with some of the strengths of the other. Although hybrid regulatory mechanisms offer the potential for significant improvements in regulatory effectiveness, the literature notes that this approach can increase the complexity of the regulatory scheme.[10] Thus, an assessment must be made of whether the gains and effectiveness of each regulatory framework adopted by the Commission, outweighs the regulatory costs.

2. Objective of Study

While the effectiveness of each type of regulation will vary depending on the circumstances and type of industry, there is a clear preference in the literature for incentive type regulation. This is because of their potential to yield better outcomes in terms of economic efficiency and cost reduction potential, while requiring relatively minimal regulatory effort. Moreover, a regulator has a clear responsibility to ensure a regulatory framework that allows realization of the necessary incentives for investments. Based on a comprehensive review of the economic regulation and regulatory incentives literature, this study

1. assesses the existing regulatory incentive mechanisms, focusing on electricity distribution networks, and how these can encourage investment in Ghana's electricity sector.
2. investigates key factors that drive the amount and direction of investments in electricity distribution networks in Ghana; and
3. identifies key attributes a regulator must consider in developing a regulatory incentive mechanism.

The rest of this study is organized as follows: Section 2 provides an overview of the main drivers of investments in the electricity distribution sector of Ghana. Section 3 reviews existing regulatory incentive mechanisms and their application in the electricity sector while expounding on the need and usefulness for them. Section 4 presents some key attributes and parameters a regulator must consider in developing regulatory incentives for the electricity sector. Section 5 summarizes and concludes the study.

3. Drivers of Investments in the Electricity Distribution Sector of Ghana

The electricity distribution companies in Ghana (ECG, NEDCO and EPCL), are responsible for delivering energy to end users, and required by law to have reliable and available network at all times. These regulations are stipulated under the Electricity Supply and Distribution (Standards of Performance) Regulations, 2008 (L.I 1935), in conformity with the provisions of Electricity Supply and Distribution (Technical and Operational) Rules, 2005 (L.I 1816). The regulations oblige the distribution companies to support and facilitate a market oriented electricity sector through developing and maintaining an economically and technically efficient distribution system. The companies are also required to comply with additional standards such as those related to the environment, security of supply, health and safety, and effective customer service. These mandatory requirements necessitate adequate investment plans to ensure ECG, NEDCO and EPCL to achieve certain regulatory benchmarks and performance targets, and at the same time ensure that all statutory and legal obligations are met.

Aside the use of regulatory incentives, there are several technical and non-technical factors that can potentially drive such investments in the electricity distribution companies. For instance, the number of connected consumers and distribution of load, in a specific area or region, can change (increase) which may require network reinforcement.[11] Thus, an increase in demand for new connections leads to additional investment by electricity distribution companies. At the same time, the load profile of existing customers can change and, overtime, lead to lower or higher demand for electricity.[12] For example, consumers may use more (less) energy efficient equipment or appliance which causes the demand for electricity to decline (rise). Under conditions where the load increases, thereby pushing the grid capacity to its limit, electricity distribution companies need to carry out general reinforcement to enhance network capacity.

Ghana's electricity distribution companies are also responsible for quality of service and reliability of electricity supply at the distribution level. This means that the companies need to reduce progressively the frequency and duration of electricity supply interruptions as well as the number of affected consumers. The networks often experience technical faults which, in worse cases, lead to disruptions in power supply. Thus appropriate investment measures are needed to resolve these faults which may damage consumers' appliances. In this respect, frequent inspection and maintenance of network assets are carried out, to ensure all devices work properly and provide a highly reliable service.

For instance, the commissioning of the Accra Central BSP increased the level of reliability and distribution capacity to meet the growing demand within the ECG network in Accra. This has also resolved the loading constraints on selected 33kV feeders and reduced technical losses within the ECG network in Accra. In a bid to improve voltages in Nsawam and Aburi, ECG has installed a number of Voltage Regulators to improve on reliability and quality of supply. Furthermore, a number of upgrade projects have either been commissioned into service or under construction.[13] The essence of all these interventions is to increase the distribution capacity thereby impacting reliability of supply to consumers. Power supply reliability in NEDCo areas of operation has equally been quite stable, although reliability in some areas of the network has been lower than expected as a result of over aged equipment and overextension of lines resulting in high technical losses. Some level of intervention has been made on some of these lines resulting in improved supply reliability.[14]

