RPM Avoidable Cost Rate Development

RPM Avoidable Costs Workshop

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Purpose of Avoidable Cost Rate Development

- Avoidable costs information is required to develop unit specific offer caps which may be applicable.
- Market participants in LDAs which fail the Preliminary Market Structure Screen must submit unit avoidable cost information

- Avoidable costs are the incremental costs of being a capacity resource
- Avoidable costs are the fixed annual operating expenses that would not be incurred if a unit were not a capacity resource for a year

- Avoidable costs are the portion of the fixed annual operating expenses of the generating unit if not participating in the capacity market for one year.
- Assume unit is shutdown, laid up, secured, insured, in working order and state of repair to return to the next year capacity market.
- The Avoidable Cost Rate (ACR) is the total annual Avoidable Cost divided by the MW ICAP divided by 365
  - ACR is measured in $/MW-Day

- ACR is defined by the formula found in Section 6.8.a of Attachment DD of the RPM Settlement Agreement
- ACR =

  1.10*(AOML + AAE + AME + AVE + ATFI + ACC + ACLE)

  + APIR

  - AOML – Avoidable Operations and Maintenance Labor
  - AAE – Avoidable Administrative Expenses
  - AME – Avoidable Maintenance Expenses
  - AVE – Avoidable Variable Expenses
  - ATFI – Avoidable Taxes, Fees and Insurance
  - ACC – Avoidable Carrying Charges
  - ACLE – Avoidable Corporate Level Expenses
  - APIR – Avoidable Project Investment Recovery Rate

- PJM has developed a spreadsheet to assist participants in calculating a generating unit's ACR
- Market participants input the respective annual expenses, plant staffing, hourly rates, salaries, benefits markups, overtime hours and rates, bonuses, fuel prices and other data.
- The spreadsheet calculates the ACR
- PJM will provide a process to submit the results via upload to the PJM website.
- The PJM MMU will provide ACR calculations for a set of proxy units. These calculations may be used in place of the ACR for a specific unit of that type.

Avoidable Cost Detail (1)

Section 1 - Power Plant Technology	1
Combustion Turbine - Diesel	1
Combined Cycle	2
Oil or Gas Steam	3
Sub-Critical Coal	4
Super-Critical Coal	5
Waste Coal	6
Hydro	7
Pumped Storage	8

Avoidable Cost Detail (2)

Section 2 - General Unit Data	
Date	November 7, 2006
LDA	PJM Input
ORG_ID	Participant
Unit ID	PJM Input
Plant Commercial Operation Year	2003
Capacity Planning Year (Start June 1 to Finish May 31)	2007
Age of Plant	4
Net Plant Heat Rate (BTU/kWh) (HHV)	7,050
ICAP (MW)	515.0
Current Plant Value ($Million)	$300.00
Plant Value ($/kW)	$582.52

Avoidable Cost Detail (3)

Section 3A - Simple Cycle CT, Diesel or Combined Cycle Technical Information	
Primary Fuel	Gas
Back Up Fuel	None
On Site Natural Gas Compression	Yes
CT or Diesel OEM	GE
CT or Diesel Model	PG7241FA
CT or Diesel Rating at ISO (MW)	171.7
Number of CT or Diesel Units	2
STG OEM	GE
STG Capacity (MW)	200.0
Number of STG	1
Per HRSG Duct Burner Capacity (MMBTU/Hr) (HHV)	30.0
CT/Diesel Nox Control Type	Water Injection
CT/Diesel Exhaust Nox Control	SCR
HRSG HP Pressure/Temperature	2,000/1,000
HRSG Reheat Pressure/Temperature	600/1,000
Average Steam Export Flow to Host (Lbs/Hr)	NA
Average Electric Export Flow to Host (MW)	NA
Condenser Cooling System	Wet Cooling Tower
Turbine Inlet Air Cooling Technology (TIC)	Evaporative
Target Inlet Temperature if Mechanical TIC	NA

Avoidable Cost Detail (4)

Section 4 & 5 - Staffing Assumptions to Determine AOML and AAE	
Base Annual Labor Hours	2,080
Overtime Hours (%)	10%
Overtime Wage of Base (%)	150%
Administrative Bonus (%)	0%
Benefits Percent of Base (%)	35.0%

