Report on System-Level Estimation of Demand Response Program Impact

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New York Independent System Operator
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Introduction

This report provides the details and results of a top-down statistical analysis method designed to provide an estimate of the amount of load reduction provided by the Special Case Resources (SCR) and the Emergency Demand Response Program (EDRP). A demand response event can occur during summer or winter peak load periods or during emergency conditions. The load reductions obtained from the DR resources are a required input to several planning studies prepared by the NYISO.

Prior to an event, market participants submit enrollment data for each program regarding the amount of load reduction that can be obtained from each discrete demand response resource. The expected load reductions are based upon the obligated SCR MW and the available EDRP MW in any particular month.

During an event, the NYISO operators activate NYISO Demand Response (DR) resources to reduce the load.

After an event, the NYISO receives actual hourly load data from individual SCR and EDRP resources into its Demand Response Information System (DRIS). However, the performance data is not available to the NYISO until 75 days after an event. For events called in the summer, any impact evaluations of these programs based upon this data are typically not available until after three key planning studies related to the Installed Reserve Margin (IRM) are performed each year.

As a result of this delay in receiving and evaluating the metered load data, there is a need to conduct a preliminary analysis that can estimate the amount of load reduction achieved through the SCR and EDRP programs prior to the bottom-up evaluation of the programs using the actual metered data submitted for each resource during the event.

The top-down method described in this report relies upon system loads, which are reported on an hourly basis by zone. The results of the analysis show that the estimated impact of the SCR and EDRP programs, as measured at the system level, is within 10% of the expected load reductions. Thus, either the expected values (the obligated SCR MW and available EDRP MW) or the top-down estimates may be used for IRM study purposes during the current year.

Overview

The SCR and EDRP programs have a combined capability to provide a net system load reduction of approximately 2,000 MW at the direction of the NYISO during the hours of a called event, which historically average 6 hours in duration. (For more information about these and other Demand Response programs, please see the NYISO web site.).

These two programs have been deployed several times by the NYISO since their inception in 2001. Typically, resources are activated by the system operator in response to load conditions in one or more of the eleven NYISO load zones. Most recently the SCRs and EDRP resources were deployed in the summers of 2010 and 2011. In 2010, SCR and EDRP were activated in Zone J, serving load in New York City. In 2011, SCR and EDRP were activated in all but one of the NYISO load zones. On July 21, 2011 SCR and EDRP were activated from 1 pm to 6 pm in zones G through K (Hudson Valley south to Long Island) and on July 22, 2011 SCR and EDRP were activated in Zone J from noon to 6 pm and in all other zones except zone D from 1 pm to 6 pm.

The aggregate system impact of the program can usually be observed immediately by system operators through their telemetry on system load buses. Load may often be observed to drop within a few minutes of activation. However, system telemetry is not the primary method used to determine the impact of these programs. Actual metered hourly load data, which is submitted by market participants into DRIS within 75 days after the event, is used to determine the impact of these programs, and to determine performance for future capacity sales as well as energy payments for the verified load reductions.

In order to determine the Demand Response impact, the actual hourly load during an event must be compared to some reference load or baseline value, which would have been served but for the load reductions caused in response to the NYISO deployment of the programs. Each program, however, provides a specific baseline methodology by which the reference load for a given resource is determined. SCRs, for example, use the Average Coincident Load (ACL) method as the baseline when measuring the capacity obligations of each Special Case Resource. Both EDRP and SCR programs use a Customer Baseline Load methodology to calculate the amount of load reduction that is eligible for energy payments.

The two programs are comprised of over 6,000 individual load points. Due to meter reading schedules, the hourly loads upon which the DR impact is determined are not available until about three months after activation. The hourly load data must then be reviewed for data quality prior to analysis. The analysis itself also takes time to perform and review, such that the DR impact is not available until January of the following year, when the NYISO submits its annual filing to the Federal Energy Regulatory Commission.

SCR & EDRP Obligated or Available to Perform in July

By Transmission District & Zones Where EDRP were Activated

Zone/TD	CenHud	ConEd	LIPA	N-Grid	NYSEG	NYPA	O&R	RGE	NYCA
A	0.0	0.0	0.0	284.1	27.7	0.0	0.0	0.0	311.8
B	0.0	0.0	0.0	14.0	2.5	0.0	0.0	91.0	107.5
C	0.0	0.0	0.0	39.6	93.6	0.0	0.0	0.3	133.5
D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0	0.0	0.0	28.1	27.3	0.0	0.0	0.0	55.4
F	0.0	0.0	0.0	119.5	9.1	0.0	0.0	0.0	128.6
G	29.2	0.0	0.0	0.1	14.2	0.0	29.9	0.0	73.4
H	0.0	7.5	0.0	0.0	2.7	0.0	0.0	0.0	10.2
I	0.0	40.3	0.0	0.0	0.0	0.0	0.0	0.0	40.3
J	0.0	441.8	0.0	0.0	0.0	0.0	0.0	0.0	441.8
K	0.0	0.0	128.3	0.0	0.0	0.0	0.0	0.0	128.3
NYCA	29.2	489.6	128.3	485.4	177.1	0.0	29.9	91.3	1430.8

Prior to each operating month, certain information is available for SCRs and EDRP resources based upon enrollments of resources in the SCR and EDRP programs as well as the certification and sale of obligated SCR capacity in the NYISO's ICAP markets. From this information, the NYISO can determine the load reduction expected should an event be called during the operating month. The expected reduction is comprised of the obligated SCR MWs for the month and the available EDRP MWs for the month. A summary of these values for July 2011 is shown by zone in the table below[1]. It is these values that are to be validated after an event, either by information from program participants or from a system-level analysis, which is described in detail in this report.

[1] Enrolled capacity in zone D for July 2011 is not shown in this table because the zone was not included in the activation of demand response resources for the July 2011 events

SCR and EDRP events have typically been called by the NYISO in the summer. The IRM planning studies are performed each year by the NYISO during the late summer and early fall. These studies require an estimate of the load reduction impacts achieved by SCR and EDRP programs for any events called during the summer, prior to the submittal of actual metered data for the performing resources. The evaluation of the actual metered load data is typically not completed until the following January when the NYISO submits its annual report to FERC on its demand response programs.

Estimation of Demand Response Load Reductions Using System Hourly Load Models

The NYISO forecasting group builds load models that are used to dispatch the generation on the system. These models are developed at fifteen minute intervals – there are 96 such models that are updated with weather forecasts each hour of the day. Given a ten-day weather forecast and three days of prior history, these models can provide a load forecast ten days ahead. The interval models use as inputs weather data, calendar data, and prior hourly loads. Such models typically have an average accuracy of about 2% over the course of an entire year.

The modeling methodology employed by the load forecasting group was utilized to develop hourly interval models for the purpose of determining what the load would have been on the days in which the SCRs and EDRP resources were deployed by the NYISO, had those resources not been called upon to reduce load. The load reduction achieved was estimated as the difference between the modeled system load and the actual system load, for each hour of the activation period. This is similar to the impact evaluation of the DR programs themselves; the difference being that for the DR programs, the impact evaluation is performed for each participant. The system impact is then obtained by summing the individual impacts.

System Loads and Load Models During Extreme Summer Weather Conditions

The SCRs and EDRP resources are usually activated during the afternoon on days with extreme summer weather conditions, characterized by a heat wave with high temperatures and relative humidity for three or more days in a row. System load behavior is atypical at such times, as compared to the average weekday load.

In typical weekday load conditions, load responds linearly to temperature and humidity. Chillers and air conditioners do not need to operate at full load conditions. Rather, the equipment will cycle on and off during an hour. The diversified impact of thousands of such units is such that the aggregate load is a fraction of the sum of the full load of all units; that is, the diversity factor is less than 1.0.

Consumer behavior changes during a heat wave. People may set their thermostats lower and they may run their air conditioning equipment during the day even when not at home, so that the home is not excessively hot upon their arrival after their work day.

Commercial air conditioning equipment is sized to provide a maximum amount of cooling at design conditions, according to ASHRAE[2] standards. Extreme weather conditions may exceed design conditions, in which case chillers and air-conditioners reach their maximum cooling capacity even though all cooling loads have not been met. In this case, morning loads on the third day of a heat wave will be much higher than the first or second days, because air conditioning equipment has been running

[2] American Society of Heating, Refrigeration and Air-conditioning Engineers

throughout the previous evening to meet the previous day's cooling loads. Many chillers on the third day of the heat wave will be running at or near full capacity with no duty cycling, hence the diversity factor approaches 1.0. When observed at the system level, the response of the motor loads serving this equipment may no longer respond linearly to the hourly increase in temperature throughout the day.

For all of these reasons, the hourly system load on such days is different than on days with mild or moderate temperature and humidity. This poses challenges to load forecasters, because the response is non-linear and because of the relative rarity of such days upon which to estimate models. The hourly accuracy of load models is usually worse on extreme weather days than on typical days, because it is difficult to capture the non-linear behavior of loads.

Fortunately for the present circumstances, the actual load conditions on the extreme weather days are known after the fact. If the problem is to estimate the load during the afternoon of a heat wave in the absence of demand response, it is of great benefit to know what the load actually was immediately before and immediately after the event. Any non-linear response to temperature and humidity that has occurred will be embodied in the actual loads on the days in question.

A modeling strategy has emerged that is unique to estimating the impacts of demand response. It is possible to build models during the afternoon hours that are related to the late morning and early evening hours of the day, when the demand response programs are not active. The morning load at 10 am and 11 am, and the evening load at 7 pm and 8 pm can be considered independent of the effect of demand response events from 1 pm to 5 pm, or very nearly so[3].

A second modeling strategy decided upon was to build hourly models of afternoon load that were independent of each other. The reason for this is twofold. First, the models are constrained to depend more upon the current or preceding hourly temperatures than on the loads in prior hours. The correlation between the current and the preceding loads is so high that standard regression techniques will place more emphasis on that load than any other variables, such as temperature and humidity. Second, and this point is critical for estimating demand response, the load in the preceding hour of the afternoon will necessarily include the impact of demand response. However, the whole idea is to determine what the load would be in its absence!

A third modeling strategy was to relate hourly load models in the late morning and the early evening (when demand response programs are not active) to the daily energy. On non-demand response days, the daily energy is known exactly, after the fact. On demand response days, it is known exactly for all but the afternoon hours when demand response is deployed; and for the afternoon hours, an initial estimate is available by adding the prior estimate of demand response to the actual hour's loads in the afternoon. The possible inaccuracy from doing so is relatively small compared to daily energy usage, and of small consequence for modeling loads outside the demand response activation period.

