



## Transmission Services

### DRAFT - NT Redispatch Protocols

#### NT Redispatch - Policy Overview

The NT Redispatch program dispatches Network Integration Transmission Customer (NT Customer) designated Network Resources (DNR) during a transmission congestion event to avoid the curtailment of Firm NT (7-FN) transmission schedules and maintain system reliability.

Pursuant to sections 30.5 and 33.2 of BPA’s Open Access Transmission Tariff, as a condition to receiving Network Integration Transmission Service (NT Service), the NT Customer agrees to redispatch its DNRs as requested by the Transmission Provider to maintain reliability and service to NT Customer loads.

This document captures the protocols and procedures for the redispatch of NT Customer DNRs as part of the NT Redispatch program.

For information on BPA’s curtailment procedures, please refer to the “Redispatch and Curtailment” Business Practice.

#### A. DNRs Considered to Provide NT Redispatch

The following table identifies which types of Designated Network Resources (DNRs) will be considered for the NT Redispatch program and, if deemed eligible in accordance with section B below, may provide INC or DEC capacity.

	Considered for NT Redispatch?	Considered for INC?	Considered for DEC?
DNRs associated with specific generation, not including variable generation, located within or outside BPA’s balancing authority area; includes designation of FCRPS system	Yes	Yes	Yes
DNR’s associated with specific variable generation (e.g. wind resources) located within or outside BPA’s balancing authority area.	Yes	No	Yes
DNRs not associated with specific generation, including Market Purchase	Yes	No	Yes

DNRs (e.g. off-system seller's choice contracts, WSPP Schedule C contracts) located within or outside BPA's balancing authority area			
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## B. Eligibility Criteria for DNRs

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DNRs satisfying the eligibility criteria identified below must participate in NT Redispatch program:

1. *Duration of designation:* The DNR is designated for a period greater than one year ("long-term"). At this time, DNRs designated for a period less than one year ("short-term") are not eligible to participate in the NT Redispatch program;
2. *Dispatchability and Controllability:* Generation levels can be adjusted remotely or by staff within 10 minutes in order to achieve the ramp rates assumed in criteria B.3. below ; and
3. *Effectiveness:* Based on the total designated MW demand of a resource (from all NT Customers) and its ramp rate, the DNR is paired to all other DNR's, federal and nonfederal, on all flowgates to calculate flowgate relief. If the flowgate relief for at least one pair is 3 MW or greater over a 10-minute period on any one flowgate, then the resource is deemed "effective" unless
  - a. the transmission provider determines, based upon customer demonstration, that increasing or decreasing the generation output of the resource to provide INC or DEC capacity would cause the generator to operate outside of its normal operating parameters/curve and such operation could damage the resource or cause it to violate operating/regulatory restrictions. Customer demonstration may include providing the transmission provider with the operating specifications, warranties and/or manuals for the resource.

If a DNR is deemed to meet the eligibility criteria, it will be identified in the NT Service Agreement as being eligible to be called upon to provide NT Redispatch. BPA may, at its discretion, periodically reevaluate the application of eligibility criteria to DNRs.

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## C. DNR Informational Requirements

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For DNRs participating in the NT Redispatch program, the NT customer must provide the following information:

1. 10-minute INC and DEC capability;
2. Minimum and maximum generation levels by hour (in whole MW); and
3. Forecasted INC and DEC cost and saving estimates to be used in creating the NT Redispatch resource stack; such estimates may be based on the data

elements listed in Section F.5 below and provided in one of the following formats:

- a. \$/MWh estimate
  - b. Market cost +/-adder
4. Customers will submit the required information by completing the attached excel spreadsheet and submitting it to [inbox TBD].
  5. Customers are encouraged to update and submit the identified information on a monthly basis, prior to the start of each month. However, the customer will have the opportunity to update the information as frequently as desired. Any updates submitted outside normal business hours will be reflected in the NT Redispatch Stack the following business day.

