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Electricity Industry Restructuring - Beyond the Parer Report

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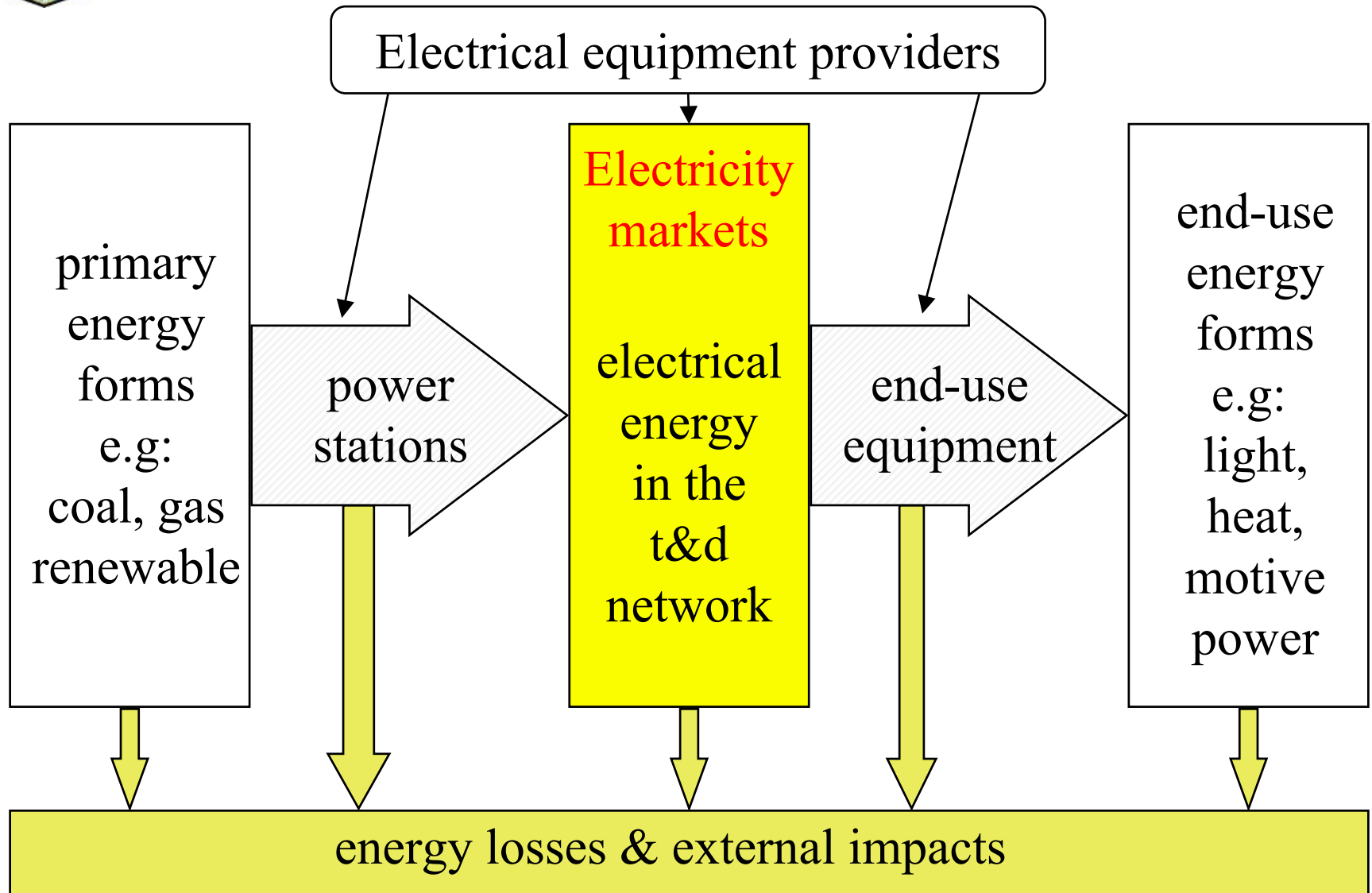


Outline

- Issues in electricity industry restructuring
- Deficiencies identified in the report
- Report recommendations
- Conclusions & recommendations