A fourth modeling strategy was to incorporate the daily minimum load in the late morning and early evening hours. Again, the reason is because any nonlinearities in modeling the minimum load on extreme weather days are circumvented, after the fact.

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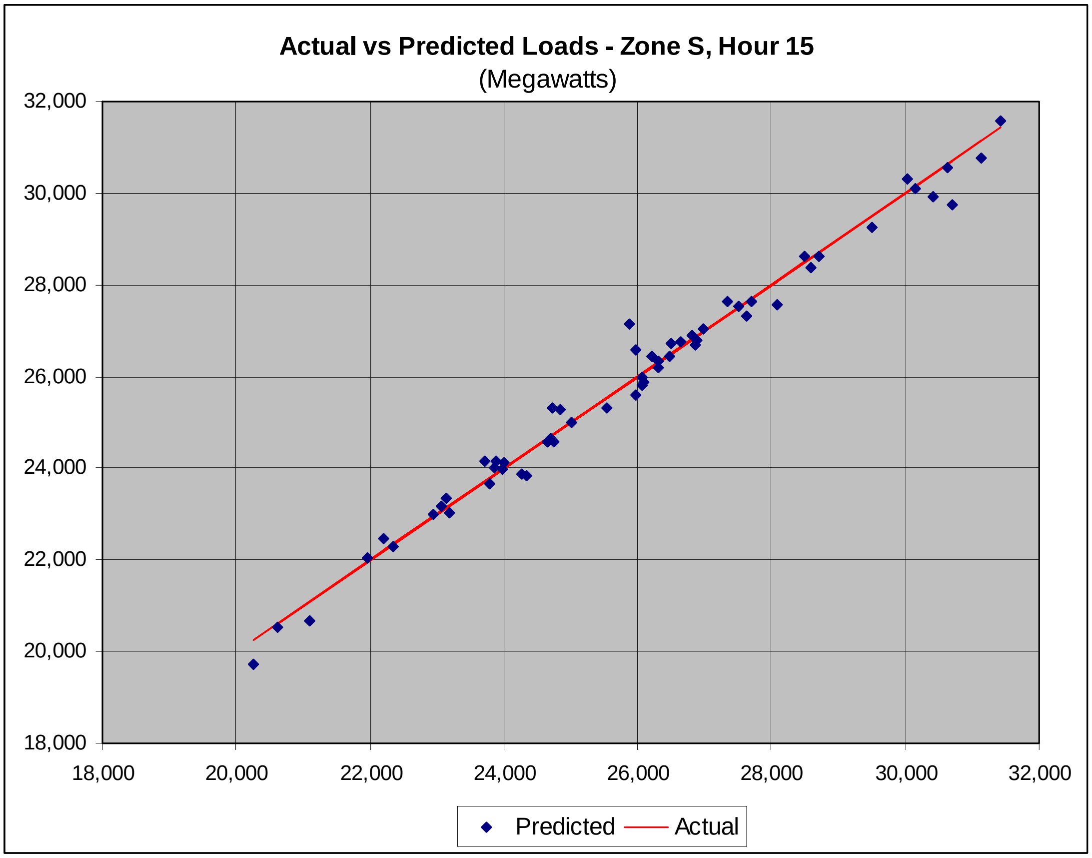
[3] A certain amount of time must elapse after a demand response event has ended before the load can be considered independent of the event because motors will need to run for some period of time before they return to normal operating conditions. This is referred to as a "bounceback or rebound period".

A fifth modeling strategy is to relate the load in a given afternoon hour to the *change* in temperature between the current and the preceding hour. This strategy should help the hourly models to be responsive to the overall temperature characteristics on any given day.

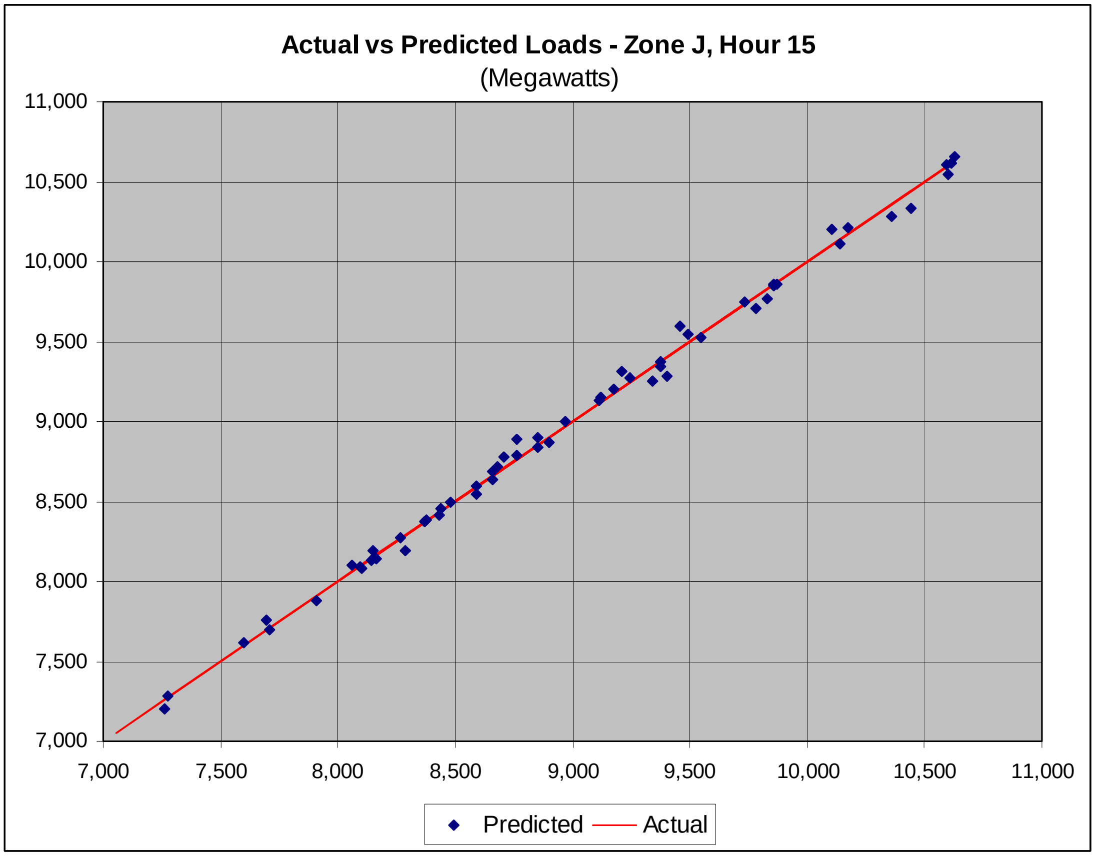
The basic modeling strategy was therefore to build independent models of each hour of the afternoon that are based upon afternoon temperatures and the actual hourly loads in the late morning and early evening. Hourly models in the late morning and early evening were based upon daily energy, daily minimum load, maximum daily weather data, and hourly loads in preceding or subsequent hours.

Of course, we wish to minimize modeling errors as much as possible. The effectiveness of the modeling strategies is illustrated by the following three charts, which compare the actual and predicted values of 3 pm load for the NYCA system, Zone J, and Zone K.

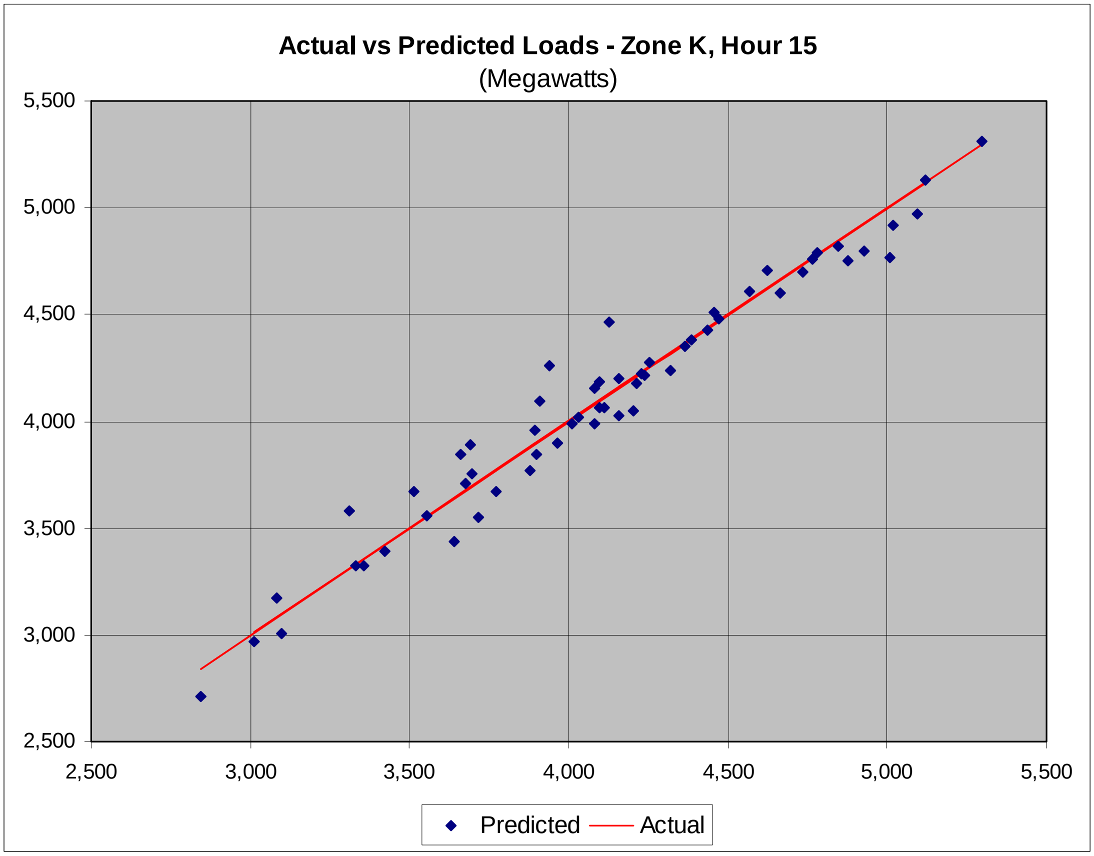
The chart below is an example of the goodness of fit of the models used to estimate 3 pm loads in the NYCA, excluding demand response days. The overall goodness of fit, as measured by the r-squared statistic for this chart, is .984. This means that the hour 15 model has explained over 98 percent of all variation using the model's input variables. The model error is indicated by any deviation of predicted load (blue markers) above or below the red line.



