WDR settlements workshop

Wednesday 28 April 2021

WebEx only

Please disconnect from your workplace VPN for WebEx call

PLEASE NOTE THIS MEETING WILL BE RECORDED FOR THE PURPOSE OF PREPARING MINUTES

We acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and culture.

We pay our respects to their Elders past, present and emerging.

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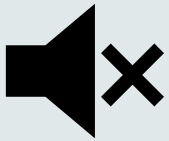
Online forum housekeeping



1. Please mute your microphone, this helps with audio quality as background noises distract from the information being shared.

2. Video is optional, but having it turned off helps with webinar performance and minimises distractions.

3. We ask that you utilise the Chat function for any questions or comments you may have if you are unable to use audio.

4. If you have dialled in via phone, could you please email your name and organisation to WDR@aemo.com.au for our records.

5. Be respectful of all participants and the process.

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AEMO Competition Law Meeting Protocol

AEMO is committed to complying with all applicable laws, including the Competition and Consumer Act 2010 (CCA). In any dealings with AEMO regarding proposed reforms or other initiatives, all participants agree to adhere to the CCA at all times and to comply with this Protocol. Participants must arrange for their representatives to be briefed on competition law risks and obligations.

Participants in AEMO discussions **must**:

1. Ensure that discussions are limited to the matters contemplated by the agenda for the discussion
2. Make independent and unilateral decisions about their commercial positions and approach in relation to the matters under discussion with AEMO
3. Immediately and clearly raise an objection with AEMO or the Chair of the meeting if a matter is discussed that the participant is concerned may give rise to competition law risks or a breach of this Protocol

Participants in AEMO meetings **must not** discuss or agree on the following topics:

1. Which customers they will supply or market to
2. The price or other terms at which Participants will supply
3. Bids or tenders, including the nature of a bid that a Participant intends to make or whether the Participant will participate in the bid
4. Which suppliers Participants will acquire from (or the price or other terms on which they acquire goods or services)
5. Refusing to supply a person or company access to any products, services or inputs they require

Under no circumstances must Participants share Competitively Sensitive Information. Competitively Sensitive Information means confidential information relating to a Participant which if disclosed to a competitor could affect its current or future commercial strategies, such as pricing information, customer terms and conditions, supply terms and conditions, sales, marketing or procurement strategies, product development, margins, costs, capacity or production planning.

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Agenda

NO	TIME (AEDT)	AGENDA ITEM	RESPONSIBLE
1	10:00am – 10:05am	Welcome	Ruth Guest (Chair)
2	10:05am – 10:15am	WDR design refresher	Ruth Guest
3	10:15am – 10:25am	Settlement high-level design	Ruth Guest
4	10:25am – 10:35am	Standard framework for settlements applies to WDR	Stephen Harrison
5	10:35am – 11:00am	Examples of settlement and baseline calculation	Katalin Foran
6	11:00am – 11:15am	WDR Settlement Reports	Stephen Harrison
	11:15am – 11:25am	BREAK	
7	11:25am – 11:35am	Compliance processes that affect settlements	Ruth Guest
8	11:35am – 11:50am	Baseline calculation data	Alice Michener
9	11:50am – 12:00pm	General questions	All

WDR design refresher

Ruth Guest

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Rationale for introducing a wholesale demand response mechanism

- Currently, consumers can only undertake wholesale demand response via their retailer and so face limited pathways to participate. Customers could access other demand response products, such as the RERT or network demand response.
- The final rule facilitates greater access to wholesale demand response for customers whose retailers do not currently offer such products.
- The wholesale demand response mechanism is designed to encourage participation and also to provide reliability and price related benefits (including by being an alternative to expensive peaking generation).
- As such, the final rule placed requirements on DRSPs to participate in central dispatch with a lesser set of obligations than other scheduled participants.

Scheduling of DRSPs under the final rule

AEMC slide

- Under the rule, DRSPs would participate in central dispatch in a transparent, scheduled manner.
- DRSPs would be treated in a similar manner to scheduled generators, i.e. a DRSP would submit dispatch offers and when cleared by NEMDE, receive dispatch targets to provide wholesale demand response.
- DRSPs would also be able to set the wholesale market price.
- DRSPs would have a number of obligations and incentives consistent with the obligations imposed on scheduled generators, including compliance with dispatch targets.

Final determination

AEMC slide

- The final determination and final rule was published on 11 June 2020.
- The final rule introduced a wholesale demand response mechanism, which will commence on **24 October 2021**.

https://www.aemc.gov.au/rule-changes/wholesale-demand-response-mechanism

Settlement high-level design

Ruth Guest

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Overview of WDR settlement factors

SETTLEMENT ROLES

- **DRSP** receives payment for a reduction in energy at the NMI
- **FRMP** pays for the reduction in energy at the NMI
- **FRMP** receives a reimbursement rate, to cover for hedging costs, which is paid by the DRSP

