

Agenda Item 3.A

PSPC Meeting 278

August 19, 2010

# Generator Availability at Peak Load Conditions 2010 Update

Yunzhen Mao / Wayne Coste  
ISO New England, Resource Adequacy  
August 19, 2010

# Background

- Prior reviews of on-peak unit availability have been presented to the PSPC
  - November 2006 (20 samples: 2003 through 2006 data)
  - May 2009 (30 samples: 2003 through 2008 data)
- Results suggested that historical resource availability
  - Showed more outages at time of peak than the EFORd statistics would suggest
  - Different resource types had different performance compared to their respective EFORd statistics
  - Normal approximation may not characterize actual EFORd based distribution

# Background: EFORd Review

- Investigation of availability statistics
  - EFORd parameter is used as key factor in the calculation of ICR
  - Quantify differences in availability distributions
    - Actual availability distribution of generating resources
    - Compared to an exact outage distribution using the EFORd statistic
- As part of the Forward Capacity Market (FCM)
  - A proposed sampling of resource availability based on only shortage hours is envisioned
  - Expected to better align the planning statistics with actual performance when capability is needed

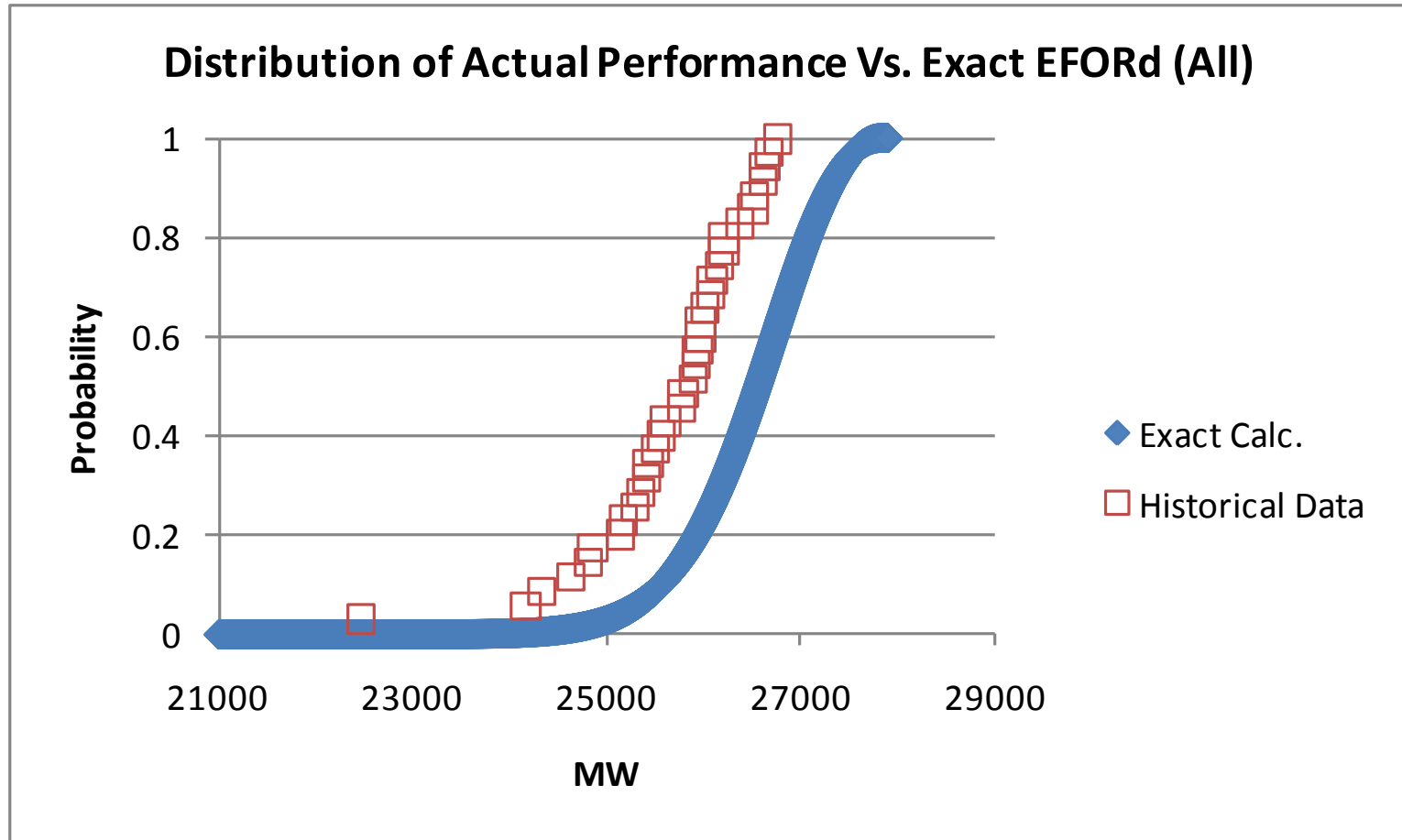
# 2010 Investigation of Availability Statistics

- Statistics from seven summers: 2003 – 2009
  - Top five peak load days selected each summer
    - Performance of resources evaluated for peak hour
- Sample of 35 peak load hours in distributions
  - Actual availability performance of generating resources
  - Exact distribution established through convolution based on EFORd statistics
- Included only units consistently operating from 2003-2009

