

Agenda Item 4.2

PSPC Meeting 277

May 13, 2010

# Alternative Perspective on Summer Maintenance for ICR

May 13, 2010  
PSPC Meeting

# Overview

- Previous presentation discussed the impacts of including the specific short term outages
  - These outages are not part of the EFORd calculation
  - Therefore, EFORd may not include all relevant factors
  - May overstate resources available to meet peak loads
  - Historical availability retrospective suggests aggregate New England availability is 900 MW less than using estimator EFORd
- Previous presentation based on
  - Average MWs on outage
  - By month
  - Concluded that “AIO + STO” is appropriate value

# Additional Analytical Perspective

- To address the follow-up question:
  - How much of the “average MW on maintenance” occurs
    - When loads are “lower”
    - Because additional maintenance may be reasonably allowed
    - May not have an impact on system Loss-of-Load Expectation
  - Create a framework to estimate a LOLE risk based index
    - Use actual loads – calculate a LOLP index
    - Use loads plus “additional maintenance” - calculate LOLP index
    - Use loads plus a constant “firm equivalent” - calculate LOLP index
  - Resulting “firm equivalent” represents the amount of summer period maintenance

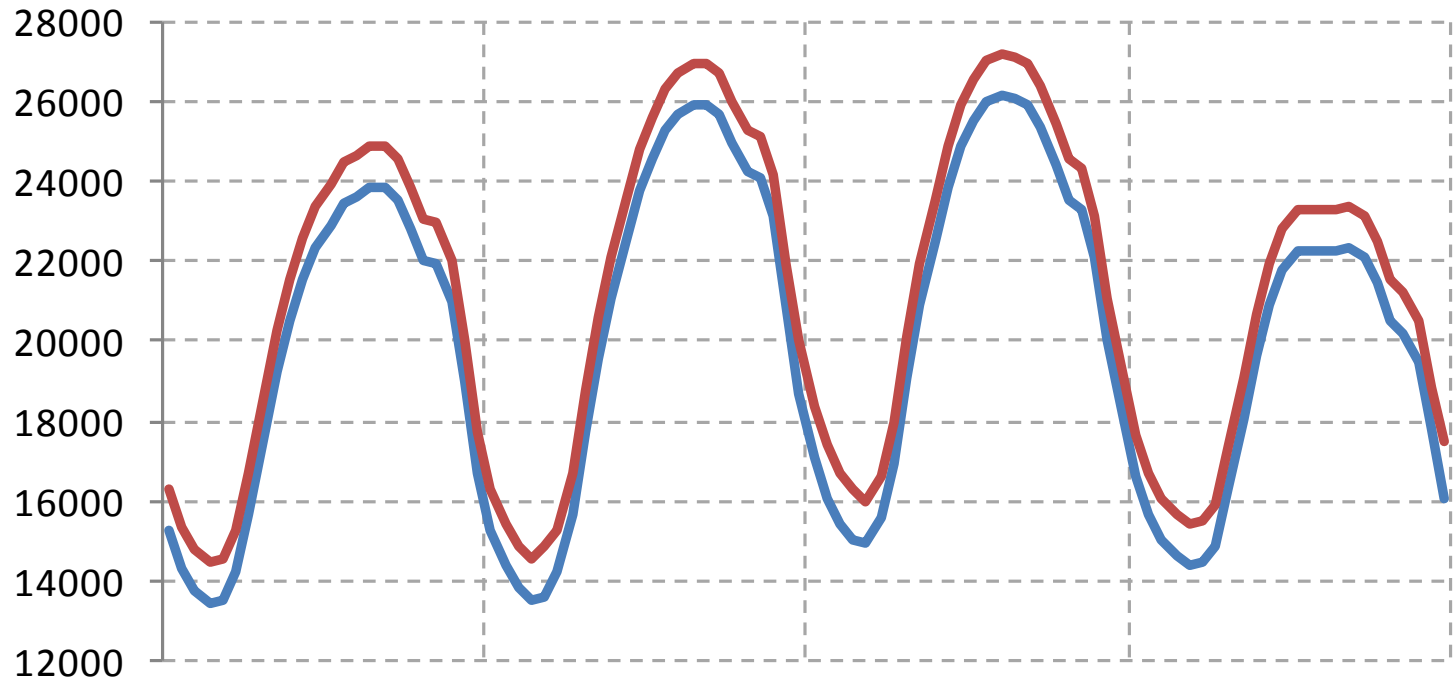
# LOLE Risk Function

- Risk function developed to mimics the LOLP calculation
  - Historic loads are known
  - Historic resource availability hypothesized using normal approximation
    - Assume mean capacity available (assumed 28,000 MW)
    - Assume standard deviation (assumed 800 MW)
  - Compare load in each hour to “available capacity”
  - Probability of insufficient capacity for load is hourly LOLP
  - Summation of LOLP across all hours give the “hourly LOLE” or LOLH
  - Repeat LOLH calculation
    - With actual outages and
    - Then with the “firm equivalent”

