



Reclassifying Reservoir Water as a Produced Asset: Implications for the Hydroelectricity Industry

Understanding asset status impact on hydroelectric power sector

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AUSTRALIAN BUREAU OF STATISTICS

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The Australian Bureau of Statistics acknowledges the Traditional Owners and Custodians of Country throughout Australia and recognises their continuing connection to land, waters and community. We pay our respects to their cultures and Elders, past and present.

Introduction and Context



Overview of Australia's hydroelectricity sector



Hydroelectricity Contribution

Hydroelectricity supplies 5–7% of Australia’s national electricity, supporting renewable energy and grid stability.

Key Infrastructure

Snowy Mountains Hydro-Electric Scheme and Hydro Tasmania’s reservoirs illustrate major water storage systems.

Pumped Hydro Energy Storage

PHES systems store energy during low demand and release it during peak demand using artificial reservoirs.

Economic Classification Challenge

Reservoir water is currently classified as non-produced asset, ignoring economic activities in its management.

Current accounting treatment of reservoir water



Water Classification in SEEA and SNA

Water in artificial reservoirs is classified as a non-produced natural resource under SEEA and SNA frameworks.

Economic-Statistical Disconnect

Current accounting creates a disconnect between economic infrastructure and statistical representation of reservoir water.

Impact on Hydroelectricity

Stored water is a key input for hydroelectric production but not fully captured in current accounts.

Water Management in Reservoirs

Management of water levels, inflows, and outflows is critical for economic activities linked to reservoirs.

Case for Reclassification

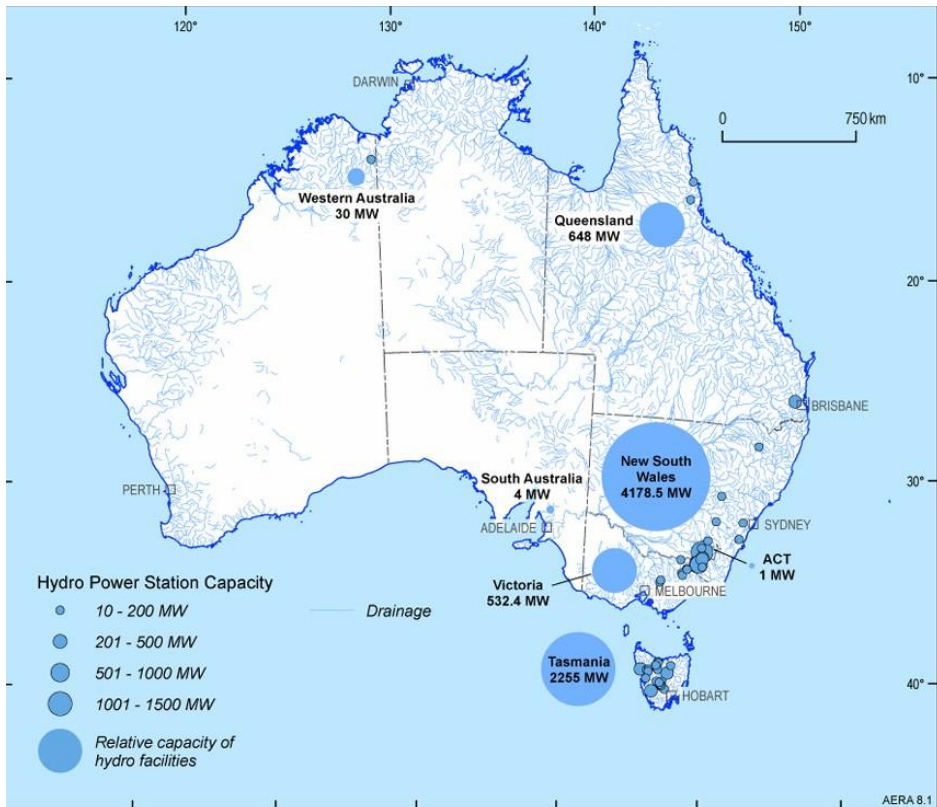


Figure 8.1 Major Australian operating hydro electric facilities with capacity of greater than 10 MW
 Source: Geoscience Australia

Economic and operational rationale

Reclassifying Water Assets

Water in artificial reservoirs should be classified as a produced asset, reflecting human cultivation and management.

Capital Investment in Infrastructure

Significant investments in dams, pumping systems, and control infrastructure support water storage and management.

Active Water Management

Operational decisions actively manage water inventories to optimize availability and usage.

Role in Energy Production

Stored water in hydroelectric systems is crucial for energy production, not a passive resource.

Before we move on...

