HYDRO-QUÉBEC - TELECOMMUNICATIONS INFRASTRUCTURE VALUATION PROJECT - PREPARED BY META GROUP EIS CONSULTING - FINAL REPORT

Hydro-Quebec
Telecommunications Infrastructure Valuation Project
Prepared by META Group EIS Consulting
Final Report

I. Introduction

META Group Energy Information Strategies Service-Consulting (EIS-C) was hired by Hydro-Quebec (H-Q) under Letter Agreement dated March 24, 2000 to perform certain services. EIS-C was tasked by H-Q to validate the methodology and pricing approach that Hydro-Quebec used to determine the value of the telecommunications system and charges to their internal customers.

H-Q faces its first regulatory hearing on a number of issues. One of the numerous issues that H-Q will seek regulatory approval of is the price that the Transport Division will pay for telecommunications services. H-Q does not have historic cost information for each discrete function and service that would serve as the basis for internal pricing. Thus it had to develop a pricing methodology as well as establishing valuation of the functions and services.

In preparation of this effort, H-Q staff developed a pricing structure based on quantifiable value of comparable telecommunications services. Although H-Q can only recover for the cost of service charged to Transport, quantifiable "comparable" value is seen as a basis to evaluate the reasonableness of the cost of service. To determine the annualized value, all telecommunications functions and services were valued based on comparable, competitive pricing in the telecommunications marketplace. Non-quantifiable benefits for which a value could not be assigned were identified as well. The annualized quantifiable "comparable" value was judged against the annualized cost of the telecommunications service. This relationship was applied to the discrete

value for each function and service to assign cost to be charged for that service to internal customers. Thus the price paid by Transport is based on quantifiable "comparable" value with cost derived and limiting the total recovery.

II. Summary of Findings

The approach used by H-Q to value and price internal telecommunications services is reasonable and justifiable based on widely accepted regulatory practices. The basis for determining the prices charged to internal customers sends the correct price signals and reflects acceptable regulatory objectives and policies.

Based on assignment and allocation of communications assets and costs, the figures as of June 5, 2000 reflect an annualized network cost of $196.5 million and the quantifiable "comparable" market value has been determined to be $167 million. These findings identify an annualized "comparable" value of the telecommunications system that is less than the annualized cost. As will be addressed below, the quantifiable "comparable" value method fails to capture significant value in the H-Q communications network that cannot be obtained from tariffed services offered by competitive telecommunications providers. It is conceivable and likely that a reproduction value for example would demonstrate value above costs. Even though the "comparable" value is less than cost, there are still justifiable reasons—based on sound regulatory principles—for charging cost over "comparable" value to internal customers. Note in particular the discussion about "uneconomic bypass" below—the very reason most utilities originally built their own communications systems.

The issue in the valuation approached used by H-Q of most concern is the application of the rural "surcharge" to the entire system. The basis for the 40% rural and 23% higher rural cost may be challenged. It may also be argued that the rural surcharge adequately "covers" at least some of the number of significant non-quantifiable valuation elements noted below in the Valuation Approach. The assumptions made in the valuation approach may be subject to challenge. If the rural surcharge or other

assumptions are successfully challenged, the relationship between value and cost may change. However, as noted above, there are valid and justifiable rationales for charging more than "comparable" value for key communications services and functions.

III. Scope of the Review

As part of this analysis, EIS-C reviewed the methodology and approach to valuation and internal pricing. EIS-C reviewed the documentation supporting the methodology and approach and source documents used in the valuation and pricing. EIS-C also reviewed internal materials that may be used to support H-Q's filing with the regulators. EIS-C conducted an on-site review of the approach and supporting materials with H-Q personnel and conducted a follow-up on-site review of the preliminary report.

EIS-C has not performed an audit or sampling of the numbers or performed any cross checking of entries nor has EIS-C evaluated allocation and assignment of costs and assets. EIS-C has not independently verified whether actual costs for discrete functions and services could be established. Further, EIS-C has not independently validated the external pricing materials that were used to develop the fair market valuation that is the basis for the reasonableness determination and for internal pricing. Finally, since this is the first regulatory hearing that H-Q will face, EIS-C has not independently researched the regulatory policies that H-Q will face in hearing before the regulatory commission, rather EIS-C has relied on generally accepted regulatory practices and policies.

A.