Avoidable Cost Detail (5)

Operating Onsite & Offsite Plant Work Force																
											Base	Annual	Annual	Unit	Unit Cost	Total
						Total					Salary	Bonus	Wages	Benefits	w Benefits	Expense
Section 5 - Administrative Expense (AAE)	**Onsite**				**Offsite**	**On & Offsite**										
Plant Manager	1				0	1					$125,000	$0	$125,000	$43,750	$168,750	$168,750
Operations Manager	0				0	0					$80,000	$0	$80,000	$28,000	$108,000	$0
Maintenance Manager	0				0	0					$75,000	$0	$75,000	$26,250	$101,250	$0
Technical Manager	0				0	0					$70,000	$0	$70,000	$24,500	$94,500	$0
Plant-Environmental-Design Engineer	0				0	0					$60,000	$0	$60,000	$21,000	$81,000	$0
ND Testing-Balancing-Chemist-Inspection	0				0	0					$60,000	$0	$60,000	$21,000	$81,000	$0
Plant Engineer/Environmental	1				0	1					$60,000	$0	$60,000	$21,000	$81,000	$81,000
Accounting/Purchasing	1				0	1					$45,000	$0	$45,000	$15,750	$60,750	$60,750
Secretary/Administration	1				0	1					$40,000	$0	$40,000	$14,000	$54,000	$54,000
Total Administrative					0	4										$364,500
							Base Rate	Unit Base	Unit OT	Unit Total	Unit Base	Unit OT	Unit Wages	Unit	Unit Labor	Total
Shift Number	**1**	**2**	**3**	**4**			$/Hour	Hours	Hours	Hours	Wages	Wages	with OT	Benefits	w Benefits	Expense
Section 4 - AOML Operations	**Onsite**	**Onsite**	**Onsite**	**Onsite**	**Offsite**	**On & Offsite**										
Shift Supervisor					0	0	$32.00	2,080	208	2,288	$66,560	$9,984	$76,544	$23,296	$99,840	$0
Lead Operator	1	1	1	1	0	4	$28.50	2,080	208	2,288	$59,280	$8,892	$68,172	$20,748	$88,920	$355,680
Auxiliary Operator	2	2	2	2	0	8	$27.50	2,080	208	2,288	$57,200	$8,580	$65,780	$20,020	$85,800	$686,400
Plant Mechanic					0	0	$22.00	2,080	208	2,288	$45,760	$6,864	$52,624	$16,016	$68,640	$0
Fuel Handling					0	0	$20.00	2,080	208	2,288	$41,600	$6,240	$47,840	$14,560	$62,400	$0
Total Operations					0	12										$1,042,080
Section 4 - AOML Maintenance	**Onsite**	**Onsite**	**Onsite**	**Onsite**	**Onsite**	**On & Offsite**										
Foreman	0				0	0	$31.00	2,080	208	2,288	$64,480	$9,672	$74,152	$22,568	$96,720	$0
Millwright	1				0	1	$25.00	2,080	208	2,288	$52,000	$7,800	$59,800	$18,200	$78,000	$78,000
Pipe fitters	0				0	0	$25.00	2,080	208	2,288	$52,000	$7,800	$59,800	$18,200	$78,000	$0
Boilermaker	0				0	0	$25.00	2,080	208	2,288	$52,000	$7,800	$59,800	$18,200	$78,000	$0
Laborer	0				0	0	$18.00	2,080	208	2,288	$37,440	$5,616	$43,056	$13,104	$56,160	$0
Electrician/I&C	3				0	3	$30.00	2,080	208	2,288	$62,400	$9,360	$71,760	$21,840	$93,600	$280,800
Total Maintenance					0	4										$358,800
Total					0	20										$1,765,380

Avoidable Cost Detail (6)

