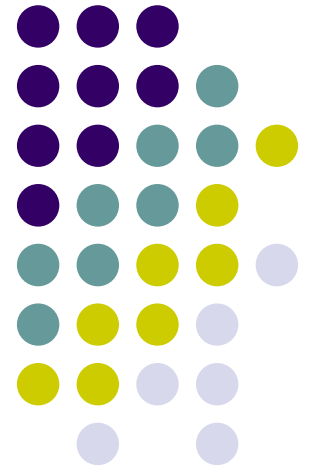


Dispatch of Scheduled Network Services

David Bowker
Ken Secomb

May 2007

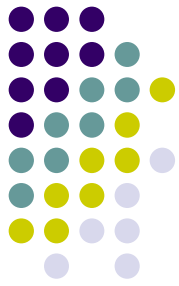


Outline



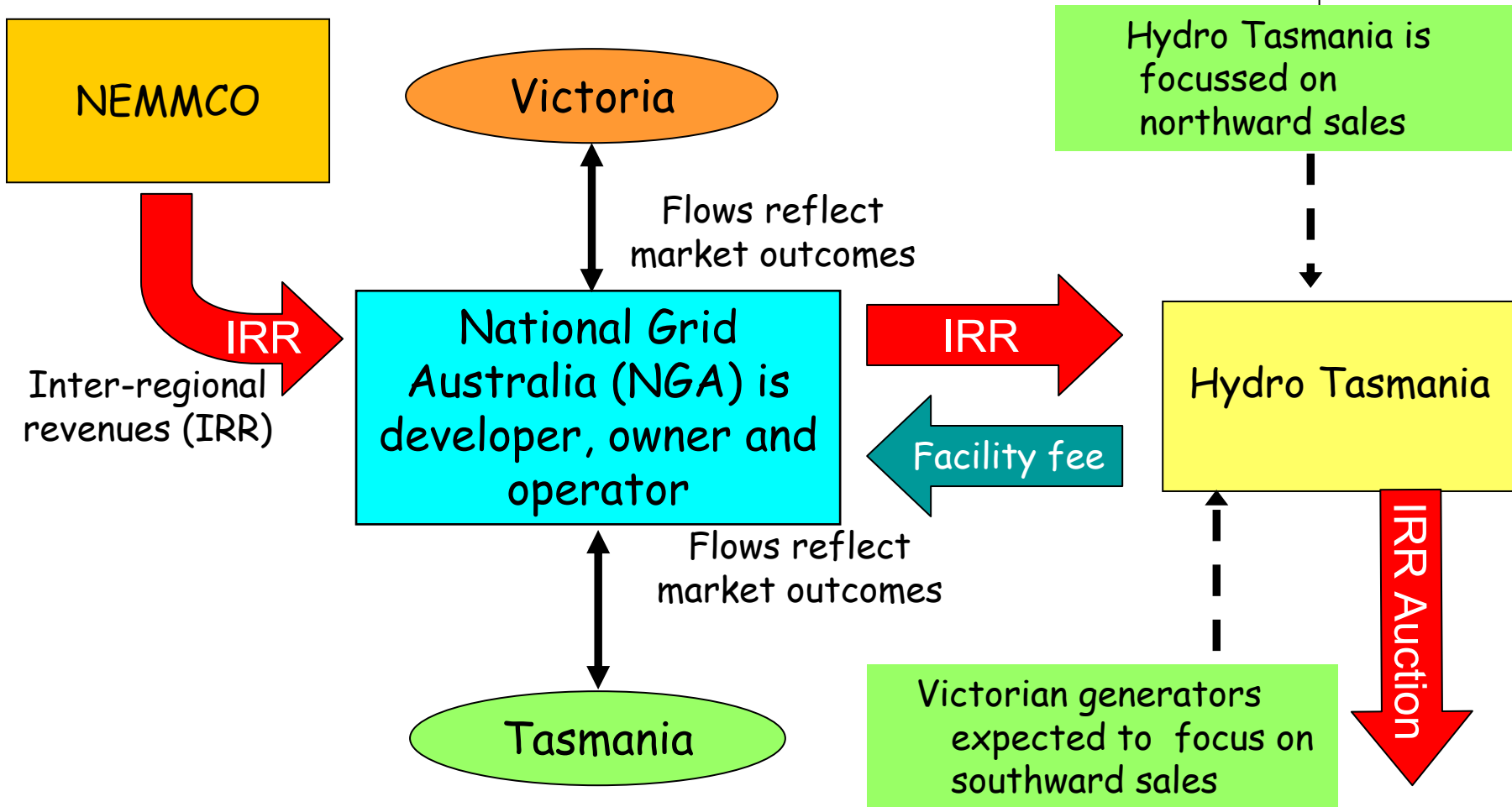
- The Role of Scheduled Network Services
- What has been happening?
- How does market dispatch lead to this outcome?
- Is the current dispatch process consistent with the NEM Rules?
- Alternatives to overcome the adverse effects