# Actual Maintenance on Load Shape

## Effect of Maintenance (AI+AIO+STO)

on Effective Peak Loads (August 1st to 4th 2007)



# Estimate the LOLH indices

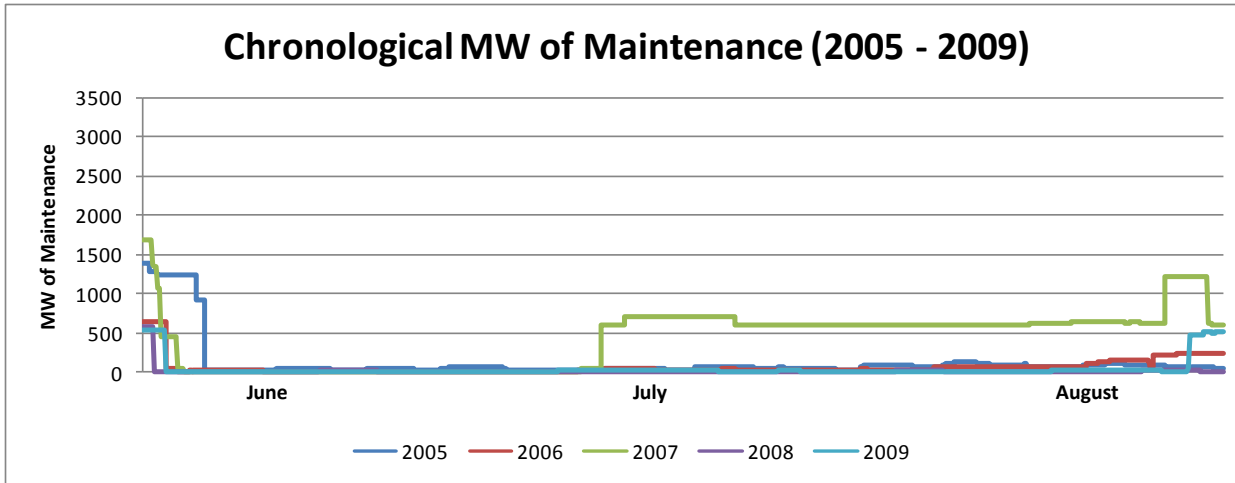
	LOLH w/STOetc	LOLH w/Equiv	Equiv MW
2005	0.53829	0.53969	55
2006	9.64054	9.64770	455
2007	0.32240	0.32748	510
2008	0.19089	0.18930	520
2009	0.01638	0.01613	730
Average			454

# Summary of Equivalents for Maintenance

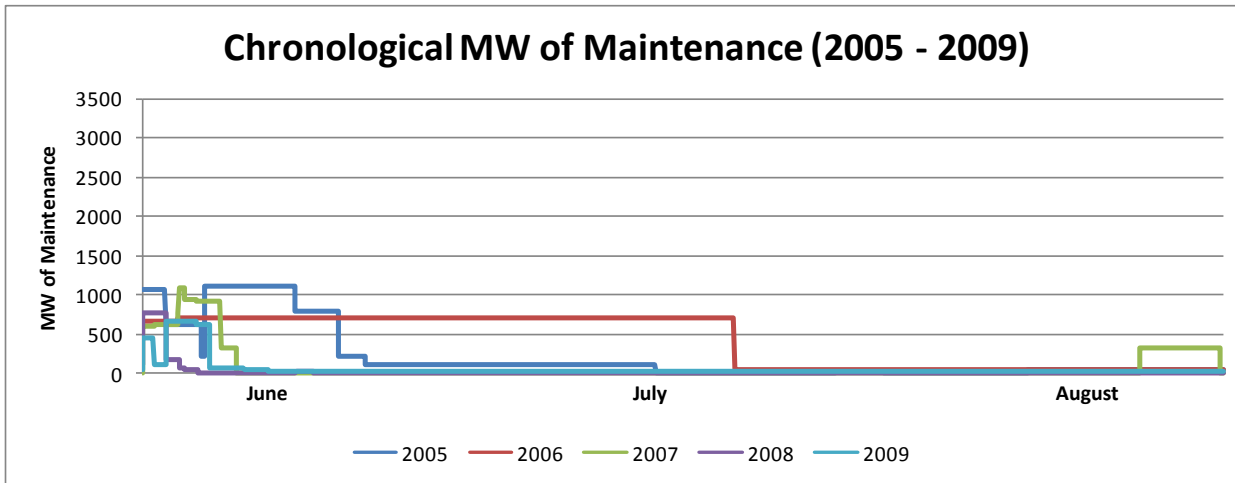
	AI	AIO	STO	AIO+STO	AIO+STO+AI
Year	1	2	3	4	5
2005	65	35	5	55	125
2006	25	300	105	455	480
2007	500	0	505	510	925
2008	10	0	520	520	525
2009	15	30	700	730	750
Average	123	73	367	454	561