Rate Setting Policy (see also Section VII. Other Regulatory Issues below)

A. Recovery and Reasonableness

Utilities are given an opportunity to recover for investments in assets and for costs incurred that are necessary to provide service. This "social contract" provides further that any change in regulation that disallows recovery of the investment or cost incurred under an earlier regulation may constitute a "taking" which is contrary to public policy if not illegal. For example, if investments and costs originally incurred by a utility are rendered "uneconomic" through a change in technology or policy, the utility is entitled to recover those original costs.

As a general principle, regulators attempt to determine that the costs paid by regulated utilities are reasonable and prudently incurred. Generally, the basis for making the reasonableness determination is the cost of service and the prudency decision is based on whether the decision was reasonable when made. However, when the exact cost cannot be determined, alternative valuation methods will be employed. These alternative valuations may include determining the cost of comparable or fair market value of functions and services, determining the replacement or reproduction value with any appropriate offset, or determining the capitalized earnings/income stream of the service. H-Q has adopted the comparable/fair market value approach to demonstrate reasonableness. The relative strengths and weaknesses of the various methods are discussed below.

A. Cost-Based/Cost Causation

Regulators also seek to ensure that costs are assigned to the cost causer. The ultimate objective is to have fully allocated cost for each discrete regulated service and product assigned to the consumer. As with reasonableness, when discrete actual costs cannot be allocated to a discrete customer, regulators will look to alternative mechanisms to reflect cost causation and send the correct price signals. Methods used to determine

and allocate costs appropriately can be derived on any reasonable basis. H-Q has adopted a fair market value-based, cost derived pricing methodology.

B. Incentive/Performance Based Regulation

Traditional rate cases are based on cost of service regulation. However, new forms of regulation are being designed by regulators to apply to monopoly services or functions. The new forms of regulation are incentives-based and performance-based. The difference between the two approaches is how pervasive the performance objectives are; the less pervasive is generally considered incentive-based, while the more pervasive is considered performance-based. (In the U.S., for example, the trend is toward more pervasive or performance-based regulation.) Under either approach, the utility is allowed to earn more if it meets the performance metrics to be penalized if they are not met. These forms of regulation pertain more directly to investor-owned utilities; however, attempts are being made to apply them to government-owned and consumer-owned utilities as well.

In its regulatory case, Transport Division may be subject to arguments that incentive/performance regulation should be applied. If the form of regulation becomes an issue for Transport Division and performance metrics are considered, it will provide an opportunity for H-Q to demonstrate the productivity and efficiency gains and service improvement that the telecommunications system provides. Further it will provide a basis to demonstrate the value of future investments and enhancements to meet performance objectives.

C.

Open Access

H-Q sells electricity to utilities in the U.S. To do so, it must obtain transmission access over other utilities' transmission systems. If the Quebec electricity market is opened to competition in the future, other utilities will seek access over H-Q's transmission system. If or when this occurs, the information and communications technologies needed to accommodate open access will become even more important and contribute additional value to the Transport Division. This also may require additional investments in communications and control technologies.

V. Description of Methodology for Valuation

A. Approach

The telecommunications system was disaggregated into known market elements (elements that could be purchased on the open market), including:

A. Local loop
B. Distance (line of sight)
C. Conditioning applied
D. Modem
E. Continuous power supply
F. Protection against power surges
G. Bandwidth—Packet Switched Network

These market elements can be purchased through Bell Canada, Quebec Telecommunications, or Telebec. The purchase amounts were based on price sheets and informal bids for service

A. Local loops priced from $22 – 100 per—valued conservatively at $25
(took $25, broke down circuit, each end of the local loop)

B. Distance (less than 10km $0)—based on published mileage bands by type and nature—digital—of circuit
C. Quality priced at C2, Bell Canada had an old C4 priced quality, but will no longer guarantee anything greater than C2
D. Modem for analog circuits, priced as if renting
E. For sites needing continuous power option—ULO48 (DC converter)
F. Ground voltage (teleline equipment?)—tower on the mountain, substation in a valley
G. Line speed—packet switch network assuming a 25% utilization (11 hours x 21 days/month)

Other elements that could not be purchased through a provider, but that may be dealt with through exception valuation, include:

