

Australia's Electricity Supply System and Opportunities for Network DSM

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Australian Electricity Industry Restructuring

- Restructuring of the Australian electricity supply industry (ESI) has now been proceeding for 14 years since the ESI itself set up an industry reform working group during 1990
- This process has been the most profound and major restructuring in the 100 year life of the Australian ESI
- Restructuring consists of:
 - introduction of competition
 - unbundling of ESI functions
 - reorganisation of the electricity market
 - separation of network charges
 - privatisation of electricity businesses in some States
 - formalisation of ESI regulation

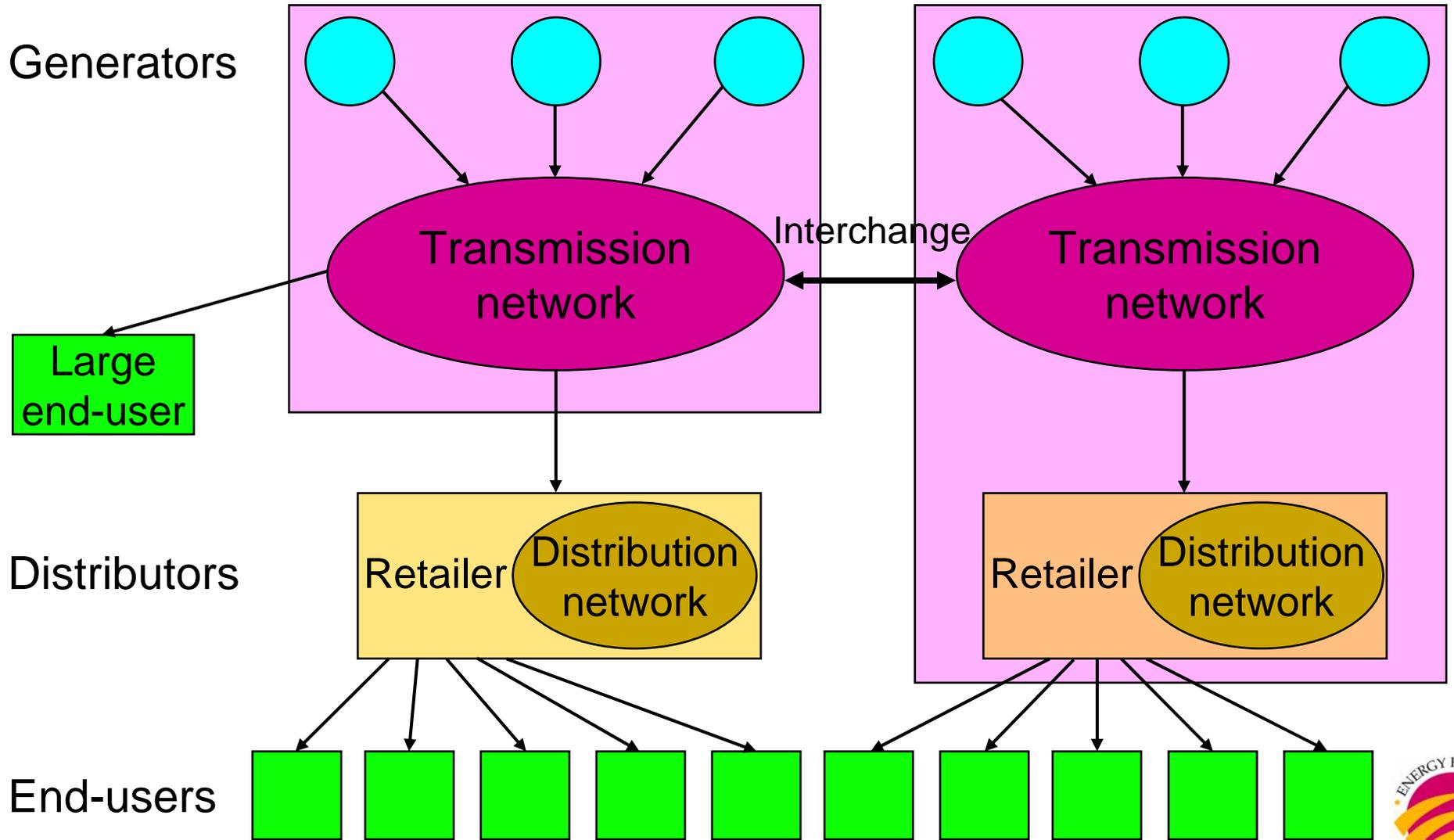
Introduction of Competition

- Competition has been introduced into the Australian ESI wherever possible
- The generation and retail supply functions have been opened to competition
- In contrast, the two 'wires' functions - transmission and distribution - are considered to be natural monopolies

Unbundling of ESI Functions (1)

- Originally, in Victoria, South Australia, Western Australia and Tasmania the four ESI functions were carried out within a single, vertically-integrated, monopoly business
- In New South Wales and Queensland:
 - generation and transmission were contained in a single monopoly business
 - distribution and retail supply were carried out by a number of businesses, each with a monopoly franchise covering a specified geographical area within the State

Model 1: Vertically Integrated Monopoly



Unbundling of ESI Functions (2)

- The four ESI functions have now been unbundled into separate businesses:
 - several competing generation businesses have been established in each State
 - a single monopoly transmission business has been established in each State
 - the geographical monopoly franchises for distribution have been retained in each State
 - a two tier system has been established for retail supply in each State

Structure for Retail Supply

- First tier retailers are attached to a distribution business with a monopoly geographical franchise in that State:
 - the retail business is “ring fenced“ from the distribution business (ie established as a separate accounting entity within one holding company)
 - first tier retailers can sell electricity to customers throughout the State
- Second tier retailers are stand-alone businesses not attached to a distribution business in that State; a second tier retailer in one State may be a first tier retailer in another State

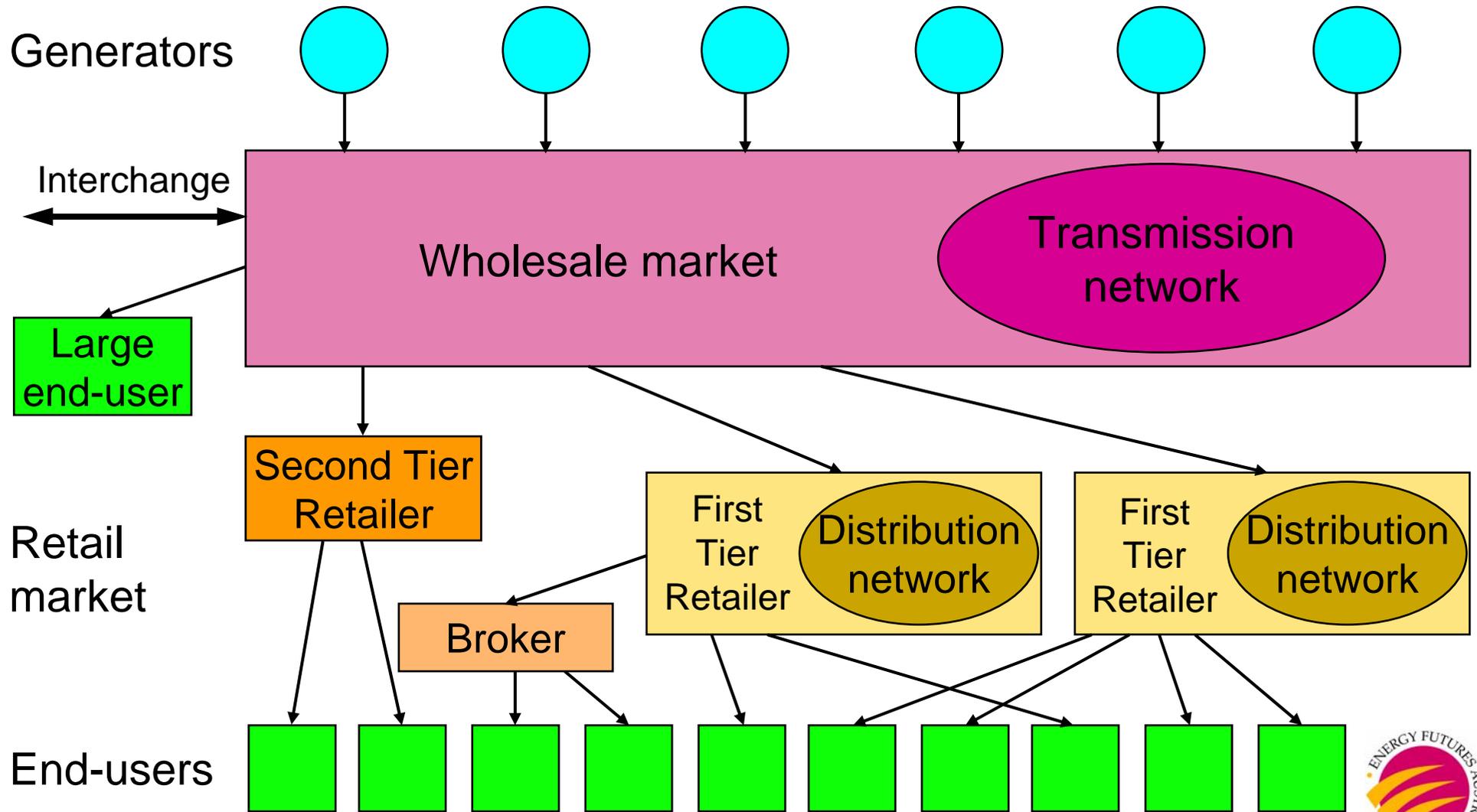
Retail Contestability (1)

