AusNet

Transmission Revenue Reset 2027 to 2032 (TRR 2027-32)

Planning Report: NPSD GIS Replacement Project

Date: October 2025

AusNet

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1. Executive summary

Newport Power Station is a natural gas power facility consisting of a single generator with a capacity of up to 510 MW. Owned and operated by Energy Australia (EA), it supports demand within the western metropolitan 220 kV ring and provides ancillary services, including voltage support and system strength.

AusNet owns the 220 kV connection station with gas insulated switchgear (GIS) located inside the power station building. The asset ownership interface is at the 220kV terminals of the generator and auxiliary transformers. The power station and connection station are located on the west bank of the Yarra River, south-west of Melbourne suburb Newport.

Newport connection station (NPSD) includes 220 kV connections to FBTS and BLTS and is part of the western metropolitan 220 kV ring from Keilor. The 220 kV GIS, installed in 1979, is nearing end of life with increasing failures, technical obsolescence and no manufacturer support beyond generic advice. The aging GIS presents significant reliability, safety and environmental risks exhibiting in SF6 leaks, worn circuit breaker mechanisms and flange corrosion. The role of Newport Power Station may become more significant given the planned early closure of Yallourn Power Station in 2028 and it is considered that the site will remain an important part of the transmission network in the foreseeable future.

The asset replacement project plans to build a new indoor GIS generator connection station near the current location of the 220 kV cable heads.

The project delivery lead time is estimated to be 4 years and AusNet proposes to start the project by 2028 and have the RIT-T completed by 2032 with all forecast expenditure falling into the 2027 to 2032 TRR period.

2. Background

NPSD is owned and operated by AusNet Services and is located on the west bank of the Yarra River, south-west of Melbourne suburb Newport. NPSD includes the following transmission line and transformer connections:

- One 220 kV line to Fishermen Bend Terminal Station (FBTS)
- One 220 kV line to Brooklyn Terminal Station (BLTS)
- One 600 MVA 220/24 kV generator transformer
- Two 25/33 MVA 220/6.6/6.6 kV auxiliary transformers

Figure 1: Victorian transmission system

Asset Condition

AusNet Services conducted a condition assessment of the 220 kV GIS at NPSD, where the components were evaluated across a range of criteria including: physical condition, spares availability, estimated rate of deterioration, and manufacturer support. The assessment revealed that the GIS is in poor condition due to increasing equipment failures, with the asset approaching the end of its operational life, along with a lack of manufacturer support and late stage switching burdens.

The GIS equipment is technically obsolete, with only generic technical support for maintenance and repair available. The spare parts can only be sourced from decommissioned units, making maintenance more challenging and increasing operational risk. Restoring connection service to Newport Power Station after a major GIS failure will therefore take considerable time. No alternative maintenance strategies have been identified that would reduce the failure rates or address the lack of manufacturer support.

The GIS present challenges due to duty-related deterioration and the obsolescence of the equipment, posing significant reliability, safety and environmental risks. The aging of the GIS has resulted in a number of issues including:

- internal and external SF6 leaks,
- worn CB mechanisms,
- Ferro resonance,
- flange corrosion,

all of which result in high probability of failure, likely to increase if remedial action is not taken.

Since 2020, sections of the GIS have undergone major repairs and refurbishment, leaving limited scope for further life extension. Proactive refurbishment of the entire GIS system is constrained by limited spare parts availability and restricted gas segregation within the pipework.

Further information can be found in NPSD GIS Replacement Asset Condition Report.

Table 1 shows the forecast failure rates for the 220 kV GIS circuit breakers (CBs) at NPSD.