A. Out of the way site—could use actual distance versus line of site or apply a rural "surcharge"—23% more costly to build rural x 40% of system rural = 9.2% surcharge/adjustment factor system-wide is in the valuation
B. Outage recovery mission critical—based on O&M charges--$950k/year 1998 actual—estimated $1.1m/year estimated failure rate is in the valuation
C. Diversity in technology—cost to manage fiber, MW and power line carrier system—MW is double the price of a circuit due to 2 different leads—use reproduction/replacement costs
D. Specific routing to accommodate geology—use reproduction costs
E. Diversity of routing—fiber versus microwave—different band lengths—use reproduction/replacement costs
F. Power supply, site specific—batteries, diesel genset—use reproduction/replacement costs
G. Maintenance time on network—need to conduct one year O&M in 4 months—overspec, inventory, workforce issues—use actual experience from electricity if possible

H. Specific equipment—digital/analog converters (8 millisecond response)—use reproduction/replacement costs

I. C2+ superior conditioning >9600 baud rate up to 56k

J. Power line carrier pricing—need foreign pricing—not feasible for any entity except a utility—use reproduction/replacement costs

The total value of the telecommunications that has been quantified to date is $167m+++ (the +++ refers to those non-quantifiable elements of the system that provide value to the system and if quantifiable would increase fair market value significantly above $167 million). Items 1 and 2 are included in the valuation. Items 3, 4, 5, 6, 8, and 10 are items that cannot be directly quantified using comparable values for telecommunications services. However, they are candidates to be valued by exception using reproduction or replacement value (for items 3, 4, 5, 6, and 8). Examples of these items could be quantified as examples demonstrating the value to reproduce or replace the function or service compared to simple telecommunications pricing. Such valuation would not be specifically added to the $167 million valuation, but would be used as examples of the +++ demonstration that $167 million is an understated fair market value. Only items 7 and 9 are not candidates for direct valuation or exception/example valuation. These items deal with unique maintenance issues that may be quantifiable based on similar electric system experience and superior conditioning for which it may be possible to use the C4 pricing differential compared to C2 as a surrogate.

As of the time of the on-site review, the annualized cost of the communications system is $196.5 million. Thus the annualized cost of the telecommunications system, based on preliminary figures, is larger than the annualized quantifiable "comparable" value of the system. This serves as the basis for evaluating the reasonableness of the valuation approach and for the fairness of value-based, cost derived pricing to internal customers.

B. Documentation

As part of the on-site review, EIS-C relied on H-Q created charts/calculations used to derive Embedded Costs (EC) and Quantifiable "Comparable" or Fair Market Value (FMV). These included:

1. Etat de la Facturation (Cost Table)

This table includes billable circuits with customer, client name, number of circuits and costs. These are then allocated between TD and RE, through the Year 2000. Through the Year 2000, the TD and RE allocated costs are not equally allocated. In the Year 2001, projected forward, the costs are not allocated between TD and RE. The backbone circuits are in "red" and have been spread across the other billable circuits.

2. Tableau sommaire de facturation selon la juste valeur marchande

This summary table accounts for the costs of the circuits according to the quantifiable "comparable" value. This table is organized the same as the actual cost table referred to in #3.

3. Tableau sommaire de facturation selon la juste valeur coutant

This detailed table accounts for the costs of the circuits according to the actual costs. The numbers on this table, dated "janvier 2000", are projected for the year 2001. It is important to note that the circuits numbers are billable circuits only: 15K. There are approximately 3K infrastructure circuits. At the top of the table are costs for "criteres comparables au marche" (comparable criteria on the market): local loop, distance, conditioning speed, modem, continuous power supply, protection against power surges, bandwidth (only for packet switched networks and is a function of packets sent over time: it is a shared resource). The second category listed at the top of the table is the elements unique to HQ. The first four elements have costs derived for them: out of the way site, outage recovery, diversity of routing, superior conditioning. The remaining six elements in gray do not have costs derived for them and require special attention re.

costing methodology: diversity of technology, power supply (site specific), maintenance time on network, HQ specific equipment, HQ specific technology, specific routing.

4. Tableau Global: Facturation Couts Actual

This table is a full inventory of the actual circuits and their costs. This number is higher than the circuit number on the other tables because of the inclusion of the backbone circuits, based upon a weighted average. It is analogous to double counting, although not exactly identical. The backbone circuits are listed in the bottom right hand corner in "red".

5. Bell Canada and Communications Price Lists

H-Q staff has compiled and maintains price lists and price schedules for different services and products offered by competitive telecommunications companies. These price documents were used to determine the quantifiable "comparable" value for similar services and products for those elements of H-Q telecommunications service that are "comparable." For a number of services identified by H-Q that cannot be priced based on competitive price lists, the competitive service providers reportedly will construct the facilities, charge the construction costs to the consumer and bill for ongoing service.

