

SABP

APPENDIX H

RELIABILITY MUST-RUN PAYMENTS AND CHARGES COMPUTATION

H 1 Purpose of the Payments and Charges

The Reliability Must-Run Payments are the amounts which the ISO is obligated to pay to the owners of Reliability Must-Run Units under or arising out of Reliability Must-Run Contracts. The Reliability Must-Run Charges enable the ISO to recover those amounts from relevant Participating TOs.

H 2 Calculation of Payments and Charges

H 2.1 Reliability Must-Run Payments.

Invoices submitted by Reliability Must-Run Owners to the ISO must be calculated as follows:

(a) Agreement A:

The Reliability Must-Run Payment under Agreement A for each month for each Owner shall be the total of the payments for that month for each Reliability Must-Run Unit owned by the Owner to which the Conditions of Must-Run Agreement A apply calculated in accordance with those Conditions. The Agreement A payment for Reliability Must-Run Owner o for Reliability Must-Run Unit u for month m shall be calculated as follows:

$$\begin{aligned} RMRPayA_{uom} = & \sum_m [(E_{uot} * RPR_{uot}) + (EM_{uot} * EMR_{uot}) + (E_{uot} * HVO\&M_{uot}) + (SCAC_{uot})] \\ & + HOF_{uom} + SUFC_{uom} + SUPC_{uom} + OSUC_{uom} \\ & + \sum_m [AGC_{uot} + SR_{uot} + NSR_{uot} + RR_{uot} + VS_{uot} + ASPDP_{uot}] \\ & - \sum_m [EA_{uot} * SCP_{uot}] - \sum_m [SCASC_{uot}] - \sum_m [SCASEP_{uot}] - \sum_m [ER_{uot} * P_{xuot}] \\ & + \sum_m [(ER_{uot} - E_{uot}) * P_{xuot}] \end{aligned}$$

The total payment to each Owner for Reliability Must-Run services under Agreement A for a given month shall be calculated by summing all the payments for the month for the Reliability Must

-Run Units owned by the Owner to which Agreement A applies. The payment for Owner o for month m shall be calculated as follows:

$$RMR PayTotal A_{om} = \sum_u RMRPayA_{uom} + OPA_{om} + IAA_{om} + IDA_{om}$$

(b) Agreement B

The Reliability Must-Run Payment under Agreement B for each month for each Owner shall be the total of the payments for that month for each Reliability Must-Run Unit owned by the Owner to which the Conditions of Must-Run Agreement B apply calculated in accordance with those Conditions. The Agreement B payment for Reliability Must-Run Owner o for Reliability Must-Run Unit u for month m shall be calculated as follows:

$$\begin{aligned} RMR Pay B_{uom} = & \sum_m [AP_{uot} + (EM_{uot} * EMR_{uot}) + (E_{uot} * HVO \& M_{uot}) + (SCAC_{uot})] \\ & + HOF_{uom} + SUFC_{uom} + SUPC_{uom} + OSUC_{uom} + \\ & \sum_m [ASPDP_{uot} + VS_{uot}] \\ & - 0.9 * \sum_m [EMT_{uot} * PXM_t] - \sum_m [EA_{uot} * SCP_{uot}] \\ & - \sum_m [SCASCP_{uot}] - \sum_m [SCASEP_{uot}] - \sum_m [ER_{uot} * P_{xuot}] \\ & + \sum_m [(ER_{uot} - E_{uot}) * P_{xuot}] \end{aligned}$$