SETTLEMENT TRIGGERS

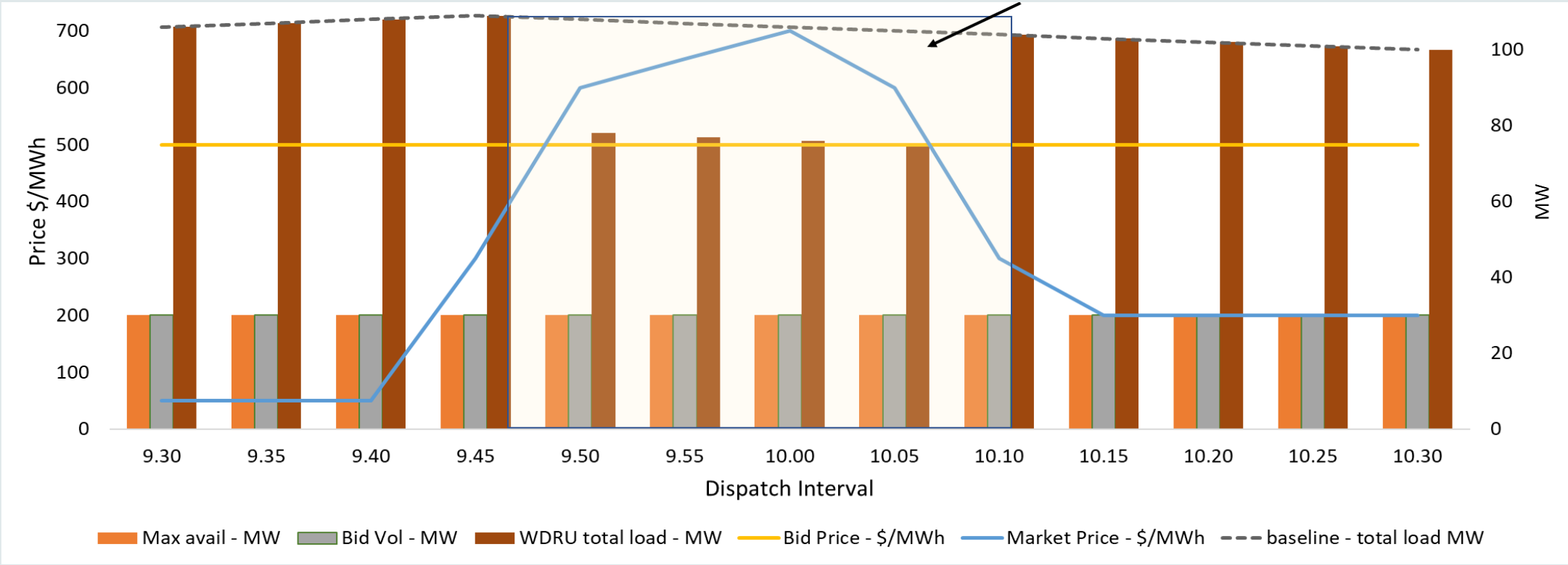
- Settlement occurs when the dispatch instruction for a DUID that the NMI is associated with is > zero
  - Aggregation based dispatch, but NMI based settlement
- For operational and compliance reasons, a NMI can be withdrawn from a dispatchable unit aggregation of NMIs

SETTLEMENT CALCULATIONS

- Settlement requires the determination of a counterfactual (**baseline**) energy against which a response is measured.
- Settlement can be **negative** which will see the financial flows reversed. This occurs when there is a net increase against the NMI baseline
- Settlement MWh volumes are **capped** through the NMIs Maximum Responsive Component (MRC) value

Settlement occurs for a WDR dispatch event: Dispatch illustration

- Bid price ($500/MWh) is that price at which the WDRU is prepared to reduce consumption by the bid volume (30 MW)
- Market price exceeds bid price and reduction target goes from zero to 30 MW
- The DRSP reduces the consumption of responsive component of the WDRU to achieve the dispatched response
- The baseline is determined post event as the counterfactual for settlement and dispatch performance
- Good dispatch performance and baseline outcomes will show a WDRU reduction in metered consumption of 30 MW



Wholesale Demand Reimbursement Rate (WDRRR)

WDRRR Definition

- WDRRR for a *region* for a *trading interval* is the peak period load weighted average *spot price* for the *regional reference node* for the quarter in which the *trading interval* falls.
- Expressed in $ per MWh