# Supporting Data

# Chronological MW on Maintenance



AI

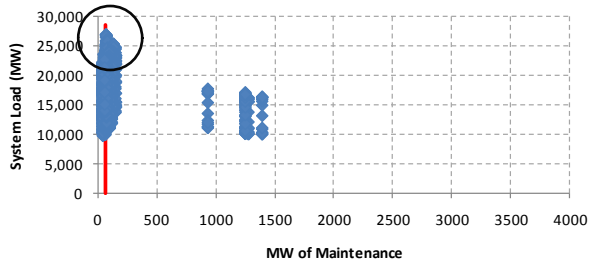


AIO

# Maintenance Detail: "AI" Only

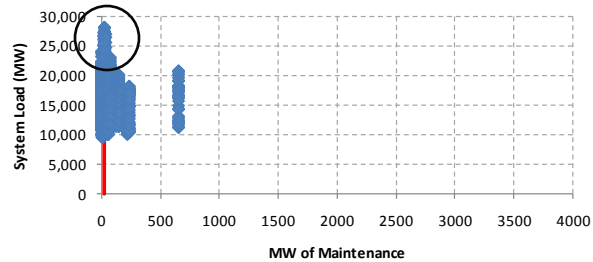
### 2005 Hourly Load vs. Maintenance

(June, July August)



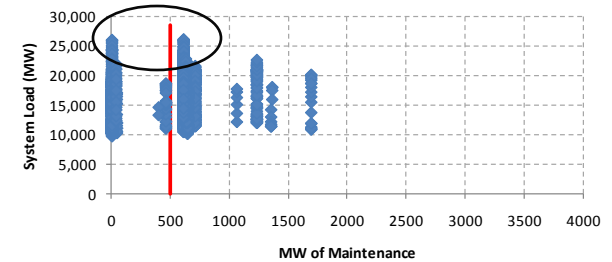
### 2006 Hourly Load vs. Maintenance

(June, July August)



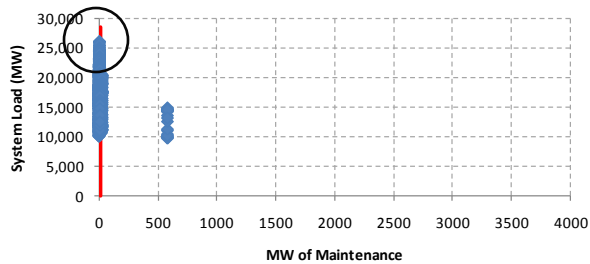
### 2007 Hourly Load vs. Maintenance

(June, July August)



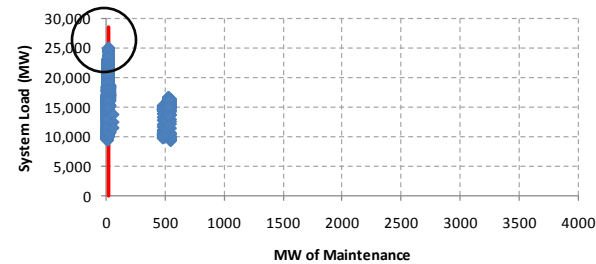
### 2008 Hourly Load vs. Maintenance

(June, July August)