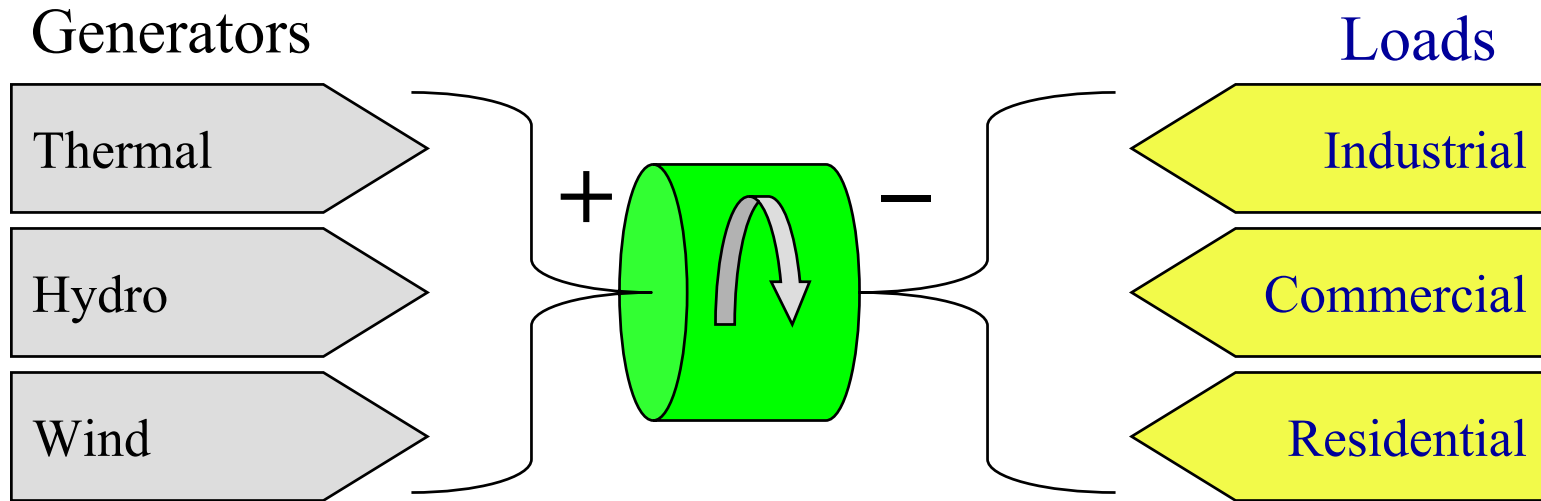


The electricity industry conversion chain





Supply-demand balance in the electricity industry



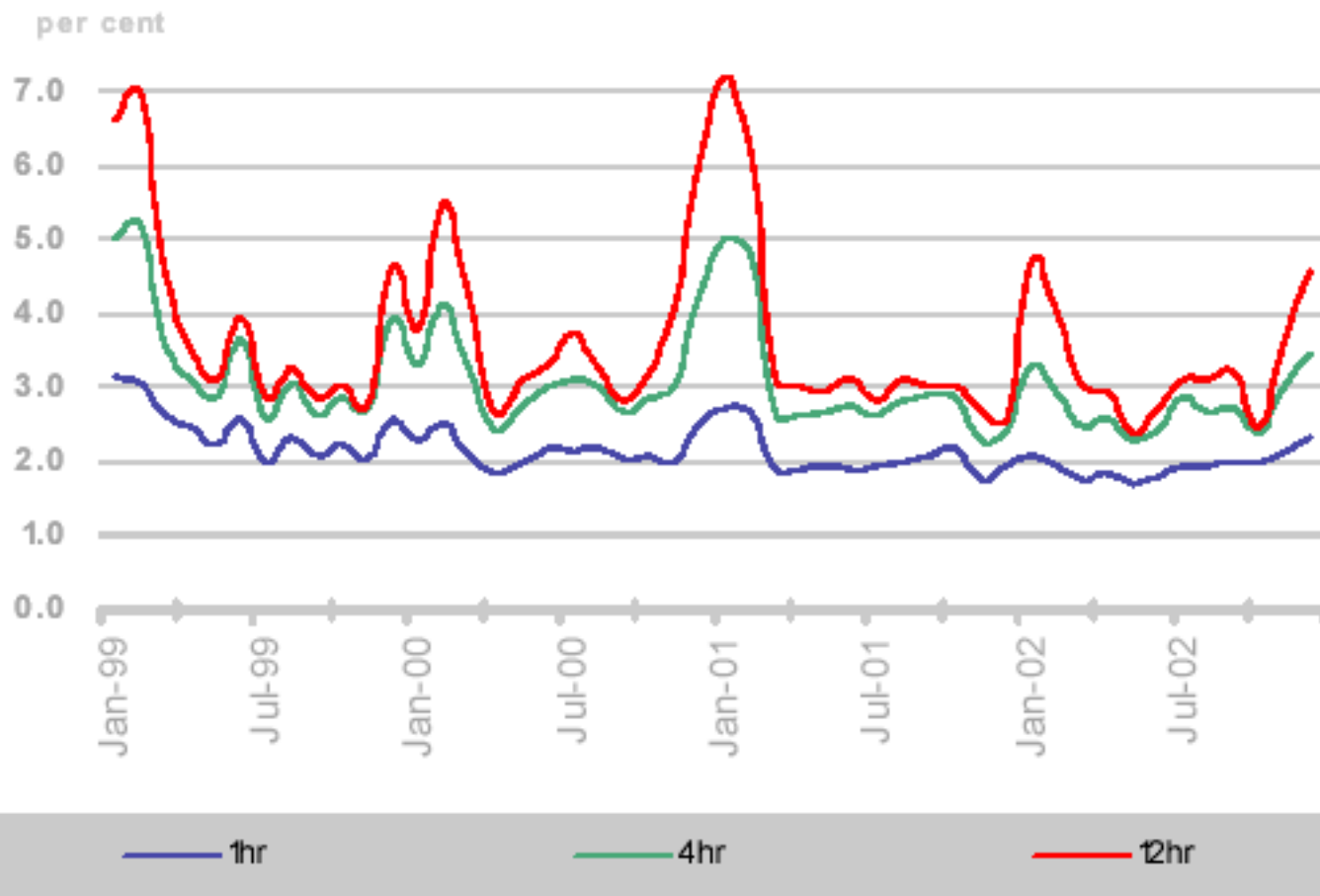
Kinetic energy of rotating masses connected via the network
 $KE \propto (\text{frequency})^2$ for slow oscillations in frequency (<0.1 Hz)

- Frequency is a measure of supply-demand balance:
 - Rate of change of KE = generator power minus load power
- Generator & load powers & network availability are stochastic processes:
 - Hence frequency is always varying
- Wind farms will make frequency more variable:
 - Does this matter & if so, who should pay for additional control action?



