

NEMMCO

NEMMCO and the NEM

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NEMMCO and the NEM

Topics to be discussed:

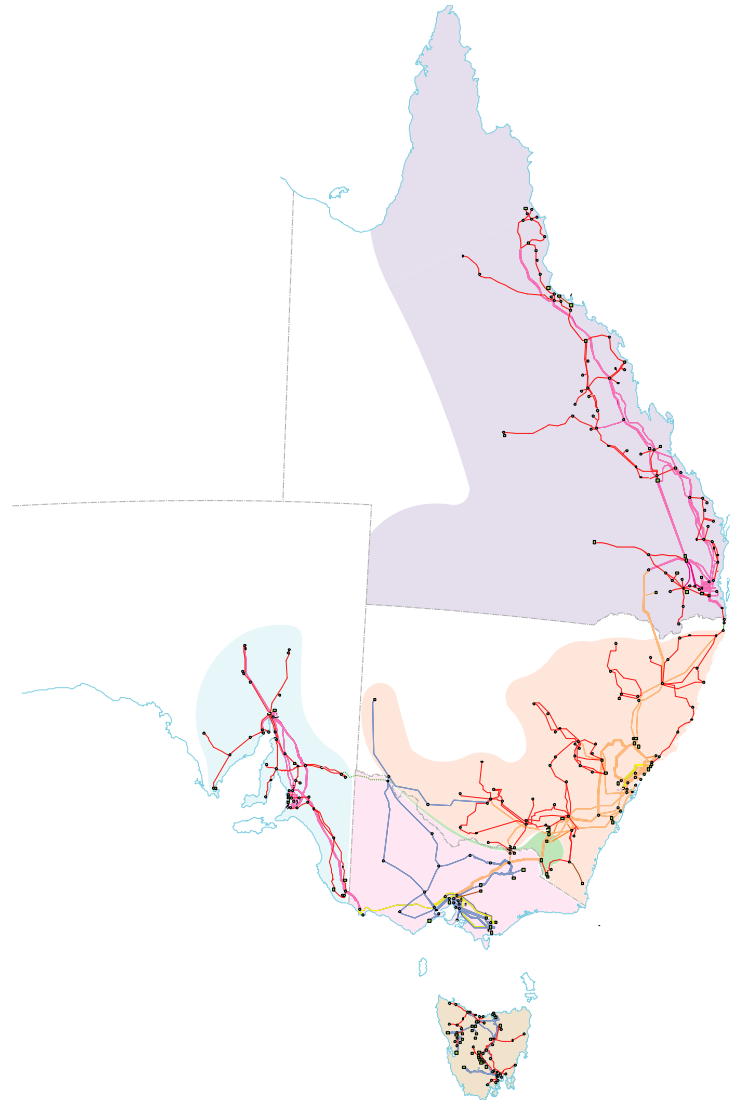
- The National Electricity Market (NEM)
- Market Operator Responsibilities
- System Operations
- Spot and Financial Markets
- Metering and Settlement
- Market Developments
- Basslink Information
- Questions

NEMMCO and the NEM

What is the NEM?

- Wholesale market for electricity
- Commenced operating in December 1998
- Operates 24 hours a day, every day of the year
- Supplies electricity to QLD, NSW, ACT, VIC, TAS and SA
- Consists of six regions based on State boundaries with ACT included in NSW, and Snowy a region of its own
- Interconnected power system stretches more than 5000 km from Port Douglas in Queensland to Hobart in Tasmania and Port Lincoln in South Australia

The National Electricity Market



Why the NEM was created

Government of the 1990s undertook to de-regulate the electricity supply industry:

- driven by principles of economic rationalism and competition
- required the disaggregation of government-owned electricity authorities into generation, transmission, distribution and retail sales sectors
- intended to increase competition for the industry and provide more choice for customers
- undertaken also to deliver benefits to the national economy

Requirements of the National Electricity Code

From 1996, the Code required NEMMCO to develop and operate a NEM that:

- was competitive
- facilitated choice of supplier for all end-use customers
- provided open access to transmission and distribution networks
- did not favour existing market participants over potential market participants
- did not favour one fuel type or technology over any other fuel type or technology
- did not favour intrastate trading over interstate trading

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NEM Objective introduced in the National Electricity Rules from 1 July 2005:

“To promote efficient investment in, and use of, electricity services for the long term interests of consumers of electricity with respect of price, quality, reliability and security of supply of electricity and the reliability, safety and security of the national electricity system.”