### 2009 Hourly Load vs. Maintenance

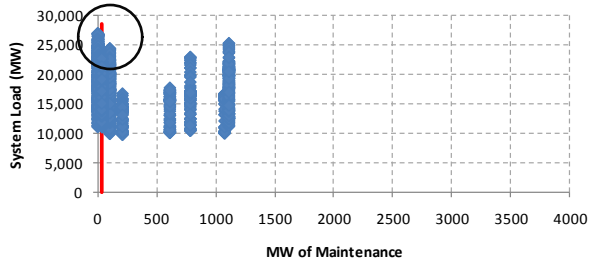
(June, July August)



# Maintenance Detail: "AIO" Only

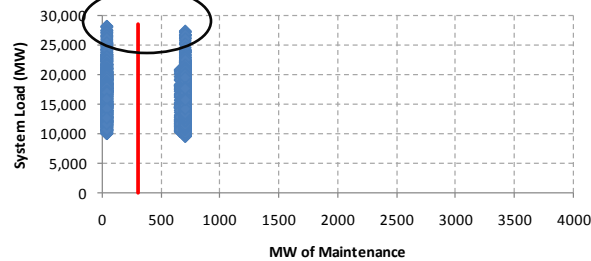
**2005 Hourly Load vs. Maintenance**

(June, July August)



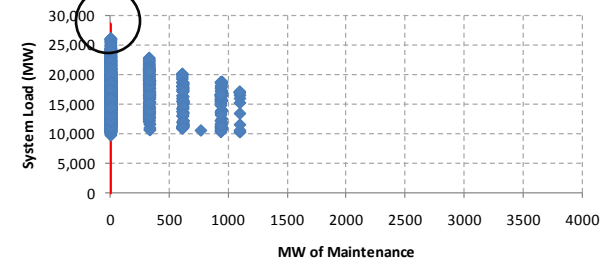
**2006 Hourly Load vs. Maintenance**

(June, July August)



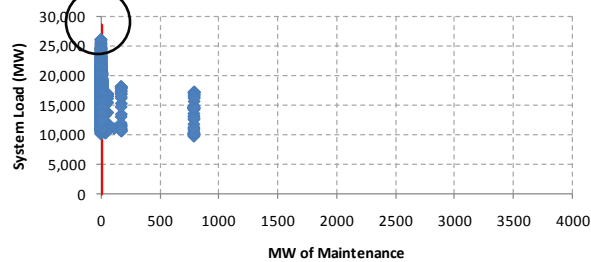
**2007 Hourly Load vs. Maintenance**

(June, July August)



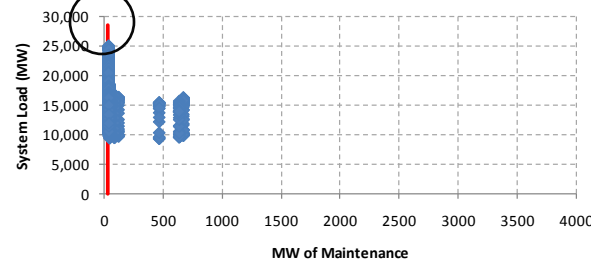
**2008 Hourly Load vs. Maintenance**

(June, July August)