- In New South Wales, Victoria and Tasmania there is full retail contestability:
 - retailers can sell electricity to all end-use customers down to the household level
 - customers may continue purchasing electricity from their local first tier retailer and the tariffs they pay are then controlled by the electricity industry regulator
 - alternatively, customers can choose to purchase electricity under a competitive retail contract from a first or second tier retailer in their State; there are no controls on prices under such competitive retail contracts

Retail Contestability (2)

- In Queensland and Western Australia, there is partial retail contestability:
 - only larger customers can be offered competitive retail contracts by retailers
 - smaller customers continue to purchase electricity under controlled tariffs from their local first tier retailer

Model 4: Unbundled, Full Competition



Reorganisation of the Electricity Market (1)

- The wholesale National Electricity Market (NEM) consists of the sale of bulk electricity by generators to retail suppliers and large end-use customers in southern and eastern Australia
- The retail market consists of sales of electricity by retail suppliers to end-use customers. This market is partly competitive and partly on a franchise basis. Retail suppliers compete to supply:
 - those large customers who choose not to purchase directly from the wholesale market; and
 - smaller customers who opt out of purchasing electricity from their first tier retailer

Reorganisation of the Electricity Market (2)

- The National Electricity Market commenced operation in December 1998 and is completely competitive, with any participant able to purchase from any other
- All wholesale electricity sold in the NEM is accounted for through spot trading in a commodities-type pool (this is called a “gross pool” or “energy-only pool” arrangement)
- Energy is traded through a pool price set every half hour by the last (most expensive) generator selected to run; pool prices are used to clear the market and despatch generation in order of price bids
- The pool price is very volatile and most purchasers manage their risk through two types of financial instruments which are traded entirely separate from the pool:
 - **bilateral long-term contracts** covering fixed amounts of energy over specified time periods under set prices
 - **short term forward market trading** in which purchasers lock in energy prices through hedging contracts (“contracts for differences”)

Separation of Network Charges

- Originally, network charges, covering the cost of transporting electricity from the generator to the point of end-use, were bundled together with energy charges in calculating the electricity price to be charged to the end use customer
- Following the reorganisation of the electricity market, both generators and end-use customers are required to pay separate network charges:
 - in the wholesale market, participants are responsible for paying connection charges and 'use of system' charges directly to their local transmission and distribution network owners
 - in the retail market, network charges incurred by contestable customers are paid for them by their retail supplier who packages these network charges together with the energy charge to provide one contract price to the end-use customer