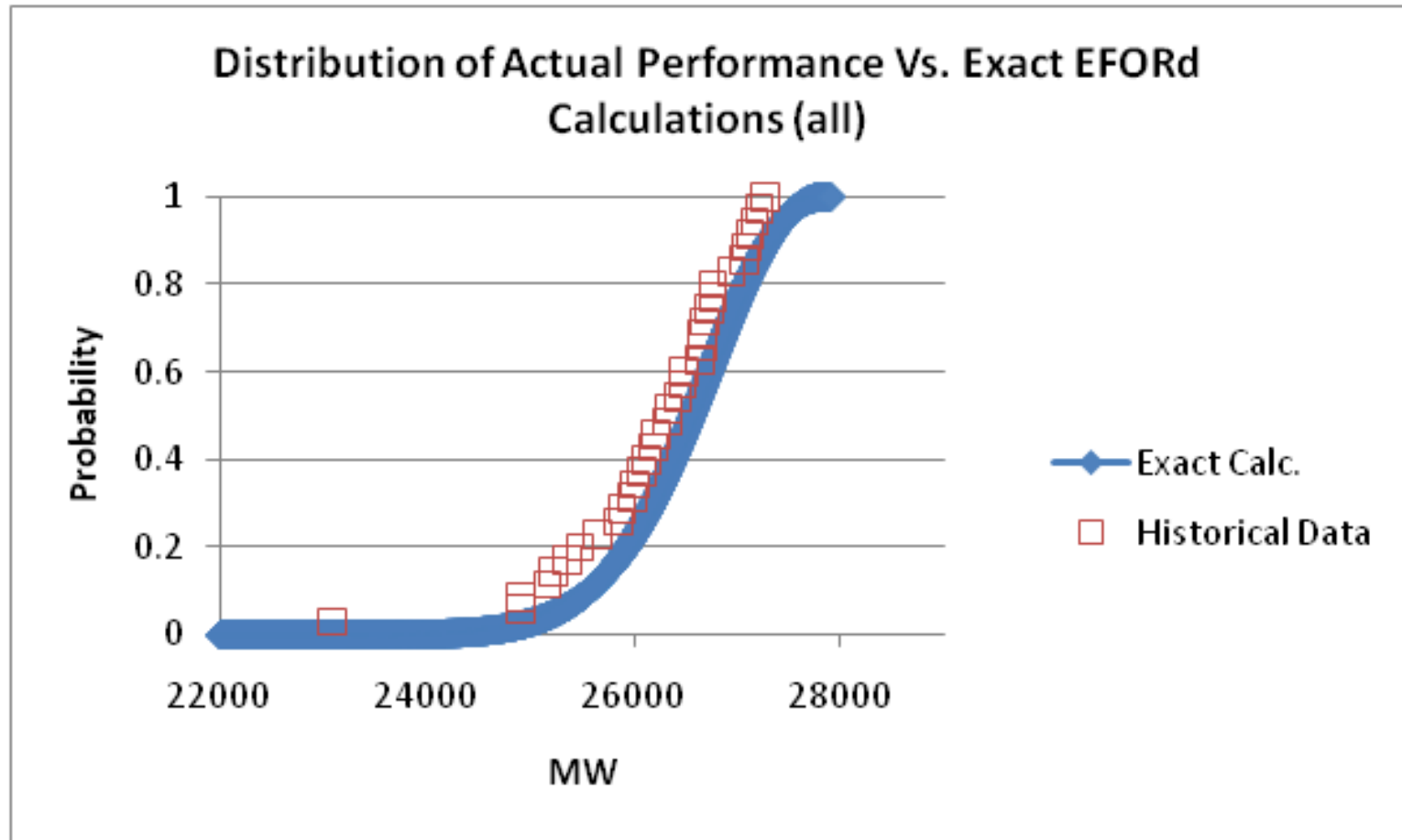
# Assumptions

- Generating units are mutually independent
- Units are either operating at full capability or completely forced out
- Generation ratings limited to Summer Claimed Capability
  - Performance ratings adjusted with SCC as the upper bound
  - Allows clean comparison of
    - Actual availability vs.
    - EFORd estimator of availability
  - Sensitivity to real-time rating is also considered

# Distribution of All Resources



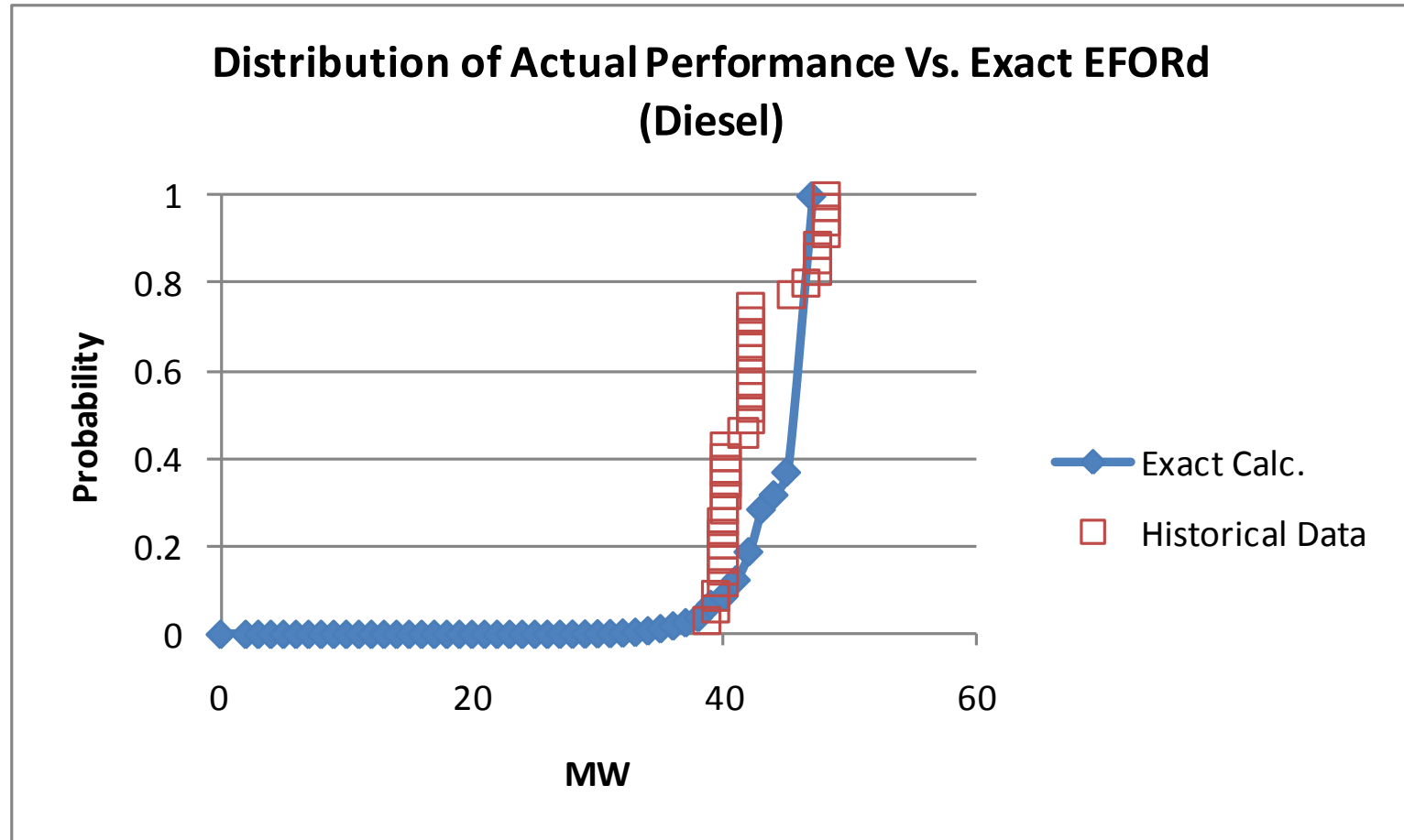
# Distribution of All Resources without Adjustment of Ratings



