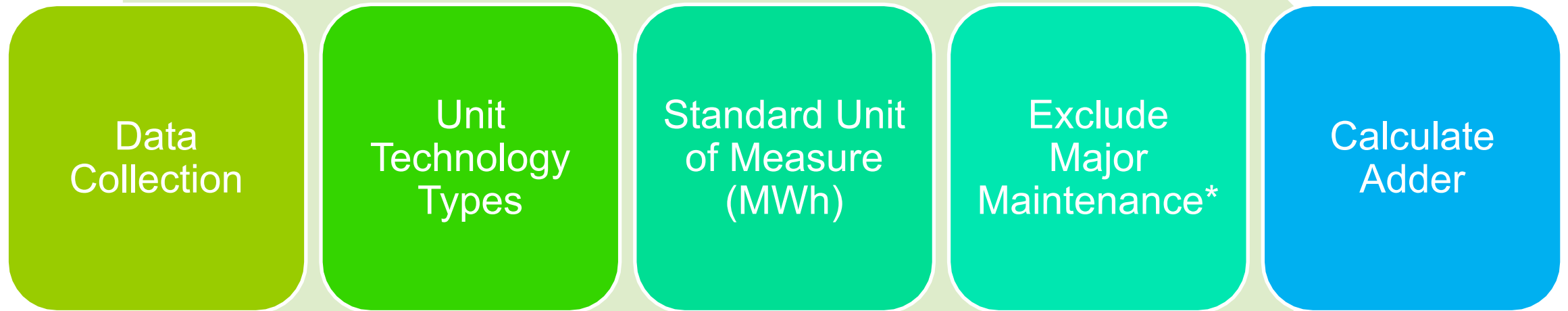




VOM Minor Maintenance and Operating Cost Default Development

CDS

August 3, 2022



*Major maintenance records were only excluded when calculating the minor maintenance defaults. No records were excluded when calculating the operating cost defaults.

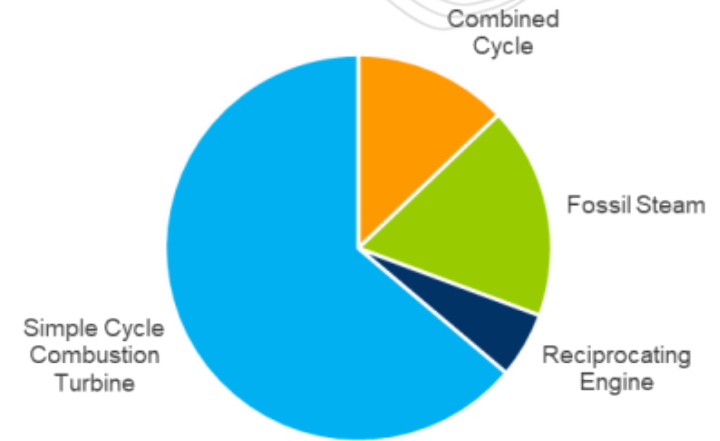
All available data from VOM templates submitted in 2021 is being used.

SECTION 2: TOTAL HISTORICAL MAINTENANCE COST			
INSTRUCTIONS:		Please select from the drop down menu whether you are using a 10 or 20 year maintenance history and fill c below with actual available maintenance history Note: If selecting Annual MWh, please only include hours with p	
Select Maintenance History:	Actual < 10 ▾	Operating History Units:	Annual MWh ▾
Year	Maintenance History Annual \$	Operating History Annual MWh	
2020	\$ 2,035,000.00	1000	
2019	\$ 87,500.00	2500	
2018	\$ 80,500.00	2300	
2017	\$ 66,500.00	1900	
2016	\$ 84,000.00	2400	
2015	\$ 63,000.00	1800	
2014	\$ 84,000.00	2000	
2013			

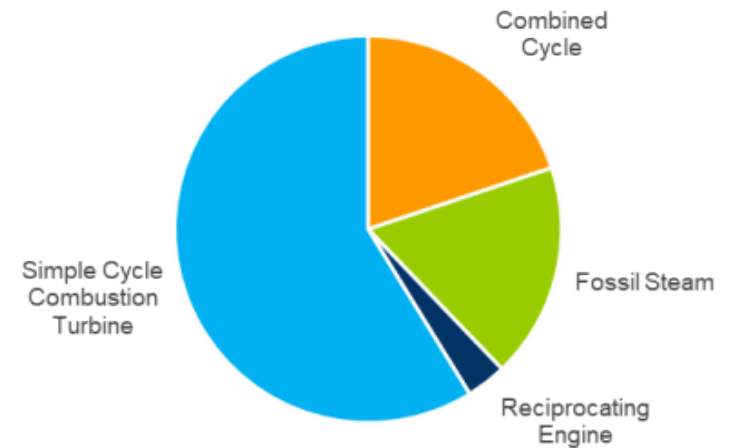
Using information submitted on the templates, as well as categories stored in PJM data bases, units were grouped into the following broad categories.