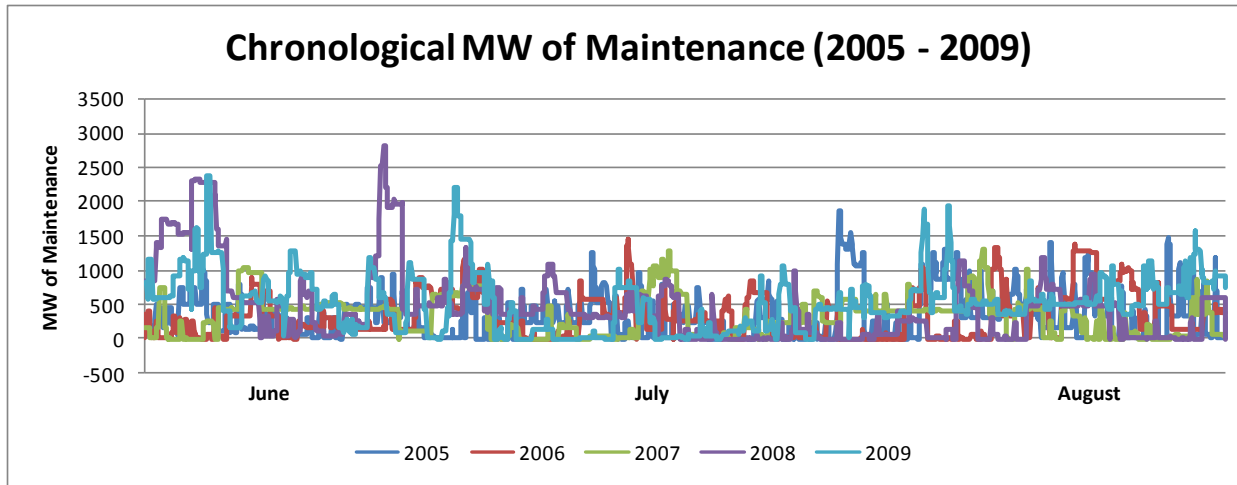


**2009 Hourly Load vs. Maintenance**

(June, July August)

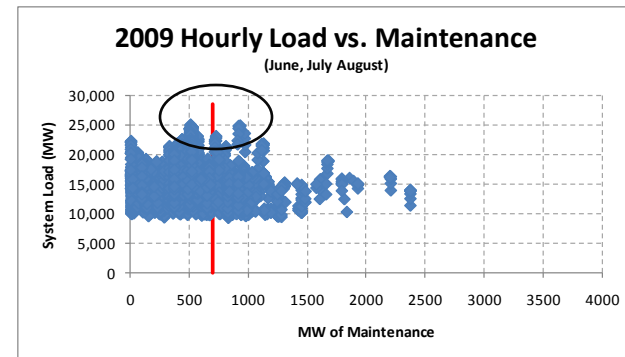
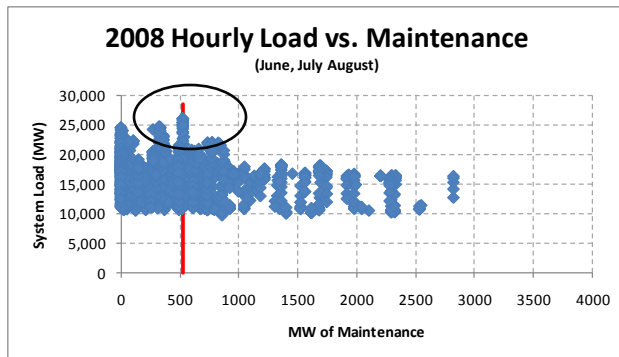
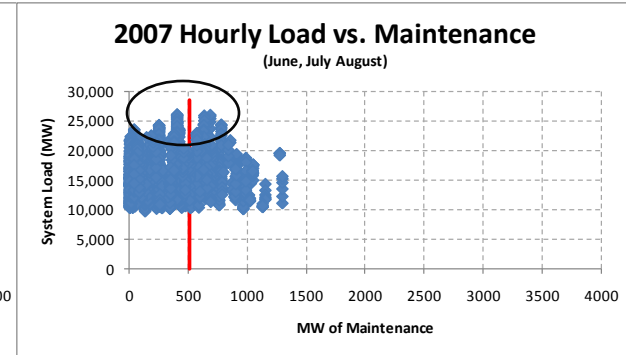
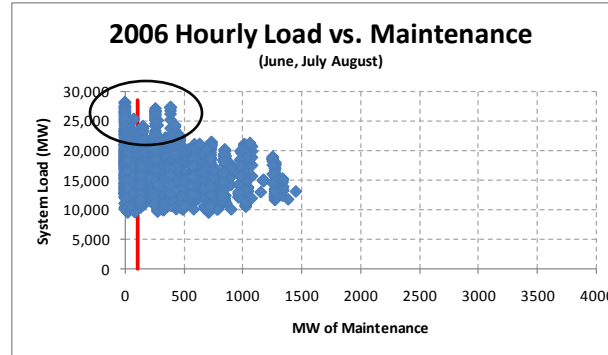
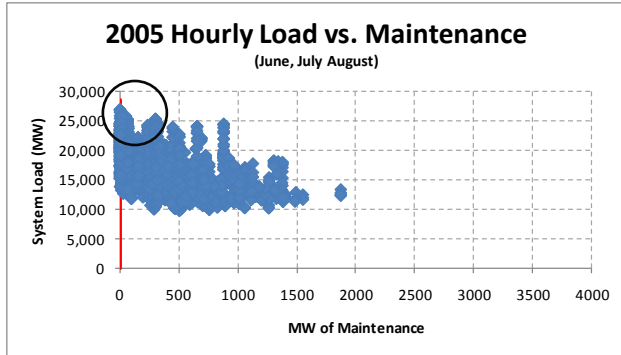


