



# Forward Net Energy & Ancillary Services Revenue Offset Methods & Comparisons

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- PJM's most updated Net Energy & Ancillary Services Revenue Offset values with new historical years and forwards for 2026/27
- Reference resource parameters for E&AS
- Comparison of IMM and PJM forward-looking E&AS assumptions
- Comparison of PJM historical vs forward-looking E&AS methods and values



# Indicative Values for 2026/27: Net CONE with Forward-Looking Net E&AS Revenue Offset (PJM Prelim Recommendations)

	2026/27 CONE (Brattle Report)	2023/24 Forward EAS (Brattle Report)	2026/27 Forward EAS (Updated)	2026/27 Net CONE (Updated)
<b>CONE Area 1</b>				
AECO	\$517	\$146	\$223	\$294
DPL	\$517	\$196	\$343	\$174
JCPL	\$517	\$143	\$230	\$287
PECO	\$517	\$174	\$197	\$320
PSEG	\$517	\$140	\$227	\$290
RECO	\$517	\$151	\$262	\$255
<b>CONE Area 2</b>				
BGE	\$506	\$239	\$420	\$86
PEPCO	\$506	\$185	\$310	\$196
<b>CONE Area 3</b>				
AEP	\$518	\$229	\$347	\$171
APS	\$518	\$267	\$466	\$52
ATSI	\$518	\$231	\$291	\$227
COMED	\$518	\$168	\$293	\$225
DAY	\$518	\$247	\$429	\$89
DEOK	\$518	\$237	\$413	\$105
DUQ	\$518	\$219	\$246	\$272
DOM	\$518	\$183	\$291	\$227
EKPC	\$518	\$239	\$387	\$131
<b>CONE Area 4</b>				
METED	\$522	\$205	\$285	\$237
PENELEC	\$522	\$310	\$460	\$62
PPL	\$522	\$182	\$236	\$286
<b>RTO</b>	<b>\$516</b>	<b>\$177</b>	<b>\$286</b>	<b>\$230</b>

Additional information based on  
5/20/2022 Special Session discussion

## Updated EAS since Brattle Report accounts for:

- Updated historical years (19/20/21 vs 18/19/20)
  - 21% increase in 3-year average historical LMP
  - 0% increase in 3-year average historical natural gas prices
- 2026/27 forward energy and natural gas prices
  - 58% increase in forward LMPs from 2023/24 values
  - 51% increase in forward gas prices from 2023/24 values
- Scaled reserve prices by forward energy prices
  - 33% increase in input reserve prices
- RGGI allowance cost added to zones in Pennsylvania
- EKPC mapped to MichCon

## Included in both sets of values:

- Updated resource parameters
- No Regulation
- No natural gas transportation costs in variable costs



# Reference Resource (Combined Cycle) Operating Parameters for Quad Review Net E&AS Revenue Offset

Parameter	Value	Notes
<b>Configuration</b>	GE 7HA.02(CT), ST F-A650(ST); Double Train 1x1 Single Shaft; Cooling towers to dry air-cooled condensers; Selective catalytic reduction	
<b>Max Capacity</b>	1,058 MW w/o Duct Burner; 1,182 MW w/ Duct Burner	Average capacity of CONE Area units at ISO conditions (59°F, 14.7 psia); Sargent & Lundy
<b>Min Stable Level</b>	176 MW	Min Stable Load for one 1x1x1 CC train = 33% single train MCR (assumes the 2nd train is not operating); Sargent & Lundy
<b>Ramp Rate</b>	30 MW/min	Existing unit offers (15 MW/min per turbine), two trains should ramp 2x faster than one; Sargent & Lundy
<b>Heat Rate</b>	7,866 Btu/kWh at Min Stable Level 6,293 Btu/kWh w/o Duct Firing; 6,537 Btu/kWh w/ Duct Firing	Min Stable (33% Load) Heat Rate ~125% Full Load Net Heat Rate. Other values are average of CONE Area full load heat rates at ISO conditions (59°F, 14.7 psia); Sargent & Lundy
<b>Min Run</b>	4 hr	Minimum Unit-Specific Operating Parameters for Generation Capacity Resources
<b>Min Down</b>	3.5 hr	
<b>Time to Start</b>	120 min	Time from ignition to base load, assumes appropriate steam cycle design. GE published startup time for these units is 60 min which assumes rapid response hot and optimal conditions. 120 min has been suggested as a more realistic time to be expected for a 1x1x1 single-shaft CC; Sargent & Lundy
<b>VO&amp;M</b>	\$2.10/MWh	Brattle values from
<b>Start Fuel</b>	7,988 MMBtu/start	Average fuel use of CONE Area units adjusted for 120 min assumed Time to Start; Sargent & Lundy
<b>Fuel Pricing Points</b>	See Manual 18, Section 3.3.2; EKPC changed from Columbia-App to MichCon, Brattle	
<b>NOx</b>	0.0074 lb/MMBtu	Sargent & Lundy; historical allowance prices escalated for forward
	160 lb/start	
<b>SO2</b>	0.0006 lb/MMBtu	EPA; historical allowance prices escalated to delivery year
<b>CO2</b>	117 lb/MMBtu	EPA; Average of RGGI ECR & CCR trigger prices applied zones in RGGI states
<b>Forced Outages (EFORd)</b>	3.1%	PJM Weighted Average EFORd by Fuel Type, Class Average Values
<b>Maintenance Outages</b>	First two weeks in October	



