

# Metering, Reconciliation and Balancing

Keith Bowen



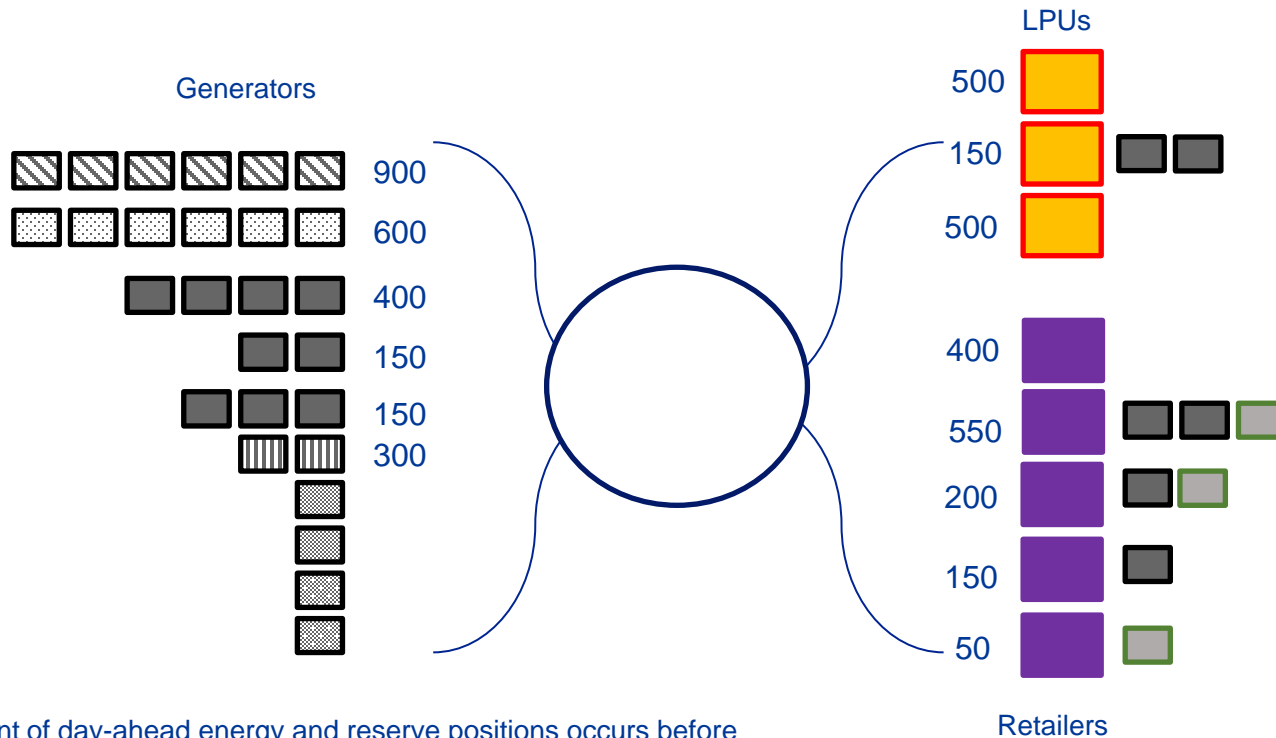
**NECOM**  
NATIONAL  
ENERGY CRISIS  
COMMITTEE

# Market Code Chapters 11-13 – Dispatch, Metering and Balancing

South African Wholesale Market Code, Chapters 11-13, p 76-86

<b>11</b>	<b>REAL-TIME DISPATCH.....</b>	<b>76</b>
11.1	INPUTS TO THE REAL-TIME DISPATCH SCHEDULE .....	76
11.2	DISPATCH ALGORITHM.....	76
11.3	SCHEDULE REPORTS.....	76
11.4	DISPATCH INSTRUCTIONS.....	77
<b>12</b>	<b>PARTICIPANT METERING AND RECONCILIATION .....</b>	<b>78</b>
12.1	METERING INSTALLATIONS.....	78
12.2	METERING DATA .....	78
12.3	RECONCILIATION OF DATA .....	78
<b>13</b>	<b>BALANCING MECHANISM .....</b>	<b>78</b>
13.1	BALANCING STACKS.....	78
13.2	IMBALANCES .....	79
13.3	BALANCING PAYMENT (ON INSTRUCTION) .....	79