Definition of an artificial reservoir

An artificial reservoir is a large, human-made lake or storage area created by constructing a dam or other barriers across rivers or streams. Its primary purpose is to store water for uses such as drinking water supply, irrigation, hydroelectric power generation, flood control, and recreation. Unlike natural lakes, artificial reservoirs are engineered and managed to regulate water flow and availability.

What about a natural lake with a damn built on it??

When a dam is built at the outlet of a natural lake, the lake becomes a “regulated natural lake.” It still retains its natural origins, but its water levels and outflows are now managed for human purposes. This hybrid status is important in water accounting, as it blurs the line between natural and artificial water bodies.

Key Points

- Artificial reservoirs “produce” water storage capacity and regulate flows, so the water held should be treated as a produced asset.
- Natural lakes are not created or managed by people in the same way, so their water remains a non-produced asset.

Before we move on...

Examples of Natural Lakes with Dams or Regulated Outflows

- **Lake Victoria (Africa):**
The Nalubaale (Owen Falls) Dam in Uganda regulates the lake's outflow for hydroelectricity and water management.
- **Lake Titicaca (South America):**
The Desaguadero River outflow is regulated by a dam to control lake levels and downstream flows.
- **Lake Geneva (Europe, Switzerland/France):**
The Seujet Dam in Geneva regulates the lake's outflow into the Rhône River.
- **Lake Superior (North America, USA/Canada):**
The **Compensating Works** at Sault Ste. Marie is a gated dam system that regulates the lake's outflow into the St. Marys River, managing water levels for navigation, hydropower, and downstream ecosystems.

Before we move on...

What about water held in irrigation channels?

SEEA/SNA Treatment (currently)

- Water in irrigation channels has been abstracted from the environment and is now being delivered as part of a managed supply network.
- At the point of abstraction (when water is withdrawn from a river or groundwater), it is recorded as a natural resource extraction.
- Once it enters the supply network (such as irrigation channels, pipes, or canals), it is being delivered as a product—specifically, as an output of the water supply or irrigation industry.

Key Distinction:

- Water in the environment (even in artificial reservoirs, currently): Non-produced asset (natural resource).
- Water after abstraction, (treatment) and supply: Produced product (output of the water supply industry)

In short:

- Water in irrigation channels is a product—it has been abstracted and is now part of the supply network, delivered as an output of the irrigation industry.
- It is not a produced asset (like a dam or channel), but a produced good/service.

Implications for hydroelectricity operations



Traditional Hydroelectric Systems

Water is released from reservoirs to turn turbines and generate electricity continuously.

Pumped Hydro Energy Storage

Water is pumped to an upper reservoir during low demand and released during peak demand, acting as a battery.

Stored Water as Produced Asset

Recognizing stored water as a produced asset improves accounting of inventory changes and environmental losses.

Enhanced Resource and Policy Integration

Better integration of water and energy statistics supports improved policy planning and environmental impact analysis.

Statistical and Accounting Impacts



Changes to physical supply and use tables

Reclassification of Reservoir Water

Reservoir water is reclassified as a produced asset, changing how it appears in physical supply and use tables.

Hydroelectricity Industry Usage

Hydroelectricity uses stored water and PHES systems can also produce stored water, reflecting in PSUT changes.

Tracking Inventory Changes and Losses

Inventory changes including seasonal fluctuations and losses like evaporation are explicitly recorded as outflows.

Alignment with SEEA and SNA

This approach aligns with SEEA Central Framework and 2025 SNA revisions recognizing inventories as produced assets.



Treatment of evaporation in multi-use reservoirs

Evaporation Allocation Challenge

Evaporation complicates accounting in reservoirs serving multiple industries, requiring clear allocation methods.

Proportional Evaporation Use

Evaporation losses are allocated based on the proportional water use by industries like hydroelectricity and irrigation.

Allocation Methods Without Data

When usage data are missing, allocation can rely on design purpose, operational control, or expert judgment.

Enhanced Transparency and Analysis

This approach improves transparency and analytical value in environmental and economic resource accounts.

Table 1: Top 10 Hydroelectric Reservoirs in Australia by Volume

Reservoir	State	Dam Name	Capacity (GL)	Primary Uses
Lake Gordon	TAS	Gordon Dam	12,359	Hydroelectricity
Lake Argyle	WA	Ord River Dam	10,763	Irrigation, Hydroelectricity
Lake Eucumbene	NSW	Eucumbene Dam	4,798	Hydroelectricity
Lake Hume	NSW/VIC	Hume Dam	3,046	Irrigation, Hydroelectricity
Dartmouth Reservoir	VIC	Dartmouth Dam	3,056	Irrigation, Hydroelectricity
Lake Eildon	VIC	Eildon Dam	3,391	Irrigation, Hydroelectricity
Blowering Reservoir	NSW	Blowering Dam	1,628	Hydroelectricity, Irrigation
Burdekin Falls Dam	QLD	Burdekin Dam	1,860	Irrigation, Hydroelectricity
Copeton Dam	NSW	Copeton Dam	1,364	Irrigation, Hydroelectricity
Tumut 3 Reservoir	NSW	Tumut 3 Power Station	1,500	Hydroelectricity

Implementation Challenges and ABS Work

Practical challenges and considerations

Data Availability Challenges

Consistent data on water volumes, flows, and losses are often lacking from hydroelectric operators.