The total payment to each Owner for Reliability Must-Run services under Agreement B for a given month shall be calculated by summing all the payments for the month for the Reliability Must-Run Units owned by the Owner to which Agreement B applies. The payment for Owner o for month m shall be calculated as follows:

$$RMR PayTotal B_{om} = \sum_u RMRPayB_{uom} + OPB_{om} + IAB_{om} + IDB_{om}$$

(c) Agreement C

The Reliability Must-Run Payment under Agreement C for each month for each Owner shall be the total of the payments for that month for each Reliability Must-Run Unit owned by the Owner to which the Conditions of Must-Run Agreement C apply calculated in accordance with those Conditions. The Agreement C payment for Reliability Must-Run Owner o for Reliability Must-Run Unit u for month m shall be calculated as follows:

$$\begin{aligned}
RMR\ Pay\ C_{uom} = & \sum_m [AP_{uot} + (EM_{uot} * EMR_{uot}) + (E_{uot} * HVO\&M_{uot}) + (SCAC_{uot})] \\
& + HOF_{uom} + SUFC_{uom} + SUPC_{uom} + OSUC_{uom} \\
& + \sum_m [VS_{uot}] - \sum_m [EA_{uot} * SCP_{uot}] \\
& - \sum_m [SCASCP_{uot}] - \sum_m [SCASEP_{uot}] - \sum_m [ER_{uot} * P_{xuot}] \\
& + \sum_m [(ER_{uot} - E_{uot}) * P_{xuot}]
\end{aligned}$$

The total payment to each Owner for Reliability Must-Run services under Agreement C for a given month shall be calculated by summing all the payments for the month for the Reliability Must-Run Units owned by the Owner to which Agreement C applies. The payment for Owner o for month m shall be calculated as follows:

$$RMR\ Pay\ Total\ C_{om} = \sum_u RMRPayC_{uom} + OPC_{om} + IAC_{om} + IDC_{om}$$

(d) Total Payment

The total amount payable to each Owner for each month for Reliability Must-Run services shall be the total of the amounts due to the Owner under Agreements A, B and C for that month. The total payment for Reliability Must-Run Owner o for month m shall be calculated as follows:

$$\begin{aligned}
RMR\ Total\ Pay_{om} = & \sum_u RMRTotalPayA_{om} + RMRTotalPayB_{om} \\
& + RMRTotalPayC_{om}
\end{aligned}$$

H 2.2 Reliability Must-Run Charges

Each Participating TO shall pay to the ISO the total amount payable by the ISO for each month under the Reliability Must-Run Contracts for the Reliability Must-Run Units located in the Participating TO's Service Area.

The charge to Participating TO n for month m for Reliability Must-Run Unit u located in the Service Area of Participating TO n shall be calculated as follows:

$$RMRC_{nm} = RMRPay_{nm}$$

The total charge to each Participating TO for Reliability Must-Run services for a given month shall be calculated by summing all the charges for the month for the Reliability Must-Run Units located in

the Service Area of the Participating TO. The charge for Participating TO n for month m shall be calculated as follows:

$$Total\ RMRC_{nm} = \sum_u RMRC_{nmu}$$

H 3 Meaning of terms of formulae

H 3.1 RMRPayAuom (\$)

The amount payable to Reliability Must-Run Owner o under Conditions of Must-Run Agreement A for Reliability Must-Run Unit u for month m.

H 3.2 RPRuot (\$/MWh)

The Hourly Reliability Payment Rate for Reliability Must-Run Unit u owned by Reliability Must-Run Owner o under the Conditions of Must-Run Agreement A applicable to Reliability Must-Run Unit u.

H 3.3 Euot (MWh)

The Energy Delivered by Reliability Must-Run Unit u owned by Reliability Must-Run Owner o in Settlement Period t pursuant to a Dispatch Notice or an ISO's Request under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u. Energy Delivered can never exceed Energy requested by the ISO in Dispatch Notices or ISO's Requests.

H 3.4 EMuot (lb.)

The emissions produced by Reliability Must-Run Unit u owned by Reliability Must-Run Owner o in Settlement Period t calculated in accordance with Schedule C to the Conditions of Must-Run Agreement applicable to the Reliability Must-Run Unit when the Reliability Must-Run Unit Delivers Energy pursuant to a Dispatch Notice or an ISO's Request under the Conditions of Must-Run Agreement. Note: only applicable where Owner is required to pay volumetric fee for emissions.