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Three regulatory bodies:

- Australian Energy Market Commission (AEMC) – makes the Rules and develops the market
- Australian Energy Regulator (AER) – monitors compliance with and enforces the Rules
- NEMMCO – registers participants and manages prudential supervision of their trading activities

Note: NEMMCO established Regulatory Affairs and Compliance team in 2005 to coordinate liaison with the AEMC and the AER

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Reliability

A measure of the power system's capacity to supply a sufficient quantity of electricity to satisfy customer demand (minimise supply shortages)

Security

A measure of the power system's capacity to continue operating within its defined technical limits despite disconnection of a major power system element such as a generator or interconnector (return to normal operation after an incident of supply shortage)

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General Statistics

- More than 5000 km network span in the Eastern and South-Eastern States
- Six NEM regions
- Approximately 120 registered participants, registered in seven categories
- Eight million end-users serviced
- Up to \$11.5 billion energy traded annually
- Spot price less than \$40/MWh for more than 90% of trading intervals
- \$10,000/MWh is the maximum allowable price in the spot market

Market Operator responsibilities

- Keeping the lights on
- Registering participants in the NEM
- Operating the power system within technical requirements
- Matching supply to demand, in the lowest-cost way
- Maintaining prudential standards for participants
- Financially settling the market on a weekly basis
- Coordinating inter-regional transmission planning

Registered Participants

There are six categories of registered participant

- Generators (scheduled, non-scheduled, market, non-market)
- Customers (market customer, first-tier, second-tier)
- Market participants (market customers, market generators, market network service providers)
- Network service providers (market, scheduled)
- Traders (participate in settlement residue auctions)
- Special participants (system operators or agents)

Forecasting Supply Capability

NEMMCO produces a variety of forecasts to ensure adequate supply is available to meet dynamic and future demand:

| | |
|-------------|--|
| Annually | Statement of Opportunities (SOO) and Annual National Transmission Statement (ANTS) |
| Weekly | Two-year reserve forecast (MT-PASA) |
| Two-hourly | Seven-day reserve forecast (ST-PASA) |
| Half-hourly | Pre-dispatch forecast – next trading interval to end of next trading day |
| Five-minute | Dispatch targets and prices set on dynamic signals |

Bidding, Scheduling and Dispatch

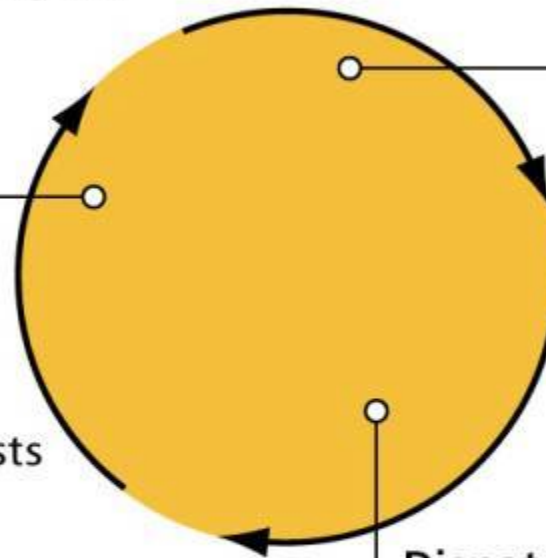
- generators bid to produce every 5 minutes every day of the year
- bids detail quantity, time and price of production
- all bids stacked according to price (see later slide)
- the most cost-effective generators are scheduled to meet demand
- adequate reserves must be maintained to protect the system and maintain supply reliability in case of major plant failure
- separate spot price for each region each half-hour
- growth of demand is driven by domestic air-conditioning and information technology

Generation-Dispatch Cycle:

The Generator-Dispatch Cycle

Data input

- Establishing current operational status of generating units
- Assessing demand forecasts
- Applying loss factors
- Determining system conditions