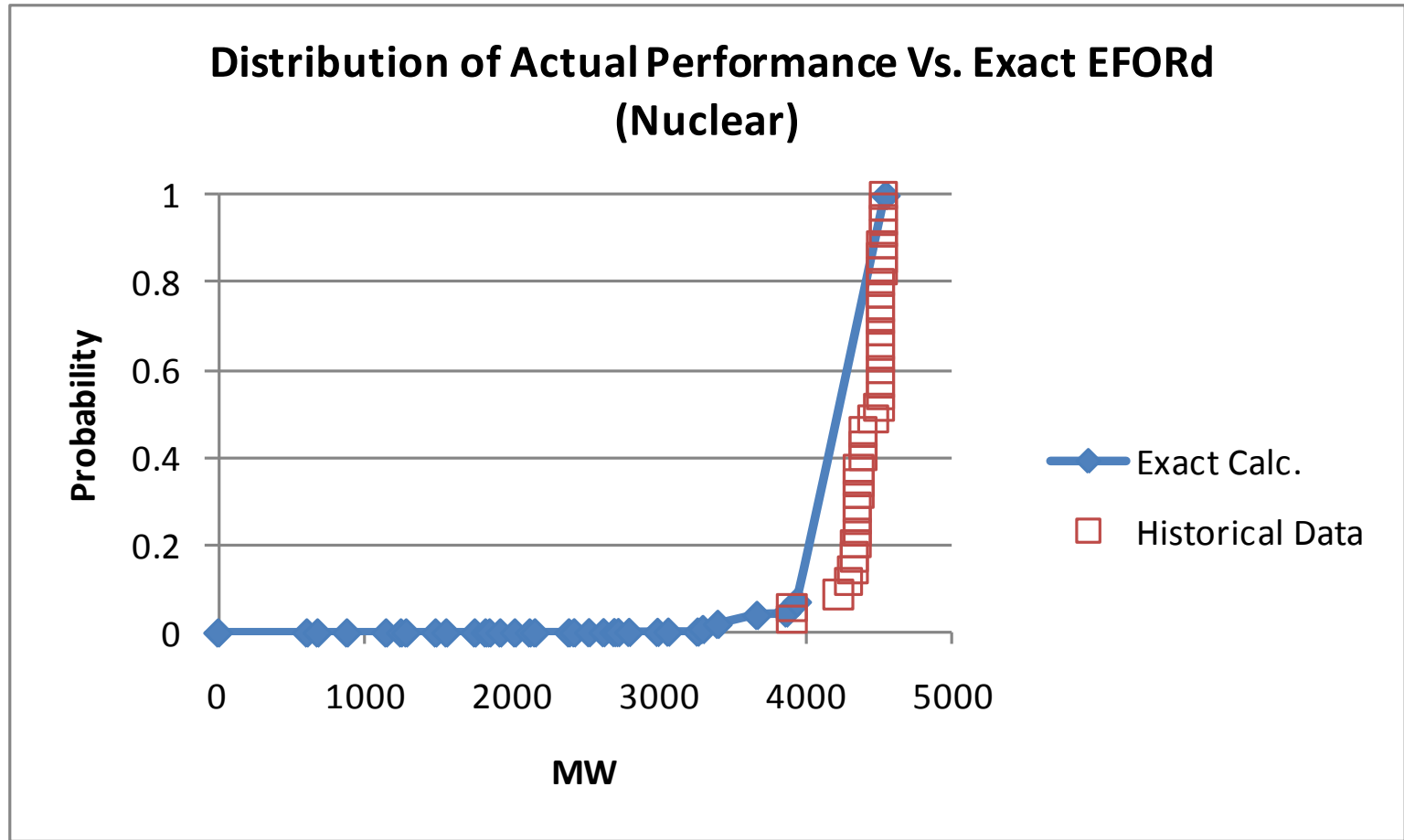
# ISO New England Statistics

- Preliminary review of historical data suggests:
  - Actual performance tends to be less than EFORd suggests
  - Comparison of distributions based on a LOLP calculation
    - Suggested actual availability was 860 MW less than suggested by EFORd
    - About 3 percent of capacity
- Some resources bid in capacity above seasonal rating
  - Capability above seasonal ratings neglected
  - Comparison of distributions based on a LOLP calculation
    - Suggested actual availability was 370 MW less than suggested by EFORd
    - Less than 2 percent of capacity
  - Possibly this effect will be amplified with CSO capacity proration