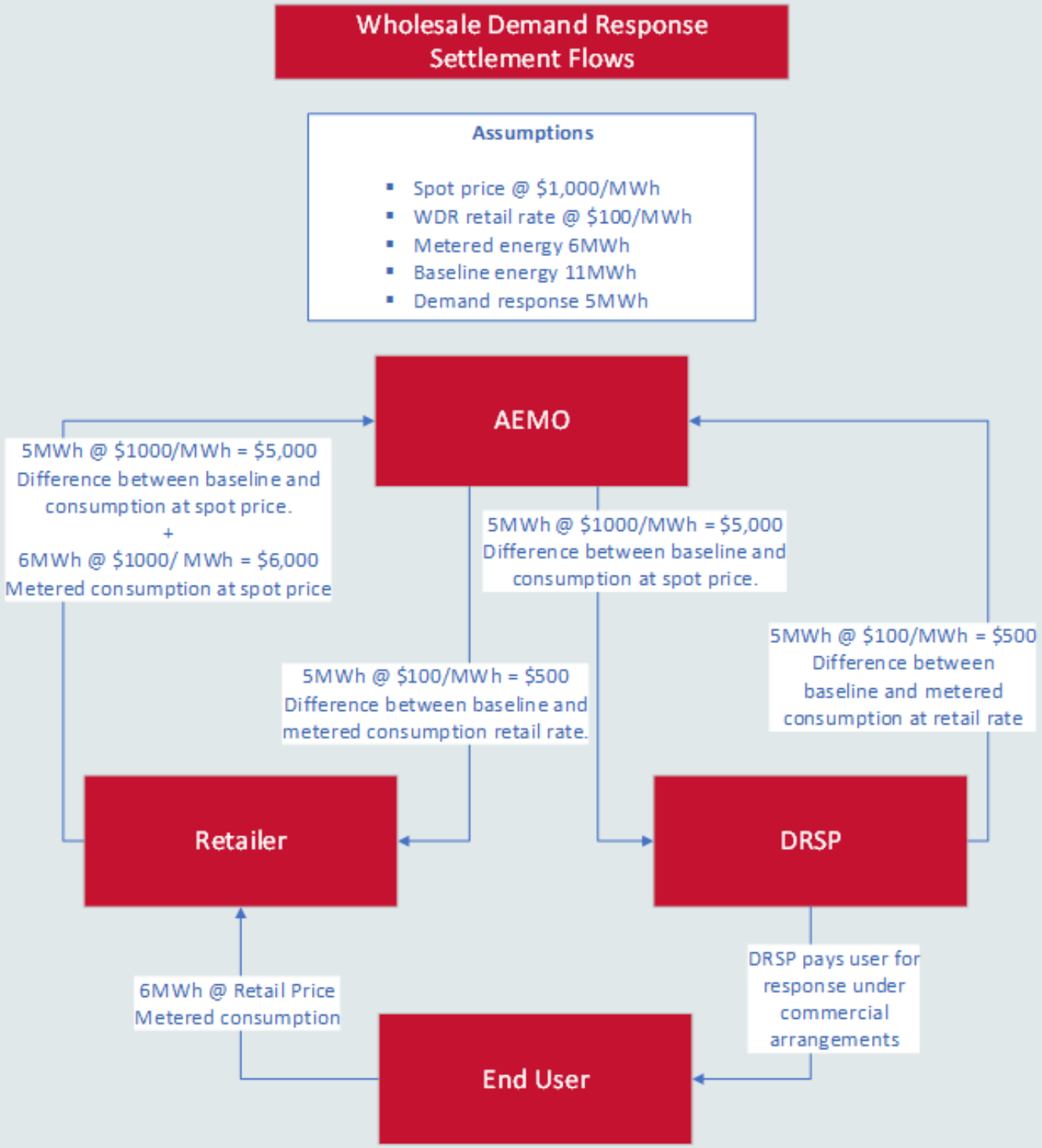
WDRRR Purpose

- Intended to reflect the wholesale component of the retail tariff for loads that are able to provide DR during periods of high wholesale prices.
- AEMC states that this "*should result in the retailer's hedging position being largely unaffected and the retailer not being exposed to costs that it is unable to manage.*"

WDRRR Quarterly reporting by AEMO

- Each quarter, AEMO must calculate and publish the **peak period load weighted average spot price** for each region for the prior 12-month period (ending immediately before the start of the quarter).
  - Peak periods are periods during the "peak load profile" specified in the contract specification Australian Peak Load Electricity Futures Contract in the ASX 24 Operating Rules of the Australian Securities Exchange.

WDR Financial Flows



Standard framework for settlements applies to WDR

Stephen Harrison

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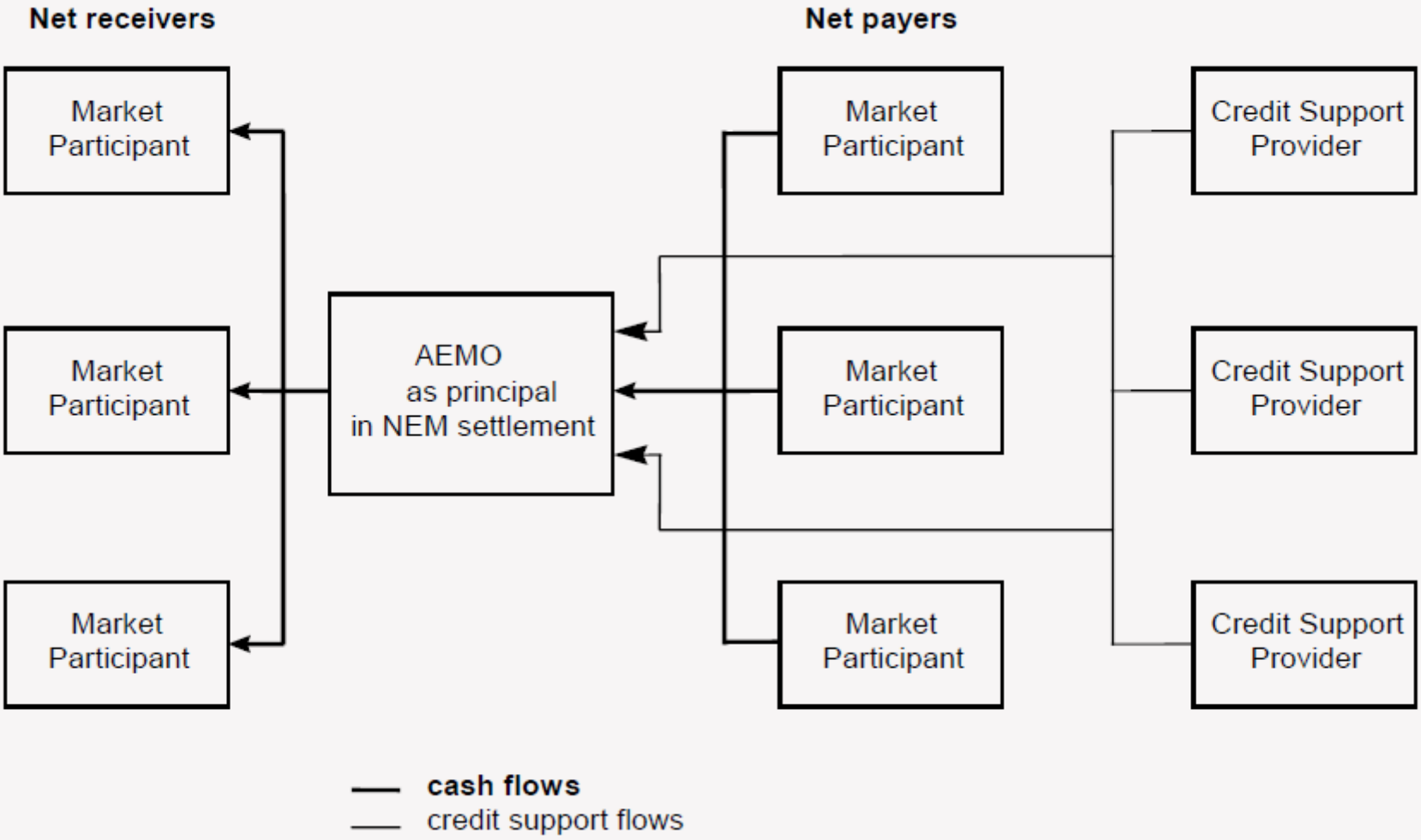
Settlements in the NEM