H 3.5 EMRuot (\$/lb.)

The emissions rate for Reliability Must-Run Unit u owned by Reliability Must-Run Owner o under the Conditions of Reliability Must-Run Agreement applicable to Reliability Must-Run Unit u. Note: only applicable where Owner is required to pay volumetric fee for emissions.

H 3.6 HVO&Muot (\$/MWh)

The Hourly Variable O&M Costs for Reliability Must-Run Unit u owned by Reliability Must-Run Owner o for Settlement Period t under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u.

- H 3.6.1** **SCAC_{uot}** **(\$)**
- The Scheduling Coordinator administration charge payable by Reliability Must-Run Owner o for Reliability Must-Run Unit u for Settlement Period t under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u.
- H 3.7** **HOF_{uom}** **(\$)**
- The Hourly Operating Fuel Costs for Reliability Must-Run Unit u owned by Reliability Must-Run Owner o for Energy Delivered pursuant to a Dispatch Notice or an ISO's Request under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u in month m calculated in accordance with Schedule C to the Conditions of Must-Run Agreement. This figure must be broken down to show that the calculation accords with Schedule C.
- H 3.8** **SUFC_{uom}** **(\$)**
- The Start-up Fuel Costs for Reliability Must-Run Unit u owned by Reliability Must-Run Owner o for Start-ups made in month m pursuant to a Dispatch Notice or an ISO's Request under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u, calculated in accordance with Schedule D to the Conditions of Must-Run Agreement. The figure must be broken down to show that the calculation accords with Schedule D.
- H 3.9** **SUPC_{uot}** **(\$)**
- The Start-up and Shutdown Power Costs for Reliability Must-Run Unit u owned by Reliability Must-Run Owner o for Start-ups made in month m pursuant to a Dispatch Notice or an ISO's Request under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u, calculated in accordance with Schedule D to the Conditions of Must-Run Agreement. This figure must be broken down to show that the calculation accords with Schedule D.
- H 3.10** **OSUC_{uom}** **(\$)**
- The other Start-up costs for Reliability Must-Run Unit u owned by Reliability Must-Run Owner o for Start-ups made in month m pursuant to a Dispatch Notice or an ISO's Request under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u, calculated in accordance with Schedule D to the Conditions of Must-Run Agreement. This figure must be broken down to show that the calculation accords with Schedule D.
- H 3.11** **AGC_{uot}** **(\$)**
- The amount payable under the Conditions of Must-Run Agreement A applicable to Reliability Must-Run Unit u owned by Reliability Must-Run Owner o for Regulation capacity Delivered by Reliability Must-Run Unit

- H 3.16.1** **EA_{uot}** **(MWh)**
- The Energy requested to be Delivered by Reliability Must-Run Unit u owned by Reliability Must-Run Owner o in Settlement Period t in a Dispatch Notice or an ISO's Request issued in the Day-Ahead or the Hour-Ahead under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u .
- H 3.17** **SCP_{uot}** **(\$/MWh)**
- The price payable to Reliability Must-Run Unit Owner o from its Scheduling Coordinator for Energy scheduled to be delivered in Settlement Period t by Reliability Must-Run Unit u pursuant to a Dispatch Notice or ISO's Request issued by the ISO under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u . This is the Energy weighted average of the decremental Adjustment Bids accepted by the ISO to accommodate Reliability Must-Run Generation and to relieve Intra-Zonal Congestion as described in Appendix B to SABP.
- H 3.18** **$SCASCP_{uot}$** **(\$/MWh)**
- The price payable to Reliability Must-Run Unit Owner o from its Scheduling Coordinator for Regulation, and/or Spinning Reserve, and/or Non-Spinning Reserve, and/or Replacement Reserve capacity Delivered in Settlement Period t by Reliability Must-Run Unit u pursuant to a Dispatch Notice or ISO's Request issued by the ISO under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u .
- H 3.19** **$SCASEP_{uot}$** **(\$/MWh)**
- The price payable to Reliability Must-Run Unit Owner o from its Scheduling Coordinator for Energy delivered from Regulation, and/or Spinning Reserve, and/or Non-Spinning Reserve, and/or Replacement Reserve capacity in Settlement Period t in compliance with a Dispatch Notice or ISO's Request issued by the ISO under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u .
- H 3.19.1** **ER_{uot}** **(MWh)**
- The Energy requested to be Delivered by Reliability Must-Run Unit u owned by Reliability Must-Run Owner o in Settlement Period t in a Dispatch Notice or an ISO's Request issued in Real Time under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u .
- H 3.19.2** **P_{xuot}** **(\$/MWh)**
- The Hourly Ex Post Price for Settlement Period t for the Zone in which Reliability Must-Run Unit u owned by Reliability Must-Run Owner o is located.