Operating Onsite & Offsite Plant Work Force						
						Total
Section 5 - Administrative Expense (AAE)	**Onsite**				**Offsite**	**On & Offsite**
Plant Manager	1				0	1
Operations Manager	0				0	0
Maintenance Manager	0				0	0
Technical Manager	0				0	0
Plant-Environmental-Design Engineer	0				0	0
ND Testing-Balancing-Chemist-Inspection	0				0	0
Plant Engineer/Environmental	1				0	1
Accounting/Purchasing	1				0	1
Secretary/Administration	1				0	1
Total Administrative					0	4
Shift Number	1	2	3	4		
Section 4 - AOML Operations	**Onsite**	**Onsite**	**Onsite**	**Onsite**	**Offsite**	**On & Offsite**
Shift Supervisor					0	0
Lead Operator	1	1	1	1	0	4
Auxiliary Operator	2	2	2	2	0	8
Plant Mechanic					0	0
Fuel Handling					0	0
Total Operations					0	12
Section 4 - AOML Maintenance	**Onsite**	**Onsite**	**Onsite**	**Onsite**	**Onsite**	**On & Offsite**
Foreman	0				0	0
Millwright	1				0	1
Pipe fitters	0				0	0
Boilermaker	0				0	0
Laborer	0				0	0
Electrician/I&C	3				0	3
Total Maintenance					0	4
Total					0	20

Avoidable Cost Detail (7)

Operating Onsite & Offsite Plant Work Force										
					Base Salary	Annual Bonus	Annual Wages	Unit Benefits	Unit Cost w Benefits	Total Expense
Section 5 - Administrative Expense (AAE)										
Plant Manager					$125,000	$0	$125,000	$43,750	$168,750	$168,750
Operations Manager					$80,000	$0	$80,000	$28,000	$108,000	$0
Maintenance Manager					$75,000	$0	$75,000	$26,250	$101,250	$0
Technical Manager					$70,000	$0	$70,000	$24,500	$94,500	$0
Plant-Environmental-Design Engineer					$60,000	$0	$60,000	$21,000	$81,000	$0
ND Testing-Balancing-Chemist-Inspection					$60,000	$0	$60,000	$21,000	$81,000	$0
Plant Engineer/Environmental					$60,000	$0	$60,000	$21,000	$81,000	$81,000
Accounting/Purchasing					$45,000	$0	$45,000	$15,750	$60,750	$60,750
Secretary/Administration					$40,000	$0	$40,000	$14,000	$54,000	$54,000
Total Administrative										$364,500
Shift Number	Base Rate $/Hour	Unit Base Hours	Unit OT Hours	Unit Total Hours	Unit Base Wages	Unit OT Wages	Unit Wages with OT	Unit Benefits	Unit Labor w Benefits	Total Expense
Section 4 - AOML Operations										
Shift Supervisor	$32.00	2,080	208	2,288	$66,560	$9,984	$76,544	$23,296	$99,840	$0
Lead Operator	$28.50	2,080	208	2,288	$59,280	$8,892	$68,172	$20,748	$88,920	$355,680
Auxiliary Operator	$27.50	2,080	208	2,288	$57,200	$8,580	$65,780	$20,020	$85,800	$686,400
Plant Mechanic	$22.00	2,080	208	2,288	$45,760	$6,864	$52,624	$16,016	$68,640	$0
Fuel Handling	$20.00	2,080	208	2,288	$41,600	$6,240	$47,840	$14,560	$62,400	$0
Total Operations										$1,042,080
Section 4 - AOML Maintenance										
Foreman	$31.00	2,080	208	2,288	$64,480	$9,672	$74,152	$22,568	$96,720	$0
Millwright	$25.00	2,080	208	2,288	$52,000	$7,800	$59,800	$18,200	$78,000	$78,000
Pipe fitters	$25.00	2,080	208	2,288	$52,000	$7,800	$59,800	$18,200	$78,000	$0
Boilermaker	$25.00	2,080	208	2,288	$52,000	$7,800	$59,800	$18,200	$78,000	$0
Laborer	$18.00	2,080	208	2,288	$37,440	$5,616	$43,056	$13,104	$56,160	$0
Electrician/I&C	$30.00	2,080	208	2,288	$62,400	$9,360	$71,760	$21,840	$93,600	$280,800
Total Maintenance										$358,800
Total										$1,765,380

Avoidable Cost Detail (8)