Role of Scheduled Network Services



- Scheduled Network services –
 - Make no charge on customers due to their presence, but rather –
 - Derive revenue only from transporting energy from a lower-price region to a higher-price
 - Make market offers for energy transport which specify a price difference above which the service is to be dispatched

Basslink Business Model



History

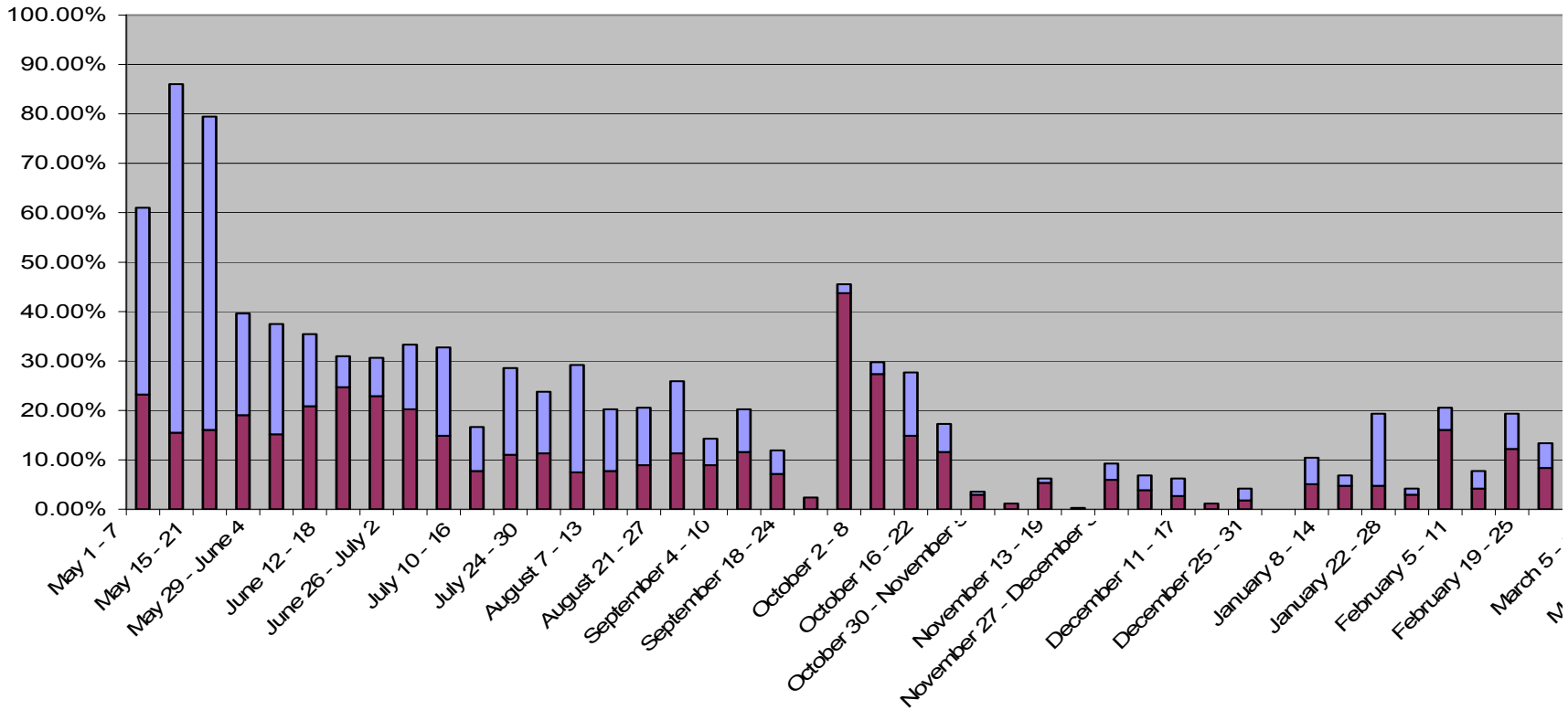


- Basslink is often dispatched with energy price difference in the wrong direction (see following information)
- Results in the market **charging** Basslink for providing a service (cost passed on to Hydro Tasmania - HT)
- Restricts HT's ability to compete with mainland generators
- Leads to changes from HT's intended pattern of generation (water management issues)

History of Basslink dispatch contrary to its offer



Incidence of negative residues on Basslink: 1 May 2006 - 16 April 2007



Total Cost to date \$2.3m

■ Southward Basslink Flow ■ Northward Basslink Flow



HT response to this risk

- As the risk due to Basslink dispatch has been better understood, HT has taken risk mitigation measures,
- These reduce the incidence of Basslink dispatch contrary to offer, but adversely affect competition between Tasmania and the mainland
- Thus, materiality remains significant, although in a different form