- H 3.20** **RMRPayTotalA_{om}** **(\$)**
- The total amount payable by the ISO to Reliability Must-Run Owner o for month m for Reliability Must-Run services from Reliability Must-Run Units to which Conditions of Must-Run Agreement A apply.
- H 3.21** **OPA_{om}** **(\$)**
- Any amount payable for month m from the ISO to Reliability Must-Run Owner o or from the Owner to the ISO (in which case this figure shall have a negative value) under Article 8.4 of Conditions of Must-Run Agreement A.
- H 3.22** **IAA_{om}** **(\$)**
- Any interest payable for month m from the ISO to Reliability Must-Run Owner o or from the Owner to the ISO (in which case this figure shall have a negative value) under Article 4.5(f) of Conditions of Must-Run Agreement A.
- H 3.23** **IDA_{om}** **(\$)**
- Any interest payable from the ISO to Reliability Must-Run Owner o or from the Owner to the ISO (in which case this figure shall have a negative value) under Article 4.5(e) of Conditions of Must-Run Agreement A in respect of unpaid or disputed amounts, provided that such interest has not previously been included in any invoice.
- H 3.24** **RMRPayBu_{om}** **(\$)**
- The amount payable to Reliability Must-Run Owner o under Conditions of Must-Run Agreement B for Reliability Must-Run Unit u for month m.

- H 3.25** **AP_{uot}** **(\$)**
- The Availability Payment for Settlement Period t for Reliability Must-Run Unit u owned by Reliability Must-Run Owner o calculated in accordance with the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u .
- H 3.26** **PXM_t** **(\$/MWh)**
- The Power Exchange Market Clearing Price for Settlement Period t .
- H 3.27** **EMT_{uot}** **(MWh)**
- The Energy delivered from Reliability Must-Run Unit u owned by Reliability Must-Run Owner o in Settlement Period t pursuant to a Market Transaction.
- H 3.28** **$RMRPayTotalB_{om}$** **(\$)**
- The total amount payable by the ISO to Reliability Must-Run Owner o for month m for Reliability Must-Run services from Reliability Must-Run Units to which Conditions of Must-Run Agreement B apply.
- H 3.29** **OPB_{om}** **(\$)**
- Any amount payable for month m from ISO to Reliability Must-Run Owner o under Article 2.2(g) or 8.6(b) of Conditions of Must-Run Agreement B or from the Owner to the ISO (in which case this figure shall have a negative value) under Article 2.2(b) or 8.6(b).
- H 3.30** **IAB_{om}** **(\$)**
- Any interest payable for month m from the ISO to Reliability Must-Run Owner o or from the Owner to the ISO (in which case this figure shall have a negative value) under Article 4.6(f) of Conditions of Must-Run Agreement B.
- H 3.31** **IDB_{om}** **(\$)**
- Any interest payable from the ISO to Reliability Must-Run Owner o or from the Owner to the ISO (in which case this figure shall have a negative value) under Article 4.6(e) of Conditions of Must-Run Agreement B in respect of unpaid or disputed amounts, provided that such interest has not previously been included in any invoice.
- H 3.32** **$RMRPayC_{uom}$** **(\$)**
- The amount payable to Reliability Must-Run Owner o under Conditions of Must-Run Agreement C for Reliability Must-Run Unit u for month m .