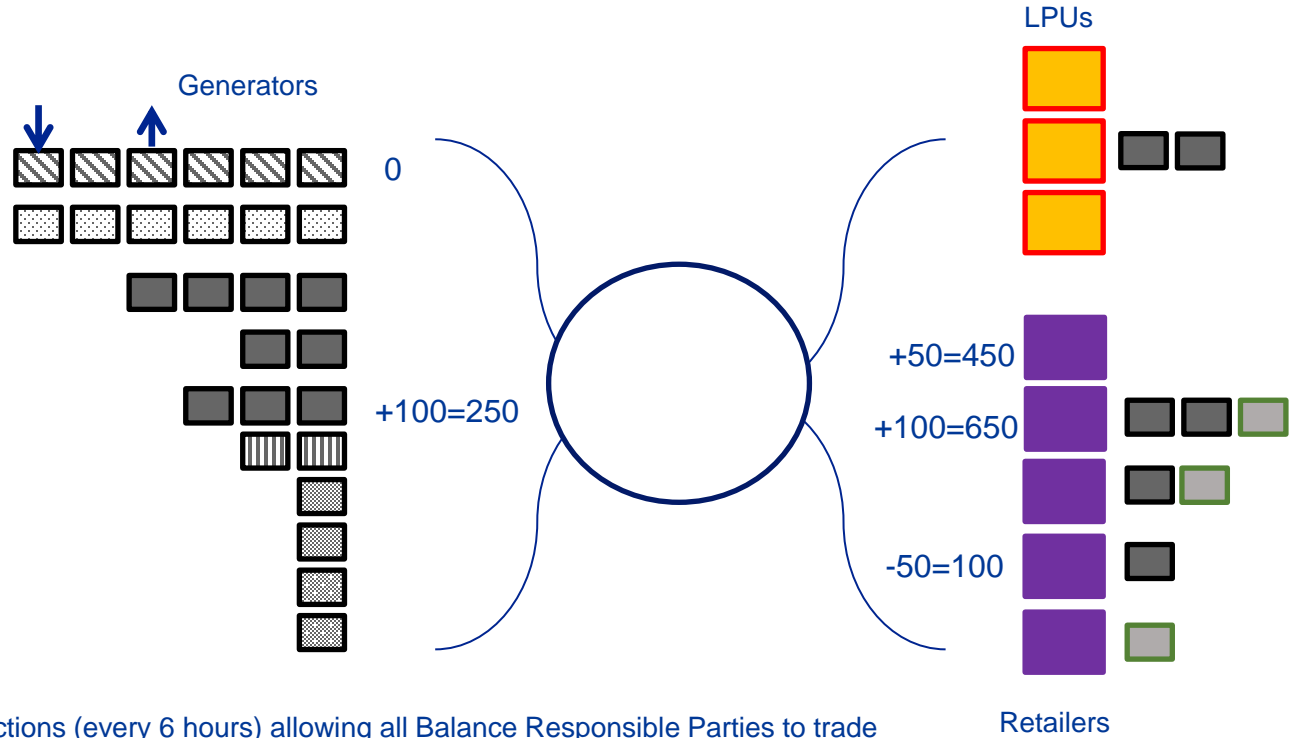
# Day Ahead positions – from DA Market and Bilaterals



- Settlement of day-ahead energy and reserve positions occurs before day of operation for those traded on market
- Physical bilateral positions also declared day-ahead