Non-technical factors such as extreme weather conditions or proximity of distribution lines to dense vegetation increases the likelihood of power disruption. In such instances, investment is needed to protect the overhead lines against the risk posed by extreme events. Ghana's electricity distribution companies are also required to invest in order to improve safety of the national grid. This, for example, includes horizontal and vertical clearance of overhead lines in accordance with national and international electricity standards, and protection of equipment from theft and vandalism.[15]

Another important driver of investment in electricity distribution companies is distribution losses. System losses for distribution utilities are benchmarked by PURC at 21% (technical and commercial), however, approximately 23% of electrical energy is lost in the distribution system by ECG. Investment in distribution network therefore becomes important in reducing the system

losses to the national benchmark or even lower. Furthermore, distribution companies undertake investments in research and development (R&D) activities and also facilities that support delivery of operational projects such as new buildings, office equipment for which funding is required.

In spite of the numerous investments undertaken within Ghana's electricity distribution network, high levels of distribution losses, limited revenues due to the non-payment of bills, power theft and inadequate tariffs (all with significant financial implications), makes it difficult for the electricity distribution utilities to make significant investments into improving the sector.[16] It is therefore important to determine how the use of regulatory incentives can reverse such challenges and foster more investments within the electricity distribution networks in Ghana. The next section provides more details on this.

4. Incentive Regulation in Electricity Networks

4.1 Incentive Regulation Explained

Incentive regulation, also referred to as performance-based regulation (PBR)[17] has been defined as the use of rewards and penalties to induce a utility to achieve desired goals where the utility is afforded some discretion in achieving goals.[18] Other researchers define incentive regulation as a regulatory mechanism through the implementation of rules including explicit financial incentives, that encourage a regulated utility to achieve desired goals by granting some (but not complete) discretion to that utility.[19] This discretion allows the utility to use innovative means or newly acquired/enhanced knowledge to achieve desired goals, particularly in a rapidly evolving industry.[20] Incentive regulation is distinguished by partial delegation of pricing to the regulated utility and the possibility for the utility to retain profits resulting from cost reductions.[21] It differs from traditional cost-of-service (rate of return) regulation by relying more on explicit financial incentives and by affording more discretion to the regulated utility.[22]

4.2 Why Incentive Regulation

According to regulatory practice in the energy sector, incentive regulation generally provides greater incentives for efficiency and efficient pricing of regulated services, reduces direct costs of regulation due to less frequent rate cases and allows for "win-win" for both consumers and utility (rates down and profits up).[23] These can be realized because incentive regulations are designed to maintain or improve service quality and encourage certain investments such as network modernization or energy efficiency investments. These incentives are provided by allowing a utility to earn more than its target return if the utility delivers superior performance. Thus, there is a risk of earning less than the target return if a utility delivers sub-par performance.[24]

4.3 Regulatory Incentives in the Electricity Sector

Regulatory practice posits that in order to enable electricity distribution companies to maintain their networks, comply with regulation and standards, and provide an acceptable quality of electricity supply, the regulatory framework needs to incentivize "investment sufficiency".[25] Generally, with the traditional approach, a reasonable rate of return on capital is known to be a major incentive for electricity companies to undertake investment. However, empirical research suggests that, this return on capital may not be sufficient to incentivize investment.[26]

Thus along with the reasonable returns provided by rate of return regulations, regulators often adopt additional instruments and incentives to ensure security of electricity supply, incentivize utilities to improve their service quality, and promote cost efficiency. These incentives are normally provided through the following approaches;

4.3.1 Retail Price Index (RPI)-X Price Cap Regulatory Incentives

A number of electricity networks are regulated under an RPI-X price cap regulation. Revenue allowances are fixed in advance for a fixed period (typically five years), with some adjustment during the period for specified variables (such as certain exogenous costs) and for inflation. The initial price levels (price caps) are set by the regulator based on present prices and revenues of the utility. This framework establishes the utility's overall price level by indexing the price level according to inflation minus an offset (improvement or X-factor). If the utility is more efficient than had been assumed at the time when the improvement factor was, it is allowed to retain excess savings as profits. However, if a utility underperforms, it must bear at least part of the associated cost.[27]

