

Settlement Residue Auctions, Units, and Inter-Regional Settlement Residues

1. Executive Summary

This note provides an explanation of Inter-Regional Settlement Residues (IRSRs), Settlement Residue Auctions (SRAs), and negative residues (arising from “counter-price flows”) associated with interconnection within the National Electricity Market (NEM). It sets out how these mechanisms operate and their financial significance.

Settlement residues arise when regional electricity prices separate due to interconnector constraints. These residues are overwhelmingly positive and are redistributed through AEMO run auctions known as SRAs. Negative residues do occur, but only in rare and tightly constrained circumstances when power flows counter to price signals (historical operation shows this to be ~1% of positive residuals for Basslink).

Regulated interconnector arrangements materially improve the efficiency of market outcomes by ensuring maximum link flows and the dispatch of the lowest cost generation in the NEM.

2. Background and Context

The NEM operates under the foundational settlement principle that total revenues collected from consumers equal total payments made to generators. In practice this means all generators in a region are paid the regional spot price, and all electricity consumers in that region pay the regional spot price for their loss-adjusted volumes, irrespective of individual contract positions.

Under normal operating conditions, prices can be set by a generator within a region, or by a generator in a connected region. Because of this, regional prices in interconnected regions are closely aligned and prices will equalise across regions^[1] so long as there is room for additional power to flow. Regional prices will separate when interconnectors reach their operating limits because the next MW of power can no longer be sourced from the importing region. When this occurs, AEMO’s settlement position in each region is no longer individually balanced, giving rise to IRSRs across regions.

Illustrative Worked Example

The following simplified example demonstrates how IRSRs arise when regional prices separate due to an interconnector constraint.

Assume, in a single trading hour:

- Basslink is flowing northward at its maximum capacity of **500 MW**.
- Tasmanian demand is **1,000 MW**, with total Tasmanian generation of **1,500 MW**.

- Victorian demand is **10,000 MW**, with Victorian generation of **9,500 MW**.
- The Tasmanian regional price is **\$100/MWh**.
- The Victorian regional price is **\$300/MWh**.

Tasmania

- Wholesale customers (i.e. retailers, BBA) pay: $1,000 \text{ MW} \times \$100/\text{MWh} =$
\$100,000
- Generators are paid: $1,500 \text{ MW} \times \$100/\text{MWh} =$ **\$150,000**
- Net settlement position: **-\$50,000**

Victoria

- Consumers pay: $10,000 \text{ MW} \times \$300/\text{MWh} =$ **\$3,000,000**
- Generators are paid: $9,500 \text{ MW} \times \$300/\text{MWh} =$ **\$2,850,000**
- Net settlement position: **+\$150,000**

Net Outcome Across Both Regions

Across Tasmania and Victoria combined, AEMO collects **\$100,000 more than it pays to generators**. This net amount is the **IRSR** for the hour.

This outcome can also be expressed more directly as:

$$\begin{aligned} \text{IRSR} &= (\text{Price difference between regions}) \times \text{interconnector flow} \\ &= (\$300 - \$100) \times 500 \text{ MW} = \mathbf{\$100,000} \end{aligned}$$

[Note in practice there are also small adjustments made for transmission losses across the link but this simplified example does not detail this.]

Consistent with market rules, AEMO does not retain this surplus. Instead, the rights to portions of these IRSRs are sold as Units through **Settlement Residue Auctions (SRAs)**. These auctions are conducted progressively in advance of the operating period.

3. Settlement Residue Auctions (SRAs) and Inter-Regional Settlement Residues

SRAs are the mechanism through which Units are acquired. These Units form the basis for the distribution of IRSRs to market participants.

Key characteristics include:

- Units are auctioned incrementally in quarterly auctions over a three-year horizon preceding the quarter of interest.
- Units are directional between regions (i.e. VIC to TAS Units and Tas to VIC Units are separate and will relate to separate residue pools for settlement)
- Participants acquire Units representing financial rights to a proportion of IRSRs, independent of physical generation or load.

- In the auction the Units are allocated to the highest price bids progressively in order until all Units are allocated. The clearing price for the auction (the price all participants pay) is set by the lowest price bid that is allocated a Unit after they have all been allocated^[2].
- Auction proceeds are distributed to the Coordinating TNSP for the importing region
- Units are used by generators and retailers to manage exposure to regional price separation.
- Speculative participation is possible but involves risk in the absence of a natural hedging position.
- IRSRs are calculated directionally for each trading interval based on the net energy flow between regions.
- We understand AEMO intends to auction 500 units for northward flows and 500 units for southward flows for Basslink. Each unit will therefore relate to 1/500th of the settlement residues for the relevant direction of flow.
- AEMO allocates all positive settlement residues to the owners of the relevant Units (net of the allocation fees arising from the auction expenses).

For example, a participant holding 50% (or 250) of the northward SRA Units for the relevant quarter in the worked example above would receive **\$50,000** for that hour^[3].

4. Direction of Flow and Units

Settlement residues arise regardless of the direction of interconnector flow.

