

Utilities Make Money Owning Assets, Not Selling the Energy You Buy

Q3 2021 – Volume 1 - Issue 1

Surprise! BC Hydro Does not Make Money Selling Electricity, and Neither Does FortisBC Selling Natural Gas

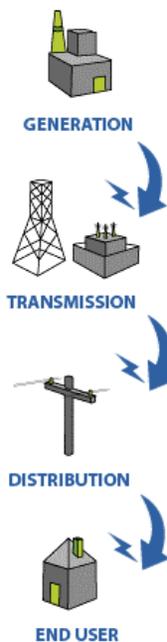
How is this possible? You diligently pay your utility bill(s) each month and your costs are tied to the quantity of electricity and/or natural gas sold to you.

Counter intuitive as it sounds, utility profits are determined based on the value of the assets they own, not the price of the commodity they deliver¹. *Selling the commodity (e.g., electricity, natural gas, or district heat) is how utilities collect money from you, but owning assets determines how much profit a utility makes!*

Natural Monopolies

Utility companies, such as those who provide electricity, natural gas, and district heat in British Columbia, maintain infrastructure monopolies for these essential public services because these utilities have “natural monopolies”. Natural monopolies exist because it makes economic (and common) sense to have only one service provider in a geographic area to avoid asset duplication. For example, imagine the unnecessary cost and “eye sore” of having multiple separate sets of power lines running down your street to provide electricity to you and your neighbours with different utility providers.

To ensure a monopoly utility does not take unfair advantage of its privileged position as the sole



supplier of an essential service and overcharge for their services, utilities monopolies are subject to regulation and oversight by a utilities commission² whose role is to protect customers by acting as a proxy for the competitive marketplace. In a competitive marketplace consumers have choice and can switch away from service providers that act inappropriately. For example, although food is essential, if a grocery store raises its prices inappropriately, you can go down the street to another grocery store or shop online.

Did You Know?

60% of Canada’s and 91% of BC’s electricity generation is hydroelectric generation. Acting as Canada’s most important renewable energy source, Canada was the third-largest producer of hydroelectricity in the world in 2018.



Sources:

<https://www.nrcan.gc.ca/science-data/data-analysis/energy-data-analysis/energy-facts/20061>

[https://www.cer-rec.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-british-columbia.html#:~:text=In%202018%2C%20B.C.%20generated%2074.2%20terawatt%20hours%20\(TW.&text=BC%20Hydro%20generates%20most%20of,is%20produced%20from%20hydroelectric%20sources](https://www.cer-rec.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-british-columbia.html#:~:text=In%202018%2C%20B.C.%20generated%2074.2%20terawatt%20hours%20(TW.&text=BC%20Hydro%20generates%20most%20of,is%20produced%20from%20hydroelectric%20sources)

Consequently, as part of utility regulation, utilities do not derive profit from the underlying market price of the commodity, but rather from the total value of the assets they own, called Rate Base. For example, typical

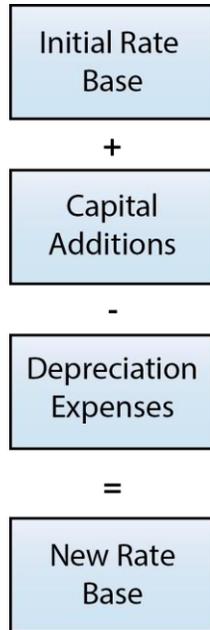
¹ For brevity, RCIA acknowledges it is making generalizations & simplifications, but these simplifications do not alter basic regulated utility principles.

² Or Utilities Board or other similar name as they are called in other jurisdictions.

assets in an electrical utility’s Rate Base include transmission lines, distribution lines, substations, buildings, rolling stock (e.g., trucks), generation facilities (e.g., hydroelectric dams) etc.

What Is the Rate Base?