The same chart for Zone J, hour 15, is shown next. The r-squared statistic is .997 for this chart. Visually, we can see that the predicted values cluster much closer to the red line.



The next chart shows the results of the 3 pm model for Zone K. Its r-squared value is .958. Visually, there is a wider degree of variation from the red line compared to the other two zones' models of 3 pm. This model explains over 95% of all variation for the 3 pm hour.



Additional modeling statistics are included in the appendix to this report.

Estimation of Demand Response Impact Using Adjusted Predicted Loads

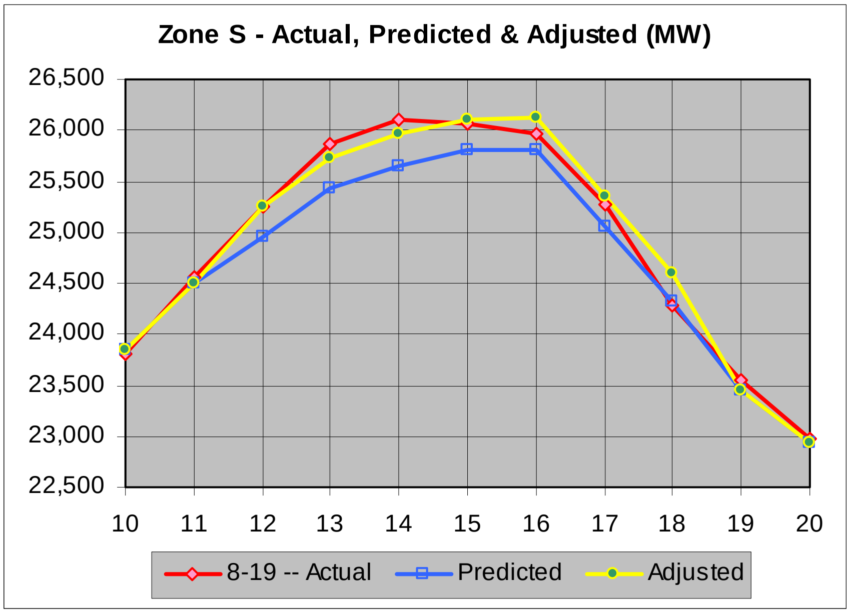
The method to estimate the demand response impact is straightforward. One takes the difference between the modeled load in an hour and the actual load in the hour, for each hour during a demand response event. This difference is an estimate of the impact. The models of hourly loads in late morning and early afternoon, however, have an important purpose. They will be used to calibrate or adjust all hourly loads up or down to match known load conditions prior to and after the demand response event. The reason for this may not be obvious.

Like any ordinary least squares model, the predicted results for any given hour will, on average, exactly equal the actual results. However, we are not interested in the average model results – we are interested in the model results for specific days. But there is no guarantee how accurate the model will be on that specific day. In fact, it is rare that the modeled load will exactly equal the actual load on specific days – the modeled load will almost always be somewhat higher or lower than the actual. It would do us no good if, on the day of demand response, the modeled loads happened to be at or below actual loads. The demand response impact would be zero or negative. Alternatively, if it happened that the model estimate was too high, the demand response would be over-estimated. Either result should be avoided.

One way to mitigate these unavoidable over-and under-estimation errors is to adjust the predicted loads in the afternoon by the amount of the actual over-or under-estimation of the model results in the late morning and early evening[4]. This adjustment process is in essence a calibration. We are, in effect, applying the predicted difference in modeled load in the afternoon compared to the predicted late morning load to the actual morning load, so as to obtain a better, more accurate estimate of the afternoon load in the absence of demand response. It is this difference between adjusted predicted load and actual load that we will use as our estimate of demand response. This adjustment is illustrated by the following chart.

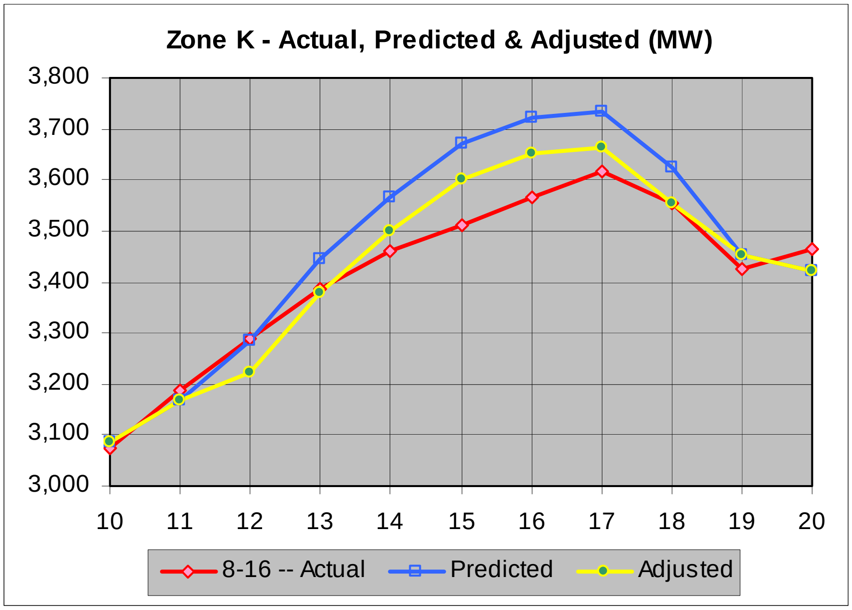
[4] Ratio adjustment is a standard approach for estimation of demand response load reductions. The references cited at the end of this report describe the rationale and method for performing a ratio adjustment in greater detail.

The chart shows hourly loads for the NYCA system on August 19, 2011 from hour beginning 10 to hour beginning 20 (10 am to 8 pm)[5]. The actual loads are shown in red and the predicted loads of all hourly models are shown in blue. The predicted values in the afternoon all tend to lie below the actual values, whereas the model values at 11 am and 6 pm are on the mark. By making a ratio adjustment for the hours from 12 pm to 6 pm, we arrive at an adjusted set of hourly loads, in yellow. All loads from noon to 6 pm were adjusted up by the ratio of (actual load at hour 12) / (predicted load at hour 12).

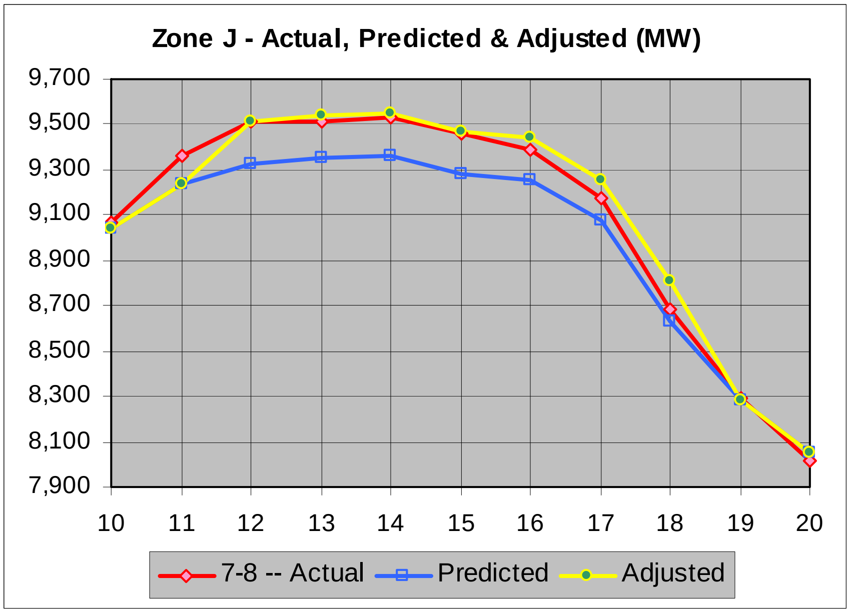


[5] All charts use the hour number instead of am and pm, with an hour-beginning convention. The 10th hour runs from 10 am to 11 am.

The next example is from Zone K, on August 16, 2011. The predicted loads all tended to over-estimate the afternoon hours. A ratio adjustment was performed based on the 6 pm hour, which results in the yellow adjusted line.



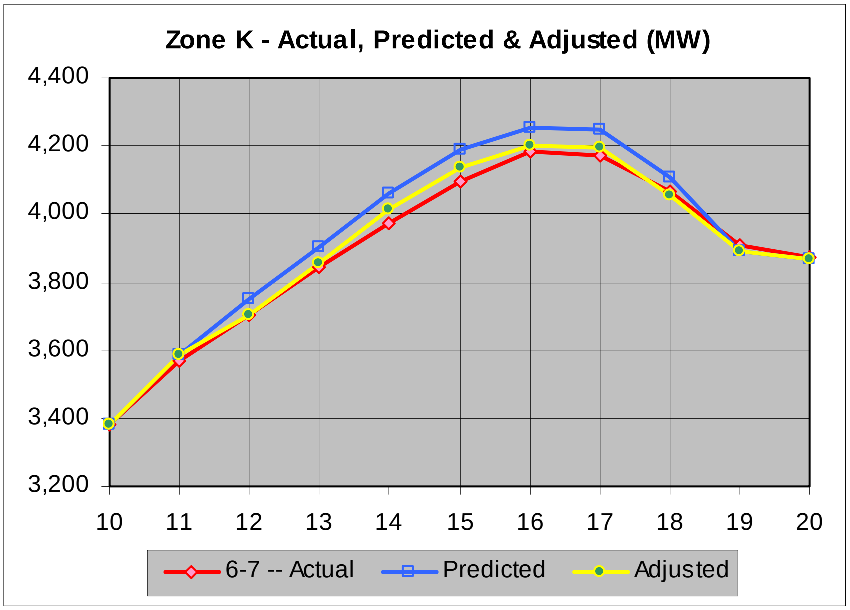
A final example is shown for Zone J on July 8, 2011, in which hours noon to 6 pm were adjusted by the ratio of actual to predicted load in hour 12.