Privatisation of Electricity Businesses (1)

- For the 50 years prior to the mid-1990s:
 - the vast majority of electricity businesses in Australia were owned by State governments
 - a small number of local distribution/retail businesses were owned by local governments (municipalities)
 - a handful of relatively small electricity businesses located in remote areas were privately owned

Privatisation of Electricity Businesses (2)

- Commencing in the mid-1990s, some State governments (eg New South Wales and Victoria) consolidated their hold on the Australian ESI by legislating to take ownership of the local government electricity businesses
- After unbundling the ESI functions into separate businesses, some State governments (eg Victoria and South Australia) sold these businesses to the private sector, including foreign owners from the United States, United Kingdom and South-east Asia
- All other States retained electricity businesses in government ownership

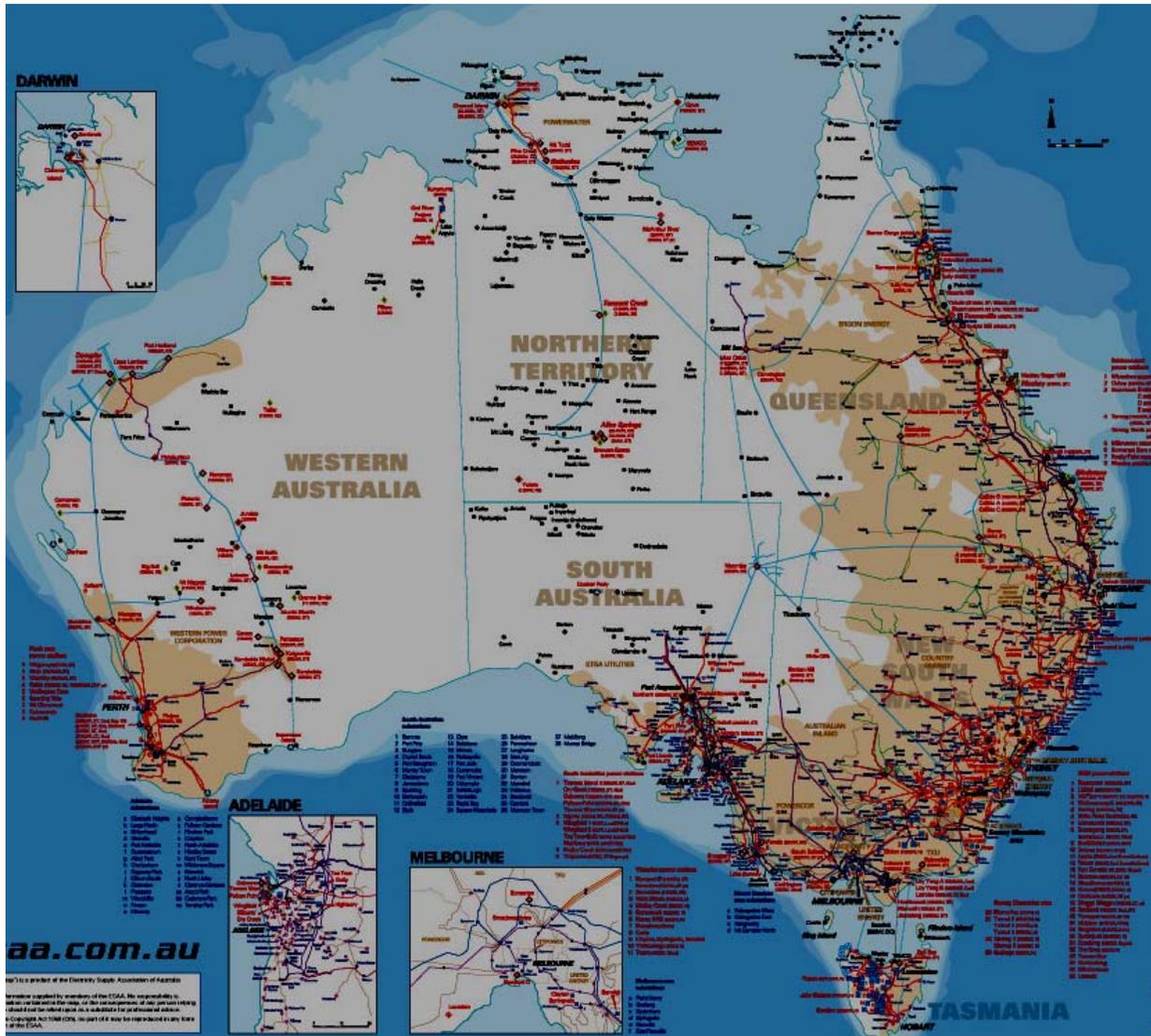
Privatisation of Electricity Businesses (3)