Section 4 - Operations and Maintenance Labor (AOML)	Base	% Avoidable	Avoidable
Operations and Maintenance	$1,400,880	82.2%	$1,151,280
Section 5 - Administrative Expense (AAE)	**Base**	**% Avoidable**	**Avoidable**
Administrative Salaries	$364,500	85.2%	$310,500
Employee Expenses	$20,000	82.2%	$16,437
Environmental Fees	$25,000	75.0%	$18,750
Safety & Operator Training	$25,000	82.2%	$20,546
Office Supplies	$20,000	85.2%	$17,037
Communications	$50,000	85.2%	$42,593
Annual Plant Tests, Inspections & Analysis	$50,000	80.0%	$40,000
Total	$554,500	84.0%	$465,862

Avoidable Cost Detail (9)

Section 6 - Maintenance Expense (AME) (Non-CDTF)	Base	% Avoidable	Avoidable
Maintenance Parts	$500,000	95.0%	$475,000
Maintenance Contract Services	$125,000	95.0%	$118,750
Chemicals & Materials Consumed	$10,000	95.0%	$9,500
Rented Equipment	$25,000	95.0%	$23,750
Total	$660,000	95.0%	$627,000

Avoidable Cost Detail (10)

Section 7 - Variable Expense (AVE) (Non-CDTF)	Base	% Avoidable	Avoidable
Water Treatment Chemicals	$200,000	95.0%	$190,000
Lubricants	$10,000	90.0%	$9,000
Water (Not for Power Generation)	$10,000	50.0%	$5,000
Gas (Not for Power Generation)	$25,000	50.0%	$12,500
Electric (Not for Power Generation)	$500,000	50.0%	$250,000
Waste Water Treatment	$50,000	90.0%	$45,000
Total	$795,000	64.3%	$511,500

Avoidable Cost Detail (11)

Section 8 - Taxes Fees and Insurance (ATFI)	Base	% Avoidable	Avoidable
Annual Insurance Premium	$1,800,000	60.0%	$1,080,000
Permits and Licensing Fees	$100,000	75.0%	$75,000
Site Security and Utilities	$100,000	25.0%	$25,000
Annual Property Tax Payment	$500,000	0.0%	$0
Total	$2,500,000	47.2%	$1,180,000

Avoidable Cost Detail (12)

Section 9 - Carrying Charges (ACC)	Base	% Avoidable	Avoidable
Spare Parts Inventory	$3,000,000	0.0%	$0
Fuel Inventory	$2,719,200	10.0%	$271,920
Other Inventory	$25,000	90.0%	$22,500
Total	$5,744,200	5.1%	$294,420
Carrying Cost Rate (%)	7.5%		
Carrying Cost	$430,815	5.1%	$22,082

Avoidable Cost Detail (13)

Section 9A - Liquid Fuel Inventory	
Inventory (Days)	2.0
Oil Heating Value (BTU/Gallon)	141,000
Burn Rate (Gallons/Hr)	25,750
Gallons In Inventory	1,236,000
Oil Price ($/Gallon) (Delivered)	$2.20
Section 9B - Coal Inventory	
Inventory (Days)	0.0
Coal Heating Value (BTU/Lb)	12,500
Burn Rate (Tons/Hr)	145.23
Tons In Inventory	0
Coal Price ($/Ton) (Delivered)	$51.00
Fuel Heating Values (BTU/Gallon)	
Kero	137,000
No. 2 Oil	141,000
No. 6 Oil	150,000

Avoidable Cost Detail (14)

Section 10 - Corporate Level Expenses (ACLE)	Base	% Avoidable	Avoidable
Legal Services	$25,000	90.0%	$22,500
Environmental Reporting	$25,000	90.0%	$22,500
Procurement Expenses	$25,000	90.0%	$22,500
Total	$75,000	90.0%	$67,500

Avoidable Cost Detail (15)

Section 11A - Project Investment - PI		
Equipment Cost		$250,000
Installation Cost		$50,000
Interconnection Costs		$0
Equipment Spares		$10,000
Mobilization and Startup		$10,000
Land Purchases		$0
Development Expenses		$25,000
Legal Fees		$5,000
Air, EIS, Land Use & FERC Permits		$5,000
Interest During Construction		$15,000
Owners Contingency		$0
Total Project Investment		$370,000
Age of Plant		4
Remaining Life of Plant		20
Entitled Plant CRF		0.125
Project Investment Recovery Rate		$46,250