Unit Technology Types

Minor Maintenance Records



Operating Cost Records



Not all units report operating history in MWh. Market Sellers were able to choose:

- Equivalent Service Hours
- Hours
- mmBTU
- MWh
- Starts

In order to standardize calculations in MWh, for all units Net Actual Generation from GADS was used in place of template-reported operating history for units not reporting in MWh.



Identify/Exclude Major Maintenance Years*

Estimate years including major maintenance based on a number of factors:

- Preliminary thresholds - Major maintenance dollars per technology type and unit size. The thresholds are based on historical observations.

Major Maintenance Thresholds						
Unit Technology	< 20 MW	20-50 MW	50-120 MW	120-250 MW	250-750 MW	> 750 MW
Aero CT	\$100,000	\$200,000	\$500,000	\$1,000,000		
Combined Cycle		\$750,000	\$2,000,000	\$3,000,000	\$5,000,000	\$6,000,000
Frame CT	\$200,000	\$500,000	\$1,000,000	\$2,000,000	\$4,000,000	
Nuclear						\$8,000,000
Reciprocating Engine	\$50,000	\$50,000	\$50,000			
Sub Critical Steam	\$500,000	\$750,000	\$2,000,000	\$3,000,000	\$5,000,000	\$7,000,000
Super Critical Steam					\$5,000,000	\$7,000,000

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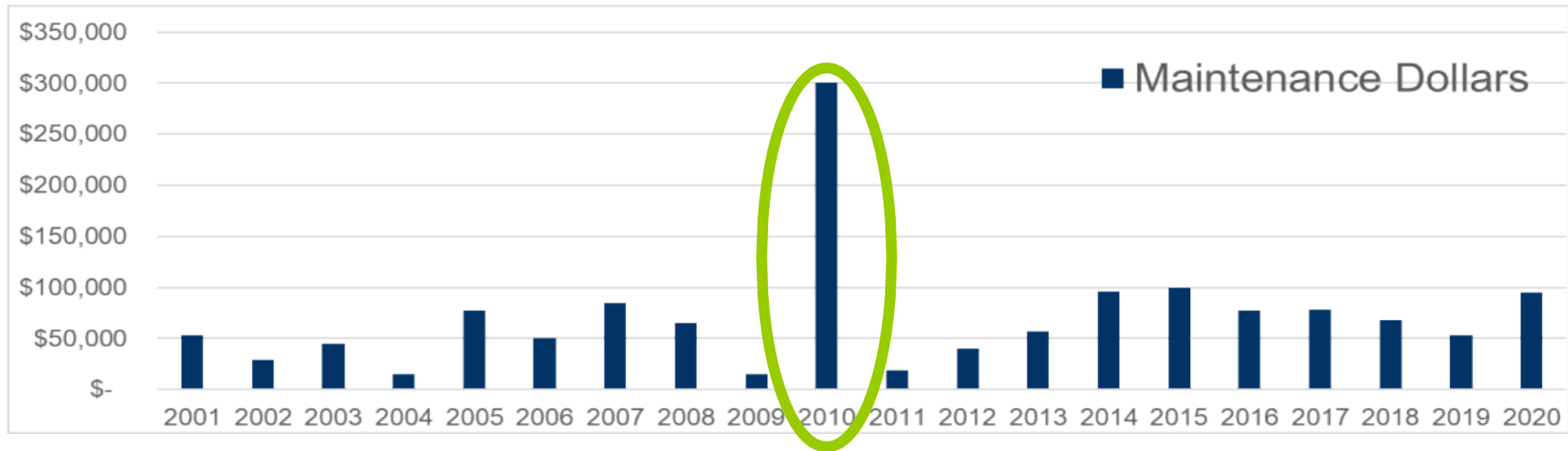
Identify/Exclude Major Maintenance Years cont.*

- Itemized expenses from 2020 - Major maintenance dollars identified in items such as 'major overhaul', 'unit outage', or any description that shows the major maintenance activities (HGP inspection, SCR replacement ...)

SECTION 1: PREVIOUS YEAR'S MAINTENANCE EXPENSES			
INSTRUCTIONS:	Please add Previous Year's Maintenance Expenses below using the optional dropdowns provided. These must only be variable expenses directly related to electric production. *CANNOT INCLUDE: Any costs included in ACR and/or any other fixed costs. Note: Use of Maintenance Expense Type provided in the dropdown list is optional. If not used, Description must be provided. The full dropdown list can be found on 'Expense and Cost Type List' sheet.		
Previous Year: 2020			
Maintenance System	Maintenance Expense Type	Description	Cost
Combustion Turbine	Combustion/Gas Turbine Repairs/Overhauls/Replacements		\$ 2,000,000.00
Combustion Turbine	Maintenance overtime labor on systems directly related to electric production		\$ 35,000.00

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- Maintenance dollar spikes in historical years. For non CTs units, if the operating history dips for that year, it could indicate major maintenance occurred.