- AEMO has a market clearing role in the NEM.
- When selling or purchasing electricity (or under WDRM, demand response) Market Participants deal with AEMO, rather than with each other.
- Under the NER, AEMO's obligations to make payments to Market Participants is limited to the money available to AEMO from receipts from Market Participants.
- Credit support is provided to AEMO by market participants according to their exposure (for DRSPs $10k upon registration), with the purpose of mitigating risk of loss given participant default on settlement payments.

https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/market-operations/settlements-and-payments

Settlement of NEM transactions



Settlement Principles

- All payments to AEMO and by AEMO are as cleared funds, and transactions are not completed until they clear.
- Market Participants have to use **Austraclear** for settlements.
- All market transactions for the billing period are combined into a single settlement amount per Market Participant each week.
- Market Participants pay AEMO on the settlement date and AEMO pays Market Participants on the same day subject to cleared funds being sufficient.
- The existence of a dispute is not a valid basis under the NER for withholding settlement payments.
- NEM settlement is underpinned by prescribed deadlines for payment in accordance with the spot market operations timetable.
  - Market Participants paying AEMO must pay in cleared funds by 10:30am (Sydney time) on settlement day.
  - AEMO pays to creditor Market Participants in cleared funds the amount by 2pm Sydney time on settlement day.
- If deadlines for payment are not met then settlement default procedures are invoked.

Examples of settlement and baseline calculations

Katalin Foran

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Baseline calculation example

Step 1 - Unadjusted baseline calculation

- Calculating baseline for 27 January, TI starting at 3.30 pm (Business day baseline methodology applies).
- In order to calculate the unadjusted baseline energy, need load data for the last 10 days that are eligible under the baseline methodology.
- For the selected days, for the trading interval starting at 3.30pm, the metered energy is summed and averaged to form the unadjusted baseline energy (see Table on next page).
- The average baseline energy for the TI, based in the data from the 10 selected days is 14 MWh.

Unadjusted baseline calculation: January 27, 3.30-3.35pm

DATE	TYPE	METER VALUE FOR TI STARTING 3.30 PM
9 Jan	Business day	14
10 Jan	Business day (WDR bid in and dispatched)	-
11 Jan	Business day	13
13 Jan	Business day	11
14 Jan	Non Business day (weekend)	-
15 Jan	Non Business day (weekend)	-
16 Jan	Business day	16
17 Jan	Business day	15
18 Jan	Business day	12
19 Jan	Business day	15
20 Jan	Business day	14
21 Jan	Non Business day (weekend)	-
22 Jan	Non Business day (weekend)	-
24 Jan	Business day	15
25 Jan	Business day	15
26 Jan	Non Business day (public holiday)	-
	Total energy	140
	Unadjusted baseline energy for TI 3.30-3.35pm	14

Adjustment calculation

- A multiplicative adjustment allows the unadjusted baseline to be increased or decreased by the % adjustment.
- In the example, the adjustment window comprises the 36 Trading Intervals (3 hours) ending one hour before 3.30pm.

