WATERPOWER CANADA

Media Primer

The True Value of Hydropower

February 2026

Executive Summary

Public clean energy debates are often shaped by cost tools that were not designed to evaluate long-term system performance. The most common metric used to compare energy technologies, the Levelized Cost of Energy (LCOE), measures how much it costs to produce a unit of electricity from a single project. LCOE does not reflect how electricity systems actually operate over time.

It does not capture:

- whether electricity is available during peak demand
- how long assets last
- how often infrastructure must be rebuilt
- or the cost of maintaining system reliability over decades

As a result, long-lived and reliable resources like hydropower often appear more expensive than they truly are, while short-lived and intermittent resources can appear cheaper than they really are.

The *True Value of Hydropower* report shows that when electricity planning is evaluated on a system-wide and long-term basis, hydropower is not expensive; it is one of the most cost-effective and reliable clean energy resources available.

What is LCOE and Why Does It Fall Short?

LCOE is a simplified calculation that divides the total cost of building and operating a project by the total electricity it produces.

It answers one narrow question: How much does this project cost per megawatt-hour?

But it does not answer:

- Will this electricity be available when demand is highest?
- How long will this asset last?
- What happens when it reaches the end of its life?
- How much backup capacity is required?

In real electricity systems, not all megawatt-hours are equal. Some resources can be relied upon during peak demand, while others cannot. Some assets last 80–100 years. Others last 20–30 years. Yet LCOE treats them as equivalent.

The Missing Pieces: What LCOE Ignores

1. Capacity value (reliability)
Capacity value measures whether a resource can deliver power during peak demand. Hydropower has high capacity value. Wind and solar have low or zero capacity value in many jurisdictions. LCOE does not incorporate this.

2. Asset lifespan
Hydropower facilities commonly operate for 80–100 years or more. Wind and solar typically operate for 20–30 years. Evaluating both over similar time horizons makes long-lived assets appear artificially expensive, even though they may have decades of useful life at the end of the LCOE study period.

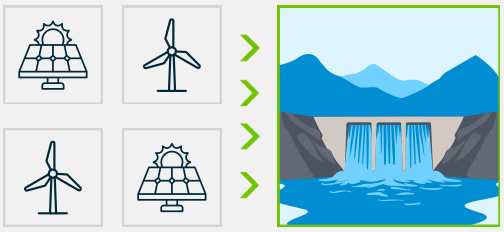
3. Replacement costs
Short-lived assets must be rebuilt multiple times. LCOE counts only the first build, not future replacements.

The Replacement Chain: Why Asset Lifespan Matters

Over a 100-year period:

› A hydropower facility is built once
› A wind or solar facility is built three to four times

This is known as the replacement chain: the same system lifespan, but a very different total investment over time.



Wind and solar must be rebuilt three to four times over the lifespan of a single hydropower facility.

Those future capital costs are rarely included in today's economic comparisons.

Why This Matters for Canadians

Electricity systems must remain:

› reliable
› affordable
› resilient
› and scalable

Using short-term cost metrics to plan long-term infrastructure can lead to:

› higher total system costs
› increased need for backup capacity
› repeated capital investment
› and higher costs for ratepayers

What appears cost-effective in the short term can become expensive over decades.

113,000x

Hydro-Québec has over 113,000x more energy storage than the largest battery project in Canada.

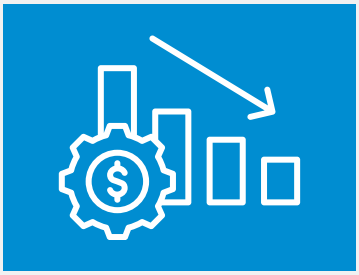
Hydropower reservoirs store vast amounts of energy naturally, supporting peak demand response, seasonal balancing, integration of wind and solar and system stability.

The Core Insight

Hydropower is often described as capital intensive. That is true in the short term, but over decades, hydropower provides:

- high reliability
- long asset life
- operational flexibility
- and foundational infrastructure

It delivers the system value that allows other clean energy technologies to operate effectively.



When capacity and lifespan are included, hydropower can become the lowest-cost non-emitting resource in long-term system planning.

Not because it is cheap to build, but because it is durable, reliable, and long-lived.

What Needs to Change

When Canadians discuss the cost of energy alternatives, we need to move beyond narrow project-level metrics and access how electricity systems actually function over time.

Energy resources that appear “cheap” on a standalone basis can impose significant additional costs when their limitations are accounted for. Backup generation, grid services, long-duration storage, transmission expansion, and repeated asset replacements are not optional extras. They are required to keep the electricity system reliable, and their costs need to be considered when comparing different energy options.

To support reliable, affordable, and resilient electricity systems, Canada’s planning and investment frameworks must shift from comparing individual project costs to assessing long-term system value.

Conclusion

The True Value of Hydropower report shows that:

› simplified cost tools systematically undervalue long-lived infrastructure
› short-term metrics distort long-term investment decisions
› hydropower can be one of the most cost-effective clean energy resources when evaluated on a long-term system basis

Using better planning tools is essential to building a clean energy system that is affordable, reliable, and resilient for Canadians.

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