220kV GIS CB Failure Rates	2025	2026	2027	2028	2029	2030	2031	2032
BLTS 220KV L CB	0.038020	0.042087	0.045000	0.048100	0.051300	0.054600	0.058021	0.061555
FBTS 220KV L CB	0.067920	0.072851	0.076800	0.081000	0.085200	0.089500	0.093995	0.098569
GEN TR 1 BUS CB	0.022450	0.024527	0.026700	0.029000	0.031400	0.033900	0.036513	0.039243
GEN TR 2 BUS CB	0.017680	0.020490	0.022500	0.024500	0.026700	0.029000	0.031388	0.033895
220KV TIE BUS 1 BUS CB	0.062210	0.068970	0.072900	0.076800	0.081000	0.085200	0.089536	0.093995
220KV TIE BUS NO 2 BUS	0.022450	0.024527	0.026700	0.029000	0.031400	0.033900	0.036513	0.039243

Table 1: 220kV GIS CB forecast failure rates

3. Identified need

The poor condition of the 220 kV GIS has increased the likelihood of asset failure. Without remedial action, other than routine maintenance, the 220 kV GIS is expected to deteriorate further and more rapidly. This will increase the market impact risk (generation constraints that results in increased wholesale market cost and involuntary load shedding) due to prolonged outages of the transmission lines and transformers switched at NPSD. In addition, there is also increased safety, environmental, collateral damage, and emergency replacement risks due to the poor condition of the 220 kV GIS.

The 'identified need' this project intends to address is to maintain reliable transmission network services at NPSD and to mitigate risks from 220 kV switchgear failures.

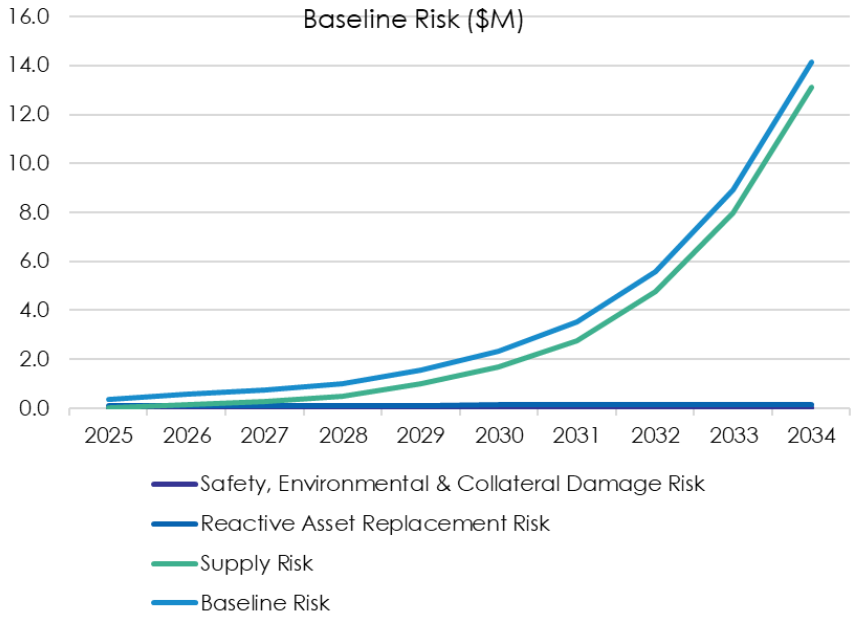

Figure 2: Baseline risk

3.1. Key inputs and assumptions

The identified need is underpinned by several assumptions, including the risk of asset failure (determined by the condition of the assets), the likelihood of the relevant consequences, and several assumptions adopted from the latest Inputs Assumptions and Scenarios Report (IASR). These assumptions are outlined below.

Market impact (wholesale market and involuntary load shedding) risk costs

Network studies are used to assess the market impact of a failure of the GIS at NPSD. These studies are based on the latest network models, demand forecast, operational procedures and forecast transmission developments used by AEMO. Involuntary load shedding is valued at the latest Value of Customer Reliability (VCR)[1].

Safety risk costs

The Electricity Safety Act 1998[2] requires AusNet Services to design, construct, operate, maintain, and decommission its network to minimise hazards and risks to the safety of any person as far as reasonably practicable or until the costs become disproportionate to the benefits from managing those risks. By implementing this principle for assessing safety risks from explosive asset failures, AusNet Services uses:

- a value of statistical life[3] to estimate the benefits of reducing the risk of death;
- a value of lost time injury[4]; and
- a disproportionality factor[5].

AusNet Services notes this approach, including the use of a disproportionality factor, is consistent with the practice notes[6] provided by the AER.