# Intra-day auctions

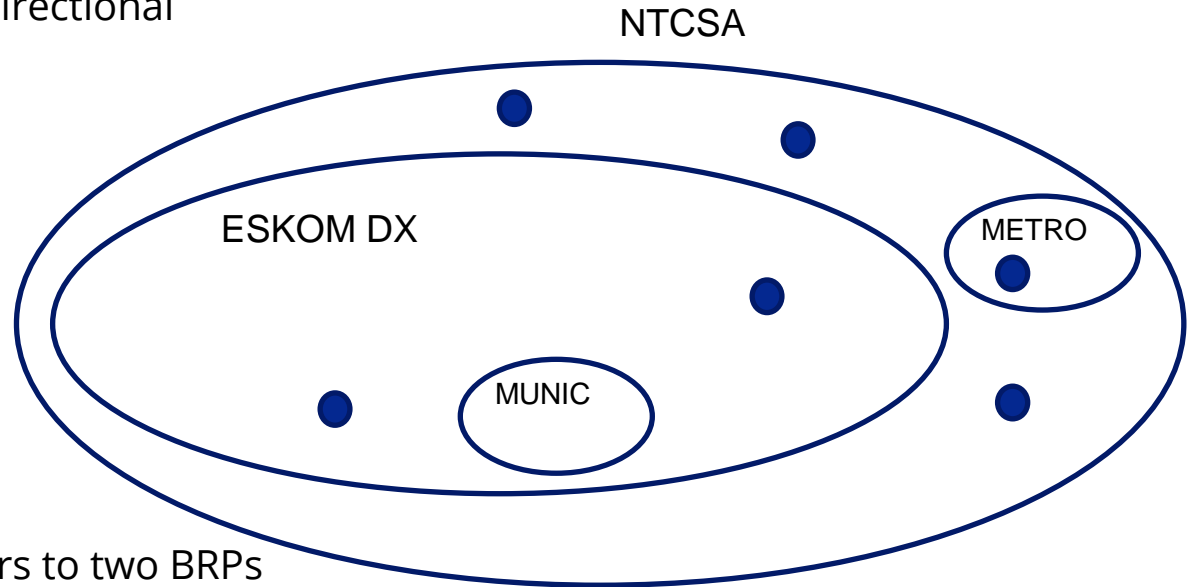


- Regular auctions (every 6 hours) allowing all Balance Responsible Parties to trade positions
- The auction clears with settlement of new positions occurring at gate closure



# Metering and reconciliation

- Metering Code
  - Main and check
  - Half-hourly, bi-directional
  - Four quadrant



- Reconciliation
  - Each meter refers to two BRPs



# Dispatch instructions

## Dispatch Instruction:

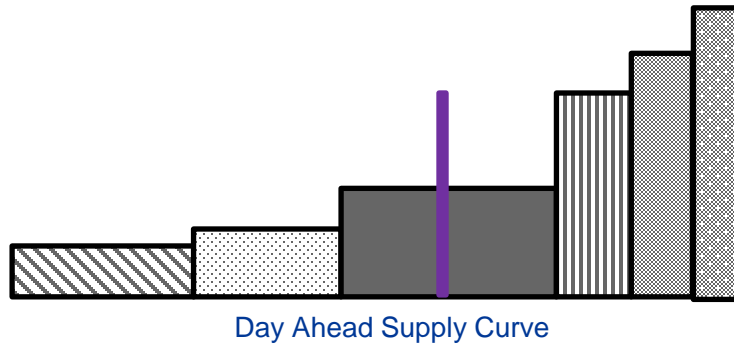
Takes the form of a tuple  $(t, v, R)$ , with  $t$  being the time at which the resource should be at volume  $v$ , and  $R$  being the ramping rate applicable to the type of instruction, i.e. startup ramp (hot, cold, warm) or normal ramp-up or ramp-down rate))

## Determining the “instructed energy” based on the integrated values reflected by the instruction (and accounting for ramps)

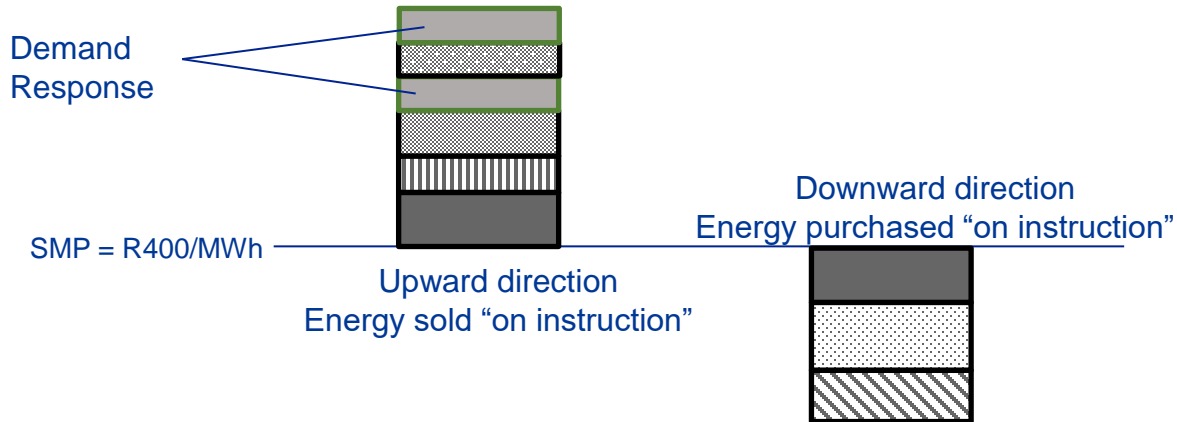
- Requires a convention for when the resource is expected to comply to hourly schedules (on the hour, half-way through the hour) – this is an issue for ramping