- H 3.33** **RMRPayTotalCom** **(\$)**
- The total amount payable by the ISO to Reliability Must-Run Owner o for month m for Reliability Must-Run services from Reliability Must-Run Units to which Conditions of Must-Run Agreement C apply.
- H 3.34** **OPCom** **(\$)**
- Any amount payable for month m from the ISO to Reliability Must-Run Owner O under Article 2.2(f) or 8.6(b) or from the Owner to the ISO (in which case this figure shall have a negative value) under Article 2.2 (b) or 8.6(b) of Conditions of Must-Run Agreement C.
- H 3.35** **IACom** **(\$)**
- Any interest payable for month m from the ISO to Reliability Must-Run Owner o or from the Owner to the ISO (in which case this figure shall have a negative value) under Article 4.6(f) of Conditions of Must-Run Agreement C.
- H 3.36** **IDCom** **(\$)**
- Any interest payable from the ISO to Reliability Must-Run Owner o or from the Owner to the ISO (in which case this figure shall have a negative value) under Article 4.6(e) of Conditions of Must-Run Agreement C in respect of unpaid or disputed amounts, provided that such interest has not previously been included in any invoice.
- H 3.37** **RMRCnmu** **(\$)**
- The Reliability Must-Run Charge payable by Participating TO n for month m for Reliability Must-Run Unit u located in the Participating TO n's Service Area.
- H 3.38** **RMRPaynmu** **(\$)**
- The total amount payable by the ISO for month m under the Conditions of Must-Run Agreement applicable to Reliability Must-Run Unit u located in the Service Area of Participating TO n.
- H 3.39** **AGCnmu** **(\$)**
- The amount received in month m by the ISO from Scheduling Coordinators for Regulation capacity held on Reliability Must-Run Unit u located in the Service Area of Participating TO n pursuant to a Dispatch Notice or ISO's Request issued by the ISO under the Conditions of Must-Run Agreement.

H 3.40 **SR_{nmu}** **(\$)**

The amount received by the ISO from Scheduling Coordinators in month m for Spinning Reserve capacity held on Reliability Must-Run Unit u located in the Service Area of Participating TO n pursuant to a Dispatch Notice or ISO's Request issued by the ISO under the Conditions of Must-Run Agreement.

H 3.41 **NSR_{nmu}** **(\$)**

The amount received by the ISO from Scheduling Coordinators in month m for Non-Spinning Reserve capacity held on Reliability Must-Run Unit u located in the Service Area of Participating TO n pursuant to a Dispatch Notice or ISO's Request issued by the ISO under the Conditions of Must-Run Agreement.

H 3.42 **RR_{nmu}** **(\$)**

The amount received by the ISO from Scheduling Coordinators in month m for Replacement Reserve capacity held on Reliability Must-Run Unit u located in the Service Area of Participating TO n pursuant to a Dispatch Notice or ISO's Request issued by the ISO under the Conditions of Must-Run Agreement.

H 3.43 **VS_{ntu}** **(\$)**

The amount received by the ISO from Scheduling Coordinators in month m for additional Voltage Support provided by Reliability Must-Run Unit u located in the Service Area of Participating TO n pursuant to a Dispatch Notice or ISO's Request issued by the ISO under the Conditions of Must-Run Agreement.

H 3.44 **Total RMRC_{nm}** **(\$)**

The total Reliability Must-Run charge payable by Participating TO n for month m for Reliability Must-Run services from Reliability Must-Run Units located in the Participating TO n Service Area.