Effects of risk mitigation



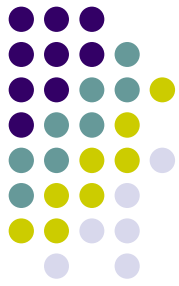
- Basslink flow direction controlled, based on forecasts, rather than as market outcome
- Inefficient resource pricing to control Basslink flows
- More uncertainty over value of inter-regional residues

Diagnosis



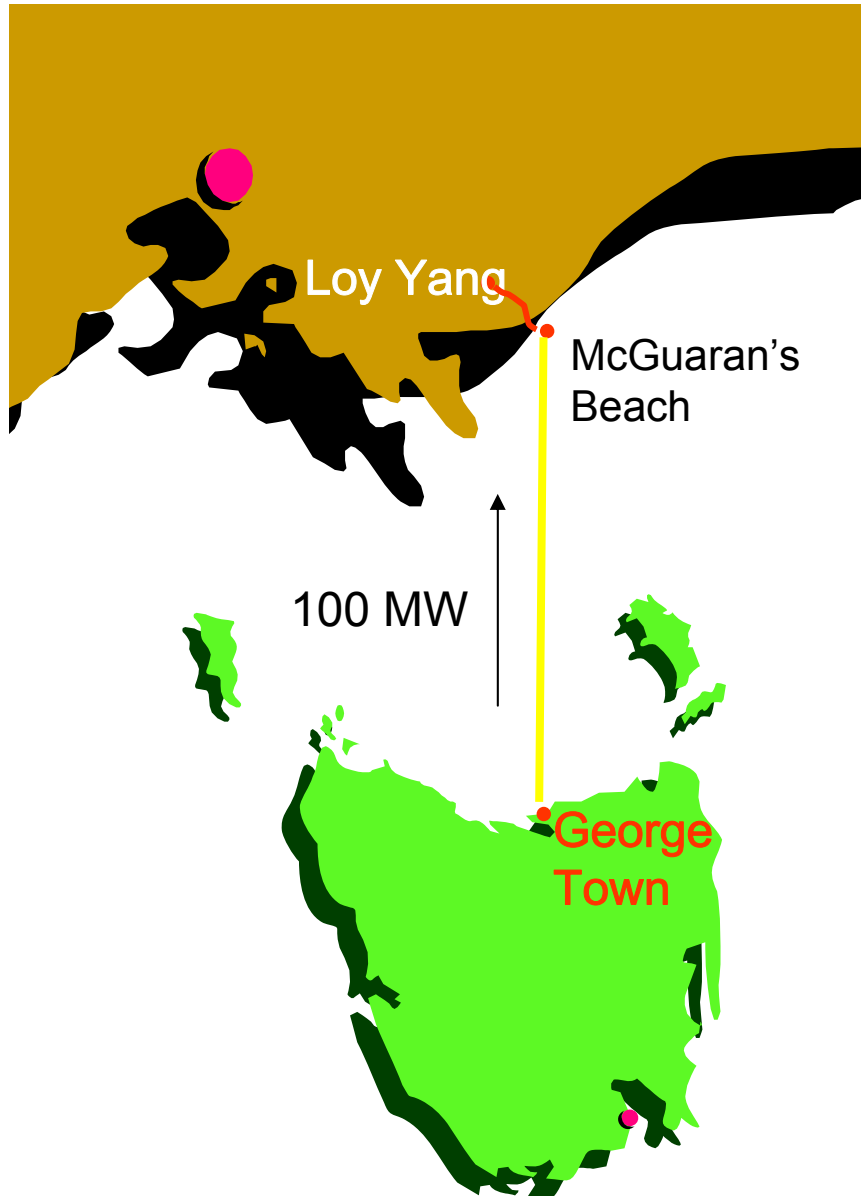
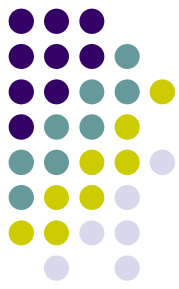
- The dispatch of these counter-price flows is due to a particular form of constraints defining **Frequency Control Ancillary Service** requirements

Background



- Basslink is the first scheduled network service provider in the NEM to have a frequency sensitive control system
- This allows single market in FCAS, with competition between Tasmania and the mainland
- Variation of Basslink flow is necessary for FCAS transport, but is limited by both availability limits AND a “no-go” zone
- This lead to a complex interaction of FCAS transport capability with Basslink dispatch level

Effect of Basslink frequency controller



If both frequencies are normal -

- Dispatched flow of, say, 100 MW north

If mainland frequency becomes low –

- Flow increases to, say, 150 MW north, supports mainland frequency, depresses Tasmanian frequency