6. Valuation Data Base/ Geographic Information Systems/Geo-Data Base

H-Q staff has developed a comprehensive database of all discrete telecommunications function and service elements with quantifiable "comparable" market value pricing and the value-based, cost-derived pricing calculation. This database can identify facilities by longitude and latitude where such is important for pricing determinations, such as the percentage of rural-based facilities. H-Q has a geographic information system that will allow for more sophisticated queries into facilities at different locations where such may be necessary to demonstrate reproduction or replacement valuation examples for non-quantifiable elements.

VI. Value-Based Approaches

A. Valuation Approaches

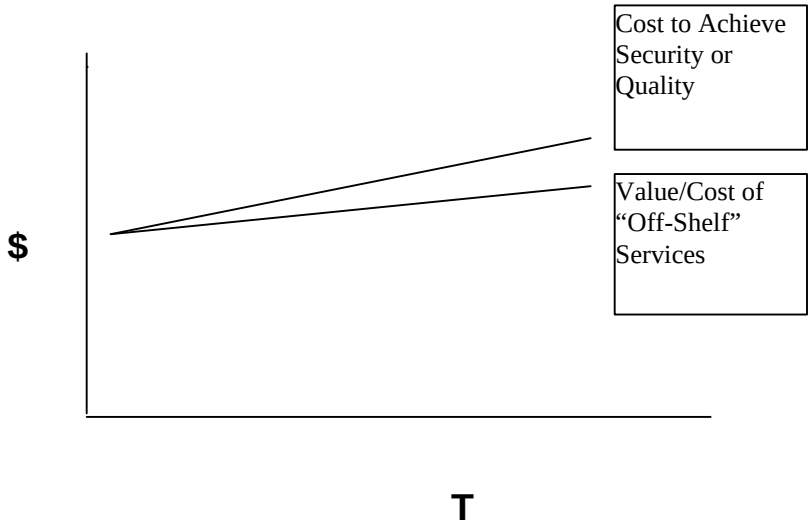
There are three methods typically used to determine fair market value of services. The three methods are based on comparables, capitalized earnings/income, and reproduction (exact duplicate)/replacement (equal desirability). Each of these methods has particular strengths and weaknesses. In appropriate circumstances, it is acceptable to use elements of each approach where the assets can be treated discretely.

Where true comparables are available, comparability is the most favored and widely used method. However, it is difficult to assign a value to elements of the service or product for which true comparability does not exist—note the case of "uneconomic bypass." Capitalized earnings or income valuation is appropriate where there is an income stream that is known and measurable, as in the case of a business or other income producing property. When there is no historic or projected market-based income stream, the method has little applicability.

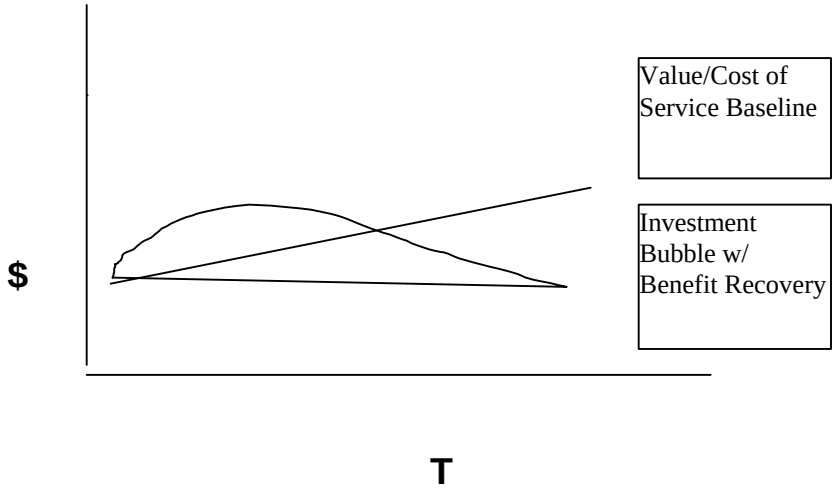
Reproduction or replacement valuation is the preferred approach when the comparable or capitalized income methods are not appropriate. Under these approaches the objective is to capture the value of the asset through determining the cost of an exact duplicate (reproduction) or an alternative property of equal desirability (replacement). Typically reproduction value will be offset by depreciation to account for age or functional diminution of the asset. This is a common method used to value utility owned dark fiber when being transferred to an affiliate or sold outright. In regulatory proceedings, replacement value is often used interchangeably with reproduction value and depreciation offset is often applied. However, replacement valuation is a different concept and is applied where the asset cannot be replicated. Since replacement will utilize assets of a different nature or technology, the depreciation offset applied to reproduction would not universally apply to replacement value.