A utility’s rate base is the sum of the value of all the assets a utility owns, and asset values are determined by asset investments (i.e., initial cost and capital additions) and asset depreciation (i.e., reduction in asset value as it ages). Consequently, the larger the rate base, the larger the utility profits are because profits are calculated as a percentage of rate base³.



Asset Investments

Rate Base additions occur when a utility either builds a new asset or upgrades/refurbishes an old one to return the asset to “as new” or improved condition.

So, How Does Rate Base Relate to My Utility Bill?

By now you might be asking yourself the question, so if Rate Base determines utility profits, how does all this relate to my utility bill? After all, you care most about your utility bill, not a utility’s rate base or profits.

The answer: Revenue Requirement and the Quantity of Energy Sold.

In an over-simplified form⁴, the price of energy (e.g., electricity, natural gas, or district heat) is determined by the formula:

$$\text{Energy Price} = \frac{\text{Revenue Requirement}}{\text{Total Quantity of Energy Sold}}$$

The Total Quantity of Energy Sold by a utility is easily understandable because it is the sum of all energy sold by a utility.

The Revenue Requirement is a little more complicated and requires further discussion, but in essence Revenue Requirement is the amount of money the utility is entitled to collect from its customers. Revenue Requirement is the sum of:

- 1) Flow Through Costs
- 2) Depreciation
- 3) Utility Profit

Flow-through Costs

Flow-through costs can be thought of as costs “flowed (or passed) through” to the customer without mark-up by the utility. Some examples of these costs include annual operating and maintenance costs, cost of fuel (e.g., natural gas on the open market), insurance costs, interest on debt and applicable property and income taxes.

In the following illustrative example, if the utilities costs are as follows, the utility’s customers will pay \$2,000,000 / year in flow through costs:

O&M Costs	\$ 1,350,000 / year
Fuel Costs	\$ 450,000 / year
Taxes and Interest	\$ 200,000 / year
Total:	\$ 2,000,000 / year

³ For brevity, RCIA acknowledges it is making generalizations & simplifications, but these simplifications do not alter basic regulated utility principles.

⁴ RCIA acknowledges that the actual price a consumer pays is a combination of fixed infrastructure and variable infrastructure charges, but in overly broad strokes the energy price is determined by revenue requirement and quantity of energy sold.

Depreciation

As assets age they deteriorate, and the reduction in asset value due to deterioration is called depreciation, and it is a cost the utility is entitled to recover from its customers.

Utilities often estimate depreciation on Straight-Line basis where the asset has full value when it is brand new, and zero value when it reaches its expected end of life (even though in reality the asset may be functional beyond its expected end of life)⁵.

To visualize straight-line depreciation, Figure 1 shows two utility assets with the same initial asset value (\$100M) but depreciating at different rates over time to a value of \$0 at the end of their expected useful lives. Not surprisingly, a dam depreciates (\$1.7M/yr.) more slowly than telecom equipment (\$6.67M/yr.).

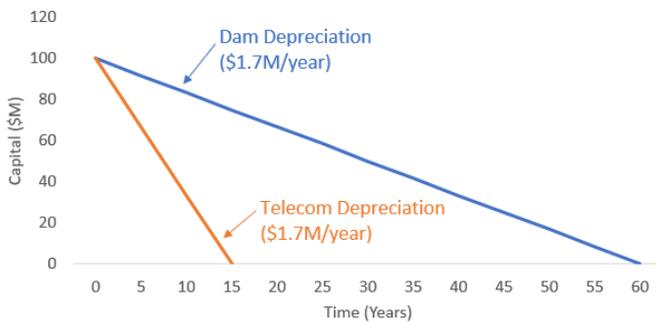


Figure 1: depreciating assets at different rates

The Depreciation expense that is recovered from utility customers is the reduction in asset value from year to year (e.g., \$1.7M/year for the dam example above).

Profits

Utilities are entitled to earn a fair profit on the equity the utility invests in its capital assets. Regulators set equity returns using fairness criteria that balances the interests of both the utility and the public it serves.