If Tasmanian frequency becomes low –

- Flow reduces to, say, 50 MW north, supports Tasmanian frequency, depresses mainland frequency

Similar effects for high frequencies

Shared FCAS gives efficient outcome

Forms of FCAS constraint



- FCAS constraints specify the requirements for FCAS, and can be –
 - Global, specifying a requirement to be met without regard to location, or
 - Local, specifying a requirement to be met within a region or set of regions eg in Tas the need for services to cover loss of Basslink, which cannot be transmitted via Basslink, or
 - Co-optimised Local, where for example the amount required in a region or regions depends on the amount that can be transported by Basslink at its dispatched flow (occasionally applies with other inter-connectors)

FCAS requirements and Basslink flow



- The automatic limitation of Basslink flow by its control system causes limits to FCAS transfer
- Limit to FCAS transfer depends on the dispatch target for Basslink, and relates to the amount of “headroom” between dispatched flow and a flow limit
- Limit is implemented by constraint equations that set FCAS requirements for Tasmania, or for the mainland, in relation to Basslink flow

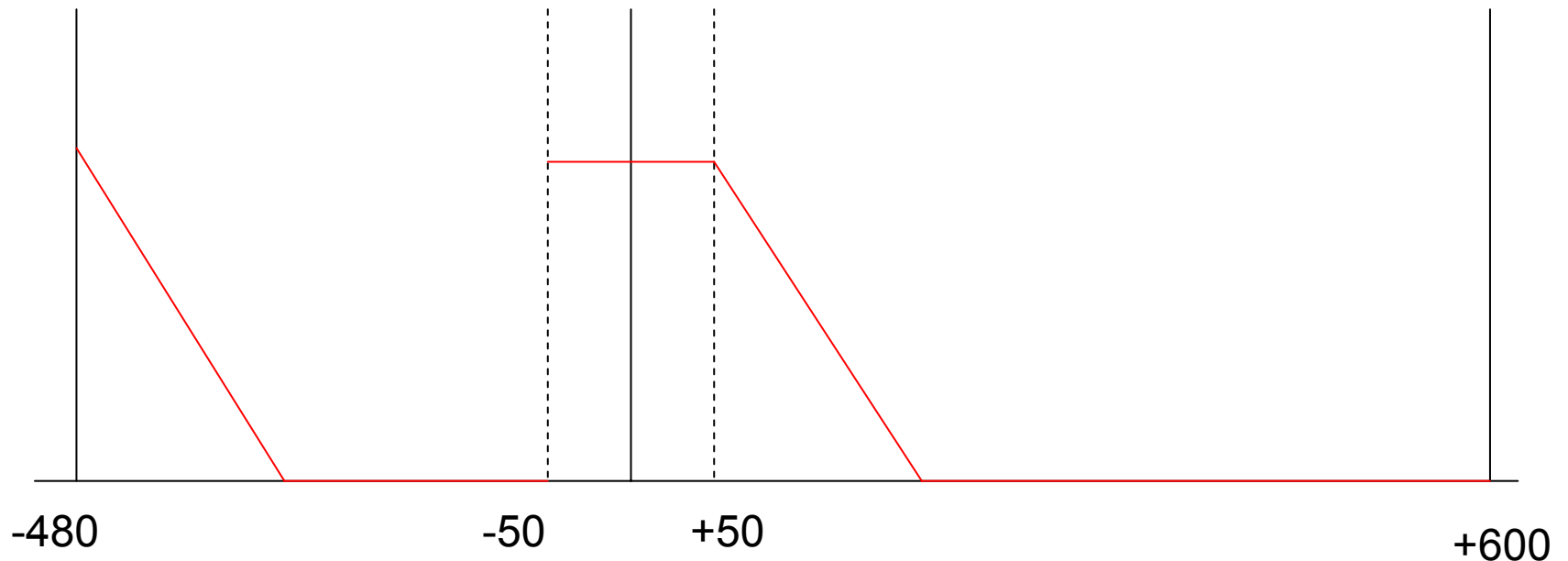
Form of constraint equations



FCAS enabled \pm Basslink flow \geq Constant

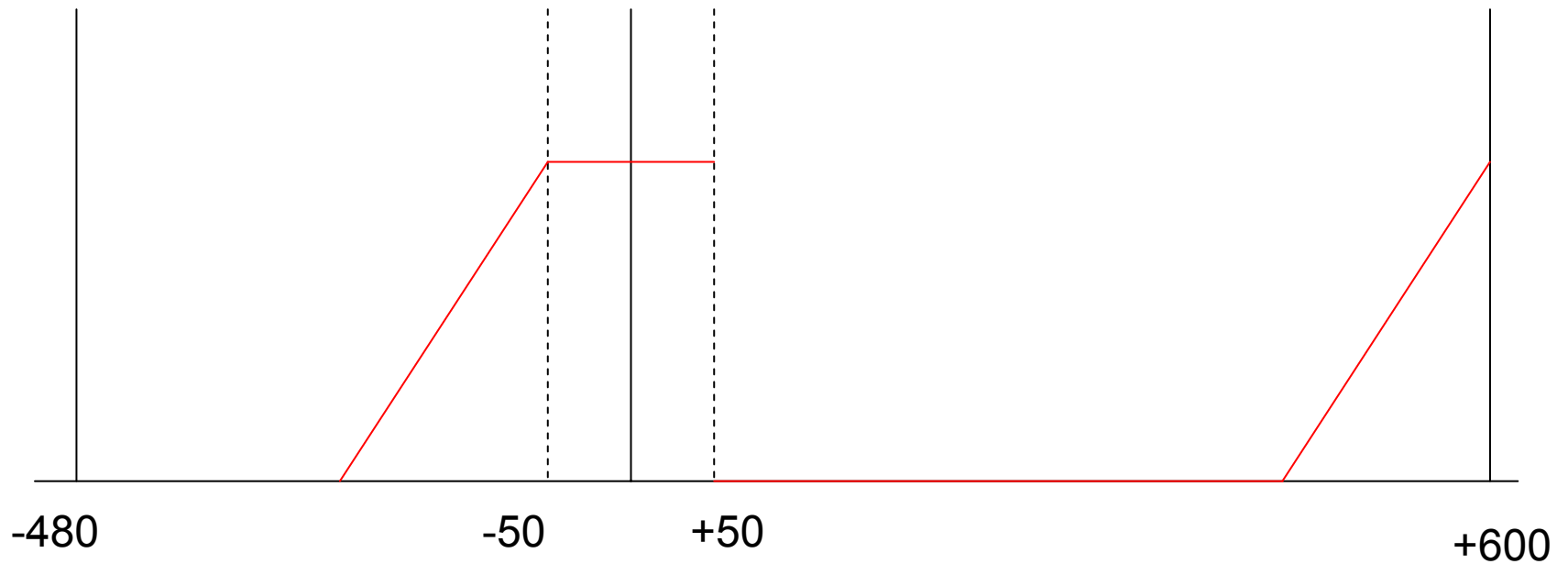
Where “FCAS enabled” is specific to a particular service, and also a region or set of regions eg Tas or mainland

Variation of local FCAS requirements



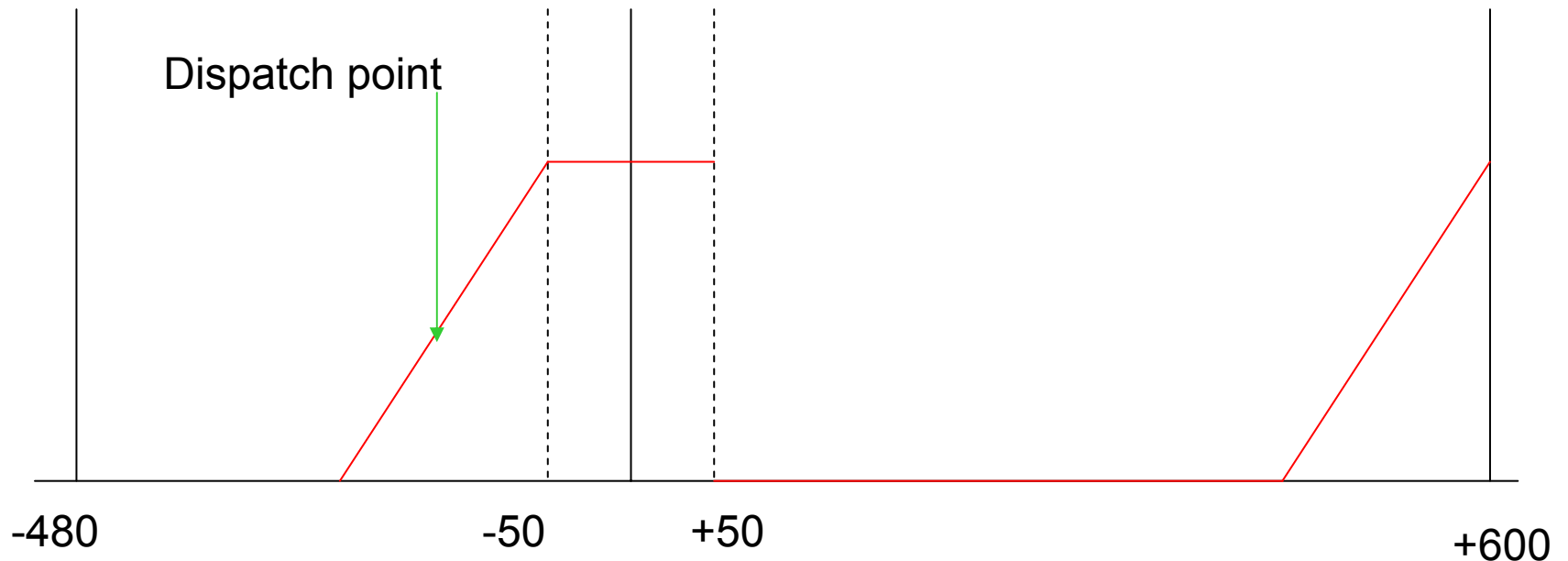
Variation of -- A Tasmanian Raise service, or
-- A Mainland Lower service