Clear Classification Criteria

Defining produced versus non-produced water requires clear criteria based on usage and management intensity.

International Consistency

Coordination with SEEA and SNA revisions is necessary for consistent global water resource classification.

Complex Valuation Methods

Valuation of stored water requires approaches like resource rent, replacement cost, or net present value.

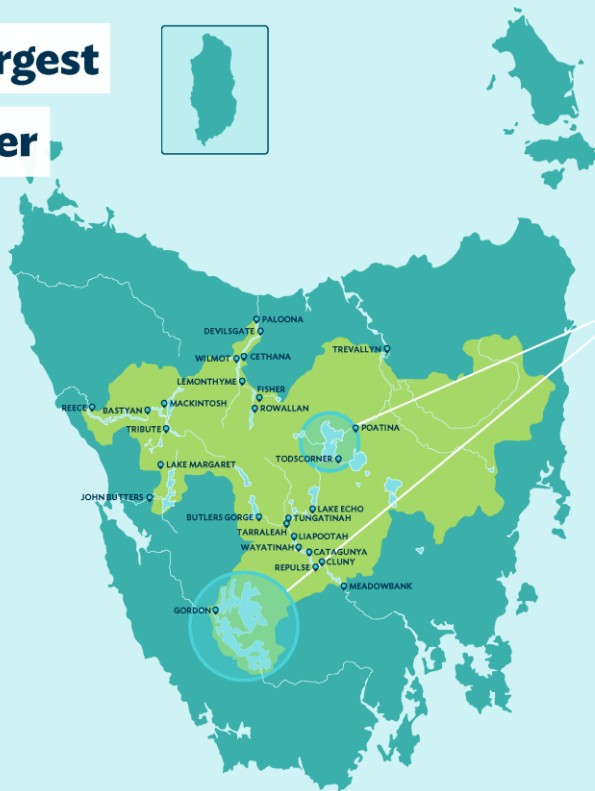
Australia's largest water manager

27x

We manage over 13,500GL/annum of water. That's the equivalent of over 27 times Sydney Harbour (approximately one every fortnight).



We own and operate 52 lakes, 54 large dams, 140 small dams and weirs and 30 hydro power stations around Tasmania.



Did you know?

- At any point in time, typically a third of all Hydro Tasmania's energy in storage is in Lake Gordon/Pedder, a third is in *yingina*/Great Lake and a third is in all our other storages combined.
- We manage 5 of the 10 largest dams in Australia.
- The rain that falls in catchment areas is collected in our dams and used to generate energy at our power stations.

- Hydro catchment areas
- Hydro power stations

Hydro Tasmania Australia's largest generator of renewable energy and largest water manager

ABS research and preliminary findings

Reclassifying Reservoir Water

ABS is exploring the reclassification of reservoir water as a produced asset to improve environmental-economic accounts.

Stakeholder Engagement

ABS is actively engaging stakeholders to review treatments and gather input on data and methodology options.

Data Challenges and Solutions

Data challenges exist but are manageable, encouraging phased or partial implementation in targeted industries or reservoirs.

International Contributions

ABS participates in international forums to influence environmental-economic accounting standards globally.

Recommendations and Conclusion



Recommendations for SEEA and national implementation

Water Reclassification

Reclassify water in man-made reservoirs used for hydroelectricity as a produced asset to improve accounting accuracy.

Clear Water Criteria

Develop distinct criteria to differentiate produced water from non-produced water for clarity in environmental accounts.

Enhanced Data Collection

Improve collection of data on water inventories, flows, and losses to support precise environmental-economic analysis.

International Engagement

Collaborate with organizations like SEEA, SNA, and UNSD to align standards and methodologies internationally.



Conclusion

Updated Environmental Accounting

Reclassifying reservoir water as an asset reflects modern infrastructure and energy systems accurately and transparently.

Policy and Economic Relevance

Enhanced accounting improves policy relevance and supports better economic decision-making regarding environmental assets.

Global Leadership and Collaboration

Ongoing work by ABS and the London Group leads international efforts to update accounting standards for resource use.