Under this type of regulation, the price charged by the utility is regulated rather than the profits. With prices constrained, utilities increase profits by reducing cost or increasing sales.[28] Moreover, the scheme allows for nominal price increases to correct for inflation (RPI) while it obliges utilities to cut price by X percent in order to correct for efficiency increases that are deemed to be feasible. Utilities retain an incentive to cut costs and to produce efficiently because in the short run their behavior has no effect on the prices they are permitted to charge, making them keep any additional profits resulting from reduced costs.[29]

Price cap regulation is however not without implementation challenges. Firstly, regulators must still determine the initial base for rates and select an appropriate cost index which may be prone to accounting manipulation and errors that can be revealed only through auditing.[30] Price caps require periodic regulatory reviews to realign prices with the cost of service and to ensure that price competition is effective.[31] As regards incentives, the profit motive of utilities may result in cost avoidance and degradation of service quality, which is why price-cap is often paired with other incentive regulation mechanisms.

Industrial research and practice has shown that price cap regulation may be more appropriate for industries without substantial investment requirements and where there is excess capacity than, for expanding industries with large investment plans.[32] Empirical evidence on how price caps affect and promote investments has however been inconclusive in the literature. It is worth noting that in an ongoing regulated utility, a pure price cap without any cost-sharing mechanism such as a sliding scale mechanism is not likely to be optimal, given existence of asymmetric information and uncertainty regarding future productivity opportunities.[33]

4.3.2 Sliding Scales (Profit-Sharing) Incentive Regulation

Sliding scales are profit sharing mechanisms that implement explicit sharing of realized earnings (profit) between a regulated utility and its customers. This incentive scheme consists of sharing

rules that determine the allocation of the benefits gained from an investment between the utility and consumers. Before profits are shared however, a price cap is set by the regulator and the utility has the incentive to raise profits by lowering costs of production.[34] If profits rise above an agreed level, customers are awarded a share of the utility's excess earnings, and prices are then adjusted downwards immediately. The regulator allows the utility to keep some portion of the excess earnings it receives and requires the utility to give the rest to customers, through price reductions (lower rates), refunds/direct financial payments, or increased investment.[35] In this way, the level of supernormal profits earned by utilities is restricted. It is worthy of note that benefit and loss sharing mechanisms are normally not symmetric given that utilities are normally protected against the risk of incurring losses over long periods.[36]

A primary purpose of this regulatory mechanism is to align the company (utility) and consumer interests, and to keep the company's earnings at politically and operationally acceptable levels during the plan's commitment period.[37] A system for sharing profits or earnings encourages efficiency and innovation by allowing the utility to apportion both risks and rewards with customers. Profit sharing helps to expand utility service operations, and reduces investment risks.[38] This creates investment incentives, especially in cases where there is a price reduction (due to profits rising above the price cap), which increases consumer demand, leading to more capital investment to meet that demand.[39]

Sliding scales regulation are often employed in combination with *rate freezes, rate case moratoria, or price caps*, and therefore considered a hybrid form of regulation. Its adoption is however complex and can involve sizable changes in the regulatory system. Designing plans that stimulate performance without undue risks and share benefits fairly can also be challenging. Although sliding scales can present some challenges, it preserves the opportunity for regulatory review by the Commission.

4.3.3 Menu of Sliding Scales Regulation

A recent development in regulatory practice is to overcome information asymmetry between the regulator and regulated utilities using a menu of sliding scales. The menu of sliding scales regulation is a hybrid of incentives and rate of return regulation where the utility can choose (on a so-called menu) between different slides which are more incentive based and slides which offer a more stable return on capital invested. Thus, this form of regulation is based on the difference between the allowed capital expenditure target chosen by the utility from the menu and the utility's actual capital expenditures during a 5-year price cap period.

The regulator designs a set of allowed revenues around different sharing factors; the utilities then choose a sharing factor from this menu. The sliding scale menu allows utilities to choose between getting a lower capital expenditure allowance but a higher powered incentive (and a higher expected return on investment) that allows them to retain more of the cost reduction if they can beat the target expenditure levels; or a higher capital expenditure allowance combined with a lower powered sliding scale mechanism and lower expected return.[40] If designed well, utilities will have an incentive to reveal the truth on their estimated costs.

To date, there are few practical applications of a cocktail menu of sliding scale regulation internationally, with the UK being a clear front-runner. In the 2004 review of electricity distribution prices in the UK, the regulator (Ofgem) adopted an innovative "menu' of sliding scale mechanisms approach to resolve the asymmetric information problem faced by the regulator in dealing with utilities' claims with respect to future capital investment requirements to meet reliability targets.[41] Hitherto, the menu of sliding scales is offered to electricity distribution companies in UK to determine future capital expenditure allowances and associated user charges for capital services.