Scheduling

- Ranking bids
- Identifying the dispatch levels of generating units

Dispatch

- Issuing dispatch instructions to generators

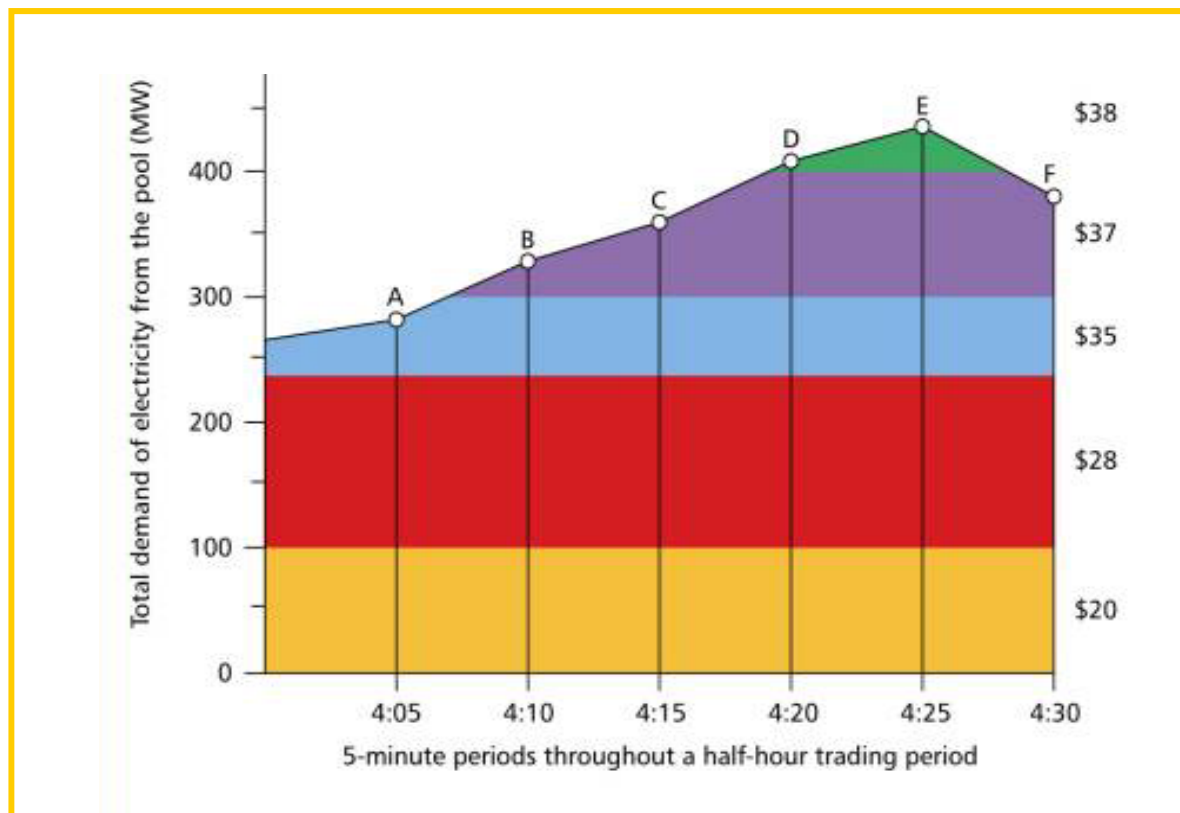
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Spot Price

- 5-minute dispatch interval
- 30-minute trading interval (average price of six dispatch interval prices)
- Spot price determined by:
 - supply and demand
 - physical limitations of interconnectors
 - transmission loss factors
 - distribution loss factors
- Difference between value of electricity in the region it is produced and its value if sold in another region is called the inter-regional settlement residue

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Generator dispatch:



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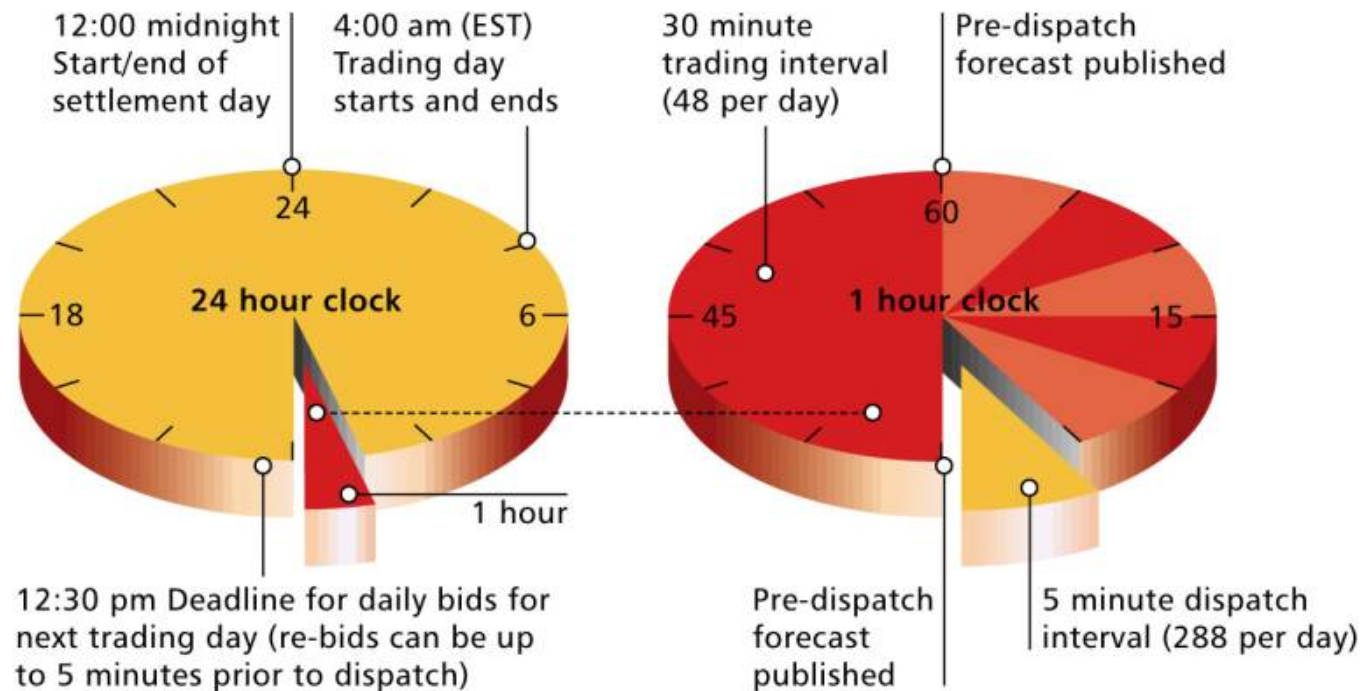
History of Spot Price Movements across the NEM

| Year | NSW | QLD | SA | SNOWY | TAS | VIC |
|-----------|-------|-------|--------|-------|--------|-------|
| 1998-1999 | 33.13 | 51.65 | 156.02 | 32.34 | | 36.33 |
| 1999-2000 | 28.27 | 44.11 | 59.27 | 27.96 | | 26.35 |
| 2000-2001 | 37.69 | 41.33 | 56.39 | 37.06 | | 44.57 |
| 2001-2002 | 34.76 | 35.34 | 31.61 | 31.59 | | 30.97 |
| 2002-2003 | 32.91 | 37.79 | 30.11 | 29.83 | | 27.56 |
| 2003-2004 | 32.37 | 28.18 | 34.86 | 30.80 | | 25.38 |
| 2004-2005 | 39.33 | 28.96 | 36.07 | 34.05 | 190.38 | 27.62 |
| 2005-2006 | 37.24 | 28.12 | 37.76 | 31.09 | 56.76 | 32.47 |
| 2006-2007 | 37.17 | 33.14 | 43.46 | 36.67 | 41.82 | 42.82 |