Financial risk costs

As there is a lasting need for the services that NPSD provides, the failure rate-weighted cost of replacing failed assets (or undertaking reactive maintenance or repairs) is included in the assessment.[7]

1 In dollar terms, the Value of Customer Reliability (VCR) represents a customer's willingness to pay for the reliable supply of electricity. The values produced are used as a proxy, and can be applied for use in revenue regulation, planning, and operational purposes in the National Electricity Market (NEM).
2 Victorian State Government, Victorian Legislation and Parliamentary Documents, "Electricity Safe Act 1998"
3 Department of the Prime Minister and Cabinet, Australian Government, "Best Practice Regulation Guidance Note: Value of statistical life"
4 Safe Work Australia, "The Cost of Work-related Injury and Illness for Australian Employers, Workers and the Community: 2012-13"
5 Health and Safety Executive's submission to the1987 Sizewell B Inquiry suggesting that a factor of up to 3 (i.e. costs three times larger than benefits) would apply for risks to workers; for low risks to members of the public a factor of 2, for high risks a factor of 10. The Sizewell B Inquiry was public inquiry conducted between January 1983 and March 1985 into a proposal to construct a nuclear power station in the UK.
6 Australian Energy Regulator, "Industry practice application note for asset replacement planning"
7 The assets are assumed to have survived and their condition-based age increases throughout the analysis period.

Environmental risk costs

Changes in greenhouse gas emissions have been assessed based on variations in the historic leakage of Sulfur Hexafluoride (SF_6), an insulation gas. A Global Warming Potential (GWP) factor of 23,500 —relative to carbon dioxide (CO_2)—has been applied to quantify the equivalent CO_2 emissions (CO_2-e). These emissions have been monetised using the Value of Emissions Reduction (VER), in accordance with guidance published by the AER[8].

4. Options assessed

AusNet Services considered both network and non-network options to address the identified need but did not find any suitable non-network solution or received a proposal for a non-network solution. The two network options are presented below.

4.1. Option 1: New 220 kV GIS connection station

Option 1 includes a new indoor GIS connection station that is configured to allow for the connection of the two 220 kV lines (BLTS and FBTS), the generator transformer and two auxiliary transformers. Newport Power Station was originally planned for two generators of which only one was installed. It is proposed to reconfigure the connection station as shown in Figure 3 to reduce the number of circuit breakers needed to switch the two lines and three transformers.

The estimated capital cost of this option is $152.6 million and the change in operating, and maintenance cost is negligible. The estimated project delivery time is 5 years.

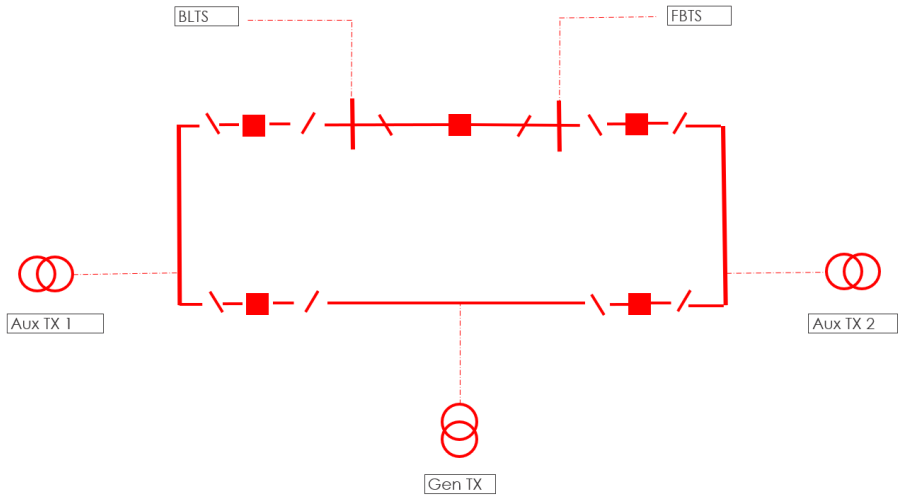

Figure 3: NPSD GIS Single Line Diagram

4.2. Option 2: Deferred replacement

Option 2 is the same as Option 1 except deferring the project by 5 years. It is assumed that cost escalation will be at the same rate as inflation.