Variation of local FCAS requirements



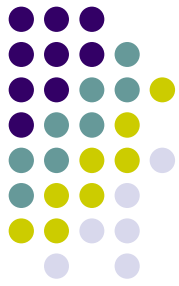
Variation of -- A Tasmanian Lower service, or
-- A Mainland Raise service

Effect on Dispatch - example



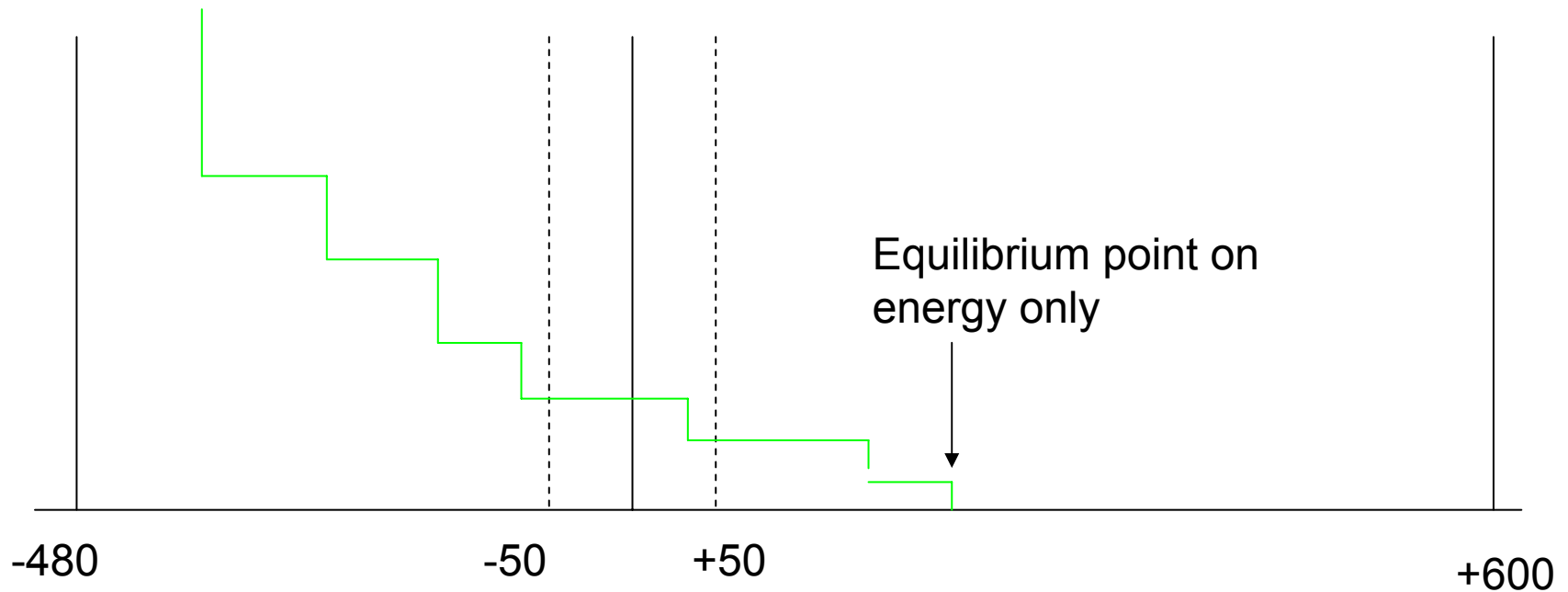
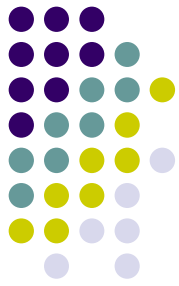
- Energy market alone indicates less southerly flow
- ← FCAS market alone indicates more southerly flow
- ↔ Dispatch point set by balance of "tensions"

Energy market “tension”



- At any dispatch point for Basslink, there will be a “tension” for a different flow, which depends on –
 - Difference in energy market prices, less
 - Offer price of Basslink (commonly zero)
 - Loss allowance
- The tension will increase with movement away from an energy market equilibrium point