Adjustment calculation

TI count	TI end time	Meter read	Unadjusted Baseline
1	11:35:00	5	4
2	11:40:00	5	4
3	11:45:00	5	4
4	11:50:00	5	4
5	11:55:00	5	4
6	12:00:00	5	4
7	12:05:00	6	4
8	12:10:00	6	4
9	12:15:00	6	4
10	12:20:00	6	4
11	12:25:00	6	4
12	12:30:00	6	4
13	12:35:00	7	6
14	12:40:00	7	6
15	12:45:00	7	6
16	12:50:00	7	6
17	12:55:00	7	6
18	13:00:00	7	6
19	13:05:00	9	6
20	13:10:00	8	6
21	13:15:00	8	6
22	13:20:00	8	6
23	13:25:00	9	6
24	13:30:00	9	6
25	13:35:00	9	8
26	13:40:00	9	8
27	13:45:00	9	8
28	13:50:00	10	8
29	13:55:00	10	8
30	14:00:00	10	8
31	14:05:00	11	8
32	14:10:00	11	8
33	14:15:00	11	8
34	14:20:00	11	8
35	14:25:00	11	8
36	14:30:00	11	8
	Average	7.8	6.7
	% Change between actual and unadjusted baseline		16.5%

- The average meter read for the 3 hour period is 7.8 MWh.
- The average unadjusted baseline for the same time period is 6.7MWh.
- The actual load is 1.1MWh higher than the unadjusted baseline representing a 16.5% multiplicative adjustment (less than the 20% cap).
- Thus for 3.30 pm the adjusted baseline is 14MWh x (1+ 16.5%) = 16.3 MWh.

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Settlement Scenarios: Good, bad and the ugly (1/2)

Following slides show examples of:

1. WDR settlement where demand response is fully settled
2. Capped settlement due to over delivery against NMI maximum responsive component
3. Negative settlement where DRSP pays due to metered energy being below the baseline level

TABLE: Standard parameters used in each scenario

Parameter	Value	Scenario comments
NMI	1234567	In jurisdiction of VIC1
DLF	1.00	For ease of calculation
TNI	ABCDE	In NEM region VIC1
RRP TLF	1.00	For ease of calculation
Region	VIC1	Unlikely to differ from NMI jurisdictional region
RRP	1000 $ / MWh	Assume constant price for each 5 minutes in dispatch hour in VIC1
Dispatch Bid	5 MW @ $500 / MWh	Assume dispatched for 1 hour ie 12, 5 min intervals with dispatch target 5 MW
MRC	6 MW	
WDRRR	100 $ / MWh	In NEM region VIC1
MRCSQ	6 MWh	

Settlement Scenarios: Good, bad and the ugly (2/2)

PARAMETER	1. GOOD	2. BAD (CAPPED)	3. UGLY (NEGATIVE)	COMMENT
ME	11.3 MWh	9.3 MWh	18.3 MWh	
ME * DLF	11.3 MWh	9.3 MWh	18.3 MWh	DLF = 1
BSQ	16.3 MWh	16.3 MWh	16.3 MWh	
BSQ * DLF	16.3 MWh	16.3 MWh	16.3 MWh	DLF = 1
UWDRSQ "Demand Response"	5 MWh	7 MWh	-2 MWh	BSQ* DLF - ME * DLF
WDRSQ	5 MWh	6 MWh	-2 MWh	CWDRSQ: Min(MRCSQ, UWDRSQ)
WDR TA to DRSP (red means DRSP Pays)	5 MWh * 900 $/MWh = $4,500	6 MWh * 900 $/MWh = $5,400	-2 MWh * 900 $/MWh = - $1,800	WDRSQ * TLF * (RRP – WDRRR)
WDR TA from FRMP (red means FRMP paid)	5 MWh * 900 $/MWh = $4,500	6 MWh * 900 $/MWh = $5,400	-2 MWh * 900 $/MWh = - $1,800	WDRSQ * TLF * (RRP – WDRRR)
Energy TA from FRMP	11.3 MWh * 1000 $/MWh = $11,300	9.3 MWh * 1000 $/MWh = $9,300	18.3 MWh * $1000/MWh = $18,300	ME * DLF * TLF * RRP
Total Amount from FRMP	$15,800	$14,700	$16,500	WDR TA + Energy TA

WDR Settlement Reports

Stephen Harrison

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WDRM settlement reports

There will be three settlement reports relevant to WDRM

1. Settlement invoice - existing
2. Settlement report (SR) – existing
3. WDR NMI report – new

There are also public summary reports being updated with WDR data.

Settlement Statement Summary (1)

- All invoices have a Summary
- A new line item will be added
- 'Wholesale Demand Response'

- **Trigger**: When prelim/final/revision 1/revision 2 are published and WDR activities were identified in that billing week
- **Delivery method**: Unchanged, via Settlements Direct portal and data interchange

Summary of NEM Transactions
for Week 6: 02 Feb 2020 - 08 Feb 2020

Description	$
Energy	-182,269.21
Ancillary Services	-1,409,290.46
Settlement Residue Auction	8,378.23
Market Fees	-8,390.44
TNSP Residue	0.00
Security Deposits	0.00
Reallocation	0.00
Revision Adjustment	0.00
Revision Interest	0.00
Early Payment Interest	0.00
Other	-302,166.96
GST	-210,811.12
Reassignment	0.00
Total	-2,104,549.96

Tax Invoices (1)

- For all Tax invoices and Recipient Created Tax Invoices a new transaction will be added
- 'Wholesale Demand Response'
- GST will be applied

