

# Snowy 2.0 Updated Business Case

24 May 2024

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### Purpose

In August 2023, Snowy Hydro announced a revision to the costs and schedule for the Snowy 2.0 Project<sup>1</sup>. This document provides an update to the business case as at that time. The original business case at the time of Final Investment Decision (FID) in December 2018 can be found on Snowy Hydro's website<sup>2</sup>.

While the economic drivers at the time of FID in December 2018 have not changed, Marsden Jacob Associates (MJA), long-standing experts in modelling the National Electricity Market (NEM), were re-engaged by Snowy Hydro to provide updated NEM modelling as an input to this update to the business case.

<sup>1</sup> Securing the future of critical energy transformation projects, Snowy Hydro, Media Release, 31 August 2023; Snowy Hydro Corporate Plan, 2024 to 2028.
<sup>2</sup> Snowy 2.0 Final Investment Decision Report and Economic Modelling.

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## **Executive Summary**

## The Net Present Value of Snowy 2.0 has increased from \$2.8 billion to \$3 billion.

The project's NPV has increased from \$2.8 billion to \$3 billion<sup>3</sup>. This is based on a diverse and robust earnings profile, derived from four revenue streams:

- Storage value: the ability of Snowy 2.0 to "time-shift" energy;
- Wholesale firming and capacity sales:
  - Wholesale firming: transforming intermittent energy into products saleable to customers; and
  - Capacity sales: risk management products sold to other NEM participants;
- Retail diversification: increased retail sales and the benefits of different load profiles among Snowy Hydro's customer segments; and
- Ancillary services: benefits of participation in the frequency control services market.

Supporting the value of Snowy 2.0 is an additional 200 MW or 10% capacity; bringing total capacity to 2,200 MW.

The value of Snowy 2.0 to the NEM has increased significantly since FID in December 2018. Its completion is critical to supporting the NEM's decarbonisation and reliability targets.

- Snowy Hydro has already contracted 1.75 GW of wind and solar supply which enabled 2.9 GW of wind and solar projects, and Snowy 2.0 will enable at least another 6 GW of renewable energy through its ability to firm intermittent wind and solar energy and transform this energy into cost-effective, reliable electricity supply.
- The 350 GWh of energy storage provided by Snowy 2.0 provides a meaningful step towards the 640 GWh of storage identified by AEMO in its 2022 Integrated System Plan (AEMO ISP 2022)<sup>4</sup>, as being crucial to absorbing surplus renewable production and maintaining supply during periods of low renewable output, as set out in Appendix 2.

<sup>&</sup>lt;sup>3</sup> All dollar amounts in this updated business case are expressed in Australian dollars and are in Nominal terms, except (i) where stated "Present Value" amounts, in which case, those amounts are discounted back to 31 December 2018 to ensure a like-for-like comparison to FID in December 2018; and (ii) charts prepared by Marsden Jacob Associates which were presented in Real, January 2023 Australian dollars. <sup>4</sup> 2022 Integrated System Plan for the National Electricity Market, published by AEMO in June 2022.

## **Executive Summary**

Set out below is the change in key financial metrics from the business case at FID in December 2018 to the updated business case in August 2023.

DESCRIPTION	Target Total Cost (\$ billion)	NPV (\$ billion) <sup>5</sup>	Asset IRR <sup>6</sup> (%)
Business Case FID December 2018	6.1	2.8	8.1
Updated Business Case August 2023	12.0	3.0	7.4

<sup>5</sup>NPV for both cases is discounted to December 2018.

<sup>6</sup> Asset Internal Rate of Return (IRR): The IRR measures the compounded return expected to be realised on a particular asset/investment.

## **Executive Summary**

The total post-tax asset cash flows over the life of Snowy 2.0 exceed the total project capital spend. The chart below summarises the project capital spend and post-tax asset cash flows to 2050.



Post-tax asset cash flows (million) to 2050 - Nominal

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## Snowy 2.0 Project

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### Target total cost: \$12 billion

Commercial operation of all units: December 2028



Generation capacity:

### 2,200 MW

- Immediately dispatchable, on-demand electricity.
- Important to firm planned renewable investment and replace withdrawing generation capacity.

# Storage capacity: 350,000 MWh

Enough to power 3 million homes for one week.

Design life: 150 years

## Snowy 2.0 Project

The Snowy Hydro and Future Generation Joint Venture are focused on delivering positive project outcomes in a highly complex environment.