- More recently, there has been a wave of selling of electricity businesses by the original private sector owners to new private sector purchasers
- These new purchasers often own more than one electricity business
- The end result has been some rebundling of the ownership of the previously unbundled ESI functions, eg a single owner may own both an electricity generator and a distribution/retail business, though these must be operated as separate businesses

Formalisation of ESI Regulation

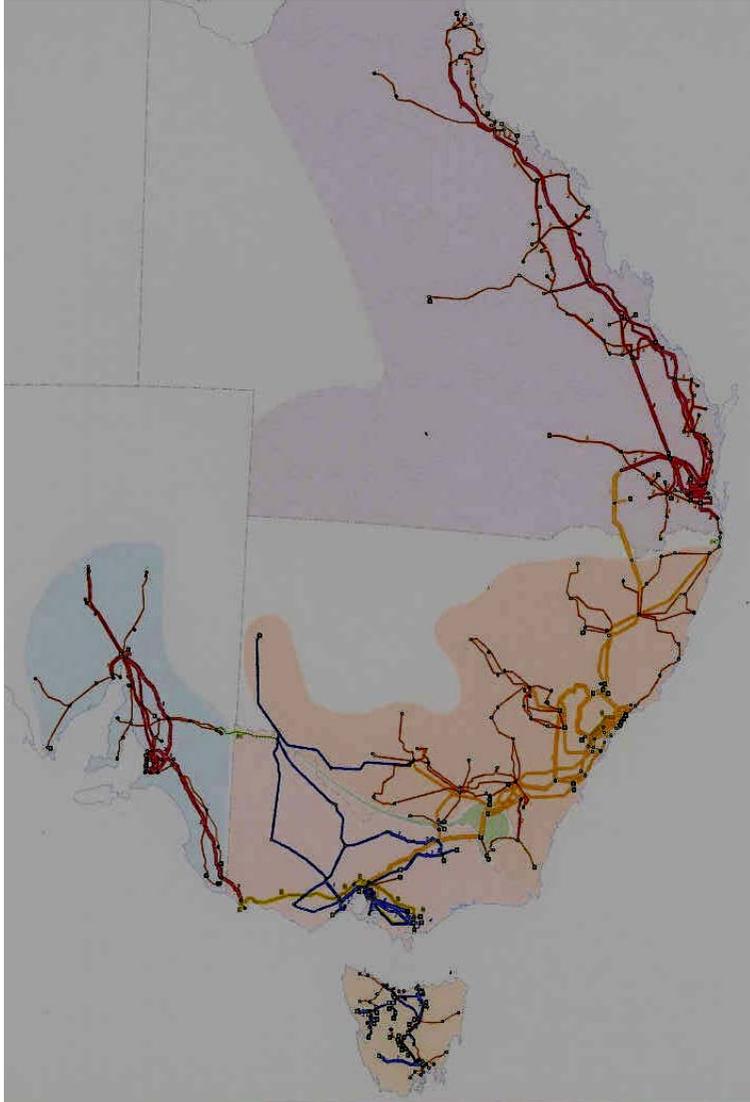
- Prior to the mid-1990s, regulation of the Australian ESI was carried out on an informal basis because most of the businesses were government-owned and were operated as a public service rather than as profit-making commercial ventures
- Once competition was introduced into the ESI, and particularly as some electricity businesses became privately owned, a more formal system of regulation was required
- Each State government has now established new agencies to regulate the ESI (plus often other industries as well)
- Currently, this State-based regulation has resulted in the Australian ESI being regulated by 13 separate agencies
- This situation is now being rationalised with regulation of the ESI being progressively transferred to national (ie federal) regulatory agencies