H 4 **Data Input/Output**

Term	Units	Variable Name	Input or Output	Detail Required
RMRPay _{A_{uom}}	\$	RMR Unit Payment under A	Output	By Unit
RPR _{uot}	\$/MWh	Reliability Payment Rate	Input	By Unit By Settlement Period

Term	Units	Variable Name	Input or Output	Detail Required
E_{uot}	MWh	Non-Market Transaction Energy Delivered	Input	By Unit By Settlement Period
EM_{uot}	lb.	Emissions Produced	Input	By Unit By Settlement Period
EMR_{uot}	\$/lb.	Emissions rate	Input	By Unit By Settlement Period
$HVO\&M_{uot}$	\$/MWh	Variable O&M Rate	Input	By Unit By Settlement Period
$SCAC_{uot}$	\$	SC Admin. Charge	Input	By Unit
HOF_{uom}	\$	Hourly Operating Fuel Costs	Input	By Unit
$SUFC_{uom}$	\$	Startup Fuel Costs	Input	By Unit
$SUPC_{uom}$	\$	Startup and Shutdown Power Costs	Input	By Unit
$OSUC_{uom}$	\$	Shutdown Power Costs	Input	By Unit
AGC_{uot}	\$	Regulation Payment due	Input	By Unit By Settlement Period
Sr_{uot}	\$	Spinning Reserve Payment due	Input	By Unit By Settlement Period
NSR_{uot}	\$	Non-Spinning Reserve Payment due	Input	By Unit By Settlement Period

Term	Units	Variable Name	Input or Output	Detail Required
R _{ruot}	\$	Replacement Reserve Payment due	Input	By Unit By Settlement Period
V _{suot}	\$	Voltage Support Payment due	Input	By Unit By Settlement Period
ASPDP	\$/MWh	Ancillary Service Pre-empted Dispatch Payment	Input	By Unit By Settlement Period
E _{auot}	MWh	Energy Requested DA and HA	Input	By Unit By Settlement Period
SCP _{uot}	\$	Scheduling Coordinator's Energy Price	Input	By Unit By Settlement Period
SCASCP	\$/MW	Scheduling Coordinator's Ancillary Service Capacity Price	Input	By Unit By Settlement Period
SCASEP	\$/MWh	Scheduling Coordinator's Ancillary Service Energy Price	Input	By Unit By Settlement Period
E _{ruot}	MWh	Energy Requested in Real Time	Input	By Unit By Settlement Period
P _{xuot}	\$/MWh	Zonal Hourly Ex Post Price for Uninstructed Imbalance Energy	Input	By Unit By Settlement Period
RMRPayTotalA _{om}	\$	Total RMR Payment under A	Output	
OPA _{om}	\$	Other A Payment	Input	
IAA	\$	Interest on adjustments	Input	

Term	Units	Variable Name	Input or Output	Detail Required
IDA	\$	Interest on unpaid and disputed amounts	Input	
RMRPayBuom	\$	RMR Unit Payment under B	Output	By Unit
Apuot	MWh	Availability Payment	Input	By Unit By Settlement Period
PXM _t	\$/MWh	PX Market Clearing Price	Input	
EMT _{uot}	MWh	Market Transaction Energy	Input	By Unit By Settlement Period
RMRPayTotalBom	\$	Total RMR Payment under B	Output	
OPB _{om}	\$	Other B Payment	Input	
IAB	\$	Interest on adjustments	Input	
IDB	\$	Interest on unpaid and disputed amounts	Input	
RMRPayCuom	\$	RMR Unit Payment under C	Output	By Unit
RMRPayTotalCom	\$	Total RMR Payment under C	Output	
OPCom	\$	Other C Payment	Input	
IAC	\$	Interest on adjustments	Input	
IDC	\$	Interest on unpaid or disputed amounts	Input	
RMRC _{nmu}	\$	RMR Charge per Unit	Output	By Unit
RMRPaynmu	\$	RMR Unit Payments	Input	By Unit

Term	Units	Variable Name	Input or Output	Detail Required
Total RMRC _{nm}	\$	Total RMR Charge	Output	