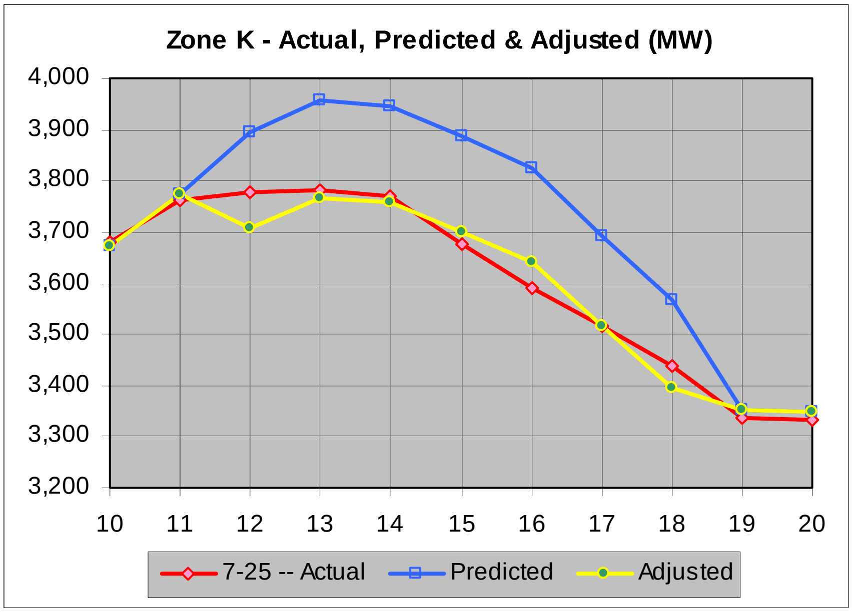
Results of adjusting the predicted hourly loads for all summer weekdays in each zone and for the system are included in the appendix.

A further point is illustrated by examining a few more examples. The day-to-day variation in hourly load patterns can be significant, but the models are responsive to these changes as well. To a large extent, this is due to including hourly temperature data in the models.

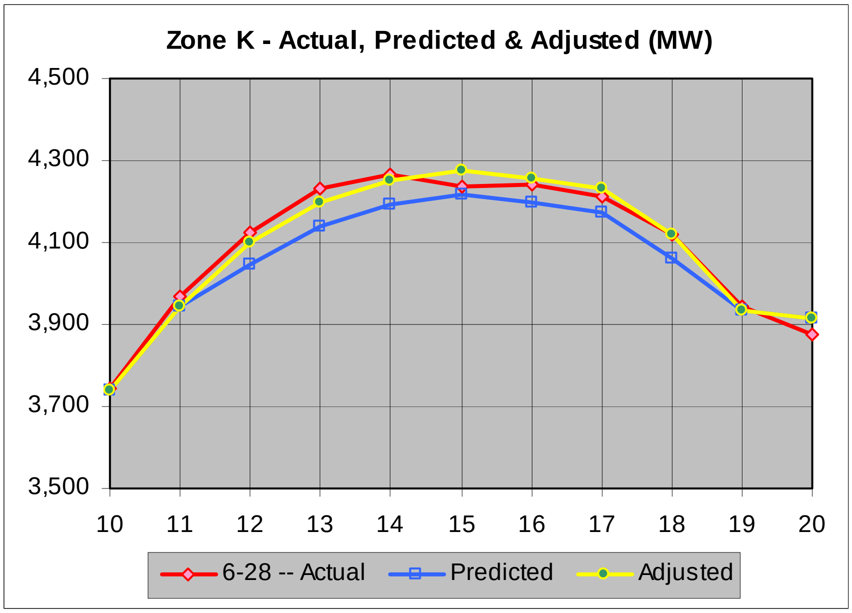
On most days, the hourly load profile in Zone K increases throughout the afternoon until 4 pm or 5 pm, after which it descends. An example of this is in the chart below, showing hourly loads in Zone K on June 7, 2011.



However, not every day exhibits this hourly pattern. The example below shows hourly loads in Zone K on July 25, 2011. On this day, loads peaked at 1 pm and descended thereafter. The predicted models peaked at 1 pm and began their descent. Although they over-predicted the loads, they correctly followed the hourly trend.

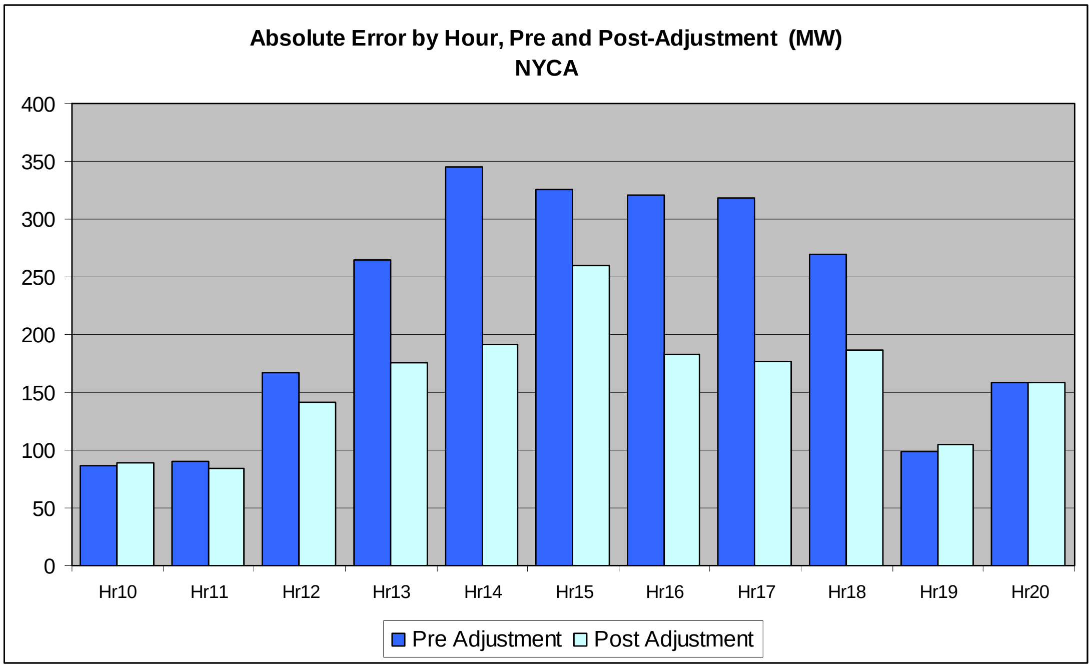


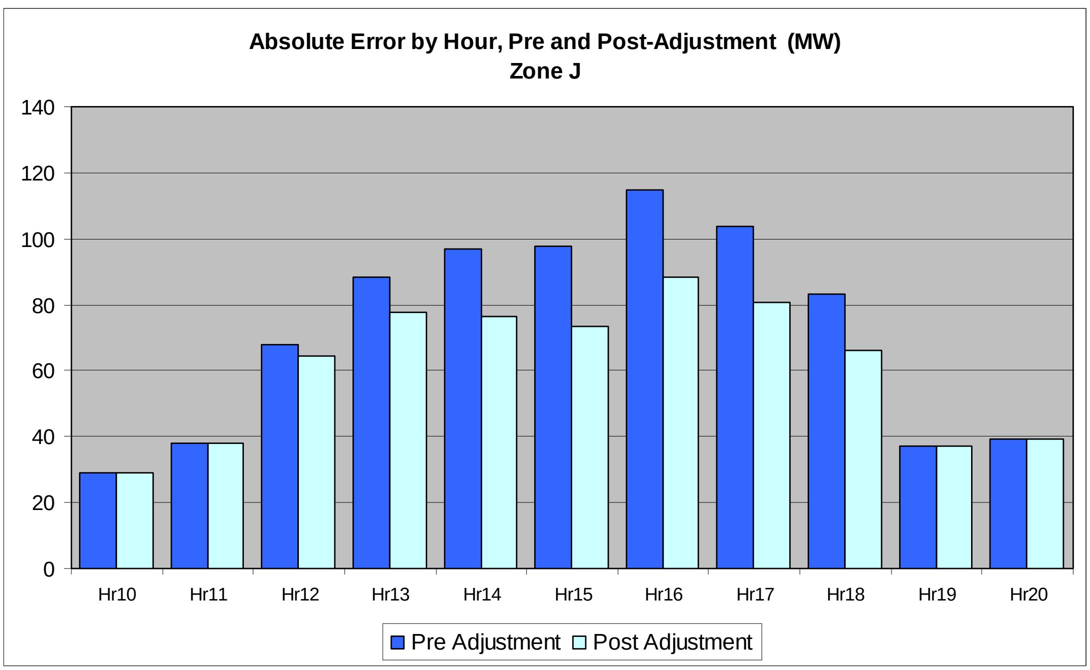
A final example is in Zone K on June 28, 2011. In this case, hourly loads were relatively flat throughout the afternoon, as were the predicted loads.

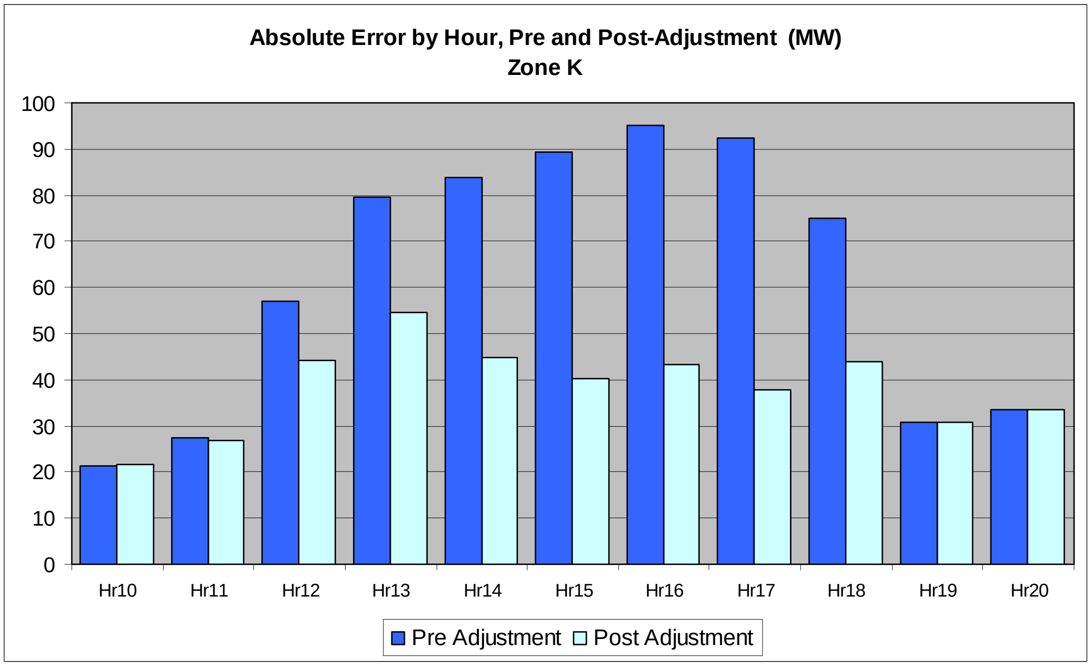


These examples illustrate the diverse nature of load patterns in Zone K, and help explain why the overall goodness of fit in this zone is not quite as good as in Zone J or for the NYCA. (Additional research must be performed to determine why Zone K loads have greater daily variation than Zone J or the system loads.)