#### **Capital Expenditure**

As announced in August 2023, target total cost is \$12 billion, with an estimated cost to complete of \$7.7 billion.

#### **Project Risks**

The project is actively managing key risks, including:

- Health and Safety;
- Environment;
- Construction Schedule and Interfaces;
- Detailed Design Finalisation;
- Resource Availability and Escalation; and
- Geotechnical Conditions.





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## **Revenue Streams**



### **Revenue Streams**

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Revenue type	Revenue source	NPV FID December 2018 <sup>7</sup>	NPV August 2023 <sup>8</sup>	
1. Storage value	The ability of Snowy 2.0 to "time-shift" energy, extracting value from pumping while prices are low, to supply the NEM when demand and prices are higher.	\$3.6 billion 47% of Project Value	\$7.1 billion 60% of Project Value	
2. Wholesale firming and capacity sales	<b>Wholesale firming:</b> The ability of Snowy 2.0 to transform intermittent energy produced by wind and solar plants into 100% firm, secure energy that is used by Snowy Hydro and others to sell to consumers to match their demand.	\$0.7 billion 9% of Project Value	These revenue sources now combined:	
	<b>Capacity sales</b> : The ability to sell risk management products to NEM participants.	\$2.7 billion 36% of Project Value	34% of Project Value	
3. Retail diversification	Snowy 2.0 will allow Snowy Hydro to increase its sales to mass market and C&I customers. The markedly different demand profiles of mass market and C&I customers provides generation portfolio optimisation benefits to Snowy Hydro.	\$0.5 billion 6% of Project Value	\$0.6 billion 5% of Project Value	
4. Ancillary services	The benefits of participation in the regulation and five-minute Frequency Control Ancillary Services (FCAS) markets, and future participation in other FCAS markets.	\$0.2 billion 2% of Project Value	\$0.2 billion 1% of Project Value	

<sup>7</sup> The NPV of the revenue components are shown as being discounted to December 2018 based on assumptions determined at the time of the FID in December 2018. The NPV of costs (discounted to December 2018) determined as at December 2018 was \$4.9 billion, producing a project NPV of \$2.8 billion.

<sup>8</sup> The NPV of the revenue components are shown as being discounted to December 2018 based on assumptions determined at the time of the project reset at August 2023. The NPV of costs (discounted to December 2018) determined as at August 2023 was \$8.9 billion, producing a project NPV of \$3.0 billion.

## **Revenue Stream 1**

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Storage value is derived by purchasing energy at low prices for pumping, for example when renewables are abundant, then selling the energy when prices are higher, for example in the evening peak and/or when renewable output is lower.

This gives an average annual net revenue of \$580 million (\$400 million at FID in December 2018).

#### **Changes since FID in December 2018**

Storage value has increased significantly; this is driven by:

- increased generation volumes due to a 10% increase in capacity from 2,000 MW to 2,200 MW;
- increased generation volumes reflecting the greater penetration of variable renewable generation (wind and solar) creating more opportunity to pump at low prices and generate at relatively higher prices during periods of high demand. The combined effect of these factors is to increase generation from an average annual 3.5TWh to 5.3TWh; and
- increase average annual price differential between pumping and generating from ~\$85/MWh to ~\$100/MWh.



#### Generation and pumping volumes to 2040 (GWh)





Source: Snowy Hydro

## Revenue Streams 2, 3 & 4

2

#### Wholesale firming and capacity sales

Snowy 2.0's capacity value is based on products traded in a transparent and high-volume market through bilateral contracts with other industry participants. The firming and capacity value is also visible through wholesale prices allowed under the Victorian Default Offer<sup>9</sup> produced by the Essential Services Commission and the Default Market Offer<sup>10</sup> produced by the Australian Energy Regulator for the other NEM states.

#### **Changes since FID**

Forecast firming and capacity revenues reflect traded forward NEM prices and the regulatory price setting referred to above. These have increased since FID and reflect global supply chain factors relating to the cost of constructing new generating capacity of all types relevant to the NEM: wind, solar, hydro and gas peaking plants.

For wholesale firming and capacity sales this gives an **average annual net revenue of \$370 million (\$325 million at FID in December 2018).** 



#### **Retail diversification**

Snowy 2.0 will allow Snowy Hydro to increase its sales to mass market and C&I customers. This gives an **average annual net** revenue of \$60 million (\$50 million at FID in December 2018).