- Northward flows (Tasmania to Victoria) relate to **TAS-VIC SRA Units**.
- Southward flows (Victoria to Tasmania) relate to **VIC-TAS SRA Units**.

Usually residues are **positive** (that is because when an interconnector is constrained, power is generally flowing from a lower-priced towards a higher-priced region).

Negative residues occur only when there are ‘counter price flows’ - ie: **power flows from a higher priced region to a lower priced region**. Exports or imports do not systematically generate negative residues.

This outcome is contrary to normal dispatch logic and occurs only under rare operating conditions, typically involving multiple, interacting transmission constraints; or at times where AEMO has intervened in the dispatch process.

In the case of Basslink, negative residues:

- Make up only around 1% of all residues historically
- Are typically associated with brief transitions between import and export modes.
- Generally occur at low flows, materially limiting financial impact.

For regulated interconnectors, AEMO actively monitors the forecast level of counter-price flows and will take steps to constrain counter-price flows when negative residues

are forecast to exceed a defined threshold of \$100k in a period, further reducing risk of material negative residues accruing.

Negative residues for regulated interconnectors are allocated to the co-ordinating Transmission Network Service Provider (TNSP) for the importing region. Negative Residues are not offset against positive residues, nor are they charged to the holders of Units.

5. Cashflows from SRA Proceeds and from IRSR settlements

The settlement of the IRSR proceeds is entirely separate to the auction process. Positive residues are distributed to the parties that bought Units in the preceding auctions in proportion to their Unit holdings. Negative residues are collected weekly from the appropriate TNSPs.

Settlement residues are not netted off against the regulated revenue for the interconnector before being provided to unit holders. Unit holders are entitled to all the positive IRSRs in respect of the relevant quarter and direction of flow their units relate to.

A co-ordinating TNSP is appointed for any region where there is more than one TNSP. It is responsible for collecting revenue on its own behalf as well as for other TNSPs in the region. For Tasmania we understand TasNetworks is likely to be appointed the co-ordinating TNSP. It will recover transmission charges from customers to meet its own revenue requirements related to the Tasmanian transmission system plus charges to cover the Tasmanian portion of Basslink's revenue requirements.

AEMO will allocate the auction proceeds generated by the sale of Units at the SRA process to the coordinating TNSP for the importing region. In the case of Basslink this means AEMO will allocate the auction proceeds for the Inter-regional settlement residues for southward flows on Basslink to TasNetworks. TasNetworks are required to apply these proceeds to reduce or offset APA's revenue requirements in Tasmania.

7. Impacts of Regulated Interconnection on Hydro Tasmania

Concerns that regulated arrangements reduce Hydro's revenues are unfounded.

Historically Hydro paid Basslink's owner for two key rights:

- The right to receive inter-regional revenue rights; and
- The commitment from Basslink that the link would be available to the market for free.

Inter-regional settlement residues are sometimes loosely referred to as providing "access" to the Victorian price. That can be a helpful in some contexts, but it can also overstate their significance.

Access to the Victorian price is primarily provided by having an open (free) link, which makes Tas and Vic operate like one region when the link is flowing unconstrained.

We say a free link enables us to access Victorian prices because prices will flow across a free interconnector (adjusted for losses) up until the point where the link is constrained (that is full capacity is reached)

By way of example: if Basslink is flowing freely (not at a limit) and the marginal (price setting) generator is a Victorian generator then that generator's bid will set the price in both Victoria and Tasmania and the prices for Victoria and Tasmania will therefore be the same (except for small differences to account for losses in the network).

Under regulation:

- Basslink will be made available to the market for free indefinitely.
- A free interconnector benefits the entire market as it enables the cheapest generation available in the NEM to be dispatched meet demand.
- This aspect of regulation should result in significantly higher utilisation of the link in both directions relative to this year; and will enable energy to flow between regions without any toll being applied. This is expected to increase Hydro Tasmania's net revenues materially.
- Hydro Tasmania will also have the ability to bid for Units at auction should it choose to do so as part of its strategy for any given quarter.

The benefits of regulation and reasons Hydro Tasmania supports it are also detailed in [Hydro Tasmania's public submissions](#) to the Australian Energy Regulator.

8. Key Conclusions

- IRSRs are a normal and expected outcome of price separation between regions in the NEM.
- SRAs provide an effective, transparent mechanism for selling the Units that form the basis of allocating IRSR revenues for regulated interconnectors.
- Negative residues are rare, small, and there are operational controls which AEMO will apply to ensure they are not excessive.
- Regulated interconnector arrangements materially improve outcomes for Hydro Tasmania and market efficiency overall.

^[1] Except for differences due to losses

^[2] If insufficient bids were received to clear all units the units sold would be priced at \$0 and the unsold units will be auctioned off in subsequent auctions. If after all auctions for a quarter there are still unsold units the IRSRs for those units are allocated to the relevant co-ordinating TNSP.

^[3] Note settlements in the NEM are actually calculated on a 5-minute basis, but this example is for an hour to keep the math simple.