The benefit of the adjustment process is to reduce the error of the adjusted hourly loads, compared to the actual hourly loads. The charts below compare the absolute error in MW by zone and hour for the predicted loads and the adjusted loads and indicate the improvement in model accuracy from ratio adjustment.






Absolute Error by Hour, Pre and Post-Adjustment (MW)
Zone K
100
90
80
70
60
50
40
30
20
10
0
Hr10
Hr11
Hr12
Hr13
Hr14
Hr15
Hr16
Hr17
Hr18
Hr19
Hr20
Pre Adjustment
Post Adjustment

Estimated Demand Response Impacts on Days with Demand Response Activation

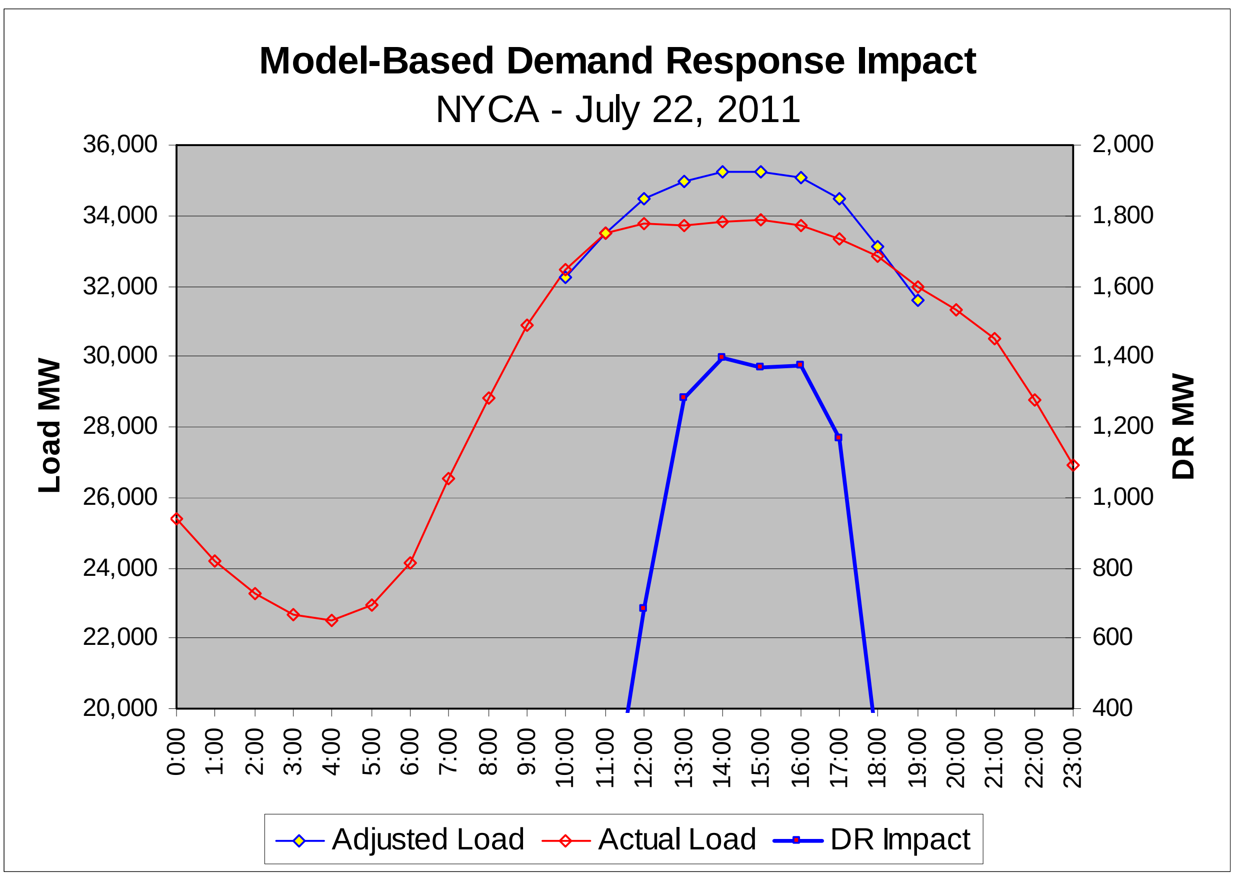
The NYISO activated demand response resources on July 21 and July 22, 2011. Using the methods described above, predicted loads were obtained for Zone J, Zone K, and the NYCA as a whole. The predicted hourly loads were adjusted using a ratio applied to afternoon hours. The results for each zone are described, each in its turn.

Results for the NYCA on July 22, 2011

Demand response resources were activated in Zone J beginning at noon and in all other zones except Zone D beginning at 1 pm. The activation period in all zones was through 6 pm. The predicted loads obtained from the NYCA hourly models are reported in the table below.

Estimated Demand Response Impact for the NYCA on July 22, 2011

			Demand Response Period							
Adj Factor: 0.992	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00
Predicted MW	32,507	33,751	34,728	35,267	35,495	35,520	35,361	34,755	33,370	31,823
Model MW	32,247	33,481	34,451	34,985	35,211	35,236	35,079	34,477	33,103	31,568
Actual MW	32,481	33,483	33,767	33,703	33,817	33,866	33,706	33,309	32,824	31,985
Demand Response	-234	-2	684	1,282	1,394	1,370	1,373	1,169	280	-417



An adjustment factor of 0.992 was applied to all predicted loads from hour 10:00 to hour 19:00. The adjustment factor calibrated the predicted loads to the actual loads at 11:00, one hour before the activation period began. This resulted in the adjusted predicted loads, as shown. The actual loads are also reported. Finally, by taking the difference of the adjusted predicted loads and the actual loads, the demand response impact from hour 12:00 to hour 17:00 is obtained.

The maximum hourly impact is estimated at 1,394 MW. The obligated SCR and available EDRP totaled 1,431 MW for the activated zones, as reported by the NYISO's Auxiliary Market Operations group. The estimated 4-hour average impact is 1,355 MW and is within 95% of the planning study value.

NYCA-Wide Estimated Demand Response Impact Summary – July 22

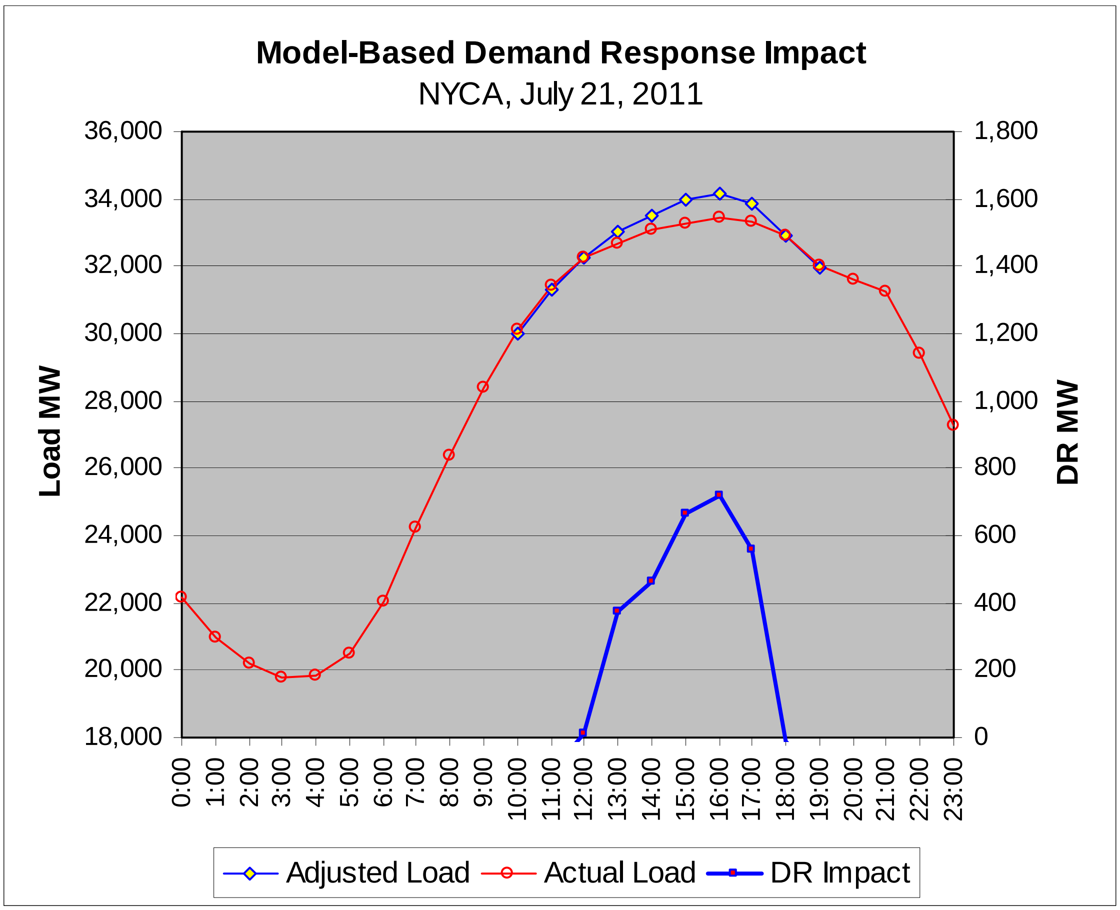
	Estimates	Expected Value
MW Expected		1,431
Maximum Hour	1,394	97%
4 Hour Average	1,355	95%

Results for the NYCA on July 21, 2011

Demand response resources were activated in Zones G - K beginning at 1 pm. The activation period in these zones was through 6 pm. The predicted loads obtained from the NYCA hourly models are reported in the table below.

Estimated Demand Response Impact for the NYCA on July 21, 2011

				Demand Response Period						
Adj. Factor: 0.996	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00
Predicted MW	30,109	31,448	32,377	33,188	33,663	34,094	34,311	33,999	33,048	32,065
Adjusted MW	29,989	31,322	32,247	33,055	33,528	33,958	34,174	33,863	32,916	31,937
Actual MW	30,146	31,424	32,238	32,680	33,067	33,292	33,454	33,307	32,927	32,041
DR MW	-157	-101	10	375	461	666	719	557	-11	-104



An adjustment factor of 0.996 was applied to all predicted loads from hour 10:00 to hour 19:00. The adjustment factor calibrated the predicted loads to the actual loads at hour 11:00, one hour before the activation period began. This resulted in the adjusted predicted loads, as shown. The actual loads are also reported. Finally, by taking the difference of the adjusted predicted loads and the actual loads, the demand response impact from hour 13:00 to hour 17:00 is obtained.