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#### D. Creating the NT Redispatch Resource Stack

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The NT Redispatch resource stack for each flowgate/path will be determined for each congestion event based on a forecast of cost and saving per MWh of congestion relief. The forecast of cost and/or forecast of saving for each DNR will be those provided by the NT customer as described in Section C.3 except as noted in Section D.2.e. The resource stack will consist of the eligible DNRs, paired and ranked in the following manner:

1. NT Redispatch pairs will be created using all the possible combinations of INC and DEC DNRs, both federal and nonfederal. The maximum MW quantity available for Redispatch for each Redispatch pair will be the lesser of the INC or DEC quantities (PairMW).
2. The MW quantity of relief each NT Redispatch pair is capable of providing on the congested flowgate/path (pair flowgate/path relief) will be calculated as follows:
  - a. Subtract the shift factor (SF) corresponding to the DEC DNR (POD) from the SF corresponding to the INC DNR (POR) to calculate the impact (distribution factor or DF) on the specified flowgate/path.
  - b. If the DF is a negative value, then the NT Redispatch pair will provide Pair flowgate/path congestion relief and is retained.
  - c. If the DF is zero or a positive value, then the NT Redispatch pair will not provide Pair flowgate/path congestion relief and is eliminated.
  - d. The Pair flowgate/path congestion relief available for each remaining NT Redispatch pair is the PairMW multiplied by the DF.
  - e. The forecasted net cost of the Pair flowgate/path congestion relief is calculated by subtracting the forecasted cost/saving of the DEC resource from the forecasted cost of the INC resource and then dividing the result by the DF, as measured in \$/MWh of relief on the flowgate/path. The INC and DEC forecasted cost/saving will be those provided by NT Customers in Section C.3 except under the following circumstances:

- i. Hydro generation:
  - 1. If the NT customer does not provide the forecasted INC cost and/or DEC cost/saving or forecasted opportunity cost for the DNR, then the INC cost and/or DEC cost/saving used in creating the NT Redispatch resource stack will be based on BPA's proxy of market prices.
  - 2. If the NT customer provides the forecasted INC cost for the DNR, then the INC cost used in creating the NT Redispatch resource stack will be the higher of BPA's proxy market price or the forecasted INC cost provided by the NT Customer. If the NT customer provides the forecasted cost/saving or forecasted opportunity cost of the DEC for the DNR, then the DEC cost/saving used in creating the NT Redispatch resource stack will be the lower of BPA's proxy market price or the forecasted DEC cost/saving provided by the NT Customer.
- ii. Thermal generation: BPA will compare (greater of for INC, lower of for DEC) its proxy market price for the hour in which redispatch will occur to the forecasted cost/saving provided by customers to determine the INC and DEC cost/saving to be used in creating the NT Redispatch resource stack.
- iii. Variable generation: the DEC forecasted cost/saving provided by the customer will be used in creating the NT Redispatch resource stack.
  - 1. If the customer does not provide forecasted cost, BPA will use \$0 as the DEC cost in creating the NT Redispatch resource stack.
- iv. Market purchases: the DEC forecasted cost/saving provided by the customer will be used in creating the NT Redispatch resource stack.
  - 1. If the customer does not provide an estimate of its forecasted cost/saving, BPA will use \$0 as the DEC cost in creating the NT Redispatch resource stack.
- f. The NT Redispatch stack for each flowgate is determined by ranking the NT Redispatch pairs based on the forecasted cost (\$/MWh) of relief on the flowgate/path in ascending order (i.e., least forecasted cost of relief at the top, and greatest forecasted cost of relief at the bottom).

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## E. Communicating an NT Redispatch Request

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- 1. Requests for NT Redispatch will be issued coincident with the corresponding curtailments, in 15-minute intervals or less.
- 2. BPA will issue a NT Redispatch request to a generator through the creation of Emergency E-tags.