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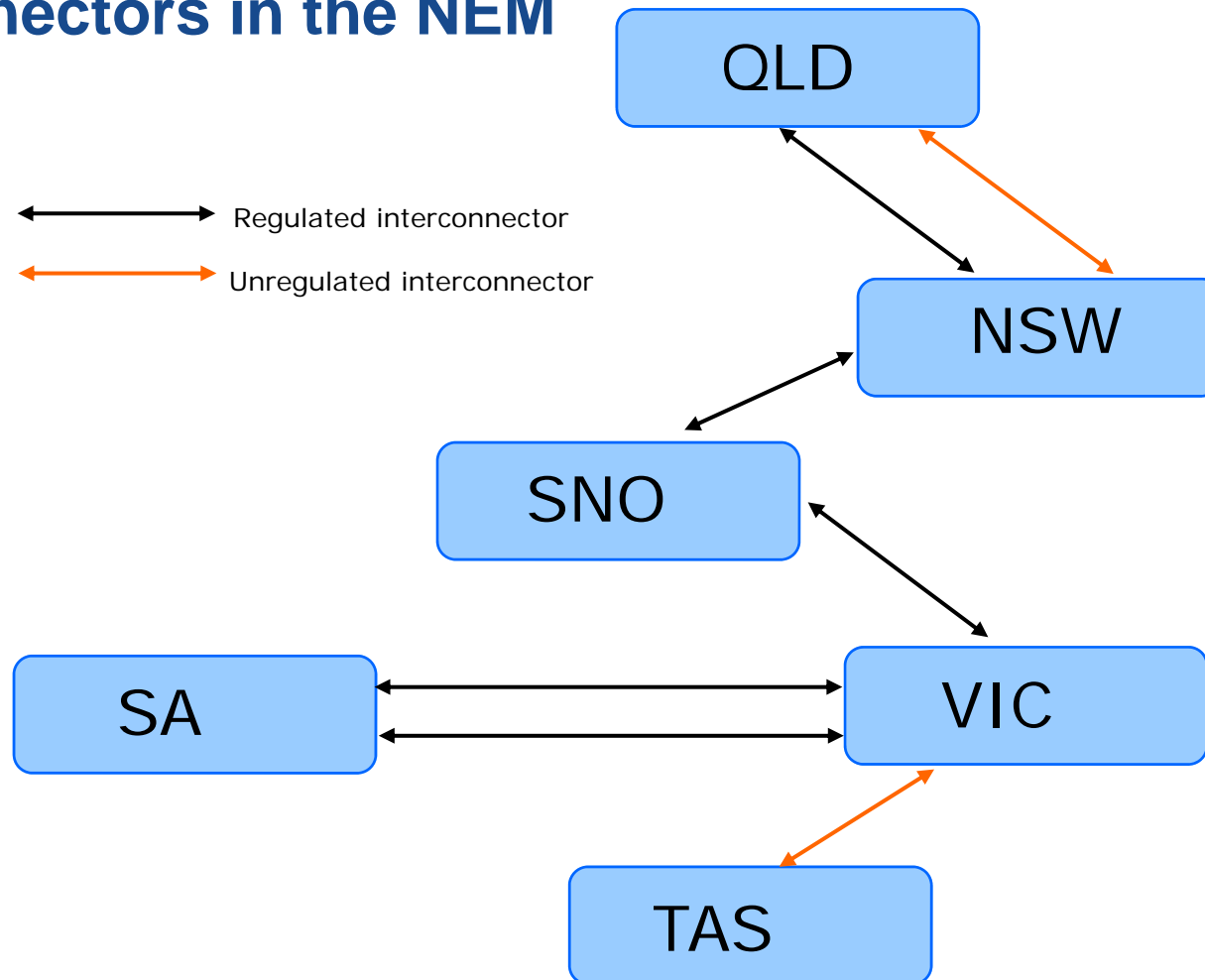
Market operations

A day in the NEM



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Interconnectors in the NEM



Ancillary Services

Services used by NEMMCO to maintain the key technical characteristics of the system, including:

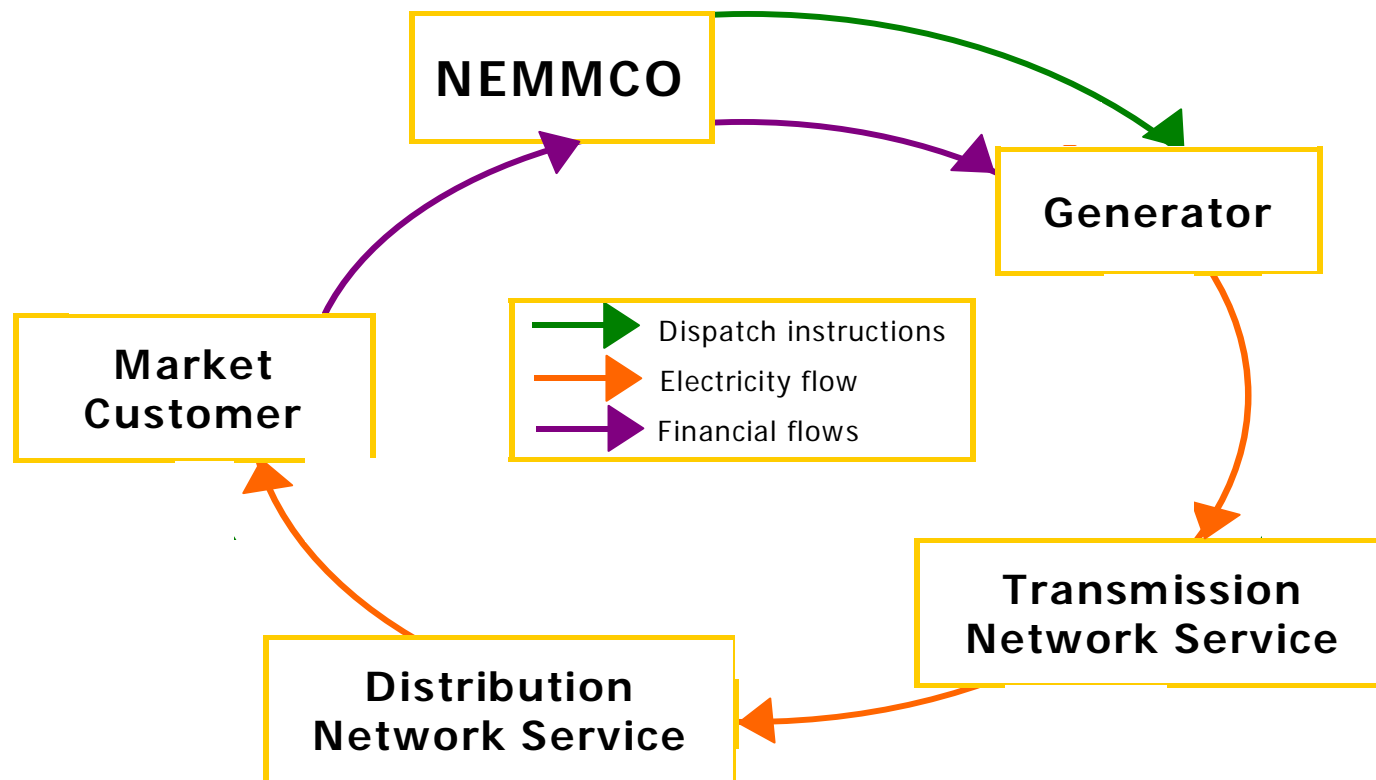
- frequency
- voltage
- network loading
- system re-start

NEMMCO operates eight separate ancillary services markets in parallel with the energy market for delivery of Frequency Control Ancillary Services (FCAS)