Supplies made by AEMO

Taxable Supplies

Description	GST Exclusive ($)	GST ($)	Sub Total ($)
Energy - 17,536 MWh	-1,463,579.88	-146,357.99	-1,609,937.87
Ancillary Service	-6,256.46	-625.65	-6,882.11
Compensation	-863.16	-86.32	-949.47
Pool Fee - EUA	0.00	0.00	0.00
Pool Fee - Nem	0.00	0.00	0.00
Manual Adjustment	0.00	0.00	0.00
Total	-1,470,699.50	-147,069.95	-1,617,769.45

- **Trigger**: When Final/revision 1/revision 2 are published and WDR activities were identified in that billing week
- **Delivery method**: Unchanged, via Settlements Direct portal and data interchange

Settlement Report (2)

- New section named 'Wholesale Demand Response (WDR) by Region and Quarter'

Wholesale Demand Response (WDR) by Region and Quarter

Region	Quarter	DRSP	FRMP	WDR Reimbursement Rate (WDRRR)	WDR Settlement Quantity (WDRSQ)	WDR Trading Amount ($)
NNN1	N	NNNNNN	NNNNNN	$XX.XX	XX.XX	$XX,XXX.XX
NNN1	N	NNNNNN	NNNNNN	$XX.XX	XX.XX	$XX,XXX.XX

- **Trigger**: When prelim/final/revision 1/revision 2 are published and WDR activities were identified in that billing week
- **Delivery method**: Unchanged, via Settlements Direct portal and data interchange

WDR NMI report (3)

- New report with NMI and other variables used for settlement reconciliation
- WDR settlement equations are stipulated in the NER 3.15.6B
- **Trigger**: When prelim/final/revision 1/revision 2 are published and WDR activities were identified in that billing week
- **Delivery method**: Same as SR, via Settlements Direct portal and data interchange

WDR NMI report parameters (3)

- **Settlement date**
- **TI** - Trading Interval
- **Region**
- **TNI** - Transmission Node Identifier
- **NMI** - National Metering Identifier
- **DRSP PID** - Demand Response Service Provider Participant ID
- **FRMP PID** - Financially Responsible Market Participant ID
- **MRC** - Maximum Responsive Component (MW)
- **MRCSQ** – Maximum Responsive Component Settlement Quantity (MWh)
- **UWDRSQ** - Uncapped Wholesale Demand Response Settlement Quantity (MWh)
- **CWDRSQ** - Capped Wholesale Demand Response Settlement Quantity (MWh)
- **ME*DLF** - Metered Energy * Distribution Loss Factor (MWh)
- **BSQ*DLF** - Baseline Settlement Quantity * DLF (MWh)
- **RRP TLF** - Regional Reference Price Transmission Loss Factor
- **RRP** ($ / MWh)
- **WDRRR** ($ / MWh) – Wholesale Demand Regional Reimbursement Rate
- **WDRTA** ($) – WDR Trading Amount
- **Publication date time**

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Market Summary report

FINAL Settlements

22-Apr-2018 to 28-Apr-2018 Week Number $17.00

	Energy	Amount
Energy Sent Out By Generators	3354426.00 (MWh)	$254297002.00
Energy Purchased By Customers	-3270460.00 (MWh)	$-259497313.00
Wholesale Demand Response	4270460.00 (MWh)	$359497313.00
Settlements Surplus Account		$-3332100.00
Inter Regional Settlements Surplus Account		$2502313.00
Market Excess Generation		$.00
Market Reserve Trading		$.00
Market Intervention Compensation		$.00
Market Administration Compensation		$.00
Total Ancillary Services		$3577696.00
Total Pool Fees Received		$-1775400.00

- **Trigger**: When prelim/final/revision 1/revision 2 are published and WDR activities were identified in that billing week
- **Delivery method**: Unchanged, via Settlements Direct portal and data interchange and website (public report)

BREAK

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Compliance processes that affect settlements

Ruth Guest

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Non-compliance and settlement

Managing WDRU non-compliance

The NER and AEMO's WDR procedures and policies allow for circumstances where non-compliance can be managed by:

- Removal of a NMI from the WDR mechanism
- Removal of a DUID from the WDR mechanism
- Setting settlement at the NMI level to zero

Scenarios resulting in WDRU non-compliance

- Post-event dispatch conformance assessment results in a non-conformance declaration.
- Dispatch occurs on a day type not matching the day type in the NMI's selected baseline methodology.
- WDRU is baseline non-compliant i.e. doesn't meet accuracy/bias thresholds at compliance testing.

How is settlement affected by a non-compliant WDRU?

- The NER requires participants to manage their dispatch non-conformance.
- The process for assessment and management of these issues between AEMO and the DRSP is set out in the post event dispatch conformance framework.
- If the DRSP fails to take steps to resolve the non-conformance, AEMO may choose to flag all the NMIs in the DUID as non-compliant. This setting will apply to:
  - Past DR events that have not yet been settled
  - Future DR events occurring before the non-compliance is resolved.
- This results in the baseline for the NMIs being set to the metered energy and a net settlement value of zero.