- a. Requesting INC Redispatch - BPA will issue an Emergency E-tag sourcing from the DNR being requested to provide INC redispatch and sinking at the "BPA NT Redispatch Centroid" point.
  - b. Requesting DEC Redispatch from all DNRs except Market Purchase DNRs - BPA will issue an Emergency E-tag sourcing from the "BPA NT Redispatch Centroid" point and sinking at the DNR being requested to provide DEC redispatch.
  - c. Requesting DEC redispatch from Market Purchase DNRs
    - i. BPA will issue the request for DEC redispatch through the curtailment of the e-tag sourcing from DNR and sinking at load.
    - ii. BPA will issue a replacement Emergency E-tag sourcing from the "BPA NT Redispatch Centroid" sinking at the NT Customer load.
    - iii. For an example, see "Requesting NT Redispatch Examples" at the end of Appendix A.
3. To the extent the NT Customer is an approval entity on the Emergency E-tags, the NT Customer is required to approve the issued Emergency E-tag unless it cannot provide the redispatch requested through the Emergency E-tag.
  4. If NT Redispatch cannot be provided, the customer must deny the E-tag and submit information describing why the requested redispatch could not be provided. The information must be submitted to the customer's Transmission Account Executive within 5 business days of the NT Redispatch request. Examples of why NT Redispatch could not be provided may include:
    - a. DNR used to make a third-party sale and the sale is for less than one year.
    - b. Providing INC or DEC will cause damage to the resource.
    - c. DNR is shut down for maintenance and/or
    - d. Lack of water or fuel.
  5. The creation and issuance of Emergency E-tags as a way of requesting NT Redispatch will enable BPA to account for the various financial settlements after the fact (i.e., Energy Imbalance, Generator Imbalance).

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## F. NT Redispatch Compensation Mechanism

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The NT Customer will be held whole financially for the directed NT Redispatch it actually provides. NT Customers who INC generation will be paid their costs by BPA. NT Customers who DEC will pay to BPA the net of their savings and costs. If costs are greater than savings for the provision of DEC redispatch, BPA will pay costs minus savings to the NT Customer.

1. Hydro Generation
  - a. INC Cost for Settlement Purposes
    - i. Actual cost or opportunity cost, whichever is greater. Both actual and opportunity cost must be certified as accurate unless the customer deems its opportunity cost to be the highest hourly price of the energy index in the Pacific Northwest during the 24-hour

period beginning with the hour in which NT Redispatch was provided.<sup>1</sup>

- b. DEC Cost for Settlement Purposes
  - i. Actual cost minus actual savings or opportunity cost, whichever is lower. Actual cost and actual savings as well as opportunity cost must be certified as accurate unless the customer deems its opportunity cost to be the lowest hourly price of the energy index in the Pacific Northwest during the 24-hour period beginning with the hour in which NT Redispatch was provided.
  - ii. If the customer's hydro system providing the DEC is in a spill condition the opportunity cost is deemed zero.<sup>2</sup>
- 2. Thermal Generation
  - a. INC Cost for Settlement Purposes
    - i. Actual cost or opportunity cost, whichever is greater.
    - ii. Both actual cost and opportunity cost must be certified as accurate unless the customer deems its opportunity cost to be the hourly energy index in the Pacific Northwest for the hour in which NT Redispatch was provided.
  - b. DEC Cost for Settlement Purposes
    - i. Net of actual cost and saving.
- 3. Variable Generation
  - a. INC Cost for Settlement Purposes
    - i. Not applicable.
  - b. DEC Cost for Settlement Purposes
    - i. Net of actual cost and saving.
- 4. Market Purchases
  - a. INC Cost for Settlement Purposes
    - i. Not applicable.

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<sup>1</sup> If no adequate hourly index exists, an alternative index will be used. At least 30 days prior to the use of such index BPA will post on its OASIS Web site the name of the index to be used. BPA will not change the index more often than once per year unless BPA determines that the existing index is no longer a reliable price index.