Illustration of energy market tension



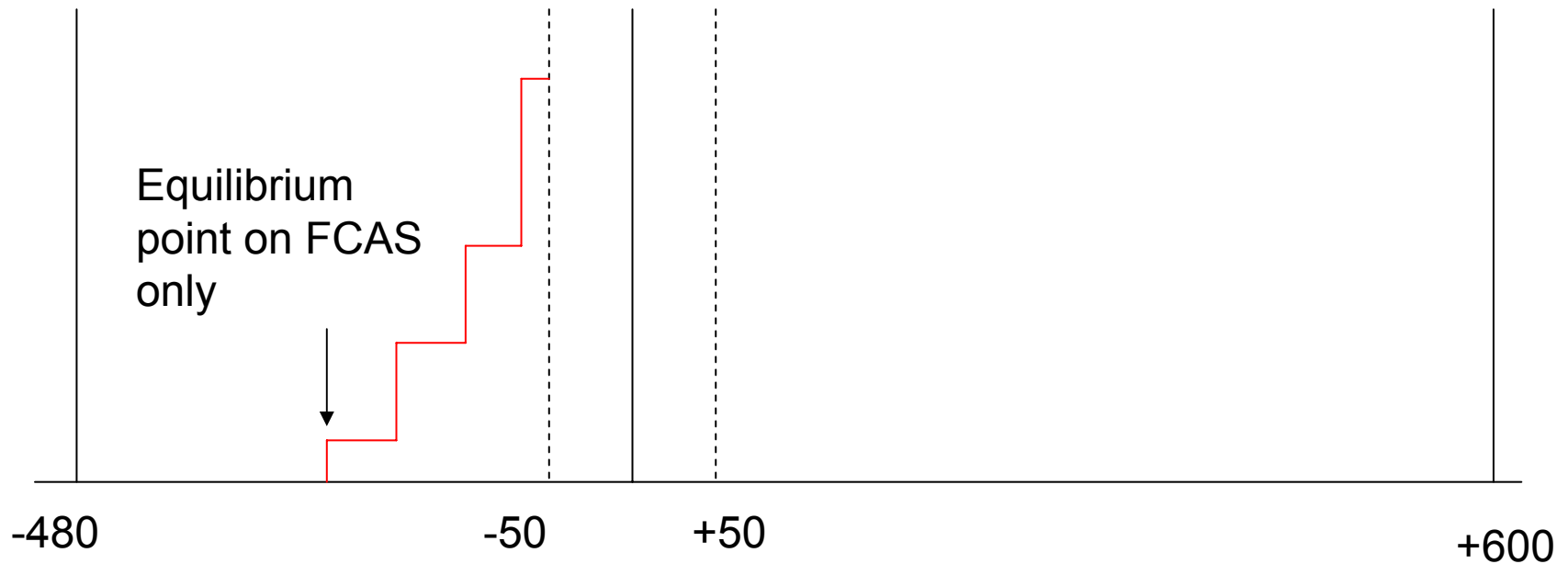
Price steps occur when – marginal unit in Tas. switches to cheaper unit, or
- marginal unit on mainland switches to dearer unit

FCAS market “tension”