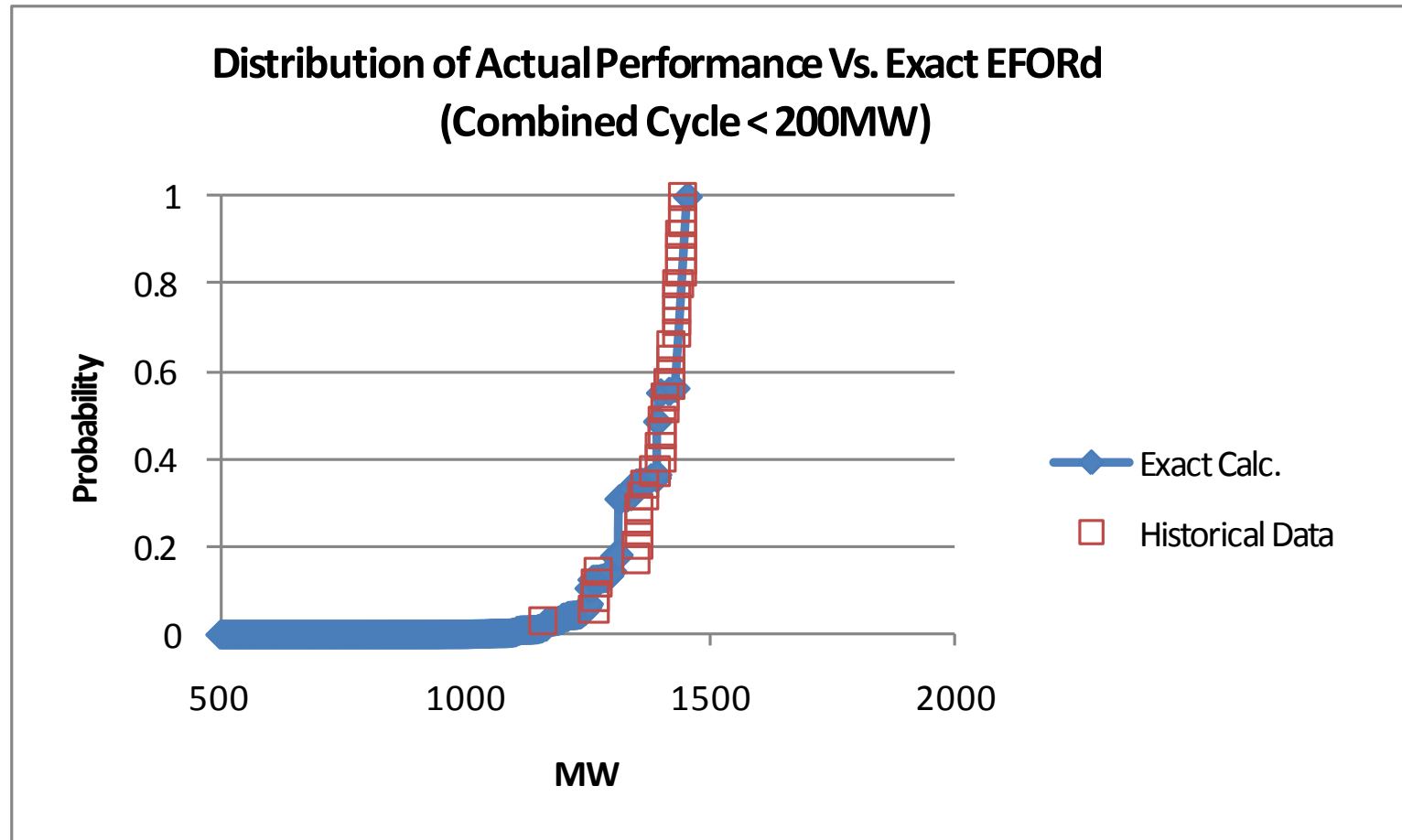
# Diesels



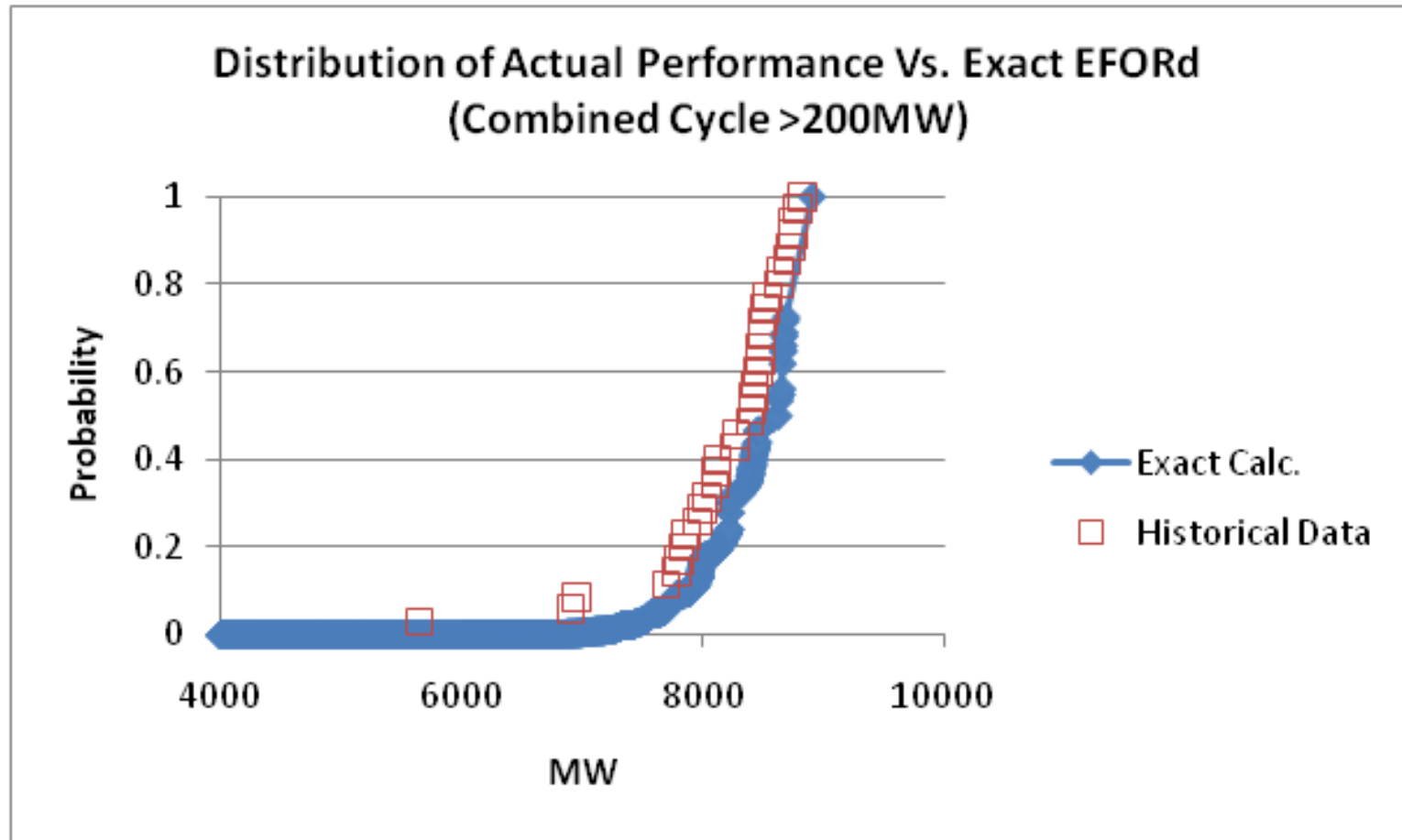
# Nuclear



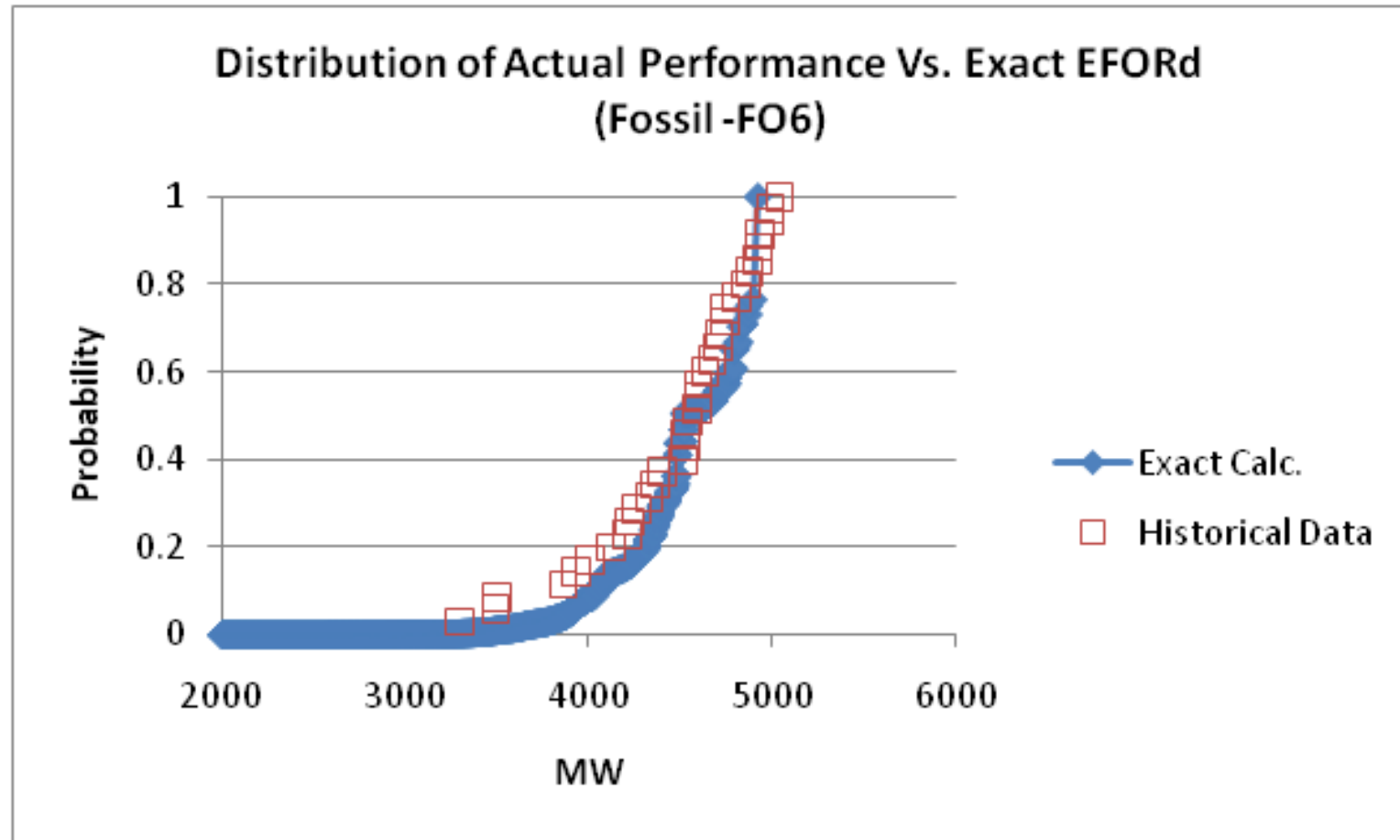
# Combined Cycle < 200 MW



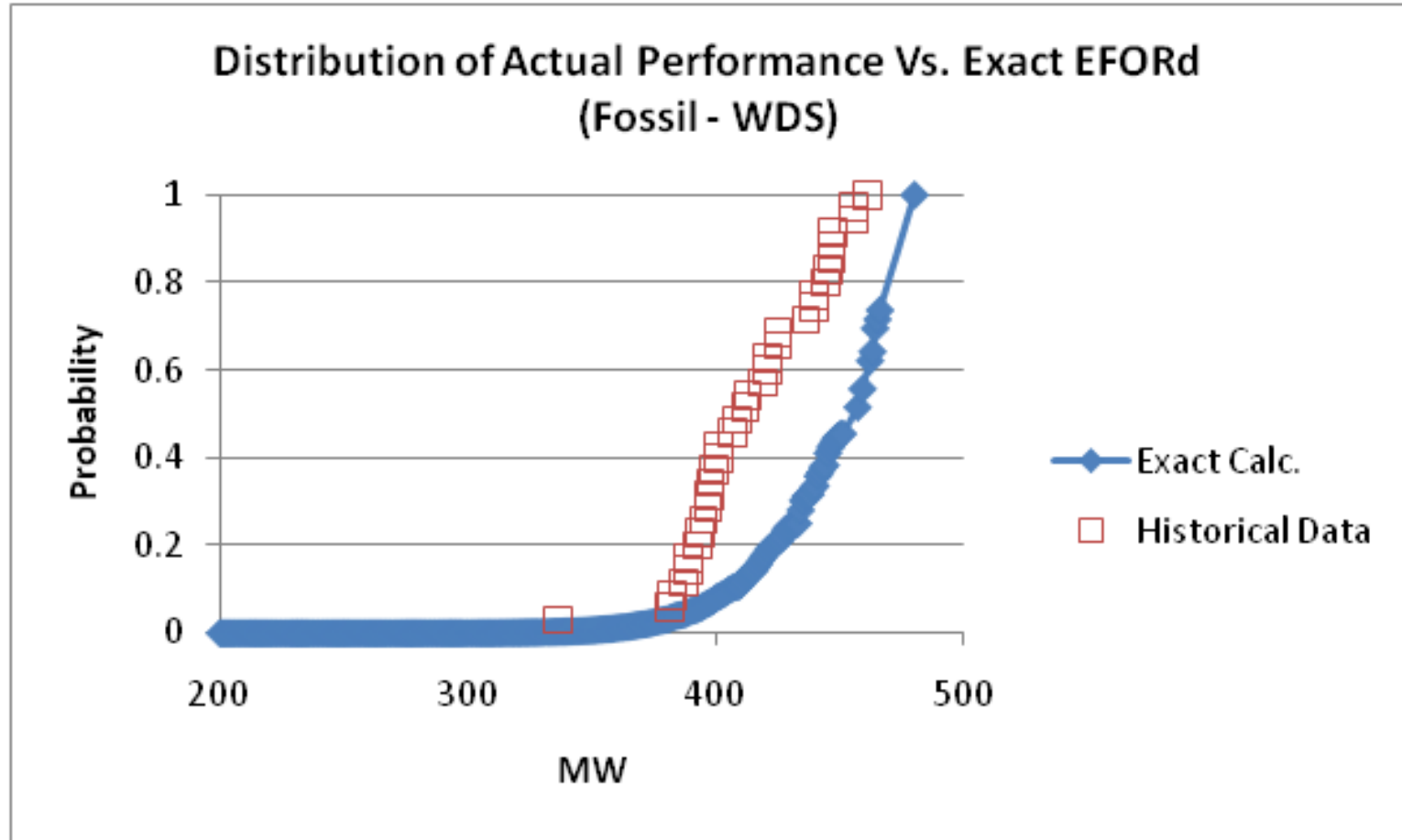
# Combined Cycle > 200 MW



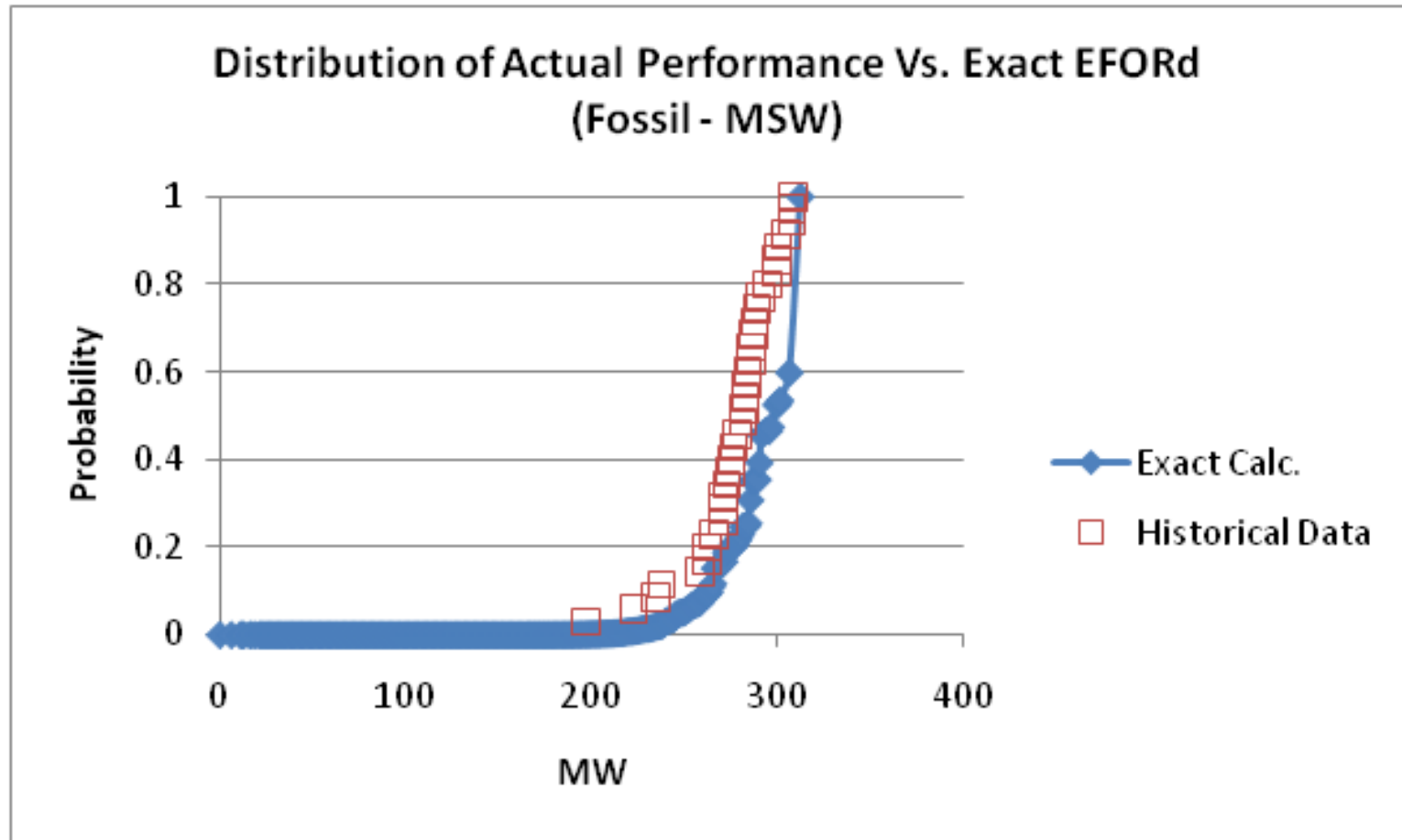
# Fossil – Residual Oil



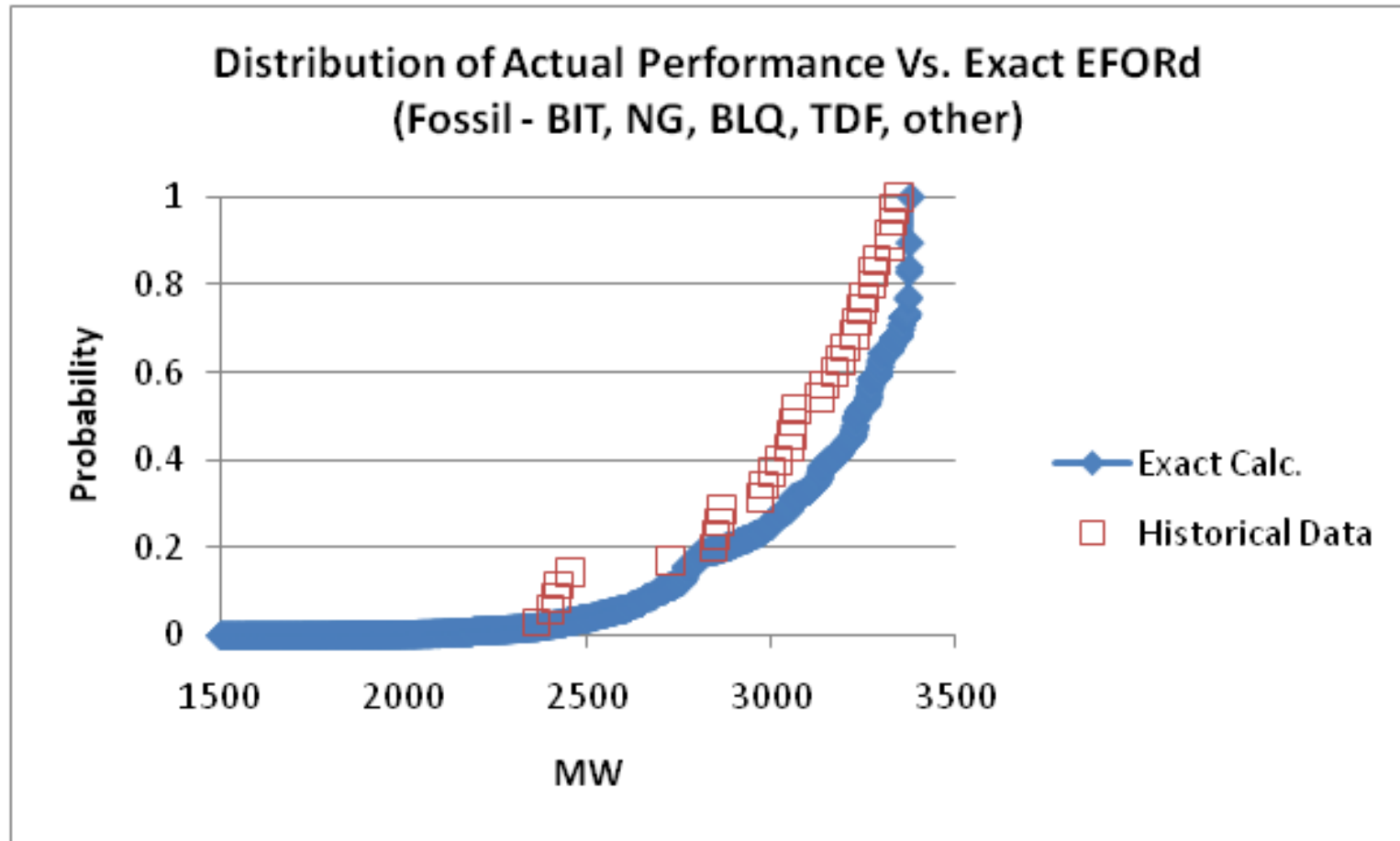