Because the menu of sliding scale regulation is a combination of different sliding scales, it offers the possibility of self-selection for an investment project by a utility depending on the efficiency and risk-averseness of the utility. Thus, a risk-averse utility with limited efficiency may choose a sliding scale with a high percentage of cost covering in case of high unanticipated costs.

Reviewing regulation theories and regulatory practice case studies on menu of sliding scale regulation by the PURC will be useful in developing an understanding of how this innovative regulatory mechanism might be applied. However, given its complex nature and the fact that experience on the application of menu of sliding scale regulation is limited, evidence on the outcomes of the menu system may not yet be comprehensively available in the interim for comparison and effective implementation in the case of Ghana.

4.3.4 Rate Freezes and Rate Case Moratoria

Rate freezes specify that a utility's prices/tariffs cannot change within a defined period of time. Electricity rates/tariffs are kept constant for a fixed and pre-specified period of time. The period between rate reviews is fixed in advance so it can create strong incentives for efficiency improvement and cost reduction.[42] Under a rate freeze, the utility will retain the profits of any efforts to reduce costs for a certain period of time. At the end of the period, the regulator may undertake a price review to adjust the rate. The ability to capture any additional profit during this period gives the firm an incentive to reduce its costs.

Under a rate case moratorium, rate cases designed to systematically increase or decrease rates are not permitted, although some individual rate elements may be changed. This requires an agreement between the regulator and the utility to abstain from general rate increases and to suspend investigations of the firm's earnings, guaranteeing that profits made will not be taken away. A moratorium imposes a regulatory lag and therefore encourages the utility to reduce operating costs because of the possibility of retaining the resulting increase in earnings.

4.3.5 Benchmarking and Yardstick Incentives

Regulators can also attach incentives to measurable performance standards or benchmarks (comparison of some measure of actual performance against a reference or benchmark performance). Utility companies use financial and nonfinancial benchmarks to track performance internally and comparatively. With electricity utilities, performance metrics or benchmarks are usually developed across various aspects of their operations including productivity, service quality,

and reliability; customer service and satisfaction; worker safety; load management; losses and loss management; recovery from outages; and rates charged for services.[43]

Benchmarking allows comparative regulation and seeks to provide an incentive for utilities to strive to lower costs by inducing them to compete for cost reductions.[44] Regulators in countries such as Norway, Netherlands, Australia, UK, Chile, among others, that use benchmarking in regulation require submission of information by the utilities in standardized formats, which are subject to different audit requirements.[45] This helps to eliminate or reduce asymmetric information between the utility and regulator; which becomes important because asymmetric information can significantly lead to alteration of the cost structure (operational and capital expenditures) presented by utilities especially with regards to large-scale investment requirements.[46] Utility benchmarking under incentive regulation therefore helps to promote economic efficiency by reducing the regulated utilities information advantage with capital and operational costs.

A main concern in applying yardstick incentives to electricity utilities is the degree to which the operating environment of the firm in question is compared to its major recent investments.[47] Such comparisons will help a regulator identify the most efficient utilities in the sector relative to performance and the less efficient utilities. A country like Ghana however, has limited number of electricity distribution utilities, which may not satisfy the data requirements of some analytical benchmarking techniques.[48] As a result, cross-country relative analysis can be used to evaluate performance of Ghana's electricity distribution utilities within the larger context of international practice. The methodological and practical approach to be adopted, will therefore require careful consideration bearing in mind the developmental stage of the country. Empirical studies can also be a useful instrument in identifying and shedding light on some of the issues arising from international benchmarking.

5. Attributes of a Well-Designed Incentive Regulation Scheme

Given the regulatory incentive mechanisms discussed above, industry experience from literature suggests that these incentive plans must be designed carefully to achieve their full potential. According to Sappington et al. (2001), incentive regulation is likely to deliver significant benefits to all parties involved if the plan,

(i) is transparent and easy to understand,

(ii) provides proper motivation and scope (in the sense that it induces the utility to consider all aspects of its operations and to focus on factors over which it exercises considerable control,

(iii) carefully balances risks and rewards to achieve operationally and politically acceptable outcomes, and

(iv) instills confidence that all of its terms and conditions remain in effect for the entire commitment period.