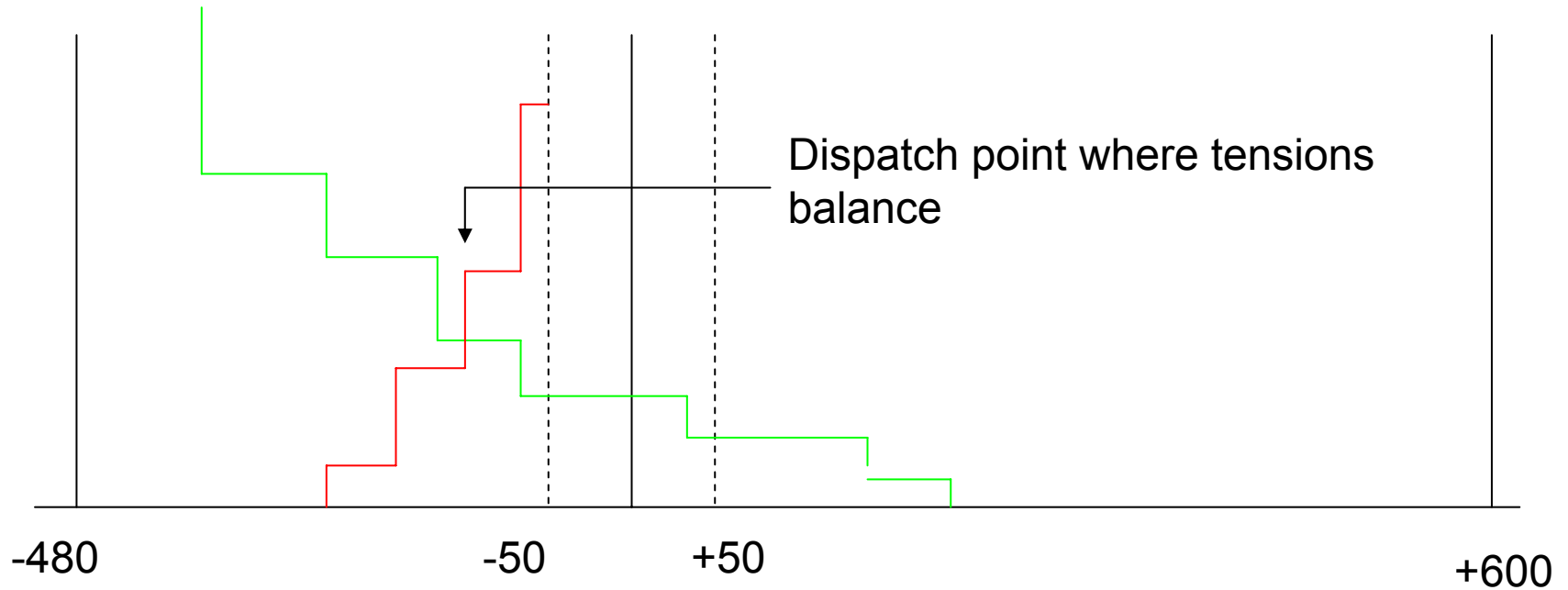
- At any dispatch point for Basslink, there will be a “tension” for a different flow, which depends on the effect of reduced transport on FCAS costs
- This is more complex than energy but has similar broad characteristics
- The tension will increase with movement away from an FCAS market equilibrium point

Illustration of FCAS market tension



- Price steps up when – an additional FCAS service has co-optimised eqn binding, or
- price difference for a service increases, or
 - price of additional quantity increases

Illustration of market balancing tensions of energy and FCAS



Effect of FCAS co-optimisation



- All 8 FCAS services have co-optimised equations involving Basslink
- Several of these may be binding simultaneously, with their effects in balancing the energy market tension being **additive**
- **The competing tensions may give a dispatch outcome contrary to the Basslink offer, and there is currently no mechanism to ensure that the dispatch outcome is consistent with the Basslink offer**

Hydro Tasmania View of the Rules



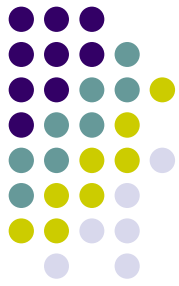
- Hydro Tasmania (HT) believes that NEMMCO has inadvertently created a situation where dispatch is contrary to the market Rules
- The requirement to maximise the value of trade is **subject** to being based on market offers and bids
- Basslink transport offers are market offers in this context
- The dispatch of Basslink has often been contrary to the current market offer: the offer is to transport energy if the price difference exceeds the offer price, but dispatch has been for energy transport when this price difference is **not** present



Hydro Tasmania view (continued)

- The dispatch of Basslink counter-price can be considered as “constrained-on”
- The market rules lead to “constrained-on” dispatch of generators due to the inherent mismatch between dispatch and settlement
- The rules, in the HT view, **prohibit** constrained-on dispatch **within the dispatch process**,
- **But the current NEMMCO arrangements DO constrain-on, for Basslink only, within the dispatch process**
- Hence we see a need for change

Hydro Tasmania internal consideration



- HT concluded that clarification of the Rules was the best approach only after considering a number of alternatives
- Many of these would have only marginal effects, and hence were not in reality a solution to the issue

Attempts to resolve with NEMMCO



- Hydro Tasmania had extensive discussions with NEMMCO, seeking a different interpretation of their responsibilities under the Rules
- Unfortunately, these did not start until current dispatch process was well established and hence NEMMCO had a substantial stake in the current approach

NEMMCO proposed actions independent of Rule change



- NEMMCO propose to change the Basslink dispatch process in November this year
- This would resolve some, but not all, of the relevant dispatch outcomes
- In terms of dispatch technology, their intended change is very compatible with our proposal

Remaining alternatives to Rule clarification



- Permanent disabling of frequency control by Basslink, but
 - This would degrade both physical performance of the network and competition in FCAS
- Temporary disabling of frequency control by Basslink when dispatch is contrary to Basslink offer, but
 - This would lead to periods of insecure operation of the network (due to insufficient FCAS)

Summary



- Our proposal is consistent with a proper reading of the current Rules, and clarifies a possible ambiguity
- Implementation of our proposal is technically compatible with changes that NEMMCO plan to make anyway
- There are alternatives to our Rule change but these involve degradation of system security or of network performance or of the FCAS market,
- The adverse effects of the current process must be eliminated in some way