*Major maintenance records were only excluded when calculating the minor maintenance defaults. No records were excluded when calculating the operating cost defaults.

- GADS outage data to indicate if major maintenance was performed.
- Filter on outages that were:
 - Planned outages
 - lasting two weeks or longer
 - with cause codes indicating ‘overhaul’.

*Major maintenance records were only excluded when calculating the minor maintenance defaults. No records were excluded when calculating the operating cost defaults.

Once years including major maintenance are excluded from the data, the remaining data can be used to calculate the adder.

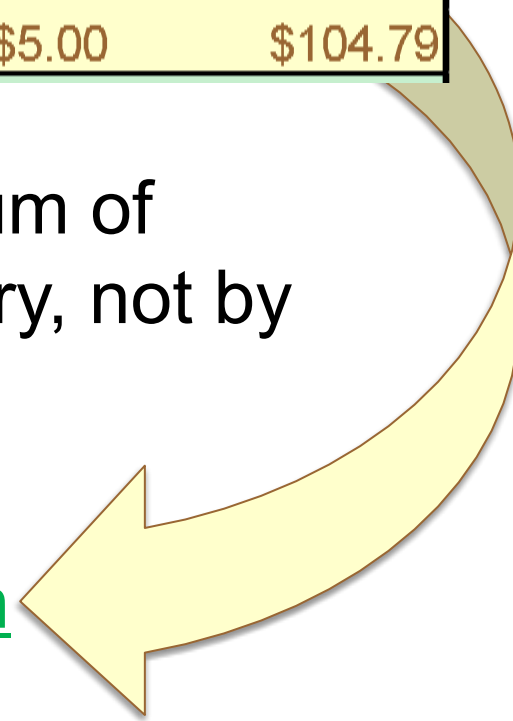
$$\text{Adder} = \text{Maintenance Dollars} / \text{Operating History}$$

Other considerations:

- Apply escalation factor
- Should the adder be the average or some other value?

Unit ID	Technology Type	Year	Maintenance Dollars (\$)	Operating History (MWh)	\$/MWh	Unit Adder
01234567	Frame CT	2020	\$500,000	10	\$50,000.00	
01234567	Frame CT	2019	\$25,000	5,000	\$5.00	\$104.79

- Individual unit adders are calculated by dividing the sum of maintenance dollars by the sum of the operating history, not by averaging the annual values.
- For this example, the calculated adder would be:
 - $\$525,000 / 5,010 \text{MWh} = \underline{\$104.79/\text{MWh}}$
 - **NOT** $\$50,005 / 2 = \underline{\$25,002.50/\text{MWh}}$





Default Adder Calculation

Unit ID	Technology Type	Year	Maintenance Dollars (\$)	Operating History (MWh)	\$/MWh	Unit Adder	
01234567	Frame CT	2020	\$500,000	10	\$50,000.00		
01234567	Frame CT	2019	\$25,000	5,000	\$5.00	\$104.79	
12345678	Frame CT	2020	\$100,000	20,000	\$5.00		
12345678	Frame CT	2019	\$35,000	3,000	\$11.67		
12345678	Frame CT	2018	\$1,200,000	10,000	\$120.00	\$40.45	
23456789	Frame CT	2020	\$10,000	4,500	\$2.22		
23456789	Frame CT	2019	\$5,000	5,250	\$0.95		
23456789	Frame CT	2018	\$20,000	9,000	\$2.22		
23456789	Frame CT	2017	\$25,000	4,500	\$5.56		
23456789	Frame CT	2016	\$10,000	7,500	\$1.33	\$2.28	
Option #1 - AVERAGE OF ANNUAL \$/MWH (average of column 6)					x	\$5,015.40	
Option #2 - AVERAGE OF UNIT ADDERS (average of column 7)							x \$49.17
Option #3 - Sum \$/Sum MWh			\$1,930,000	68,760	✓	\$28.07	

Default based on sum of \$/sum of MWh - Option 3

VOM Technology Type	MM Default (\$/MWh)
Combined Cycle	\$ 0.98
Simple Cycle Combustion Turbine	\$ 3.59
Reciprocating Engine	\$ 4.03
Fossil Steam	\$ 1.71

Default based on sum of \$/sum of MWh - Option 3

VOM Technology Type	OC Default (\$/MWh)
Combined Cycle	\$ 0.40
Simple Cycle Combustion Turbine	\$ 0.75
Reciprocating Engine	\$ 1.62
Fossil Steam	\$ 2.87

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