Australian Electricity Supply System



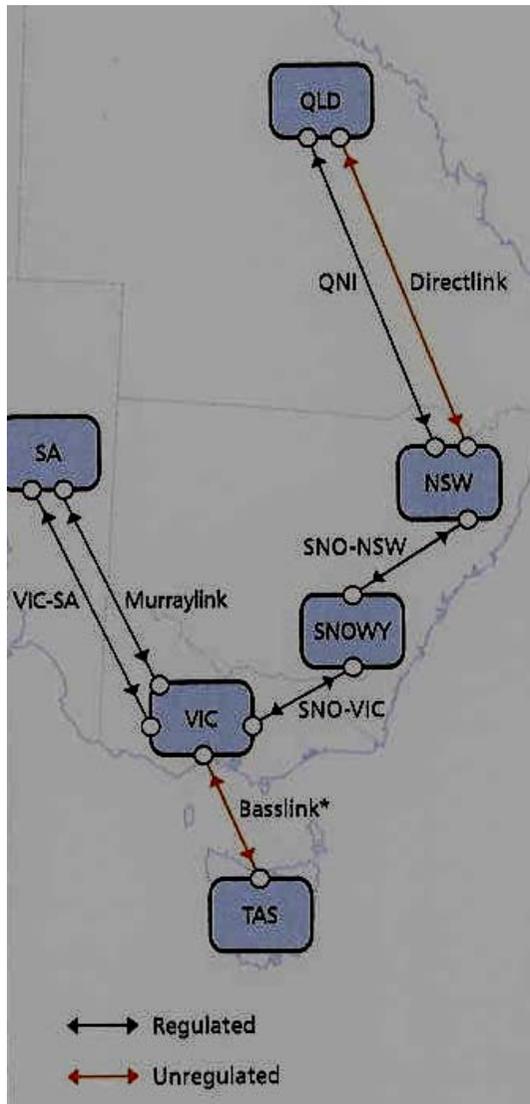
- Electricity network concentrated around population centres near the coast
- Many long rural lines and remote generation facilities

Australian National Electricity Market



- NEM operates over the interconnected network in southern and eastern Australia
- Very long “thin” network, the longest interconnected electricity system in the world, over 4000 kilometres from end to end
- Western Australia and the Northern Territory will never join the NEM

Interconnections in the NEM



- Originally developed as separate State-based networks
- Interconnections built relatively recently, most within the last 10 years
- Capacity of interconnections limited compared with the generation capacity within each of the States
- NEM is operated as individual regions (States) with limited transfers between regions

Opportunities for Network DSM (1)

- In Australia, the network owners (both transmission and distribution) are the only electricity businesses which have any motivation to carry out DSM
- The latest estimate is that upgrading and expanding electricity networks in Australia, will cost AUD11 billion (USD8 billion) over the next 10 years
- In some circumstances, DSM can cost-effectively defer some of this investment, particularly through relieving network constraints

Opportunities for Network DSM (2)

- Opportunities for network-driven DSM in Australia include:
 - deferring upgrade and expansion of network assets where load growth will soon cause capacity limits to be exceeded
 - deferring replacement of ageing network assets
 - providing voltage support for long rural lines with low loads

Network DSM Activities (1)

- In New South Wales, under an ESI Code of Practice, distribution network owners investigate DSM options before committing to building new network infrastructure
- In Sydney, land use planning approval for building new network infrastructure to augment supply to the CBD was made contingent on the transmission and distribution network owners investigating and planning DSM options for the next augmentation

Network DSM Activities (2)

- In New South Wales and South Australia, the electricity regulators provide incentives for distribution network owners who undertake DSM
- The NSW regulator recently decided to allow distribution network owners to recover:
 - approved DSM program costs, up to a maximum value equivalent to the expected avoided distribution network costs
 - approved revenue foregone as a result of DSM activities
 - rebates and payments for load reductions by customers