Smoothed demand forecast errors

SA,02 Q4 (NECA, 02Q4 Stats, 2003)





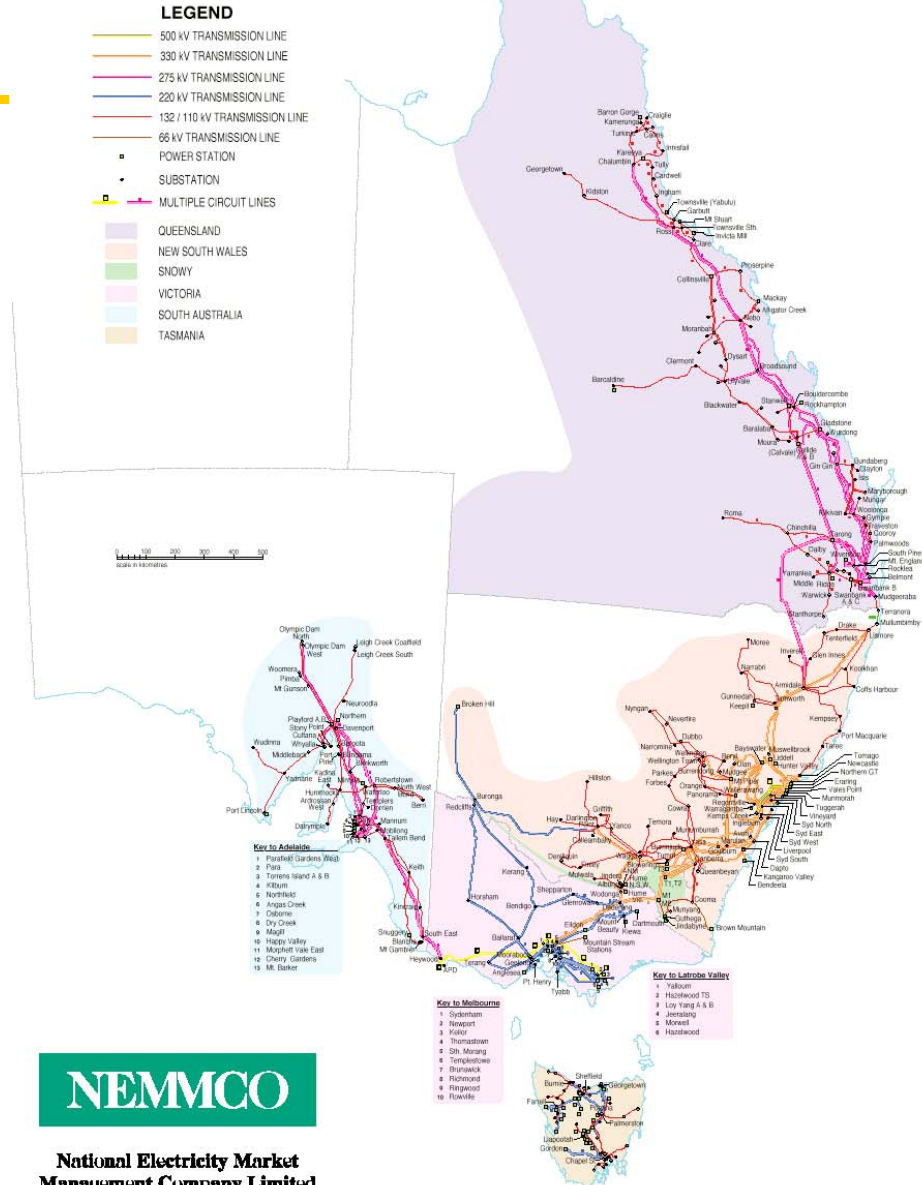
States participating in the National Electricity Market

- Queensland
- New South Wales & ACT
- Victoria
- South Australia
- Tasmania (on connection to the mainland)

NEM regions are indicated, and their boundaries need not be on state borders (e.g. two regions in NSW)