These four basic principles of a successful incentive regulation mechanism are explicated in the following sub-sections:

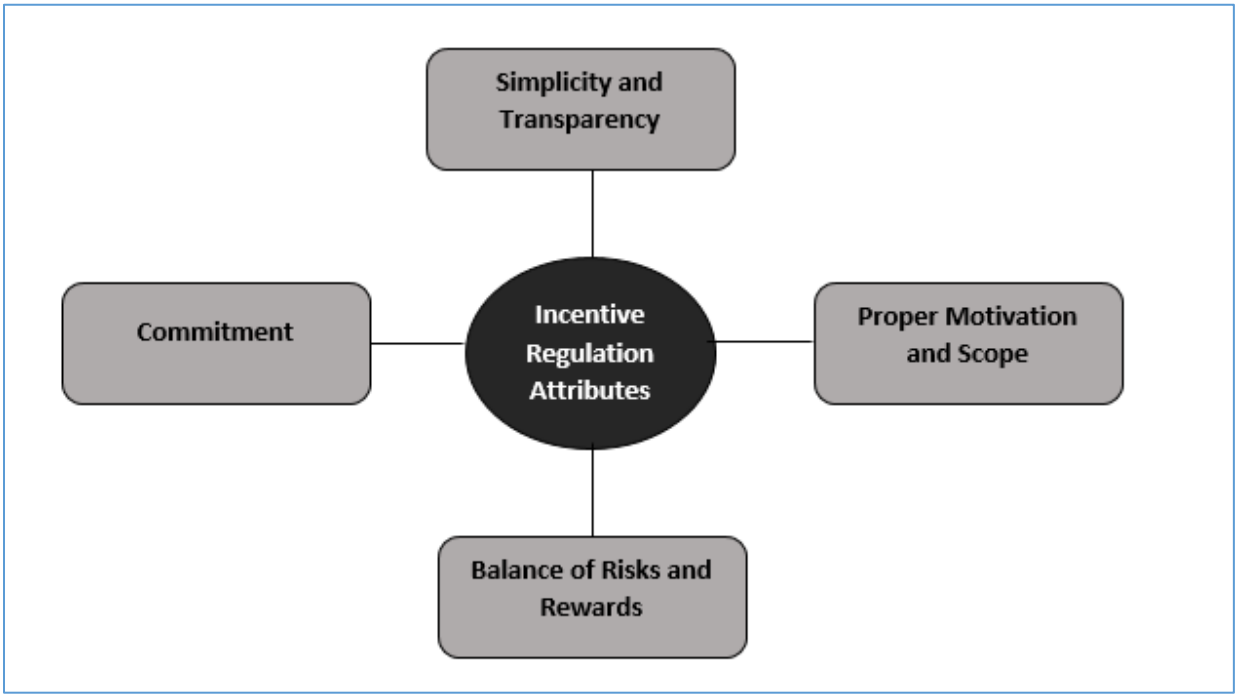
5.1 Simplicity and Transparency

The regulatory mechanism must be simple, transparent enough, and easily understood to elicit public acceptance. This also involves a regulator refraining from ambiguous designs and complex implementation details. Transparency and simplicity will reduce the natural resistance to implement a new regulatory regime, limit the likelihood of contentious disputes (which is particularly difficult to avoid during the initial commitment and revision periods) about implementation details, and mitigate associated administrative burdens.[49]

5.2 Proper Motivation and Scope

As best practice, a regulator must provide or link financial rewards to be consistent with specific dimensions of a utility's performance, over which the utility's management has substantial control. Incentive regulatory plans that base rewards on a utility's overall financial performance offers some advantages over plans that rewards specific limited dimensions of performance. First, incentive plans linked to financial performance helps avoid excessive regulatory micromanagement of the utility's operations. Second, it helps limit excessive utility focus on the specified performance dimensions and insufficient focus on other important dimensions of performance.[50]

Figure 1: ***Attributes of a Well-Designed Incentive Regulation Mechanism***



Source: Researcher's construct based on information from Sappington et al. (2001)