# Chronological MW on Maintenance

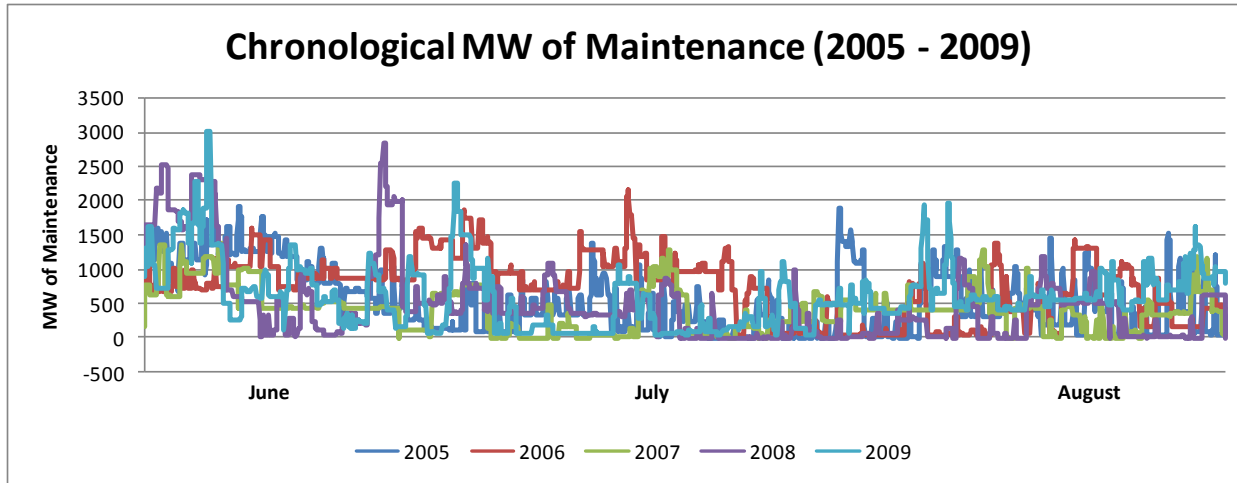


STO

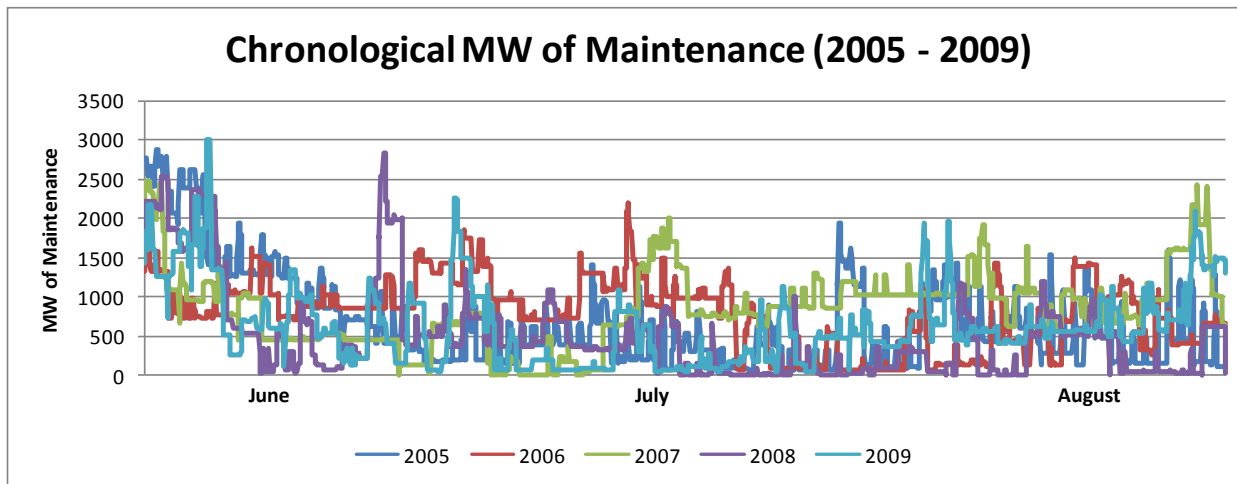
# Maintenance Detail: "STO" Only



# Chronological MW on Maintenance