Queensland was originally expected to have 3 NEM regions

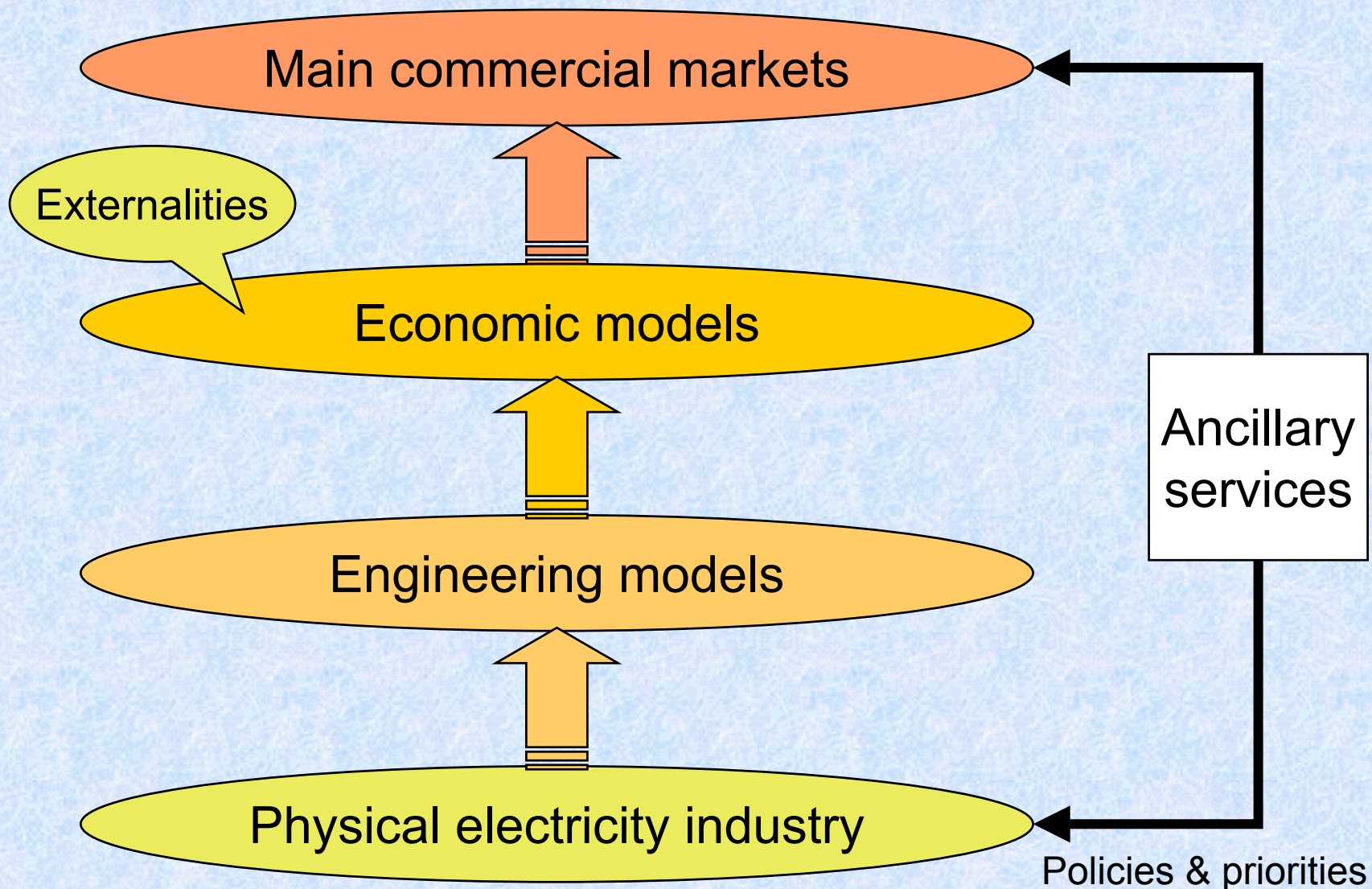
REGIONAL BOUNDARIES for the NATIONAL ELECTRICITY MARKET