The maximum hourly impact is estimated at 719 MW. The obligated SCR and available EDRP totaled 694 MW for the zones activated, as reported by the NYISO's Auxiliary Market Operations group. The estimated 4-hour average impact is 601 MW and is within 87% of the planning study value.

NYCA-Wide Estimated Demand Response Impact Summary – July 21

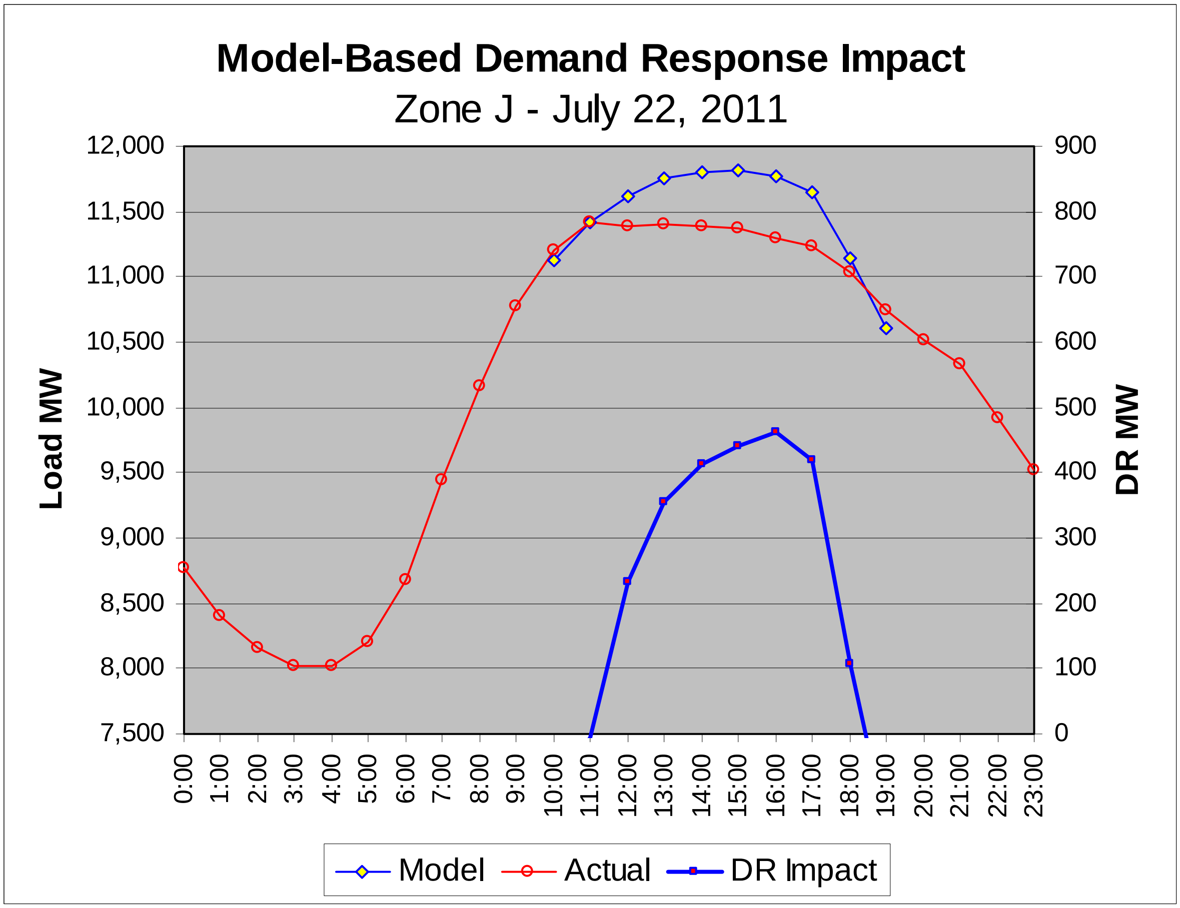
	Estimates	Expected Value
MW Expected		694
Maximum Hour	719	104%
4 Hour Average	601	87%

Results for Zone J on July 22, 2011

Demand response resources were activated in Zone J on July 22, 2011 beginning at noon. The activation period in Zone J was through 6 pm. The predicted loads obtained from the Zone J hourly models are reported in the table below.

Estimated Demand Response Impact for Zone J on July 22, 2011

			Demand Response Period							
Adj Factor: 0.993	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00
Predicted MW	11,212	11,499	11,696	11,836	11,886	11,896	11,847	11,736	11,226	10,684
Model MW	11,133	11,419	11,614	11,753	11,803	11,813	11,764	11,654	11,148	10,609
Actual MW	11,202	11,424	11,383	11,397	11,391	11,374	11,302	11,234	11,040	10,752
Demand Response	-69	-5	231	357	412	439	462	420	108	-143



An adjustment factor of 0.993 was applied to all predicted loads from hour 10:00 to hour 19:00. The adjustment factor calibrated the predicted loads to the actual loads at hour 11:00, one hour before the activation period began. This resulted in the adjusted predicted loads, as shown. The actual loads are also reported. Finally, by taking the difference of the adjusted predicted loads and the actual loads, the demand response impact from hour 12:00 to hour 17:00 is obtained.

The maximum hourly impact is estimated at 462 MW. The obligated SCR and available EDRP totaled 442 MW for Zone J, as reported by the NYISO's Auxiliary Market Operations group. The estimated 4-hour average impact is 433 MW and is within 98% of the planning study value.

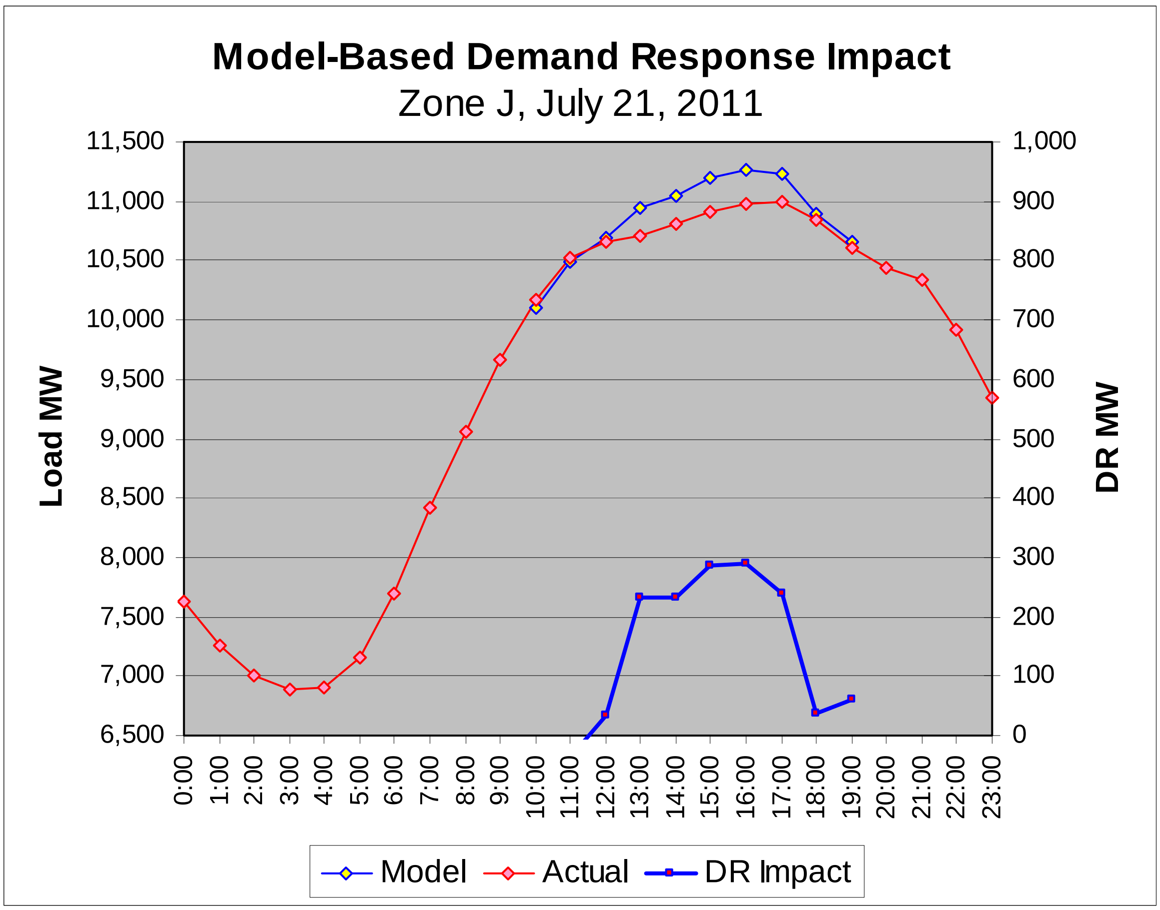
	Estimates	Expected Value
MW Expected		442
Maximum Hour	462	105%
4 Hour Average	433	98%

Results for Zone J on July 21, 2011

Demand response resources were activated in Zone J on July 21, 2011 beginning at 1 pm. The activation period in Zone J was through 6 pm. The predicted loads obtained from the Zone J hourly models are reported in the table below.

Estimated Demand Response Impact for Zone J on July 21, 2011

				Demand Response Period						
Adj Factor: 1.001	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00
Predicted MW	10,103	10,483	10,680	10,933	11,036	11,188	11,256	11,217	10,876	10,652
Model MW	10,103	10,494	10,691	10,944	11,047	11,199	11,267	11,228	10,886	10,663
Actual MW	10,175	10,530	10,656	10,712	10,816	10,914	10,977	10,988	10,848	10,602
Demand Response	-72	-36	35	232	231	285	290	240	38	61



An adjustment factor of 1.001 was applied to all predicted loads from hour 10:00 to hour 19:00. The adjustment factor calibrated the predicted loads to the actual loads at hour 11:00 and hour 18:00, one hour before and one hour after the activation period began. This resulted in the adjusted predicted loads, as shown. The actual loads are also reported. Finally, by taking the difference of the adjusted predicted loads and the actual loads, the demand response impact from hour 13:00 to hour 17:00 is obtained.