Age of Existing Units (Years)	Remaining Life of Plant (Years)	Current Levelized CRF
1 to 5	20	0.125
6 to 10	15	0.146
11 to 15	10	0.198
16 Plus	5	0.363
CapEx	4	0.450
40 Plus	1	1.100

Avoidable Cost Detail (16)

Section 12 - Summary								
Fixed Operating Expenses	In Capacity Market	Base ($/MW-Yr)	Base ($/MW-Day)	Not in Market	% Avoidable	Avoidable	Avoidable ($/MW-Yr)	Avoidable ($/MW-Day)
Operations and Maintenance Labor (AOML)	$1,400,880	$2,720	$7.45	$249,600	82.2%	$1,151,280	$2,235	$6.12
Administrative Expenses (AAE)	$554,500	$1,077	$2.95	$88,638	84.0%	$465,862	$905	$2.48
Maintenance Expenses (AME)	$660,000	$1,282	$3.51	$33,000	95.0%	$627,000	$1,217	$3.34
Variable Expenses (AVE)	$795,000	$1,544	$4.23	$283,500	64.3%	$511,500	$993	$2.72
Taxes Fees and Insurance (ATFI)	$2,500,000	$4,854	$13.30	$1,320,000	47.2%	$1,180,000	$2,291	$6.28
Carrying Charges (ACC)	$430,815	$837	$2.29	$408,734	5.1%	$22,082	$43	$0.12
Corporate Level Expenses (ACLE)	$75,000	$146	$0.40	$7,500	90.0%	$67,500	$131	$0.36
Project Investment Recovery Rate (APIR)	$46,250	$90	$0.25	$0	100.0%	$46,250	$90	$0.25
Total	$6,462,445	$12,548	$34.38	$2,390,972	63.0%	$4,071,473	$7,906	$21.66

Avoidable Cost Detail (17)

Section 13 - Avoidable Cost Rate (ARC) Calculation ($/MW-Day)									
Avoidable Cost Rate =	[1.10 x	(AOML +	AAE +	AME +	AVE +	ATFI +	ACC +	ACLE) +	APIR]
$23.80	1.10	$6.12	$2.48	$3.34	$2.72	$6.28	$0.12	$0.36	$0.25

Purpose of a Default Avoidable Cost Rate Development

- The PJM MMU will provide ACR calculations for a set of proxy units. These calculations may be used in place of the ACR for a specific unit of that type.

Preliminary Default ACR Categories

- CT
- Combined Cycle
- Oil and Gas Steam
- Sub-Critical Coal
- Super Critical Coal
- Waste Coal
- Hydro
- Pumped Storage

- Sources of Information
  - In house power plant O & M data and experience
  - FERC filings
  - Traditional FERC Form 1 information
- Compilation of Expense Data
  - An ACR Template was completed for each category of power plant.
  - Maximum percent avoidable expenses were utilized in ACR template expense categories.

Preliminary Default Avoidable Cost Rates

Preliminary Default Avoidable Cost Rates		
Category	Capacity (MW)	($/MW-Day)
CT		
First & Second Generation Frame B or Aero	20 to 45	$18.00
Second & Third Generation Frame E or F	80 to 150	$17.00
Third Generation Aero (P&W FT- 8 TwinPak)	50	$22.00
Third Generation Aero (GE LM 6000)	40	$42.00
Combined Cycle		
Two on One Frame F Technology	500 Plus	$23.00
Three or More on One or More Frame F Technology	800 to 1,250	$20.00
NUG Cogeneration Frame B or E Technology	50 to 150	$87.00
Oil and Gas Steam		
One or More Units at One Site	250 to 500	$49.00
Coal		
Sub-Critical Coal	Up to 500	$129.00
Super Critical Coal	Up to 600	$133.00
Waste Coal	Up to 400	TBD
Hydro And Pumped Storage		
Hydro	TBD	TBD
Pumped Storage	TBD	TBD