Figure 2 shows an illustrative example of the annual utility profit from the dam in Figure 1 assuming a 10%

return on equity (i.e., profit on equity) and a 70%/30% debt/equity ratio⁶.

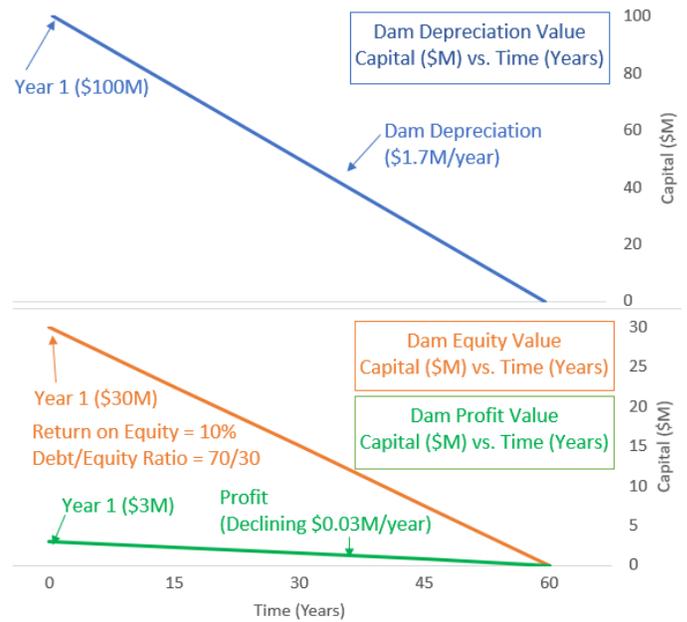


Figure 2: annual utility profit of a dam. 10% return on equity, 70/30 debt/equity ratio

So, what you see is that as Rate Base (e.g., Undepreciated Dam Asset Value) decreases, utility profits correspondingly decrease as well because profits are a percentage (e.g., 10%) of equity value.

Pulling It All Together

So, since the utility price of electricity is set not by the competitive marketplace but, according to the formula:

$$\text{Energy Price} = \frac{\text{Revenue Requirement}}{\text{Total Quantity of Energy Sold}}$$

Our illustrative utility would have an energy price of \$0.12/kWh assuming 100,000,000 kWh of electricity is sold to customers.

⁵ When calculating depreciation, it is assumed that regular maintenance and periodic refurbishment is conducted throughout the asset's life.

⁶ It is common in North America to see a debt/equity ratio of about (60%-70%) / (30%-40%) for major utilities.

$$\begin{array}{|c|} \hline \$0.12 \text{ per} \\ \hline \text{kWh} \\ \hline \end{array} = \frac{\begin{array}{|c|} \hline \$12 \text{ Million} \\ \hline \end{array}}{\begin{array}{|c|} \hline 100,000,000 \text{ kWh} \\ \hline \end{array}}$$

RCIA's Role

The RCIA's role in the rate setting process is ensuring that the Revenue Requirement (i.e., Flow Through Costs, Depreciation, Profits) and Quantity of Energy attributed to residential consumers is fair. Specifically, RCIA ensures that utilities do not invest and spend unnecessarily (thus keeping Revenue Requirement down), and that cost allocations between different ratepayer classes are fair (e.g., the Total Energy Sold to residential ratepayers is correctly allocated).

Feedback?

Since this is our first newsletter, we are trying to gauge the topics and level of detail our readers want and need. Please provide any feedback you have at:

info@residentialintervener.com

Main Author

Matthew Matusiak

Mr. Matusiak is an electrical engineer-in-training with experience working in the nuclear and energy industries since 2019. Mr. Matusiak has participated in a variety of construction management and electrical design activities during this time, and is continuing to develop proficiencies in project management, stakeholder engagement and strategic planning.