4.3. Material inter-regional network impact

The proposed asset replacements at NPSD will not change the transmission network configuration and none of the network options considered are likely to have a material inter-regional network impact. A 'material inter- regional network impact' is defined in the NER as:

"A material impact on another Transmission Network Service Provider's network, which may include (without limitation): (a) the imposition of power transfer constraints within another Transmission Network Service Provider's network; or (b) an adverse impact on the quality of supply in another Transmission Network Service Provider's network."

8 Australian Energy Regulator, "Valuing Emissions Reductions Final Guidance – May 2024"

5. Assessment approach

Consistent with the RIT-T requirements and practice notes on risk-cost assessment methodology, AusNet Services undertook a cost-benefit analysis to evaluate and rank the net economic benefits of the credible options over a 45-year period.

All options considered have been assessed against a business-as-usual case (counter factual) where no proactive capital investment to reduce the increasing baseline risks is made.

Optimal timing of an investment option is the year when the annual benefits from implementing the option become greater than the annualised investment cost.

5.1. Proposed scenarios and input assumptions

The robustness of the investment decision is tested using the range of input assumptions and scenarios described in the table below. This analysis involves variation of assumptions around the most likely values as per the IASR, AEMO's connection point forecast, latest VCR rates, and AusNet Service's best estimate of project cost and forecast asset failure rates.

Parameter	Lower Bound	Most likely (central) assumption or scenario	Upper Bound
VCR	75% of central assumption	Published VCR	125% of central assumption
Asset failure rate	75% of central assumption	Assessed failure rate	125% of central assumption
Demand Growth	85% of central assumption	Connection Point Forecast provided with AEMO 2024 VAPR	115% of central assumption
Discount rate[9]	WACC rate of a network business (3.0%)	Latest commercial discount rate from IASR (7%)	Upper Bound (10%)
Project Capital Cost	85% of estimated cost	Estimated cost	115% of estimated cost

Table 1 - Summary of input assumptions for range of scenarios

5.2. Material classes of market benefits

NER clause 5.16.1(c)(4) formally sets out the classes of market benefits that must be considered in a RIT-T. AusNet Services estimates that the classes of market benefits that are likely to be material include changes in involuntary load shedding.

5.3. Other classes of benefits

Although not formally classified as classes of market benefits under the NER, AusNet Services anticipates material reduction in: safety risks from potential explosive failure of deteriorated assets, collateral damage risks to adjacent plant, and the risk of increased costs resulting from the need for emergency asset replacements and reactive repairs by implementing any one of the options described in Section 4. These additional benefits were included in the project justification.

9 Discount rates as recommended in the AEMO Inputs, Assumptions and Scenarios Report (IASR)

5.4. Classes of market benefits that are not material

AusNet Services estimates that the following classes of market benefits are unlikely to be material for any of the options considered:

- Changes in costs for parties, other than the RIT-T proponent – there is no other known investment, either generation or transmission, that will be affected by any option considered.
- Changes in ancillary services costs – the options are not expected to impact on the demand for and supply of ancillary services.
- Competition benefits – there is no competing generation affected by the limitations and risks being addressed by the options considered.

Option value – as the need for and timing of the investment options are driven by asset deterioration, there is no need to incorporate flexibility in response to uncertainty around any other factor.

6. Options assessment

This section presents the results of the economic cost benefit analysis that has been conducted to determine the preferred option and its economic timing.

All the options considered will deliver a reduction in market impact risk (including supply risk), safety risk, environmental risk, collateral risk and risk cost of emergency replacement in the event of asset failure. Presented in Figure 4, the total risk cost reduction or project benefits outweighs the investment cost for all options for all of the sensitivities where input variables are varied one at a time.