National Electricity Market Management Company Limited

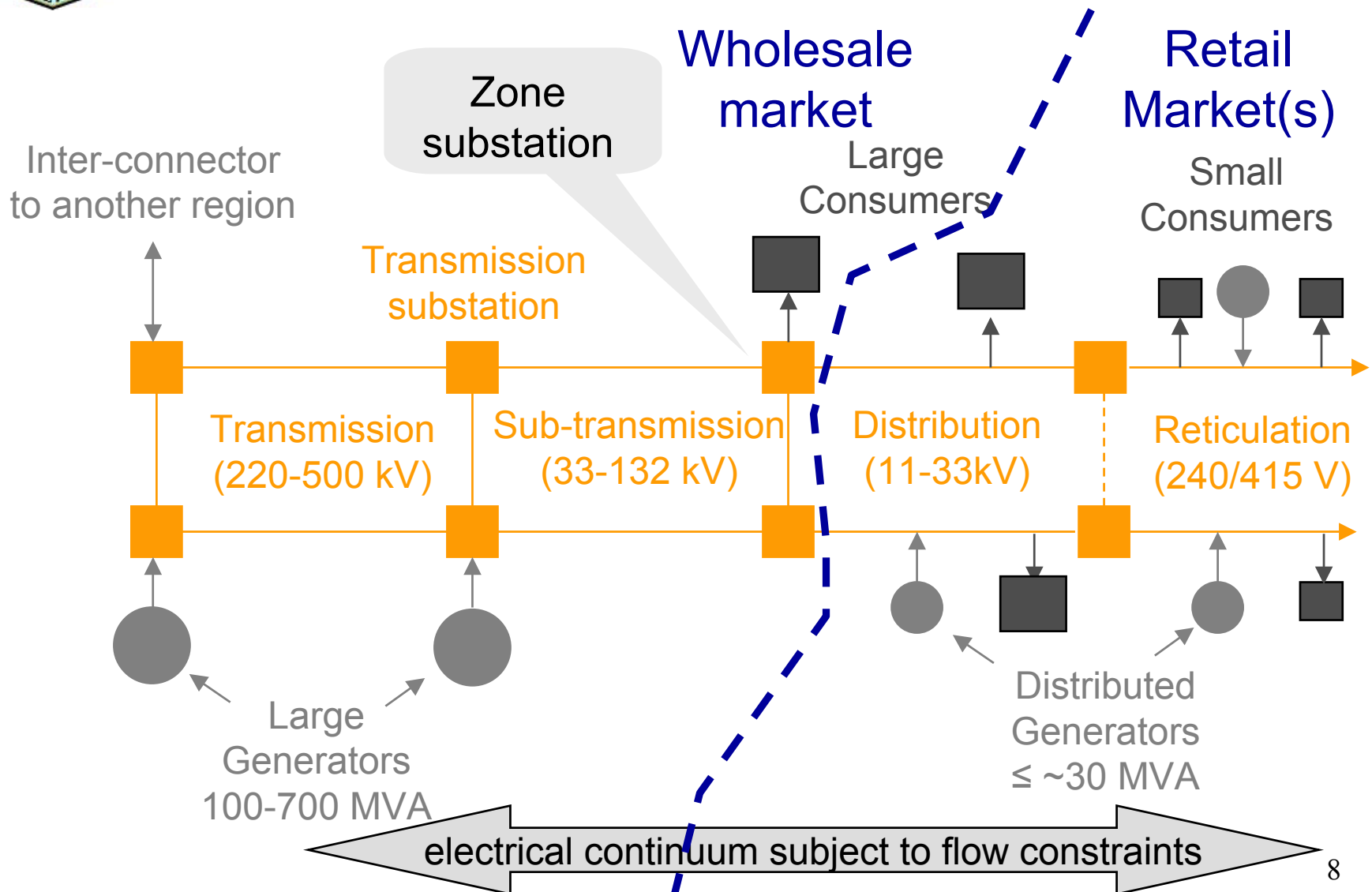


Trading in electricity:- an **abstraction** from reality



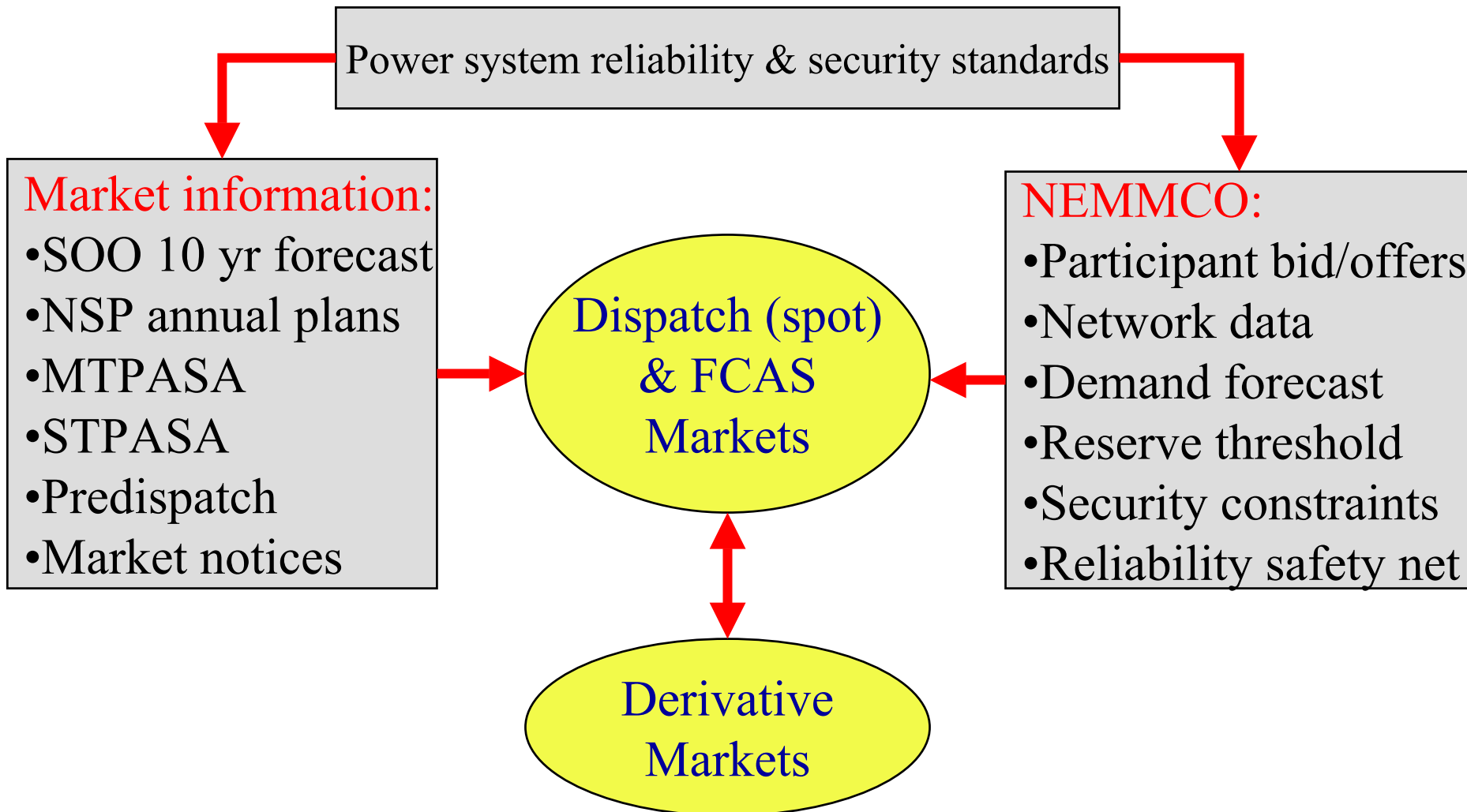


Overlay of wholesale & retail markets on an electricity industry



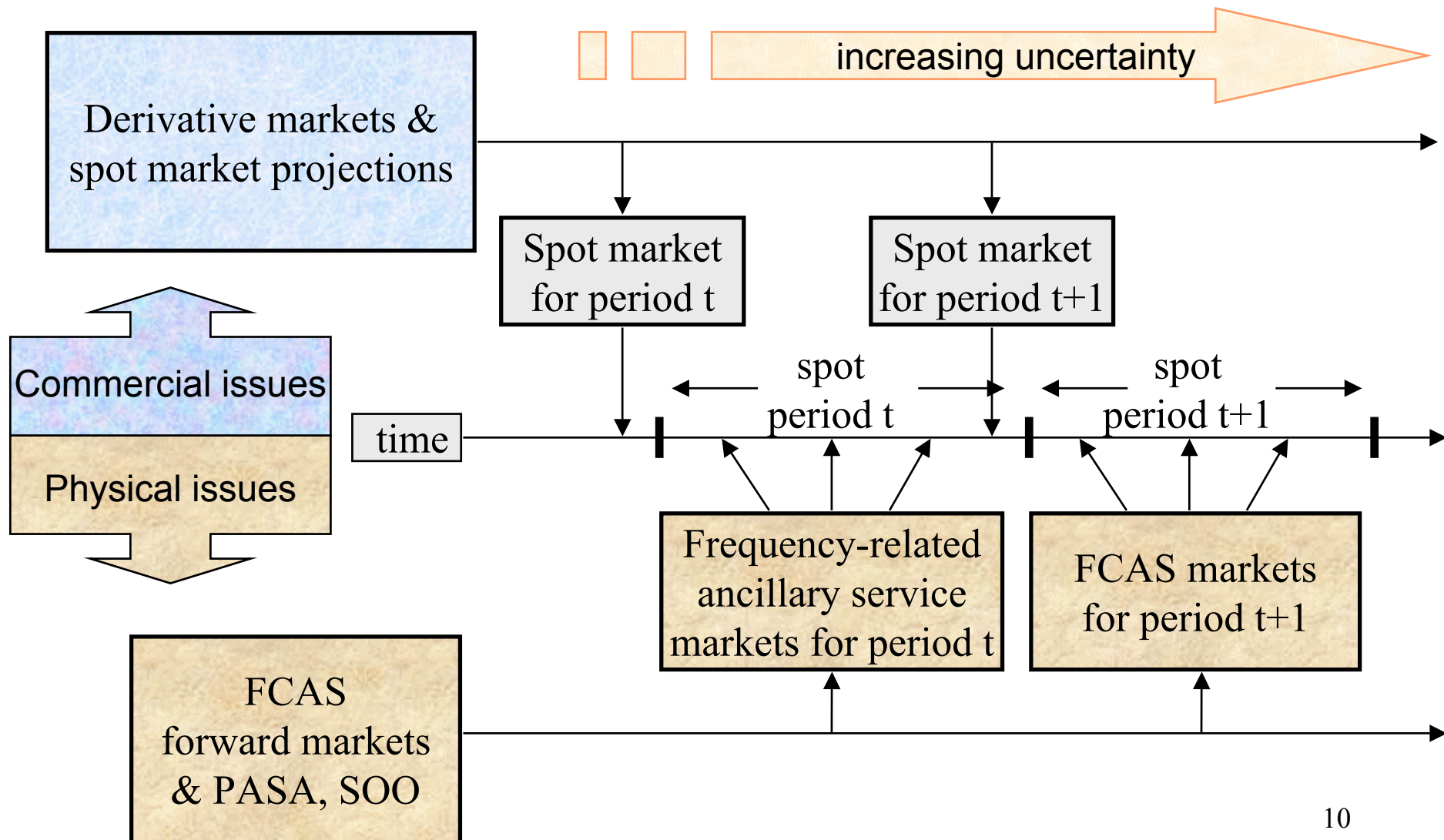


NEM processes for managing supply-demand balance



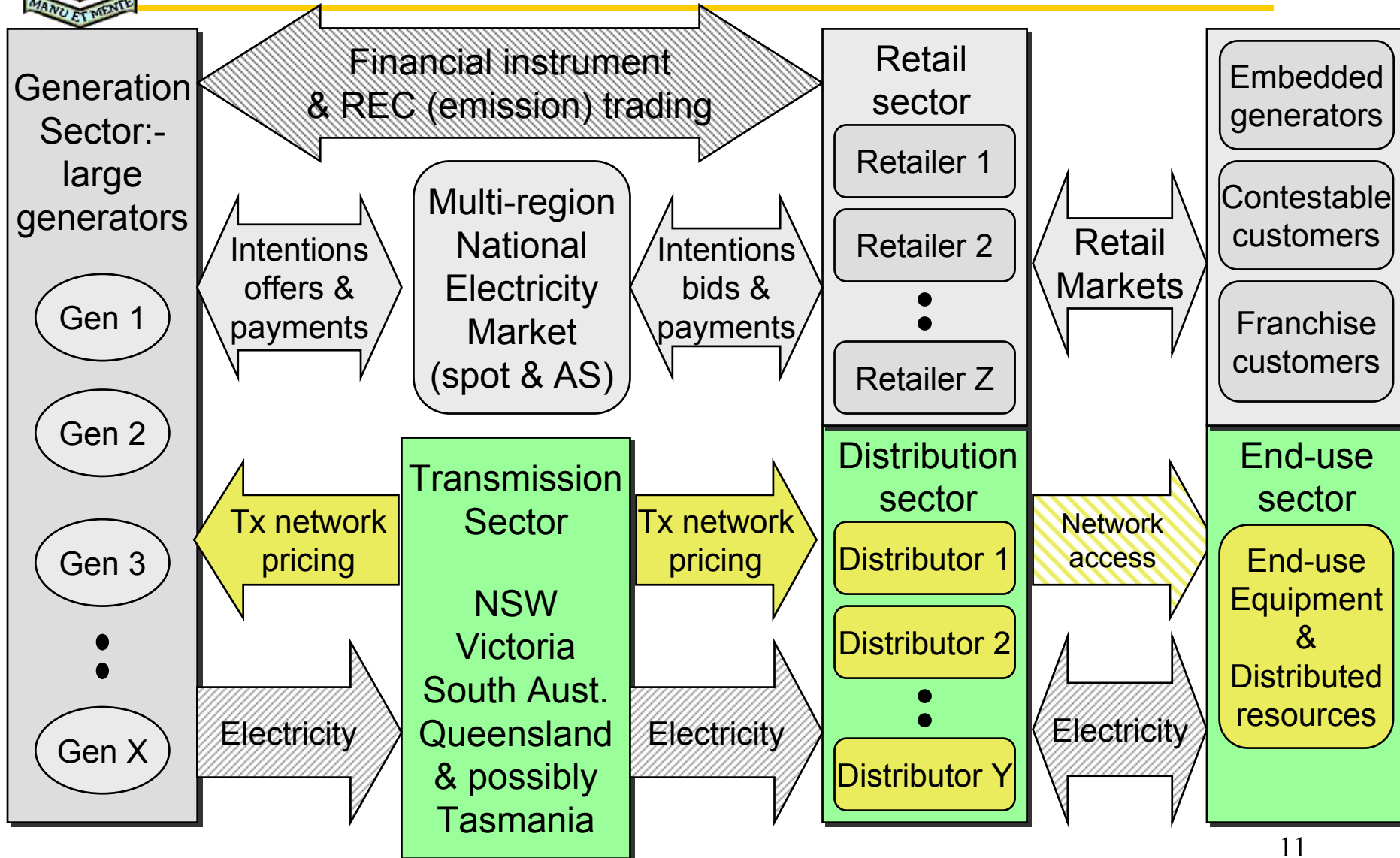


Timeline for electricity trading in NEM





Electricity industry structure in SE Australia





Summary of EI restructuring issues

- Non-storable flows of electrical energy:
 - Stochastic, inter-dependent services:
 - Generators, network elements, loads
- Individual and group decision making by all industry participants:
 - Technical, social & environmental links