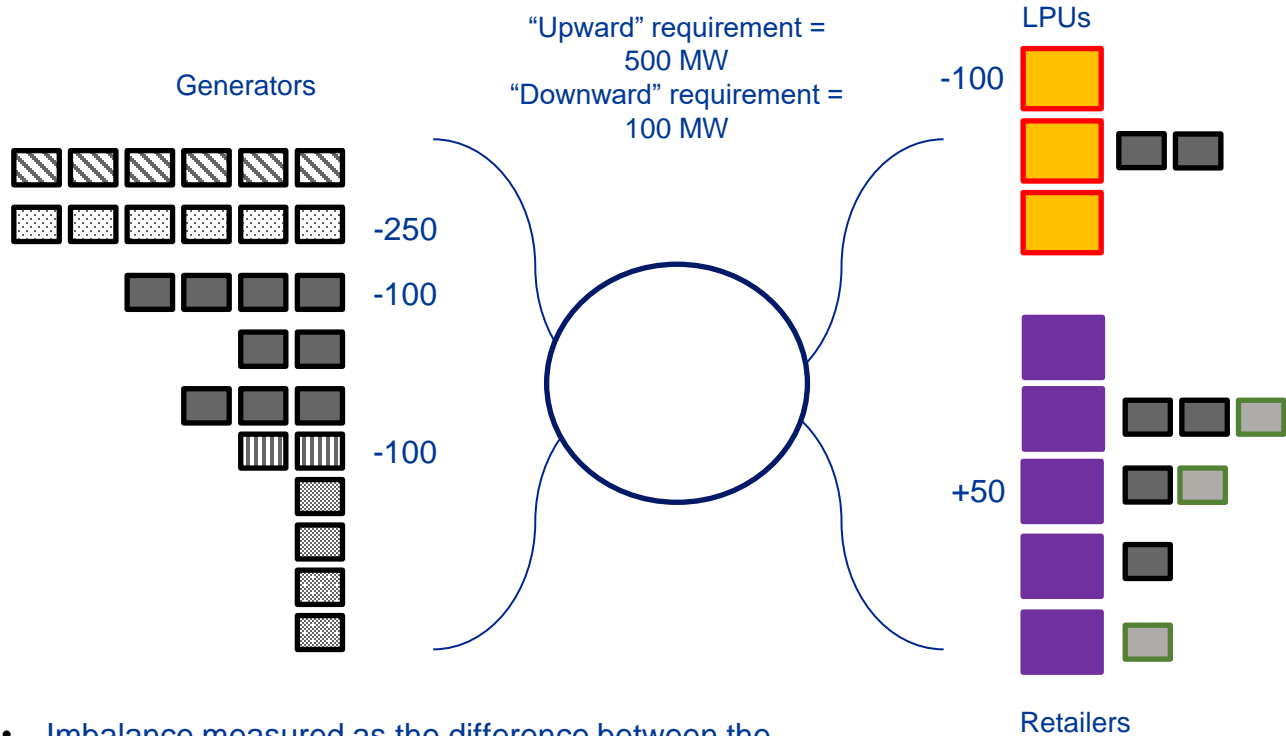
# Balancing Stacks



- Balancing Stacks or Merit Order determined by day-ahead bids (for generators and DR that were flexible and not scheduled for Instantaneous Reserve)
- If some Ten Minute or Regulating Reserve was 'pulled' back from optimal position there could be part of the stack below the SMP