# Fossil – Wood / Biomass



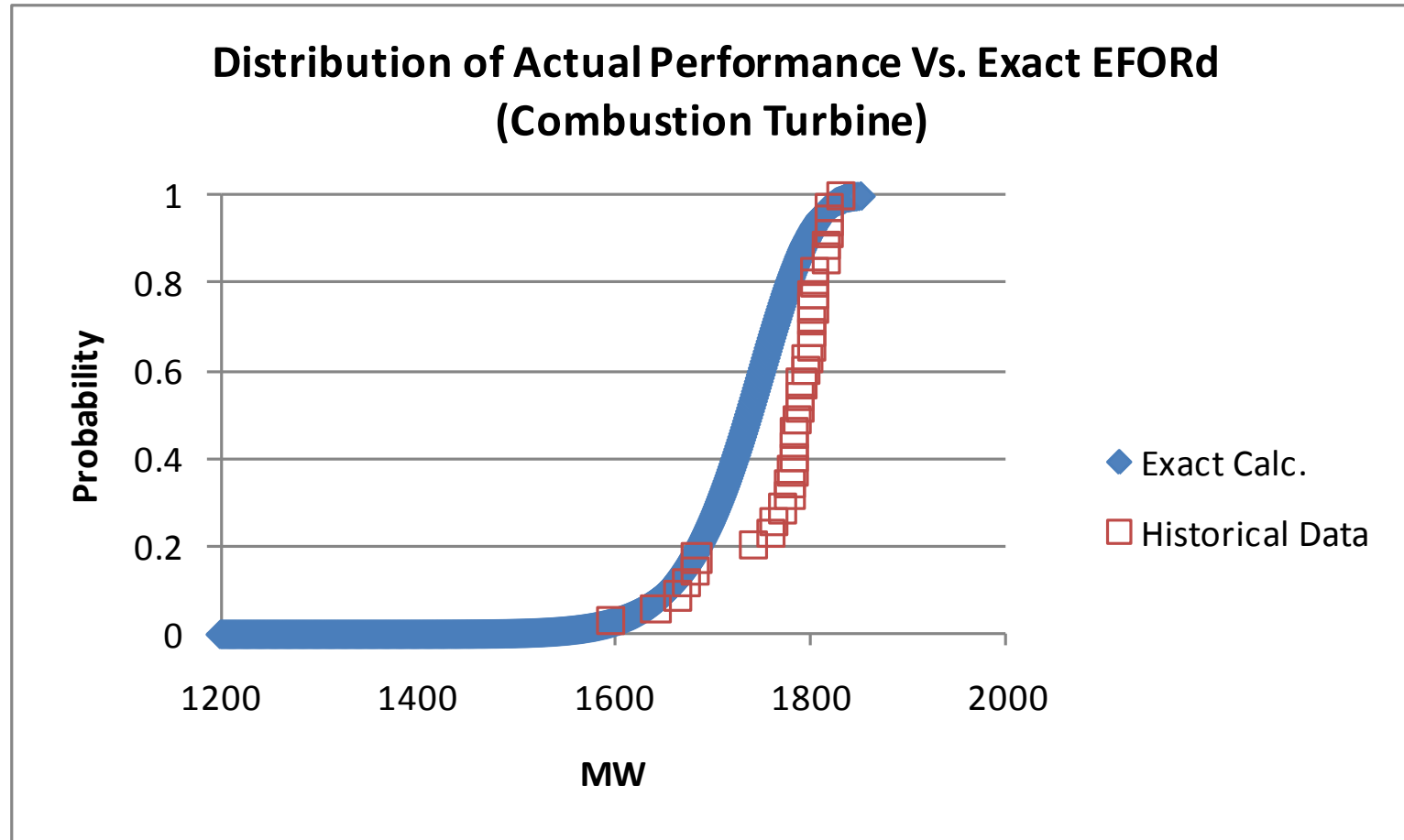
# Fossil – Municipal Solid Waste



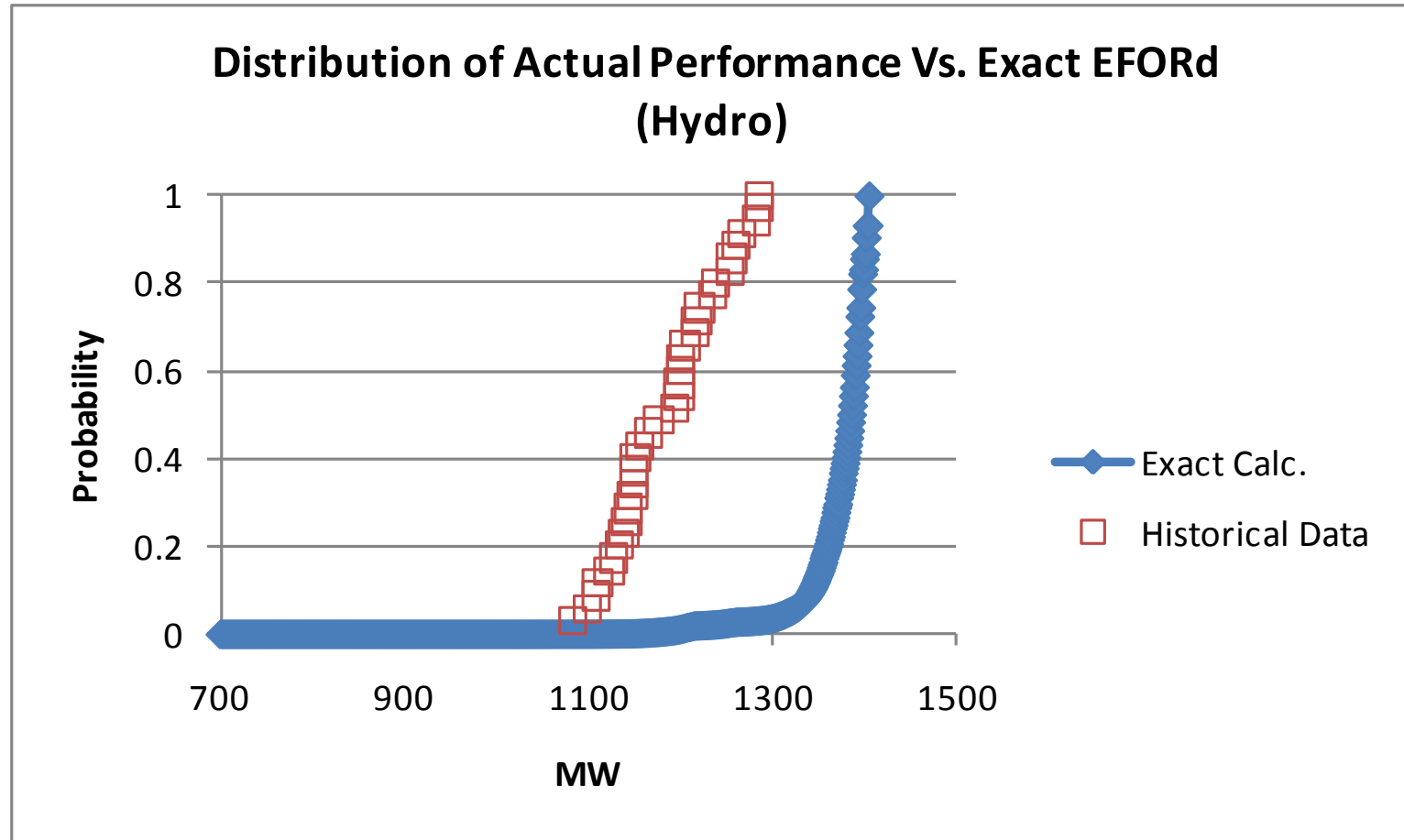
# Fossil – Other



# Combustion Turbines



# Conventional Hydro

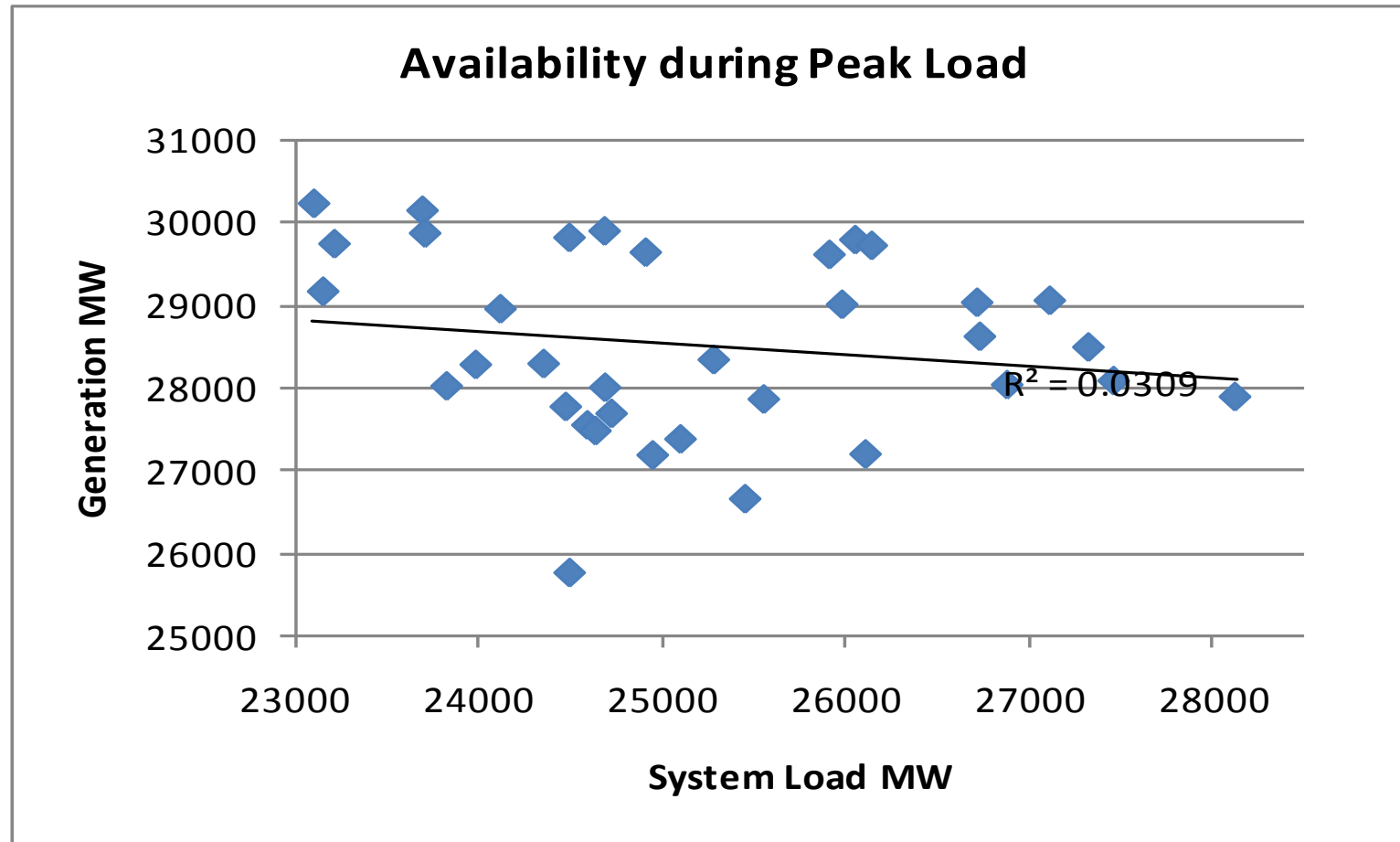


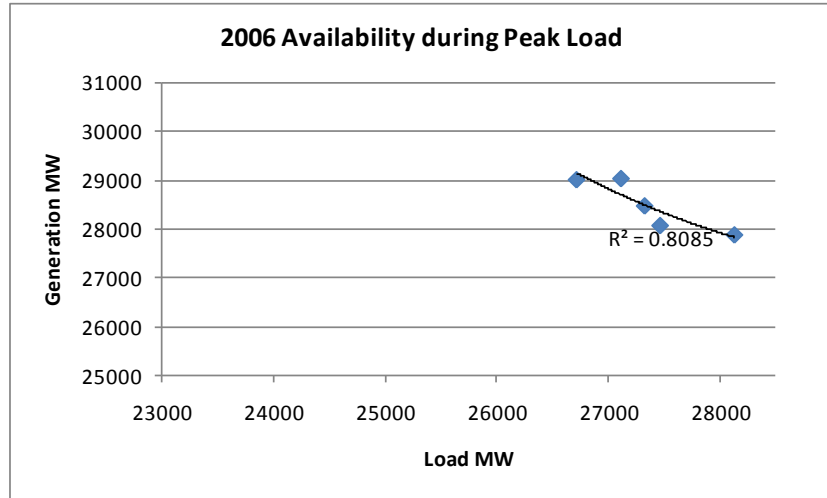
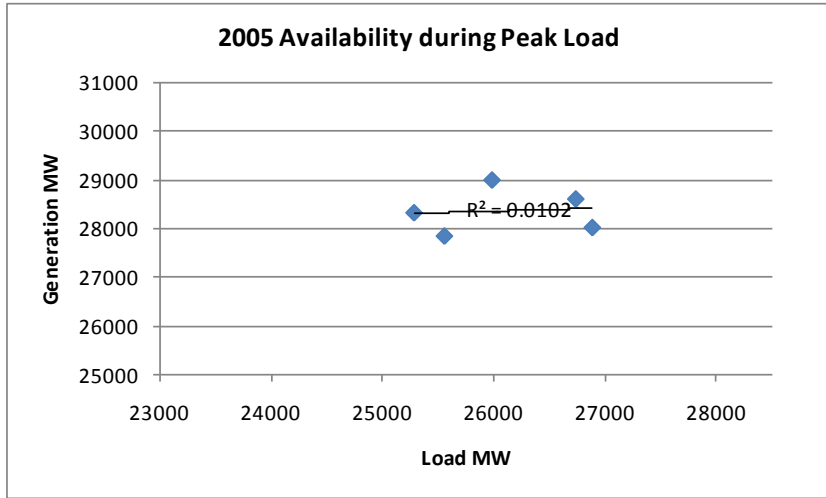
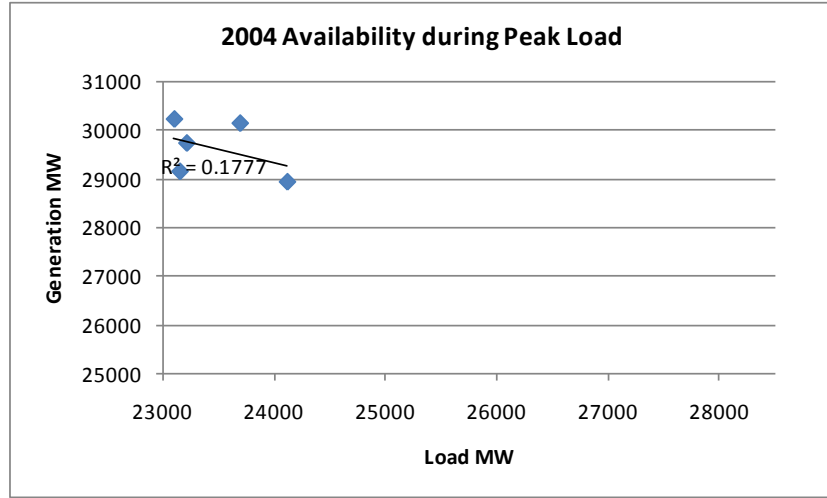
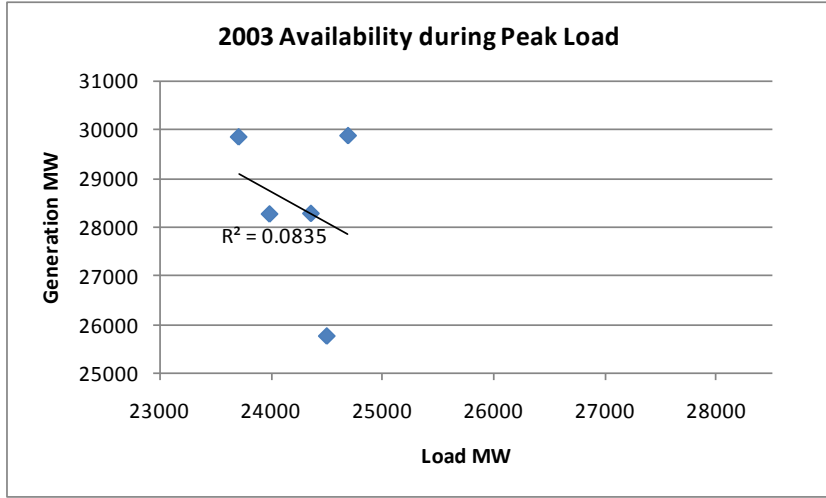