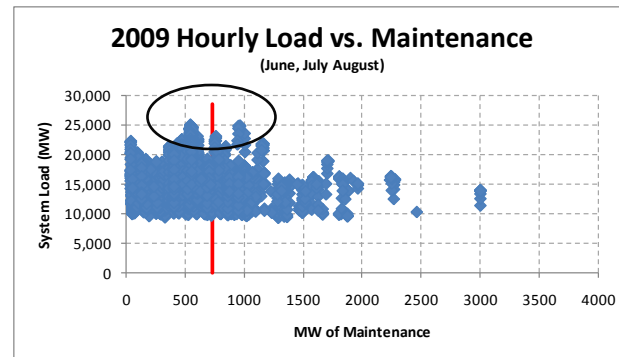
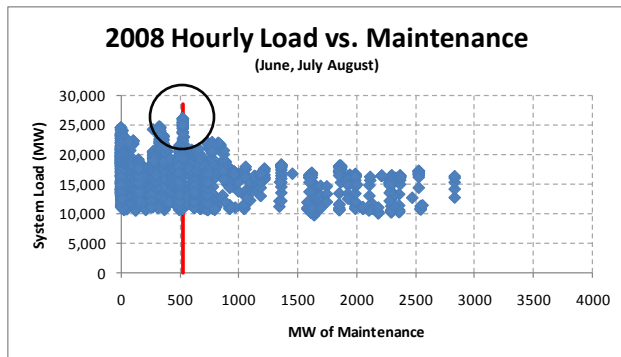
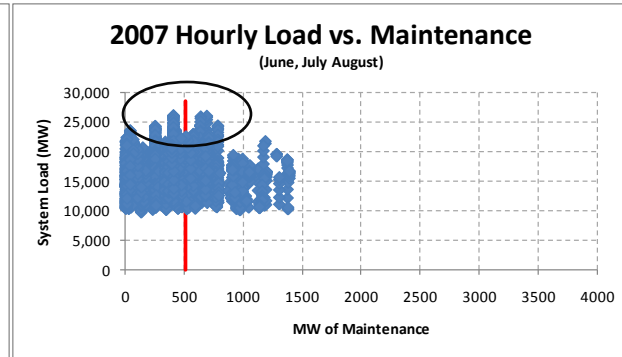
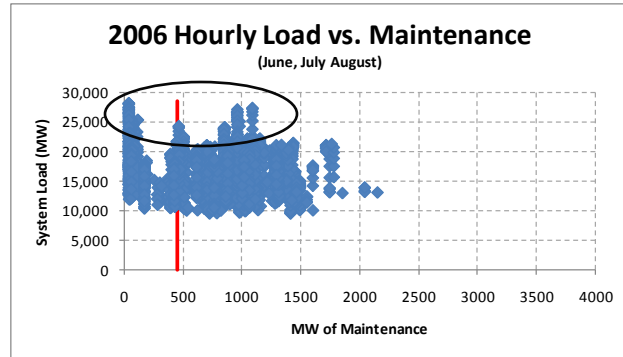
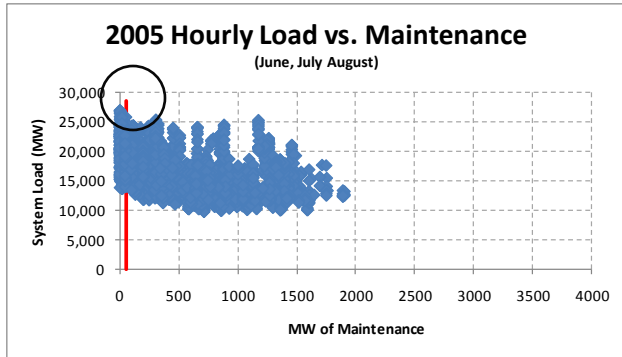