5.3 Balance of Risks and Rewards

A careful balancing of risks and rewards is important to provide the prospect of enhanced benefits for shareholders and customers alike. A regulator should afford a utility the opportunity to recover its costs and earn a return consistent with the risks it faces under the incentive regulatory plan. This is because empirical evidence shows that incentive regulation generally imposes more financial risk on the regulated utility than traditional cost-of-service regulation.[51] Therefore, an

increased opportunity to motivate earning higher returns by the utility is appropriate to mitigate the increased financial risk. However, in incentivizing to deliver superior performance, limits on company earnings are often appropriate to avoid politically and operationally unacceptable outcomes.[52]

5.4 Commitment

A relatively long commitment period and clearly defined commitment terms are essential if an incentive plan is to provide meaningful incentives to improve performance, reduce administrative and regulatory costs, and allow a utility to improve its performance.[53] Therefore, regulatory incentives can only provide meaningful incentives to enhance long-term performance if the utility is confident that promised rewards will be delivered. Generally, the longer the commitment period, the stronger the incentives are to achieve substantial improvements in long-term performance. While very long commitment periods can increase the likelihood of outcomes that are politically or operationally unacceptable (excessive or inadequate earnings), a commitment period of moderate length (e.g. Five years), can provide strong incentives to a utility.[54]

6. Conclusions and Recommendations

Electricity sector regulators are already adapting regulatory incentive mechanisms to incentivize utilities to meet energy-efficiency goals, reduce cost, and achieve specific quality of service outcomes.[55] In practice however, incentive regulation is more of a complement to, than a substitute for traditional approaches (cost-of-service or rate of return regulation) to regulating utilities. Although it presents some challenges in implementation, it has been promoted as a straightforward and superior alternative to the traditional approaches. This is because it is recognized in economic regulation practice that regulators have imperfect and asymmetric information that makes the use of incentive regulatory mechanisms useful in reducing or mitigating them.

Price cap mechanisms are the most popular form of incentive regulation, and has been adopted as the preferred model for utility regulation in a growing number of developing countries.[56] This is mainly because it has been heavily touted as the simple alternative to cost-of-service regulation.[57] Incentive regulation theory implies that adverse selection and moral hazard problems (asymmetric information) resulting from the regulators' information disadvantages are best resolved by offering utilities a menu of sliding scale incentive contracts.

Although both sliding scale and menu system is rare, its implementation offers significant advantage in terms of resolving information asymmetry over other incentive schemes. Benchmarking allows comparative regulation and seeks to provide an incentive for utilities to strive to lower costs by inducing them to compete for cost reductions. The usefulness of performance benchmarking however depends entirely on the development of valid and reliable measures of industry-specific and generally accepted indicators, so that comparisons can be meaningful. Moreover, benchmarking is mostly practiced in countries with well-developed upstream competition, spot market, and a high degree of market liberalization.[58]

As a Commission, more research needs to be done on the performance of incentive regulation mechanisms applied to the electricity sector. Any future considerations by the Commission of

adopting regulatory incentives however, should aim at the gradual development of a rigorous analysis of incentives directly applicable to the challenges and circumstances of the structure of the Ghanaian economy and electricity sector. In addition, the design and implementation of incentive regulation schemes in Ghana may have to take certain socio-economic and political concerns into consideration.

Technological improvements and changes within the electricity sector and within the Commission will also be important for the application of incentive regulatory mechanisms. Such improvements will create the scope for efficiency gains and effective monitoring of any applicable regulatory incentive mechanism. It is also important for the Commission to be aware of the dynamics of regulation, especially in determining whether applying a certain incentive regulatory scheme is timely. This is because apart from determining the appropriate regulatory mechanism, timing factors may influence the applicability and effectiveness of a particular regulatory incentive mechanism.

It is also important to ensure that whatever regulatory incentive portfolio is considered, it must be kept as simple as possible and be transparent to limit compliance costs and minimize distortions to incentives for investment. Currently, the Commission adopts a hybrid approach of combining a cost-plus revenue requirement and performance-based incentive regulation. The adoption of this mechanism is to enable the regulated utilities achieve their revenue requirement and to assist the utilities to improve on quality of service delivery. This approach is blended with a price cap on tariffs over a specific regulatory period. This approach although recommended for the Commission, it must be seen to be in tandem with the regulatory period. This will allow for the utilities to plan properly and to make the process more credible and transparent. The adopted mechanism must also be made simple enough for ease of use.

Overall, the best incentive regulation plan will vary according to regulatory goals, institutional and technological factors, the nature of information asymmetry between the Commission and regulated utility, and the commitment abilities of both the regulator and utility in adopting innovative approaches of regulation.

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