The maximum hourly impact is estimated at 290 MW. The obligated SCR and available EDRP totaled 442 MW for Zone J, as reported by the NYISO's Auxiliary Market Operations group. The estimated 4-hour average impact is 261 MW and is within 59% of the planning study value.

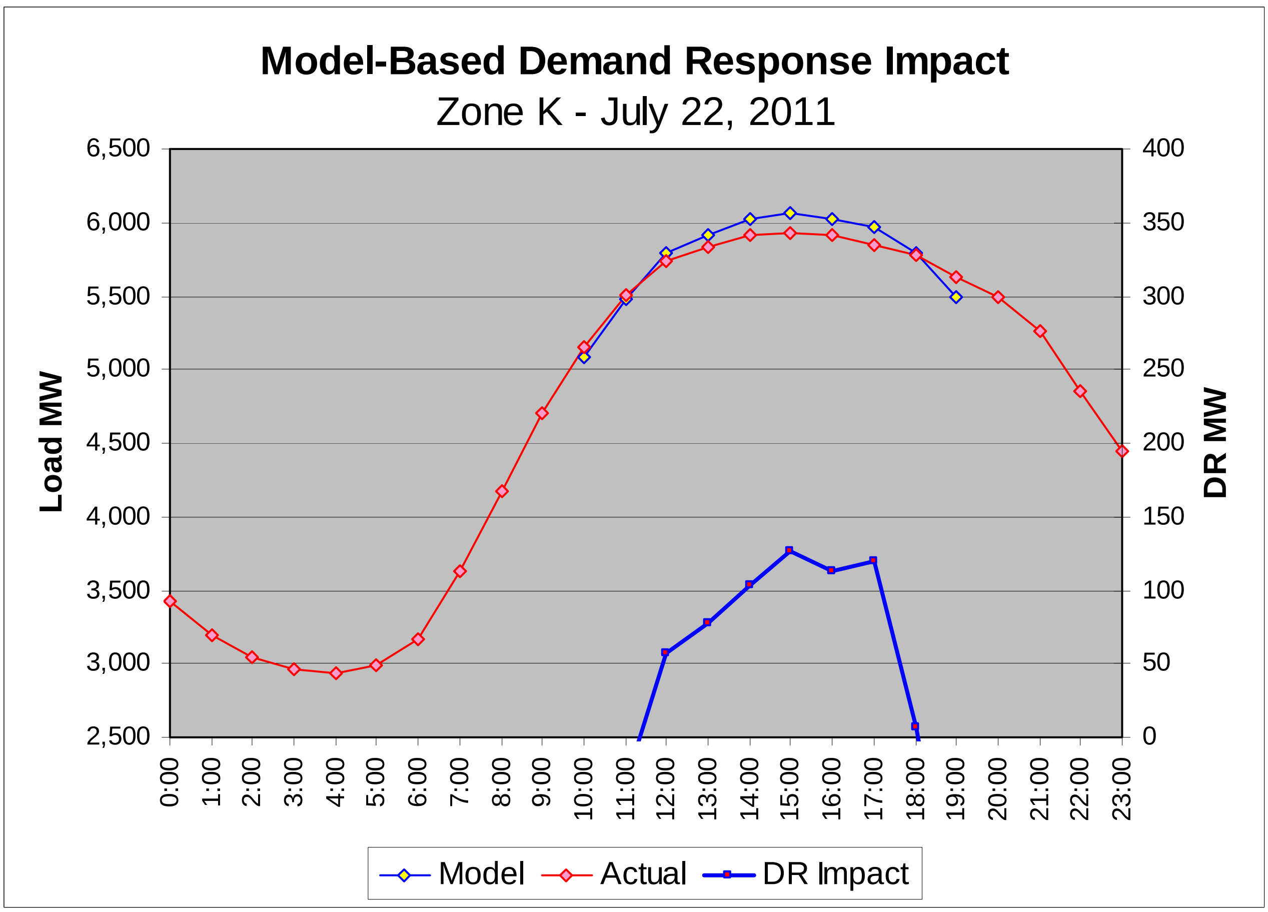
	Estimates	Expected Value
MW Expected		442
Maximum Hour	290	66%
4 Hour Average	261	59%

Results for Zone K on July 22, 2011

Demand response resources were activated in Zone K on July 22, 2011 beginning at 1 pm. The activation period in Zone K was through 6 pm. The predicted loads obtained from the Zone K hourly models are reported in the table below.

Estimated Demand Response Impact for Zone K on July 22, 2011

				Demand Response Period						
Adj Factor: 0.984	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00
Predicted MW	5,164	5,571	5,886	6,014	6,118	6,161	6,126	6,061	5,882	5,581
Model MW	5,081	5,481	5,791	5,918	6,020	6,062	6,028	5,965	5,787	5,492
Actual MW	5,157	5,511	5,734	5,840	5,917	5,935	5,915	5,845	5,781	5,632
DR MW	-76	-30	58	78	103	127	113	120	7	-140



An adjustment factor of 0.984 was applied to all predicted loads from hour 10:00 to hour 19:00. The adjustment factor calibrated the predicted loads to the actual loads at hour 18:00, one hour after the activation period began. This resulted in the adjusted predicted loads, as shown. The actual loads are also reported. Finally, by taking the difference of the adjusted predicted loads and the actual loads, the demand response impact from hour 13:00 to hour 17:00 is obtained.

The maximum hourly impact is estimated at 127 MW. The obligated SCR and available EDRP totaled 128 MW for Zone K, as reported by the NYISO's Auxiliary Market Operations group. The estimated 4-hour average impact is 116 MW and is within 90% of the planning study value.

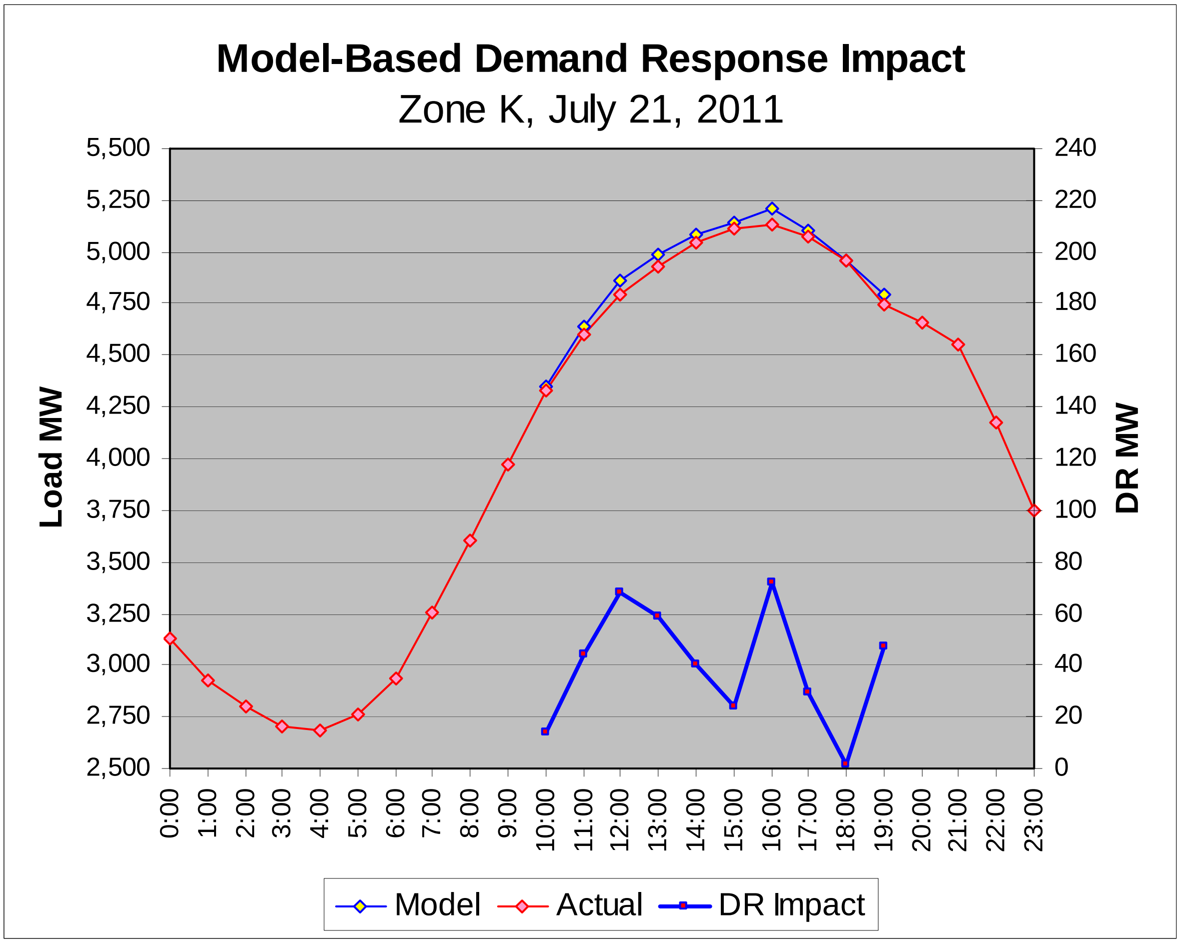
	Estimates	Expected Value
MW Expected		128
Maximum	127	99%
4 Hour Avg	116	90%

Results for Zone K on July 21, 2011

Demand response resources were activated in Zone K on July 21, 2011 beginning at 1 pm. The activation period in Zone K was through 6 pm. The predicted loads obtained from the Zone K hourly models are reported in the table below.

Estimated Demand Response Impact for Zone K on July 21, 2011

				Demand Response Period						
Adj Factor: 1.003	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00
Predicted MW	4,334	4,627	4,844	4,969	5,068	5,127	5,191	5,088	4,942	4,780
Model MW	4,347	4,641	4,859	4,984	5,083	5,142	5,207	5,103	4,957	4,794
Actual MW	4,333	4,598	4,790	4,925	5,043	5,118	5,135	5,074	4,955	4,747
DR MW	14	44	68	59	41	24	72	29	2	47



An adjustment factor of 1.003 was applied to all predicted loads from hour 10:00 to hour 19:00. The adjustment factor calibrated the predicted loads to the actual loads at hour 18:00, one hour after the activation period began. This resulted in the adjusted predicted loads, as shown. The actual loads are also reported. Finally, by taking the difference of the adjusted predicted loads and the actual loads, the demand response impact from hour 13:00 to hour 17:00 is obtained.