# Forward E&AS Assumptions Comparison: IMM vs PJM

## Assumption Differences

	IMM	PJM
<b>Major Maintenance in VOM</b>	Excluded, MM in Gross CONE	Included
<b>Ancillary Services</b>	Reactive Service Only; No Reserves	Reserves & Reactive Service
<b>Pipeline Mappings</b>	PSEG (TETCO M3), AEP (Texas Gas Zn 1), EKPC (Tenn LA 500 Leg), PPL (Tenn Zn 4 300 Leg)	PSEG (Transco Z6 NY), AEP (Columbia-Appalachia TCO), EKPC (Mich Con; QR update), PPL (TETCO M3)
<b>Zones with RGGI Allowance Cost</b>	AEP and ATSI do not include RGGI	AEP, ATSI, and RTO include RGGI
<b>Energy Forwards</b>	4/25/2022	Past 30 trading days as of 4/25/2022

### IMM & PJM both include:

- Optimized dispatch
- No Regulation
- Pipeline mappings for remaining zones corresponding to Manual 18
- SO<sub>2</sub> and NO<sub>x</sub> allowance prices
- RGGI in zones: AECO, APS, BGE, DOM, DUQ, DPL, JCPL, METED, PECO, PENELEC, PEPCO, PPL, PSEG, RECO
- No 10% adder for CC



# Indicative Values for 2026/27: PJM Historical vs Forward-Looking Net E&AS Revenue Offset

**2026/27 Historical EAS    2026/27 Forward EAS**

CONE Area 1		
AECO	\$118	\$223
DPL	\$162	\$343
JCPL	\$122	\$230
PECO	\$114	\$197
PSEG	\$122	\$227
RECO	\$142	\$262
CONE Area 2		
BGE	\$257	\$420
PEPCO	\$188	\$310
CONE Area 3		
AEP	\$205	\$347
APS	\$226	\$466
ATSI	\$183	\$291
COMED	\$126	\$293
DAY	\$209	\$429
DEOK	\$195	\$413
DUQ	\$193	\$246
DOM	\$180	\$291
EKPC	\$180	\$387
CONE Area 4		
METED	\$170	\$285
PENELEC	\$205	\$460
PPL	\$135	\$236
RTO		
	<b>\$175</b>	<b>\$286</b>

	Historical	Forward
<b>Dispatch Method</b>	Peak-Hour	Optimized
<b>Energy Prices</b>	2019, 2020, 2021 <i>Average: \$28</i>	2019, 2020, 2021 scaled using delivery year forwards <i>Average: \$43, 54% increase</i>
<b>Ancillary Services</b>	Reactive Service Only	Reserves (optimized) & Reactive Service
<b>Natural Gas Prices</b>	2019, 2020, 2021 <i>Average: \$2.57</i>	2019, 2020, 2021 scaled using delivery year forwards <i>Average: \$3.71, 44% increase</i>
<b>Emissions Allowance Costs</b>	NO <sub>x</sub> & SO <sub>2</sub> only	NO <sub>x</sub> & SO <sub>2</sub> for all zones; CO <sub>2</sub> for all zones in RGGI states, including RTO zone

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