AIO + STO

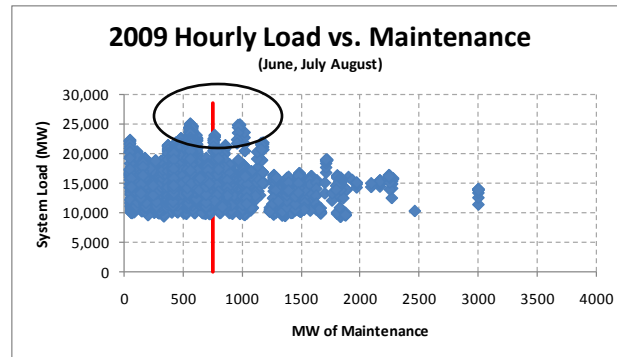
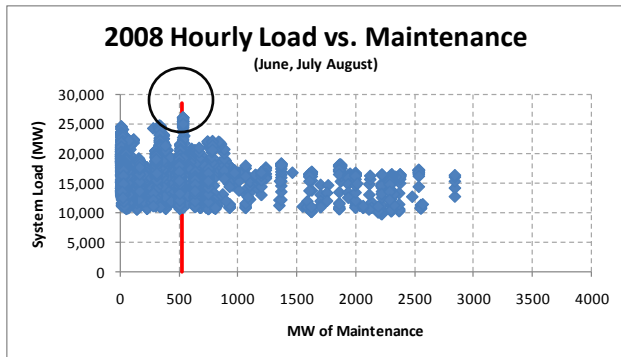
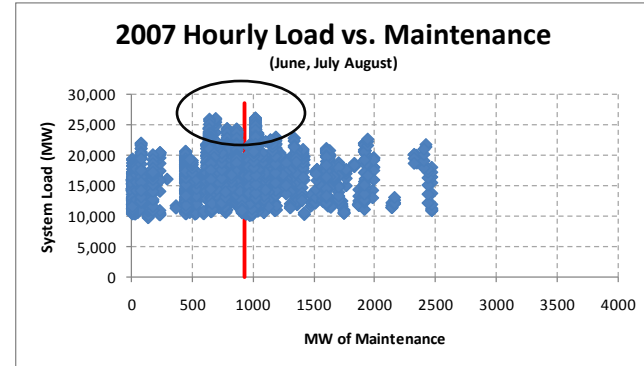
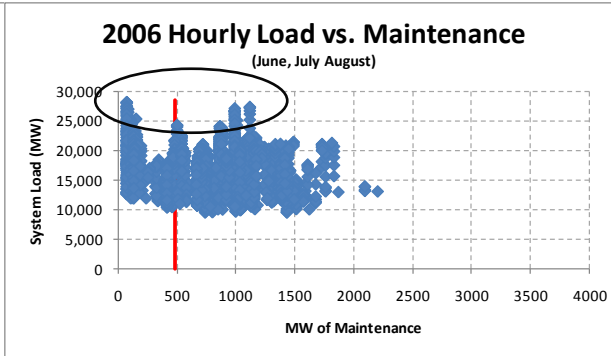
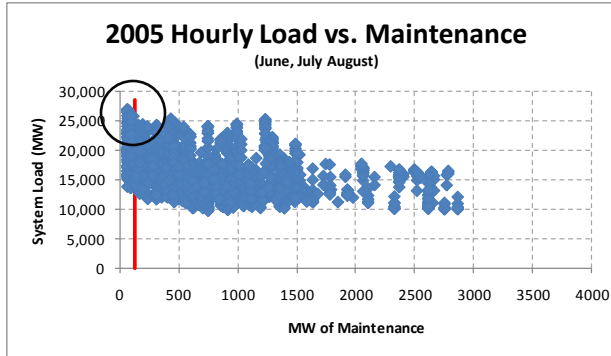


AI + AIO + STO

# Maintenance Detail: “AIO+STO”



# Maintenance Detail: “AI+AIO+STO”



# PJM's Approach

# PJM's EEFORs Statistic

- PJM adjusts EFORd statistic
  - To account for maintenance
  - EEFORd equals the EFORd plus  $\frac{1}{4}$  of the EMOF

Effective Equivalent Demand Forced Outage Rate (EEFORd) – This forced outage rate, determined for demand periods, is used for reliability and reserve margin calculations. There are traditionally three categories for GADS reported events: forced outage (FO), maintenance outage (MO) and planned outage (PO). The PRISM program can only model the FO and PO categories. The EEFORd statistic is a solution for modeling all GADS events. A portion of the MO outages is placed within the FO category, while the other portion is placed with the PO category. In this way, all reported GADS events are Modeled. The statistic used for MO is the equivalent maintenance outage factor (EMOF).

- Published sensitivity case suggests that this increases the PJM ICR by 0.7 percent

Sensitivity Number 13 (Page 68 of 98)

Substitute the EFORd Statistic for all units' Forced outage rate, replacing the EEFORd for all units in the model. (#5097)

<http://www.pjm.com/documents/~/media/documents/manuals/m22.ashx>

<http://www.pjm.com/planning/resource-adequacy-planning/~/media/documents/reports/2009-pjm-reserve-requirement-study.ashx>