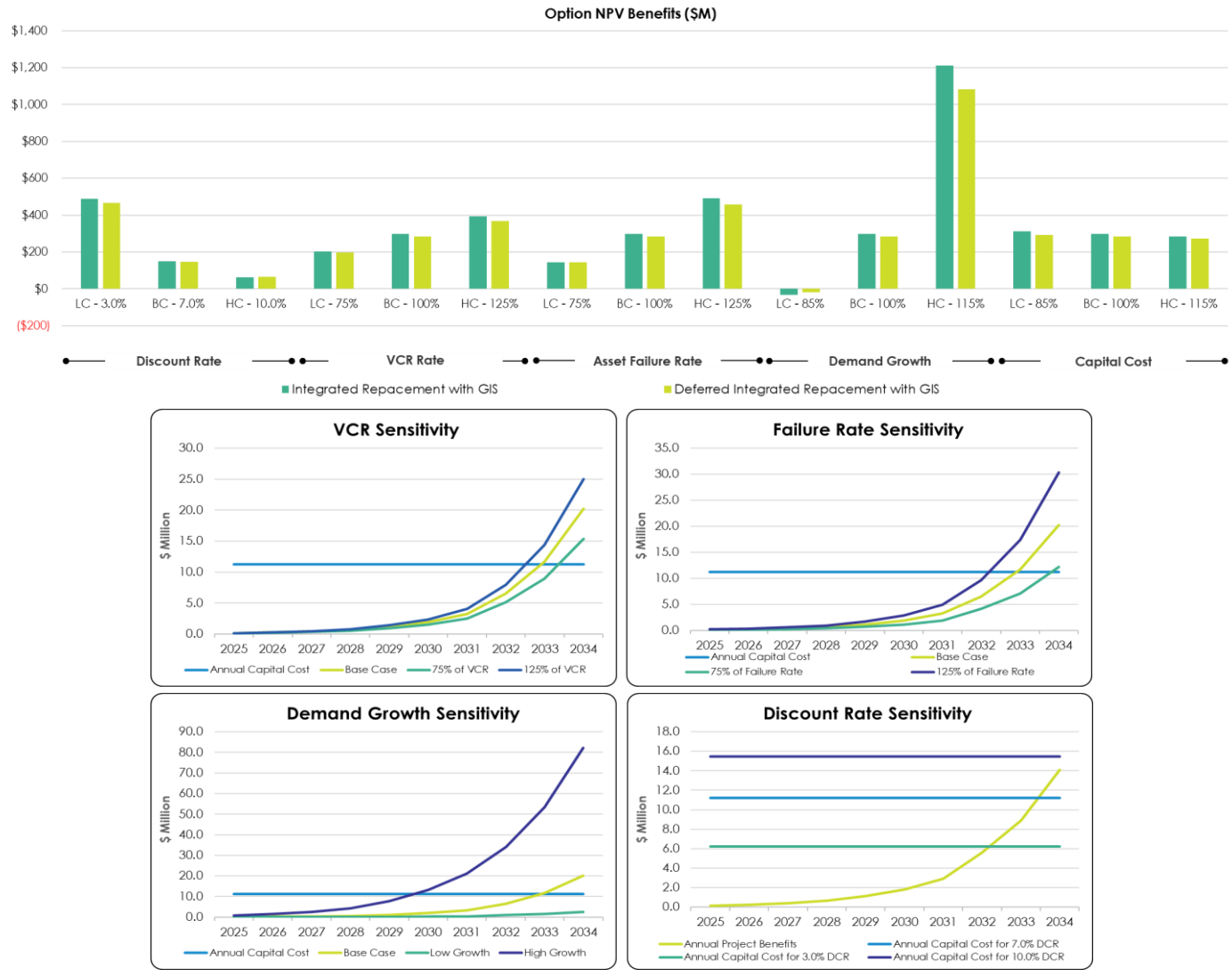

Figure 4: Scenario and sensitivity study

6.1. Preferred Option

Option 1 (New 220 kV GIS connection station) has the highest net economic benefit for most of the scenarios and sensitivities considered and is therefore the preferred option. Scenario weighting will not make a difference to the preferred option as Option 1 has the highest net benefits for all except two of the 15 sensitivity studies (Low demand growth and high discount rate). The uptake of new data centres has not been considered in the demand forecast, making the low demand growth sensitivity unlikely to occur. The high discount rate scenario is also considered highly unlikely to occur.