B. Telecommunications Value/Productivity Curves

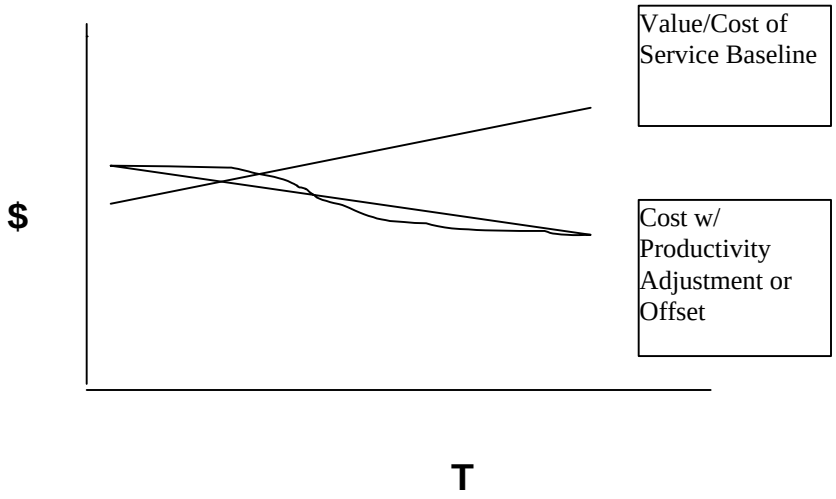
There are three basic rationales for paying more for services than fair market value of supposedly comparable services. The first rationale is **"uneconomic bypass"**—this means that you will pay more (whether buying or building) for service than it would other wise cost because you need service quality that traditional providers cannot meet. For communication services, typically the need is for higher quality and security. This is why banks and utilities historically built microwave communications systems that provided hyper security and quality for operational purposes. This relationship is represented by the following curve:



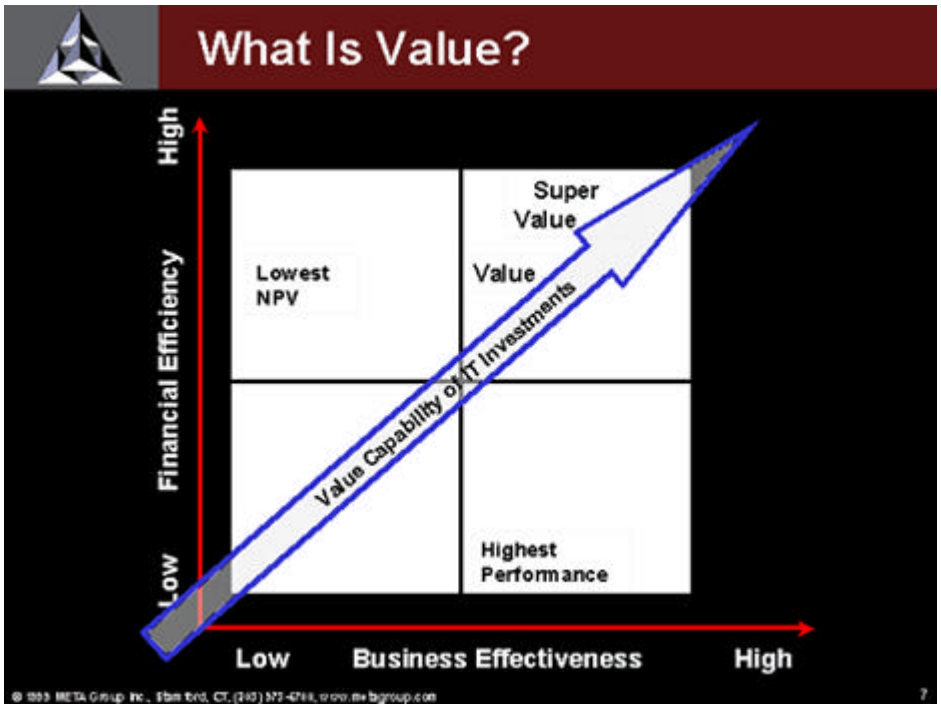
The second rationale is the **"investment bubble**"—this means that when the company makes an upfront capital investment, the bubble, it will expect to recapture those additional investment costs over time through lower operation cost. This investment justification is typically used when making investments in infrastructure and technologies that will pay back benefits over time. This is also used when a capital investment is made by the company as opposed to when the company leases services that would represent the straight-line cost (escalating) over time. This relationship is represented by the following curve:



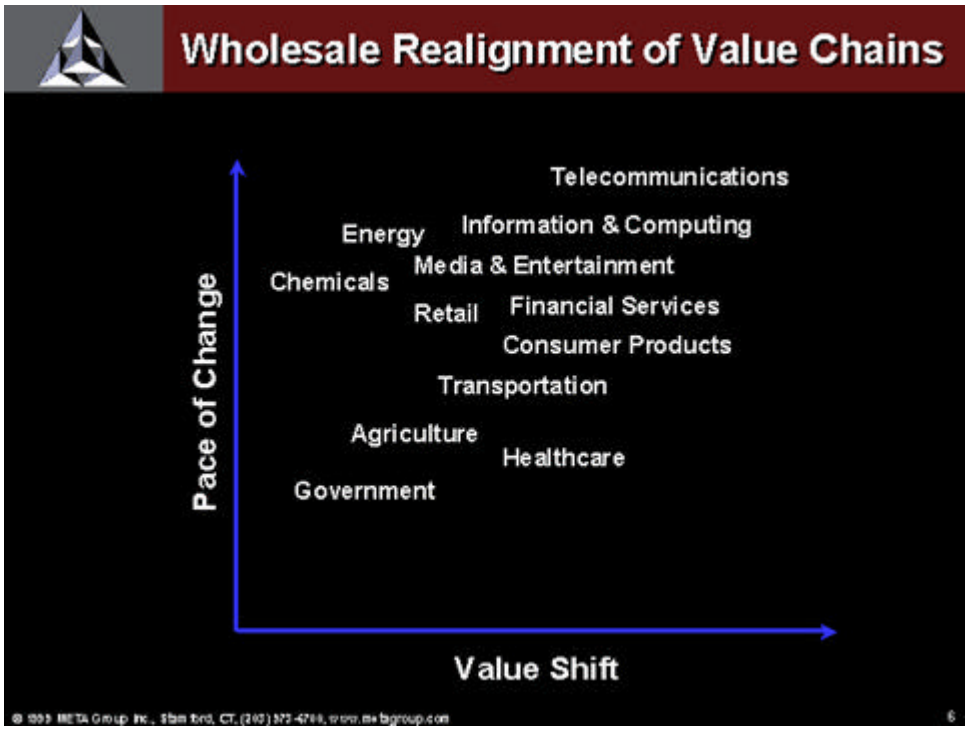
The third rational is the **"productivity offset"**—this means that the company will pay more for services (whether purchased or built) originally than market value/cost of the service but is realizing productivity gains that increase the payback over time. This is a traditional regulatory adjustment to offset additional costs of purchased services and products—offsetting against increasing costs/value of business. This relationship is represented by the following curves:



In addition to these three rationales, attached below are two additional representational curves that demonstrate value propositions in META Group's estimation relating to financial efficiency and business effectiveness of information technology investments—this shows the value IT investments adds to the enterprise:



And the value proposition and pace of change in telecommunications services relative to other industries—this relationship demonstrates how quickly the value of communications is changing:



VII. Other Regulatory Issues

As part of this review, H-Q's theory of its regulatory case has not been disclosed. The only clear direction was that the basis of recovery would be at cost. A number of additional regulatory issues are emerging and may become issues in future regulatory proceedings, including:

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A. Transfer Pricing
B. Cost Allocations
C. Separation of Function
D. Affiliate Transactions
E. Regulation of Function

VIII. Items to Defend Against

In this initial regulatory filing and in future filings, H-Q will need to protect against the potential impacts of different regulatory actions. The types of issues that may emerge and which can affect H-Q's pricing include:

A. External Pricing Limitations
B. "Most Favored Nations" Requirements
C. Economic Obsolescence—Driving Down FMV—Substitution
D. Technical Obsolescence—Driving Up Cost
E. Reexamination of Original Cost