- Important abstractions in restructuring:
 - Technical, commercial & policy processes
 - Market-based & centralised decision making



Electricity industry behaviour that is difficult to commercialise

- Continuous, shared energy flow from power stations to end-use equipment via network:
 - Instantaneously variable with time & location
 - Availability & quality can degrade rapidly
- Shared accountability for availability & quality
 - High-value end-uses have high commercial risks
 - Managed *collectively* by *ancillary services* (AS):
 - Quality (frequency, voltage), Availability & Safety (including security and fault detection & clearance)
 - Network plays an important “aggregation” role in AS



Deficiencies identified in the report

- ✓ • Confused governance; excessive regulation; perceived conflicts of interest
- ? • Insufficient generator competition in spot market
- ✓ • Flawed electricity network operation & investment; poorly defined market regions
- ✓ • Financial instrument markets Illiquid & hampered by regulatory uncertainty
- ✓ • Insufficient competition in east-coast gas & uncertainty surrounding new pipelines
- ✓ • Ad hoc & poorly targeted greenhouse response
- ? • Regional areas disadvantaged in NEM



Report recommendations

- Governance & regulatory arrangements
- Electricity market mechanisms & structure
- Electricity transmission
- Electricity financial market development
- Demand side participation & FRC
- Increasing the penetration of gas
- Greenhouse response
- Rural & regional issues