Other ancillary services obtained under contract arrangements

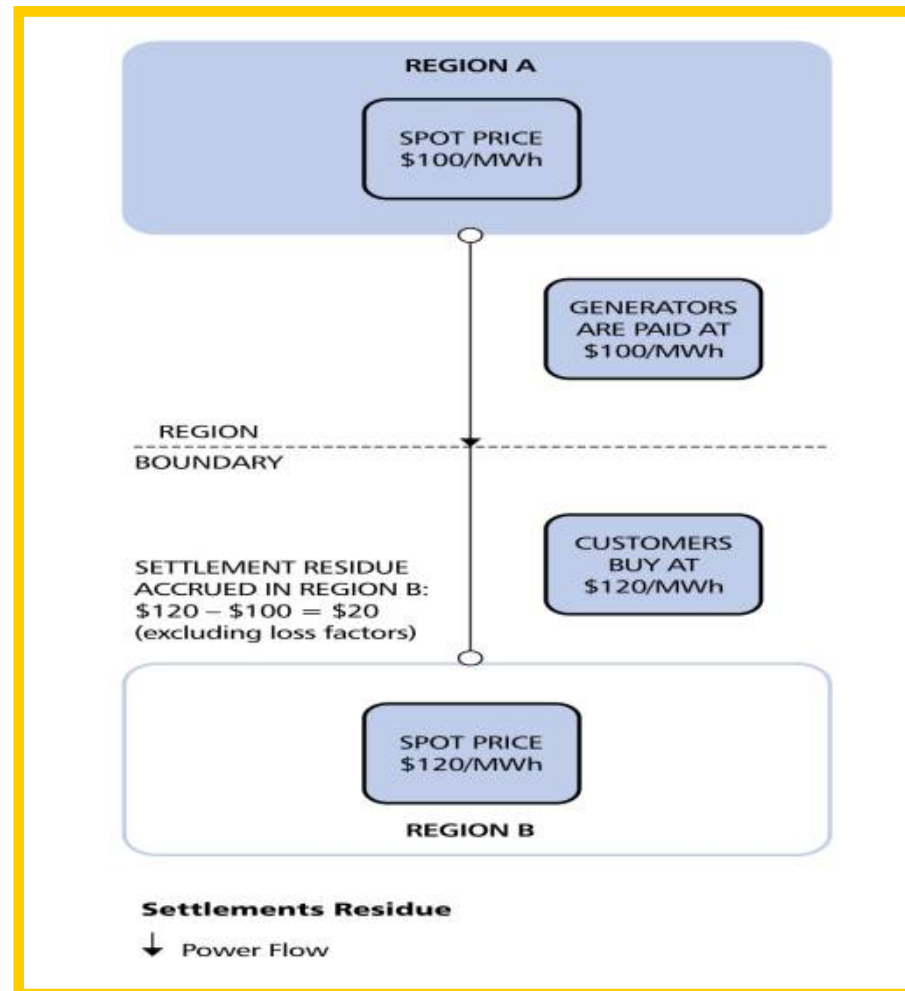
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Energy and financial flows



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Settlement residue auction



Metering

Metering refers to recording the level of production or consumption of electricity. Metering in the NEM involves:

- recording the amount of electricity flowing through the meter,
- a wide range of procedures designed to ensure the accuracy and completeness of the data from meters
- the standards of operation of the meter itself
- the means of transfer of the data to NEMMCO for use in settlement
- the quality control program underpinning installation and maintenance of metres
- the accreditation of the people who record and supply the data

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Settlement

- Billing period of 7 days comprises 336 half-hourly trading periods
- A trading interval comprises six 5-minute dispatch intervals
- Regional price is average of six dispatch price outcomes for the half hour
- Preliminary statements issued five days after end of billing period
- Final statements issues within 18 days of end of billing period
- Financial settlement required 20 days after end of billing period
- Market customers pay NEMMCO and NEMMCO pays generators for trades through the spot market
- Settlement statements revised after 20 and 30 weeks after issue using the latest metering information to ensure maximum accuracy

Full retail competition (FRC)

Electricity customers have progressively gained the right to choose their own supplier. FRC has been implemented for:

- Some large volume end-users during the pre-NEM days
- VIC and NSW end-users in January 2002
- SA end-users in January 2003
- ACT end-users in July 2003
- QLD end-users in July 2007

Increasing numbers of end-users are taking up the right to choice of supplier

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Facts about Basslink

- Basslink is an sea-bed DC cable 290 kilometres in length
- Hydro storages currently <20% capacity compared with 29% capacity in January 2007
- Basslink capable of supplying 25% of Tasmania's demand while being operated commercially
- Bell Bay gas-fired plant can supply 10–15% Tasmania's demand
- Basslink has delivered benefits in preserving hydro supplies
- Power from Basslink avoided implementation of power restrictions in the winter of 2007
- In 2007 calendar year, Tasmania imported 1902 GWh and exported 618 GWh
- Hydro Tasmania spent \$100.6 million on maintaining security of supply – this included importing power and purchasing gas to run Bell Bay
- Tasmania currently concentrating on protecting storages, planning for contingencies and using resources and assets with maximum efficiency