# Correlation of Availability with Magnitude of Peaks

# Trends in Availability in Summer Peak Load

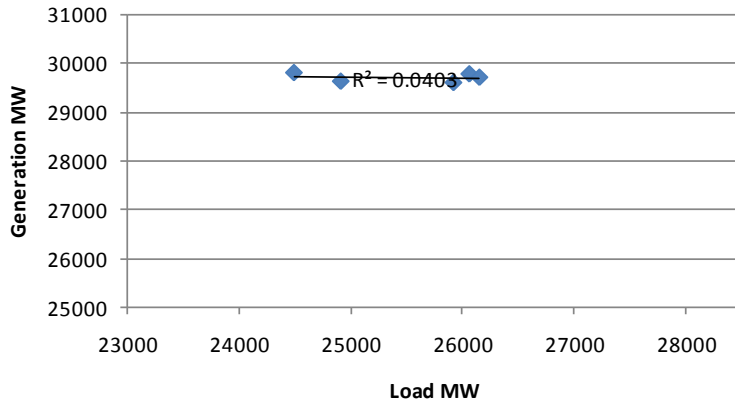
- Examined availability as a function of the peak load
  - For all years and
  - Each of the seven summers individually
- Trends are not statistically significant based on  $r^2$  , but they appear consistently showing declining availability as peak loads increase