#### **Ancillary services**

Snowy 2.0 will participate in the regulation and five-minute FCAS markets, and future participation in other FCAS markets. This gives an **average annual net revenue of \$20 million (\$20 million at FID in December 2018).** 

<sup>&</sup>lt;sup>9</sup> The ESC's role is to determine the VDO price each year. The VDO 2024-25: Final Decision was released by the ESC on 23 May 2024.
<sup>10</sup> The AER's role is to determine the DMO price each year. The DMO 2024-25: Final Decision was released by the AER on 23 May 2024.

### Revenue Streams: Net Revenues to 2040

#### Net Revenues to 2040 (million) - Nominal



Source: Snowy Hydro

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## Appendix 1: Market Modelling as at August 2023



## Market Modelling Conclusions

Snowy Hydro re-engaged Marsden Jacob Associates (MJA), long-standing experts in modelling the NEM, to provide updated NEM modelling as input into the updated business case.

#### **Dispatch and Load Weighted prices**

Pumping costs are relatively stable and selling revenues are highly variable.

The years following the closure of coal power stations in NSW and Victoria are associated with high volatility in the NEM and high capacity factors and revenue.

#### Snowy 2.0 Price Duration Curves vs Pump & Generation

Snowy Hydro aims to target the lowest pumping spot prices throughout the year. The chart on the right shows projected outcomes for the year 2031, noting a wide range of pumping price outcomes and reflecting higher winter pumping price periods (which, whilst high, still remain below winter peak generation prices).

The peak average volume of pumping is projected to occur near the lowest average prices. However, it does not reach the absolute lowest point due to the upper reservoir of Snowy 2.0 often being near capacity during summer, preventing further pumping.

The chart also illustrates that generation, represented by blue bars, occurs at times of higher spot prices.

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### MJA Market Modelling Conclusions

#### Interseasonal energy transfer

The trend in all years is a reduction in storage level between June and August.

The net change in storage between quarters has an impact on the quarterly revenue received, as water pumped into storage in quarter 4 (spring / early summer) is not seen as revenue until later in the year during quarter 2 (late winter).

The winter periods generally contain the highest revenues, due to consistent high demands.



Snowy 2.0 storage depleted during periods of high demand and low renewable output

## **MJA** Assumptions



Electricity demand outlook was based on the AEMO ISP2022 Central Demand outlook



Entry of new generation and storage were based on the assumed profile of developments under State renewable generation targets, and economics



Capital costs are as per the AEMO Draft Inputs, Assumptions and Scenarios Report (December 2022)<sup>11</sup>

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Coal power station closures in NSW and Victoria are as announced and permitted by reliability



Gas and coal costs are as per the AEMO Draft Inputs, Assumptions and Scenarios Report (December 2022)<sup>11</sup>, which are consistent with MJA estimates



Major transmission developments: HumeLink: July 2027<sup>12</sup> VNI West: July 2031<sup>13</sup>

<sup>11</sup>AEMO Draft Inputs, Assumptions and Scenarios Report, published by AEMO in December 2022.

<sup>12</sup> AEMO ISP 2022 assumes July 2026. Alignment with AEMO ISP 2022 does not materially change the market modelling conclusions.
 <sup>13</sup> As per AEMO ISP 2022.

# Appendix 2: NEM Storage



## **NEM Storage**

#### The National Electricity Market (NEM) will need more storage to ensure stable supply, absorb excess renewable production and facilitate the phase-out of coal.

The AEMO ISP 2022 concluded that approximately 640 GWh of **NEM** storage would be required by 2050 (illustrated in the chart on the right).

• This was based on AEMO's modelling and in particular the implied decarbonisation by 2050.

In a 2021 study, the Grattan Institute concluded that reaching a 90% renewable NEM would require 3,000 GWh of **new storage by** 2050<sup>14</sup>, to safeguard reliable supply.

In this context, the 350 GWh of long-duration storage supplied by Snowy 2.0 represents a critical first step towards meeting the NEM's long-term storage requirements.

<sup>14</sup> "Go for net zero", Grattan Institute Report No 2021-02, April 2021; Tony Wood and James Ha.



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### Glossary

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#### Abbreviation Definition Marsden Jacob Associates MJA MW Megawatt MWh Megawatt Hour NEM National Electricity Market Nominal value refers to value measured in terms of the Nominal dollars of the day at any point in time NPV Net Present Value Real value refers to dollars denominated at a specific Real date ΤW Terawatt TWh **Terawatt Hour** VDO Victorian Default Offer

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#### Legal Notice

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