<sup>2</sup> Spill condition, for the purpose of determining the DEC cost for settlement of NT Redispatch of hydro resources, exists when spill physically occurs on the hydro system in which the DNR is located due to lack of load or market. Spill due to lack of load or market typically occurs during periods of high flows or flood control implementation, but can also occur at other times. Discretionary spill, where the operator of the DNR may choose whether to spill, does not constitute a spill condition. Spill for fish is included in discretionary spill and is not a spill condition.

- b. DEC Cost for Settlement Purposes
  - i. Net of actual cost and saving.
- 5. Determining “actual cost and actual saving”
  - a. Actual cost may include:
    - i. Cost of fuel
    - ii. Variable operation and maintenance expense
    - iii. Start-up cost
    - iv. Cost of additional operating reserves
    - v. Cost related to minimum run times
    - vi. Lost tax credits, renewable credits
    - vii. Liquidated damages, penalties (if applicable)
    - viii. Other related verifiable and quantifiable costs
  - b. Actual saving may include:
    - i. Avoided fuel cost
    - ii. Other verifiable and quantifiable avoided costs
- 6. If the DNR has provided NT Redispatch, the NT Customer will be required to provide associated cost (actual or opportunity) and/or saving information, certified to be accurate, to BPA within 30 Business Days of the NT Redispatch event.
  - a. The customer should submit the information and certification (on a form TBD) to its Transmission Account Executive.
  - b. Settlement of NT Redispatch will be reflected on the Transmission Bill within one billing cycle of BPA receipt of cost/saving information.
  - c. If the customer does not send pertinent settlement information in the allotted timeframe, BPA will compensate the customer for hydro and thermal generation based on opportunity cost as detailed in Section F.1 and F.2. For DEC of variable generation and market purchases, BPA will assume a net of actual cost and saving equal to zero.
- 7. BPA retains the right to request more information on certified actual cost/saving provided by the customer if they deviate significantly from forecasted cost/saving or from actual cost/saving of like DNRs redispatched for the same hour. BPA will work with the customer through informal discussions to reconcile the associated cost/saving.

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## G. Reporting Costs of NT Redispatch

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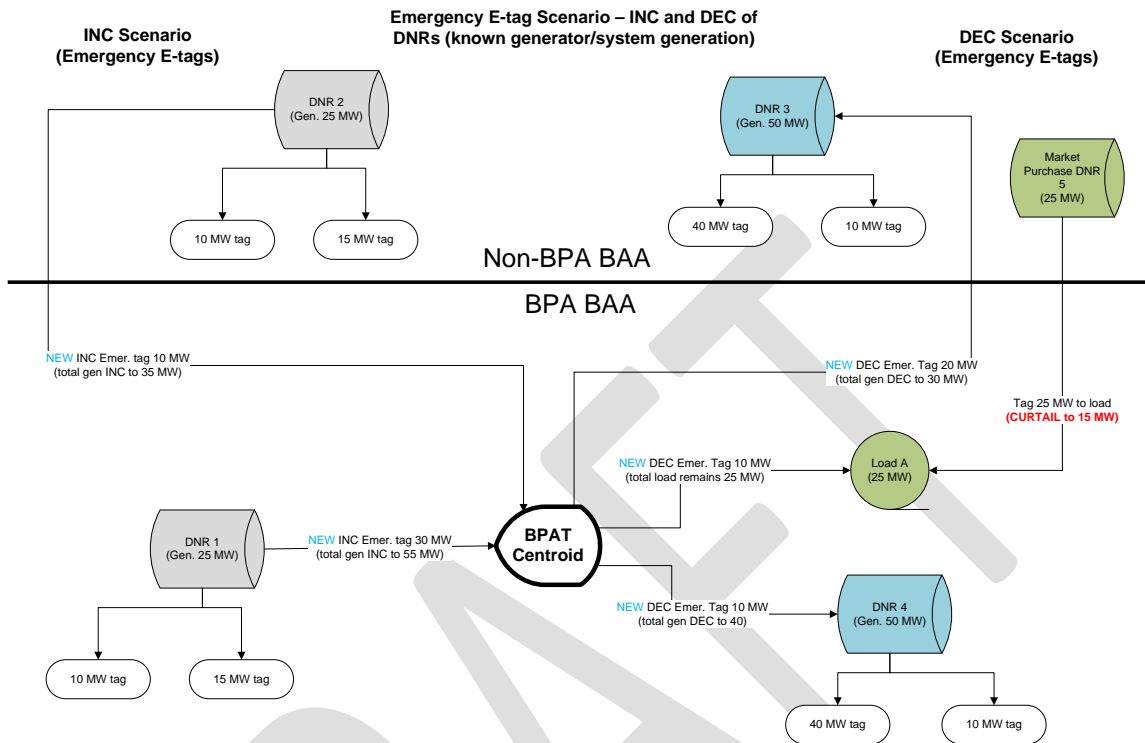
BPA will post the costs incurred as a result of NT Redispatch on OASIS on a monthly basis consistent with applicable NAESB standard. The information will be posted on BPA’s website:

<https://www.bpa.gov/transmission/Reports/PerformanceMetrics/Pages/Redispatch-Costs-Report.aspx>

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## Appendix A: Examples of Requesting NT Redispatch



In this example, BPA will request 40 MW of INC and 40 MW of DEC as follows:

DNR 1, 30 MW of INC redispatch. In communicating the request, BPA has issued an Emergency E-tag sourcing from DNR 1 and sinking at "BPA Centroid." Thus, the total expected generation would total 55 MW for DNR 1, and the total e-tags would add up to 55 MW - retaining e-tags and generation balance.

DNR 2, 10 MW of INC redispatch. In communicating the request, BPA has issued an Emergency E-tag sourcing from DNR 2 and sinking at "BPA Centroid." Thus, the total expected generation would total 35 MW for DNR 2, and the total e-tags would add up to 35 MW - retaining e-tags and generation balance.

DNR 3, 20 MW of DEC redispatch. In communicating the request, BPA issued an Emergency E-tag sourcing from "BPA Centroid" and sinking at DNR 3. Prior to the request, the generator was operating at 50 MW, and after the 20 MW DEC request, the generator would generate 30 MW. The total e-tags coming in and out of the generator would also net out to 30 MW (20 MW coming in of Emergency e-tag, and 50 MW going out of regular e-tags) thus providing for a balance between generation and the e-tags.

DNR 4, 10 MW of DEC redispatch. In communicating the request, BPA issued an Emergency E-tag sourcing from "BPA Centroid" and sinking at DNR 4. Prior to the request, the generator was operating at 50 MW, and after the 10 MW DEC request, the generator would generate 40 MW. The total e-tags coming in and out of the generator would also net out to 40 MW (10 MW coming in of Emergency e-tag, and 50 MW going out of regular e-tags) thus providing for a balance between generation and the e-tags.

DNR 5, 10 MW of DEC redispatch from a market purchase. In requesting the redispatch from DNR 5, a market purchase DNR, BPA curtails the regular e-tag (sourcing from DNR 5 and sinking at Load A) by 10 MW (from 25 MW down to 15 MW). At the same time, BPA issues an Emergency E-tag sourcing from "BPA Centroid" and sinking at Load A for the 10 MW of DEC redispatch requested. The total generation sinking at the load will be 25 MW, consisting of the 10 MW Emergency E-tag and the 15 MW regular e-tag (curtailed from 25 MW) from DNR 5 to Load A. This will ensure that the load remains balanced between schedules and load.