6.2. Optimal timing of the preferred option

This section describes the optimal investment timing of the preferred option for different input assumptions. Figure 5 shows that the optimal timing of the preferred option (Option 1) is starting from 2033 with the project completion by the end of 2032 and that investment is needed within the 2027 to 2032 regulatory control period.

Figure 5 shows that the investment economic for a 15% increase in investment cost.

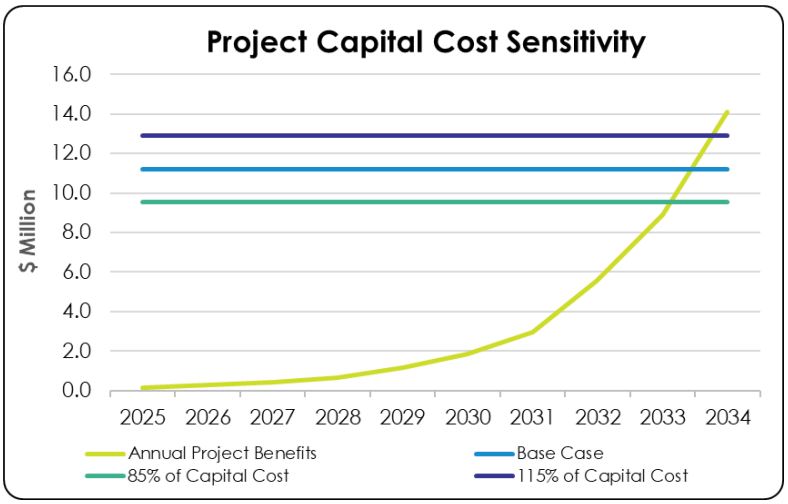

Figure 5 - Optimal investment timing sensitivity study

7. Conclusion

Amongst the options considered, Option 1 is the most economical option to address the identified need and is hence the preferred option. Option 1 involves building a new connection station to maintain a reliable connection service to Newport Power Station.

The estimated capital cost of this option is $152.6 million (excluding management reserve) with no material change in operating and maintenance cost. The project is economic by 2032/33, and AusNet Services is targeting a commissioning date of end 2032 with all cost falling within the 2027 to 2032 regulatory control period.

8. Appendix 1: Cost Estimate

	PROJECT EXPENDITURE FORECASTS	2025	2026	2027	2028	2029	2030	TOTAL
1	DESIGN & STUDIES + Permit +land	$0	$346,940	$3,122,460	$0	$0	$0	$3,469,400
2	INTERNAL LABOUR	$116,537	$233,074	$2,826,020	$2,826,020	$2,826,020	$2,826,020	$11,653,690
3	MATERIALS(AusNet Free Issue)	$0	$0	$497,465	$8,125,261	$8,125,261	$8,125,261	$24,873,249
4	PLANT & EQUIPMENT	$0	$0	$19,617	$320,417	$320,417	$320,417	$980,870
5	CONTRACTS (Including Incentive and Insurance)	$0	$0	$1,966,507	$32,119,608	$32,119,608	$32,119,608	$98,325,329
6	**PROJECT DIRECT EXPENDITURE P(50)**	**$116,537**	**$580,014**	**$8,432,069**	**$43,391,306**	**$43,391,306**	**$43,391,306**	**$139,302,538**
7	MANAGEMENT RESERVE [P(90)-P(50)]							$8,634,295
8	PROJECT DIRECT EXPENDITURE (SAP)	$116,537	$580,014	$8,432,069	$43,391,306	$43,391,306	$43,391,306	$147,936,833
9	OVERHEADS			$139,860	$2,097,896	$2,447,546	$2,307,686	$6,992,987
10	FINANCE CHARGES (IDC)			$127,044	$1,905,659	$2,223,269	$2,096,225	$6,352,196
11	**TOTAL EXPENDITURE FOR APPROVAL (Including P(90) Risk)**	**$116,537**	**$580,014**	**$8,698,972**	**$47,394,861**	**$48,062,120**	**$47,795,217**	**$161,282,016**

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