# Imbalances

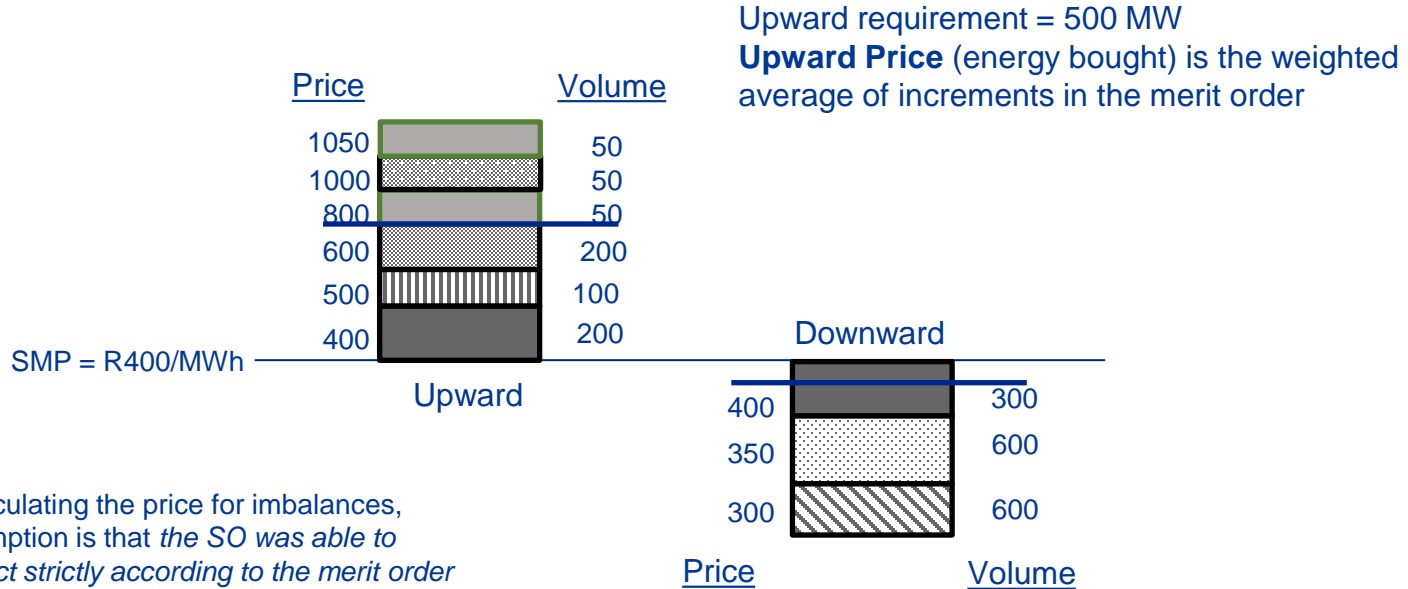


- Imbalance measured as the difference between the scheduled or instructed value and the actual metered output after allowing for a metering accuracy band (MAB)





# Setting price in the Balancing Mechanism

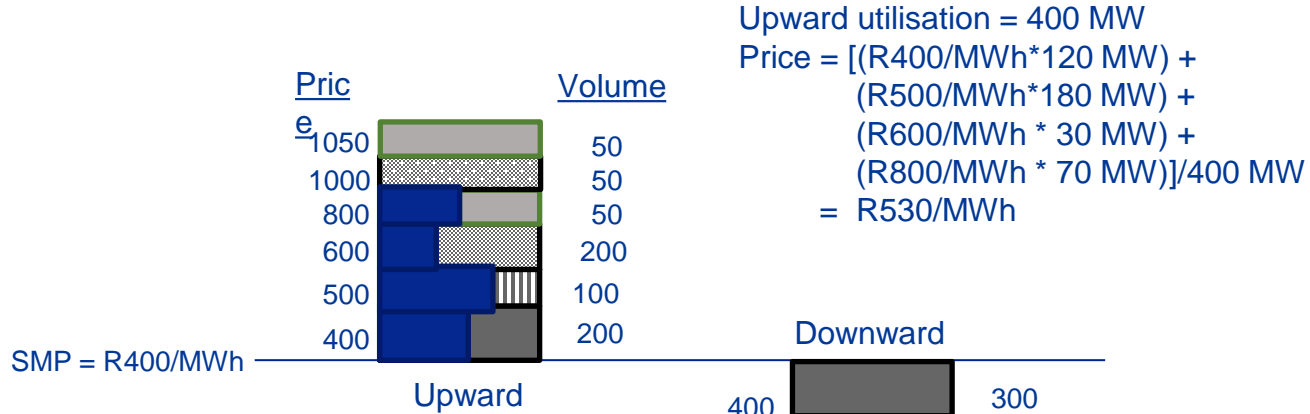


- In calculating the price for imbalances, assumption is that *the SO was able to instruct strictly according to the merit order* (complete each tranche before moving to the next)

Downward requirement = 100 MW  
**Downward Price** (energy sold) is the weighted average of increments in the merit order



# System Operator balancing instructed



Upward utilisation = 400 MW  
 Price = [(R400/MWh\*120 MW) +  
 (R500/MWh\*180 MW) +  
 (R600/MWh \* 30 MW) +  
 (R800/MWh \* 70 MW)]/400 MW  
 = R530/MWh

- SO instructs a number of resources to respond – cannot wait for each resource to provide full energy in each tranche
- Effectively imbalances 'Up' and 'Down' cancel each other out to some extent

BM paid: - R 212 000 on instruction  
 - R 40 000 against instruction (down)  
 But received R 250 000 against instruction (up)  
 Leaving - R 2 000 as a settlement imbalance



Thank you



NECOM  
NATIONAL  
ENERGY CRISIS  
COMMITTEE