Sample INC Emergency E-tag corresponding to example above:

INC Internal Resource							
BA	TSP	PSE	POR	POD	SE	Contract	NERC Priority
BPAT		NTCUST	Source: DNR 1				
	BPAT	NTCUST	DNR1 POR	BPAT Centroid	BPAT	12345	7-FN
BPAT		BPAT	Sink: BPAT Centroid				

INC External Resource (Individual or System Resource)							
BA	TSP	PSE	POR	POD	SE	Contract	NERC Priority
BAA		NTCUST	Source: DNR 2				
	TSP	NTCUST	DNR2 POR	DNR POD	BAA1	TBD	TBD
	BPAT	NTCUST	BPAT.BPAT	BPAT Centroid	BPAT	12345	7-FN
BPAT		BPAT	Sink: BPAT Centroid				

Sample DEC Emergency E-tag corresponding to example above:

DEC External Resource (Individual or System Resource)							
BA	TSP	PSE	POR	POD	SE	Contract	NERC Priority
BPAT		BPAT	Source: BPAT Centroid				
	BPAT	NTCUST	BPAT Centroid	BPAT.BPAT	BPAT	12345	7-FN
	TSP	NTCUST	BPAT.BPAT	DNR3 POD	BAA2	TBD	TBD
BAA		NTCUST	Sink: DNR 3				

DEC Internal Resource							
BA	TSP	PSE	POR	POD	SE	Contract	NERC Priority
BPAT		BPAT	Source: BPAT Centroid				
	BPAT	NTCUST	BPAT Centroid	DNR4 POD	BPAT	12345	7-FN
BPAT		NTCUST	Sink: DNR 4				



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Sample DEC Emergency E-tag for Market Purchase DNR corresponding to example above:

<b>Curtailment and Resupply of Market Purchase</b>	DEC Market Purchase							
	BA	TSP	PSE	POR	POD	SE	Contract	NERC Priority
	BPAT		BPAT	Source: BPAT Centroid				
		BPAT	NTCUST	BPAT Centroid	NT Load A POD	BPAT	12345	7-FN
	BPAT		NTCUST	Sink: NT Load A				
	DEC Market Purchase Curtailed Tag (Individual or System Resource)							
	BA	TSP	PSE	POR	POD	SE	Contract	NERC Priority
	BAA		PSE	Source: Market Purchase DNR 5				
		TSP	PSE	Market Purchase POR	BPAT.BPAT	BAA3	#####	7-F
		BPAT	NTCUST	BPAT.BPAT	NWH	BPAT	#####	7-F
	BPAT	NTCUST	NWH	NT Load A POD	BPAT	#####	7-FN	
BPAT		NTCUST	Sink: NT Load A					

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## Appendix B: Examples of Compensation of NT Redispatch (Settlement)

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The following compensation examples correspond to the NT Redispatch examples in Appendix A of this document. For simplicity, the examples below assume that the redispatch is requested to be ramped in for the second 15-minute interval of an hour (XX:15-:XX:30) and is repeated for each of the remaining 2 15-minute intervals of the hour for a total of 3 15-minute intervals or 45 minutes of the hour:

### Example 1 - Compensation for Redispatch of Hydro Generation

Hydro Project A (DNR 1 in example) has been requested to INC 30 MW to start at 15 minutes into a delivery hour for three consecutive 15-minute intervals, and Hydro Project B has been requested to DEC 30 MW at the same time. Both hydro projects are able to respond.

The lowest energy index price is \$24/MWh in the subsequent 24 hours and highest energy index price is \$36/MWh.

- Hydro Project A is paid for providing 30 MW INC for 45 minutes at \$36/MWh, total \$810.
- Hydro Project B will pay for providing 30 MW DEC for 45 minutes at \$24/MWh, total \$540.