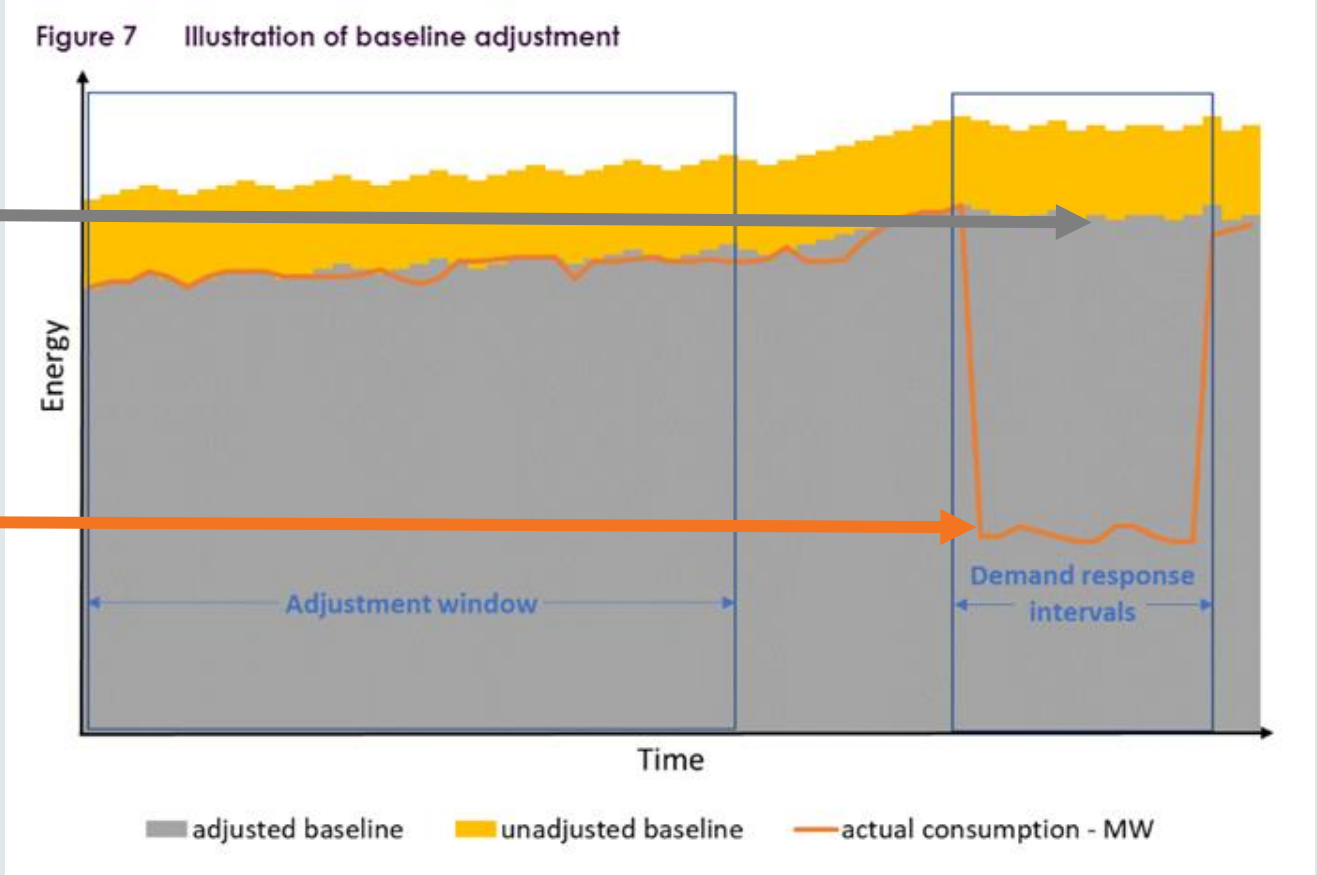
MWh value used in settlements with non-compliant flag

Baseline value if NMI is **compliant**

- baseline value = adjusted baseline value

Baseline value if NMI is **non-compliant**

- the baseline value = the value of the actual consumption during demand response event



Source: https://aemo.com.au/initiatives/submissions/wholesale-demand-response-mechanism-high-level-design

Example values used in settlement

NMI	XXXXXXXXXX		
DR event TIs	Metered energy (MWh)	Baseline result (MWh)	MWh baseline value used in settlement
14:00 – 14:05	12.608	8.453	12.608
14:05 – 14:10	10.272	9.027	10.272
14:10 – 14:15	9.056	7.113	9.056
14:15 – 14:20	6.32	6.065	6.32
14:20 – 14:25	5.904	6.271	5.904
14:25 – 14:30	5.472	6.292	5.472

Baseline calculation data

Alice Michener

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Baseline calculation data report

REPORT PURPOSE: provides understanding of the meter data used to calculate a baseline value used in settlement.

- To be provided via existing data interchange mechanism, aka NEM Reports.
- Uses existing subscription and consumption processes for reporting enabling easy access to calculation data.
- Included in WDR data package provided to participants containing the script to subscribe to the report.