Report recommendations: Governance & regulatory arrangements

- ✓ • Establish National Energy Regulator (NER)
- ✓ • Federal, WA & NT to join other governments as co-owners of NEMMCO
- ✓ • NER & NEMMCO decisions reviewable by Australian Competition Tribunal
- ✓ • Ministerial Council on Energy sole provider of policy direction on electricity & gas
- ✓ • Improve network regulation:
 - Sharing of savings; performance incentives;
 - X distribution price cap not revenue cap



Report recommendations: Electricity market mechanisms & structure

- ✓ • Further disaggregate NSW & WA gen'n
 - Divest generation once disaggregated
- ? • Gov'ts to address transmission problems
- ✓ • Abolish:
 - NSW Electricity Tariff Equalisation Fund
 - Queensland Benchmark Pricing Agreement
- ✓ • Explicit ACCC merger guidelines to control generator market power



Report recommendations: Electricity transmission

- ✓ • NEM-wide planning function in NEMMCO
 - Identify augmentation opportunities & tender
- ? • NEMMCO offer/underwrite firm inter-region FTRs
 - FTRs to provide augmentation benchmarks
- ? • NER to use commercial cost-benefit to approve intra-regional augmentation
- ? • Reliability benefits test to remain as is
- ✓ • TNSP performance incentives
- ? • Increase number of NEM regions with full nodal pricing in 7-10 years



Report recommendations: Electricity financial market development

- ✓ • Abolish NSW ETEF & Queensland BPA
- ✓ • All code changes should consider impact on financial markets
 - Including reviews of VOLL
- ? • NEMMCO to review in 1-2 years its role in facilitating clearing for bilateral contracts



Report recommendations: Demand side participation & FRC

- X • NEM dispatch market to pay demand reduction on an “as bid” basis
- ✓ • Interval meters should be mandated & phased in over 5-10 years
- ? • FRC in all jurisdictions within 3 years



Report recommendations: Increasing the penetration of gas

- ? • Allow pipeline developers to seek binding ruling from NER prior to construction
 - 15 years regulation free or pre-determined regulatory parameters
- ✓ • Review gas code & other arrangements to enhance competition



Report recommendations: Greenhouse response

- ✓ • Cross-sectoral emission trading
- ? • Delete (with grandfathering):
 - MRET: Gen Efficiency Standards; GGAP
 - NSW retailer benchmarks; Qld 13% gas
- X • Exclude traded sector from emission trading if world's best practice in energy use
- ✓ • Introduce interval meters



Report recommendations: Rural & regional issues

- ✓ • Improve regional structure of NEM
- ✓ • Introduce emission trading
- ✓ • Reform gas industry to enhance competition & coverage of regional areas



Review of restructuring status

- Physical issues
- Commercial issues
- Accountability issues
- Regulatory issues



Physical issues:- *current status*

- Large generators remote from load centres
- Re-configurable radial distribution networks
- Power system design & operating protocols:
 - Assume no “tidal” energy flows
- End-use equipment & interface design:
 - “Obligation to serve” & averaged cost-recovery
 - Inadequate performance:- inflexible; inefficient
 - Network service not adequately measured



Physical issues:- *a way forward*

- Physical behaviour likely to remain centrally managed:
 - Interval energy & supply availability & quality should be measured for all network users
 - Industry performance measures should be based on energy service delivery
 - Supply & demand side options should receive equal consideration - current use & innovation
 - Market compatible policy for innovation & implementation, including end-use infrastructure



Commercial issues:- *current status*

- National Electricity Market:
 - Network representation limited to interconnectors
- Retail market & NSP contracts with users:
 - Incompatible with NEM
 - Lacks appropriate commercial instruments for:
 - Distribution network AS, spot & forward energy
- Metering at participant points of connection:
 - Should record spot market energy, availability & quality of supply for all end-users



Commercial issues:- *a way forward*

- Extend NEM to all participants
- Modest increase in number of NEM regions
- Roll-out interval metering that measures energy, availability & quality
- Improve end-user technology & decision-making by introducing:
 - End-use facilitators
 - Innovative end-use technology & controllers
 - Physical & financial risk management



Accountability issues: *current status*

- Physical accountability:
 - Death, injury, damage to equipment
 - Non-delivery of end-use service(s):
 - May be due to either availability or quality problems
- Commercial & legal accountability:
 - Accountability for poor availability & quality of supply is ambiguous - NSP or other parties?
 - Legal context unclear



Accountability issues: *a way forward*

- Clarify legal accountability for poor availability & quality of supply
- Replace implied “obligation to serve” with clear contracts with mutual obligations:
 - AS, spot & forward energy
 - Distribution network services
- Compatible contracts for end-users & generators



Regulatory issues:- *current status*

- Economic regulation of NSPs:
 - Approved investment based on forecast demand with associated cost-recovery tariffs
- Technical regulation:
 - By standards & connection requirements that are not always technology neutral
- Environmental regulation:
 - Inadequate attention to climate change impacts



Regulatory issues:- *a way forward*

- Economic regulation of NSPs:
 - Introduce risk-sharing arrangements
- Technical regulation:
 - Modify towards technology neutrality
- Environmental regulation:
 - Internalise costs of climate change impacts:
 - Taxes or tradeable emission permits
 - Policies to facilitate sustainability transition:
 - Particularly demand side infrastructure