### Example 2 - Compensation for INC Redispatch of Thermal DNR.

Thermal DNR (DNR 2 in example) capabilities are that it can be ramped up 10 MW in 10 minutes. Unit is offline when BPA requests 10 MW INC redispatch to start at 15 minutes into a delivery hour for three consecutive 15-minute intervals. Total generation = 7.5 MWh

Actual Cost:

- Average heat rate during redispatch: 10,000 mmBTU/kWh
- Cost of natural gas and transportation: \$3.85/mmBTU
- Variable O&M: \$3/MWh
- Startup cost: \$1,000 per start

Total actual cost =

$$10 \cdot (45/60) \cdot (10000 \cdot 3.85/1000 + 3) + 1000 = 7.5 \cdot (38.5 + 3) + 1000 = \underline{\underline{\$1311.25}}$$

Cost per MWh = \$174.83

Market price = \$36/MWh

BPA would compensate customer for the higher of actual or opportunity cost which is the actual cost of \$1311.25.

### Example 3 - Compensation for DEC Redispatch of Thermal DNR.

Thermal DNR (DNR 3 in example) capabilities are that it can ramp down 20 MW in 10 minutes. BPA requests 20 MW DEC redispatch from 50 MW to 30 MW to start at 15 minutes into a delivery hour for three consecutive 15-minute intervals. Total avoided generation = 15 MWh.

Actual Cost & Saving:

- Heat rate during redispatch: 8,000 mmBTU/kWh (resource would have been operating at this heat rate had it not been DECed) and 8,889 mmBTU/kWh when DECed
- Cost of natural gas and transportation: \$3.00/mmBTU
- Variable O&M: \$1/MWh
- Penalty cost: \$0.4 per mmBTU
- Total saving (avoided fuel and O&M) =  $3 \times (50 \times (45/60) \times 8000/1000 - (50 - 20) \times (45/60) \times 8889/1000) + 1 \times 20 \times (45/60) = 3 \times (300 - 200) + 15 = \underline{\$315}$ .
- Total cost (gas penalty) =  $0.4 \times (300 - 200) = \underline{\$40}$

Net: Actual Saving - Actual Cost = \$315 - \$40 = \$275 (actual cost per MWh = \$18.33)

The customer pays BPA \$18.33/MWh, \$236, for providing DEC redispatch and having the load served by a BPA-directed INC.

#### Example 4 - Compensation for DEC Redispatch for Variable DNR.

Variable DNR (DNR 4 in example) capabilities are that it can ramp down 10 MW in 10 minutes. BPA requests 10 MW DEC redispatch to start at 15 minutes into a delivery hour for three consecutive 15-minute intervals. Total avoided generation = 7.5 MWh. Actual Cost & Actual Saving:

- Actual Saving: no fuel savings and no storage savings, \$0
- Actual Cost: lost Renewable Energy Credits of \$20 per MWh
- Total actual saving = \$0.
- Total actual cost =  $7.5 \times (20) = \underline{\$150}$

Net: Actual Saving - Actual Cost = \$0 - \$150 = -\$150 (actual cost per MWh = -\$20)

BPA pays the customer \$150 (\$20/MWh) for providing DEC redispatch and having the load served by a BPA-directed INC.

#### Example 5 - Compensation for DEC Redispatch for Market Purchase DNR.

Market Purchase DNR (DNR 5 in example) is sourced from an adjacent BA. BPA requests 10 MW DEC redispatch by curtailing the e-tag to start at 15 minutes into a delivery hour for three consecutive 15-minute intervals. Total avoided generation = 7.5 MWh. BPA also creates an e-Tag to serve the NT Customer load.

Actual Cost & Actual Saving:

- Actual Saving: take or pay, no credit given, \$0
- Actual Cost: no additional cost
- Total actual saving = \$0.
- Total actual cost =  $7.5 \times (0) = \underline{\$0}$

Net: Actual Saving - Actual Cost = \$0 - \$0 = \$0 (actual cost per MWh = \$0)

There is no settlement between BPA and the customer for providing DEC redispatch and having the load served by a BPA-directed INC.