# Available Resources vs. System Peak Load

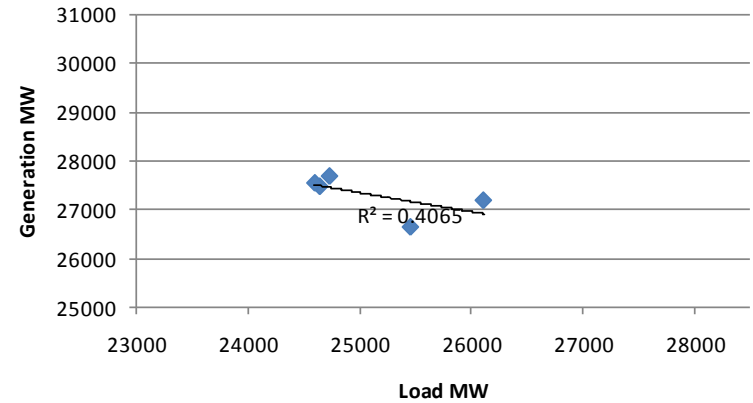




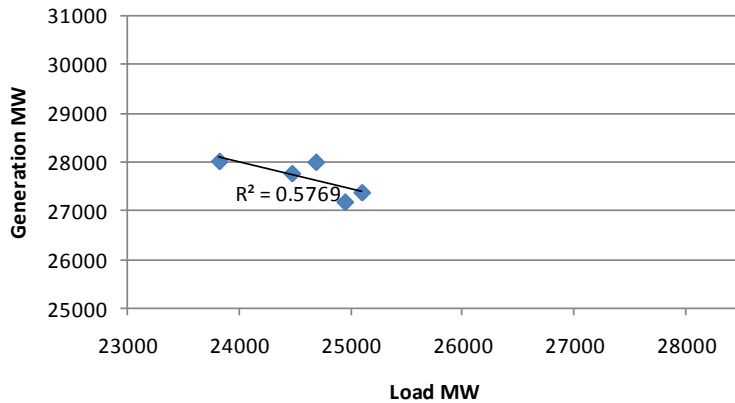
2007 Availability during Peak Load



2008 Availability during Peak Load



2009 Availability during Peak Load



# Observations

# Observations

- EFORd appears to be an optimistic estimator of generator availability at time of peak load
- Real-time ratings above SCC may be:
  - An acceptable off-set to the EFORd bias
  - May not be plausible to actually rely on this un-obligated capacity
- Data suggest that generator availability may decline as peak loads increase
  - Weak statistical support for this observation (based on  $r^2$ )
  - Trend is pervasive in that it is 'hinted at' in most years