BASELINE CALCULATION DATA	
Settlement ID	References corresponding settlement run
Days excluded from calculation and reason	Dates and reason for exclusion e.g. DR event day
Historical days included in calculation	Dates and meter data for TIs in historical days
TIs used for the adjustment window calculations	Meter data, per adjustment window TI
TIs in the DR event	• Meter data, per TI • Unadjusted baseline, per TI • Uncapped adjustment value, per TI • Adjustment value, per TI • Adjusted baseline value, per TI i.e. Final value used in settlement

Baseline calculation data example

DRSP ID	FRMP ID	NMI	TNI	DR event date	DR start time	DR end time	Methodology	Settlement version ID	Timestamp of calculation
XXXXX	XXXXX	1234567891	ABC	09/04/2021	14:00:00	16:00:00	All Days	####	09/04/2021 18:00:00

DAYS USED IN CALCULATION

I/E	Date	Reason if excl.
Included	08/04/2021	
Included	07/04/2021	
Included	06/04/2021	
Included	05/04/2021	
Included	04/04/2021	
Included	03/04/2021	
Included	02/04/2021	
Included	01/04/2021	
Excluded	31/03/2021	DR event day
Included	30/03/2021	
Included	29/03/2021	

ADJUSTMENT WINDOW VALUES

TI	Meter read (MWh)
10:05	6
10:10	6
10:15	6
10:20	6
10:25	6
10:30	5
10:35	5
10:40	5
…	…
…	…
…	…
13:00	6

DR EVENT VALUES

TI	Unadjusted baseline value (MWh)	Adjusted baseline value (MWh)
14:05	4	6
14:10	4	6
14:15	3	5
14:20	3	5
14:25	4	6
14:30	4	6
14:35	5	7
14:40	5	7
…	…	…
…	…	…
…	…	…
16:00	4	6

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General questions

All

WDR contact and information

Mailbox

wdr@aemo.com.au

WDR program information

https://aemo.com.au/initiatives/trials-and-initiatives/wholesale-demand-response-mechanism

WDR stakeholder engagement options

https://aemo.com.au/consultations/industry-forums-and-working-groups/list-of-industry-forums-and-working-groups/wdr

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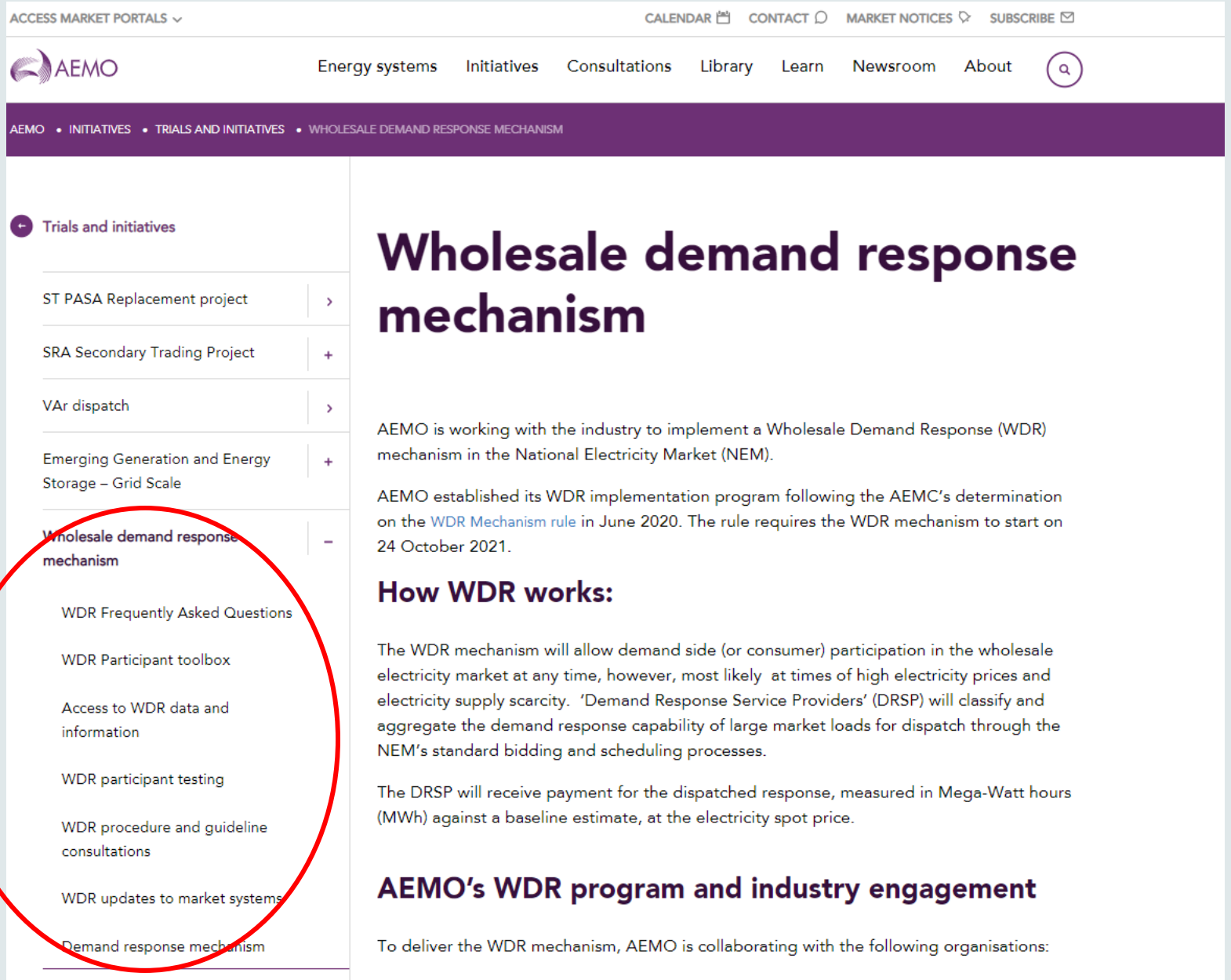
WDR web material

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