The maximum hourly impact is estimated at 72 MW. The average of the four highest consecutive hourly impacts is 49MW. The obligated SCR and available EDRP totaled 128 MW for Zone K, as reported by the NYISO's Auxiliary Market Operations group. The estimated 4-hour average impact is 49 MW and is within 90% of the planning study value.

	Estimates	Expected Value
MW Expected		128
Maximum Hour	72	56%
4 Hour Average	49	38%

References

1. **Demand Response Measurement & Verification,** AEIC Load Research Committee, March 2009
2. **PJM Empirical Analysis of Demand Response Baseline Methods,** KEMA, April 2011

Appendices

A. Model Specifications and Statistics
B. Scatter Plots of Hourly Loads versus Temperature-Humidity Indexes
C. Daily Plots of NYCA Actual, Predicted and Adjusted Hourly Loads
D. Daily Plots of Zone J Actual, Predicted and Adjusted Hourly Loads
E. Daily Plots of Zone K Actual, Predicted and Adjusted Hourly Loads

A - Model Specifications and Statistics

Table A.1 - NYCA-Wide Models, Hours 10 to 15

Hour Beginning 10 - Model Parameters & Statistics

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	-584.313	376.964	-1.550		Adjusted Observations	60
Loads.GWh_DRAdj	18.424	6.285	2.932		Deg. of Freedom for Error	54
Loads.MinMW	-0.187	0.040	-4.675		Adjusted R-Squared	0.998
Loads.Hr9	0.868	0.076	11.447		F-Statistic	5674.593
Loads.Hr20	-0.095	0.050	-1.904		Std. Error of Regression	111.54
WthrData.CTHI	15.241	14.986	1.017		Mean Abs. % Err. (MAPE)	0.35%

Hour Beginning 11 - Model Parameters & Statistics

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	-236.174	418.634	-0.564		Adjusted Observations	60
Loads.GWh_DRAdj	2.162	7.428	0.291		Deg. of Freedom for Error	54
Loads.MinMW	-0.159	0.050	-3.176		Adjusted R-Squared	0.998
Loads.Hr10	1.077	0.081	13.226		F-Statistic	5428.992
Loads.Hr20	-0.006	0.056	-0.106		Std. Error of Regression	123.50
WthrData.CTHI	44.561	15.557	2.864		Mean Abs. % Err. (MAPE)	0.36%

Hour Beginning 12 - Model Parameters & Statistics

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	-1312.039	817.610	-1.605		Adjusted Observations	60
T_Ramp.Ramp11	304.199	80.194	3.793		Deg. of Freedom for Error	55
Loads.Hr10	0.952	0.047	20.443		Adjusted R-Squared	0.994
Loads.Hr20	0.101	0.037	2.728		F-Statistic	2411.788
WthrData.CTHI	56.197	26.896	2.089		Std. Error of Regression	226.01
					Mean Abs. % Err. (MAPE)	0.64%

Hour Beginning 13 - Model Parameters & Statistics

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	551.404	884.061	0.624		Adjusted Observations	60
Loads.Hr10	0.724	0.051	14.164		Deg. of Freedom for Error	56
Loads.Hr20	0.230	0.047	4.896		Adjusted R-Squared	0.989
WthrData.CTHI	145.628	31.714	4.592		F-Statistic	1806.557
					Std. Error of Regression	309.17
					Mean Abs. % Err. (MAPE)	0.92%

Hour Beginning 14 - Model Parameters & Statistics

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	1359.891	1089.942	1.248		Adjusted Observations	60
Loads.Hr10	0.575	0.059	9.827		Deg. of Freedom for Error	56
Loads.Hr20	0.329	0.054	6.115		Adjusted R-Squared	0.988
WthrData.CTHI	186.517	35.886	5.198		F-Statistic	1600.312
					Std. Error of Regression	335.23
					Mean Abs. % Err. (MAPE)	0.97%

Hour Beginning 15 - Model Parameters & Statistics

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	1229.588	1430.503	0.860		Adjusted Observations	60
T_Ramp.Ramp14	275.006	213.137	1.290		Deg. of Freedom for Error	55
Loads.Hr10	0.458	0.085	5.398		Adjusted R-Squared	0.985
Loads.Hr20	0.452	0.063	7.161		F-Statistic	958.356
WthrData.CTHI	185.072	43.933	4.213		Std. Error of Regression	378.47
					Mean Abs. % Err. (MAPE)	0.99%

Table A.2 - NYCA-Wide Models, Hours 16 to 20

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
Hour Beginning 16 - Model Parameters & Statistics						
CONST	988.247	1433.943	0.689		Adjusted Observations	60
T_Ramp.Ramp15	759.030	274.237	2.768		Deg. of Freedom for Error	55
Loads.Hr10	0.381	0.089	4.274		Adjusted R-Squared	0.983
Loads.Hr20	0.535	0.071	7.515		F-Statistic	857.841
WthrData.CTHI	181.961	43.388	4.194		Std. Error of Regression	399.16
					Mean Abs. % Err. (MAPE)	1.10%
Hour Beginning 17 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	1923.861	1241.171	1.550		Adjusted Observations	60
T_Ramp.Ramp16	480.387	205.532	2.337		Deg. of Freedom for Error	55
Loads.Hr10	0.187	0.073	2.576		Adjusted R-Squared	0.984
Loads.Hr20	0.693	0.068	10.220		F-Statistic	930.918
WthrData.CTHI	177.317	40.952	4.330		Std. Error of Regression	380.00
					Mean Abs. % Err. (MAPE)	1.12%
Hour Beginning 18 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	495.512	368.439	1.345		Adjusted Observations	60
Loads.GWh_DRAdj	-14.984	6.588	-2.274		Deg. of Freedom for Error	56
Loads.MinMW	0.213	0.088	2.413		Adjusted R-Squared	0.986
Loads.Hr19	0.666	0.161	4.149		F-Statistic	1353.451
Loads.Hr21	0.499	0.132	3.793		Std. Error of Regression	360.94
					Mean Abs. % Err. (MAPE)	1.13%
Hour Beginning 19 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	-1147.825	759.738	-1.511		Adjusted Observations	60
Loads.GWh_DRAdj	72.233	8.866	8.147		Deg. of Freedom for Error	54
Loads.MinMW	-0.550	0.061	-8.986		Adjusted R-Squared	0.998
Loads.Hr10	-0.504	0.089	-5.669		F-Statistic	5098.076
Loads.Hr20	0.357	0.065	5.529		Std. Error of Regression	134.19
WthrData.CTHI_2	-0.872	0.818	-1.067		Mean Abs. % Err. (MAPE)	0.41%
Hour Beginning 20 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	495.512	368.439	1.345		Adjusted Observations	60
Loads.GWh_DRAdj	-14.984	6.588	-2.274		Deg. of Freedom for Error	55
Loads.MinMW	0.213	0.088	2.413		Adjusted R-Squared	0.994
Loads.Hr19	0.666	0.161	4.149		F-Statistic	2473.952
Loads.Hr21	0.499	0.132	3.793		Std. Error of Regression	205.51
					Mean Abs. % Err. (MAPE)	0.68%

Table A.3 - Zone J Models, Hours 10 to 15

Hour Beginning 10 - Model Parameters & Statistics

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	9.096	124.975	0.073		Adjusted Observations	61
Loads.GWh_DRAdj	1.535	7.234	0.212		Deg. of Freedom for Error	55
Loads.MinMW	-0.113	0.048	-2.362		Adjusted R-Squared	0.998
Loads.Hr9	1.029	0.074	13.915		F-Statistic	5889.689
Loads.Hr20	0.017	0.056	0.298		Std. Error of Regression	39.52
WthrData.CTHI	15.475	5.077	3.048		Mean Abs. % Err. (MAPE)	0.34%

Hour Beginning 11 - Model Parameters & Statistics

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	150.862	170.079	0.887		Adjusted Observations	61
Loads.GWh_DRAdj	3.645	9.064	0.402		Deg. of Freedom for Error	55
Loads.MinMW	-0.127	0.068	-1.860		Adjusted R-Squared	0.997
Loads.Hr10	0.984	0.087	11.304		F-Statistic	3477.849
Loads.Hr20	-0.009	0.069	-0.136		Std. Error of Regression	53.87
WthrData.CTHI	18.264	6.150	2.969		Mean Abs. % Err. (MAPE)	0.44%

Hour Beginning 12 - Model Parameters & Statistics

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	506.010	310.638	1.629		Adjusted Observations	61
T_Ramp.Ramp11	39.724	29.347	1.354		Deg. of Freedom for Error	56
Loads.Hr10	0.813	0.053	15.284		Adjusted R-Squared	0.988
Loads.Hr20	0.099	0.046	2.175		F-Statistic	1243.173
WthrData.CTHI	32.526	10.537	3.087		Std. Error of Regression	106.70
					Mean Abs. % Err. (MAPE)	0.83%

Hour Beginning 13 - Model Parameters & Statistics

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	638.367	311.832	2.047		Adjusted Observations	61
Loads.Hr10	0.662	0.054	12.363		Deg. of Freedom for Error	57
Loads.Hr20	0.238	0.044	5.378		Adjusted R-Squared	0.987
WthrData.CTHI	42.210	11.046	3.821		F-Statistic	1521.689
					Std. Error of Regression	113.34
					Mean Abs. % Err. (MAPE)	0.97%

Hour Beginning 14 - Model Parameters & Statistics

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	1093.327	362.723	3.014		Adjusted Observations	61
Loads.Hr10	0.531	0.060	8.791		Deg. of Freedom for Error	57
Loads.Hr20	0.293	0.051	5.764		Adjusted R-Squared	0.985
WthrData.CTHI	58.158	12.300	4.728		F-Statistic	1295.891
					Std. Error of Regression	124.73
					Mean Abs. % Err. (MAPE)	1.08%

Hour Beginning 15 - Model Parameters & Statistics

Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	1035.205	410.134	2.524		Adjusted Observations	61
T_Ramp.Ramp14	54.883	36.542	1.502		Deg. of Freedom for Error	56
Loads.Hr10	0.437	0.071	6.122		Adjusted R-Squared	0.983
Loads.Hr20	0.413	0.055	7.558		F-Statistic	871.435
WthrData.CTHI	52.691	13.702	3.846		Std. Error of Regression	132.43
					Mean Abs. % Err. (MAPE)	1.07%

Table A.4 - Zone J Models, Hours 16 to 20

Hour Beginning 16 - Model Parameters & Statistics					
Variable	Coefficient	StdErr	T-Stat	Regression Statistics	Value
CONST	1281.355	508.618	2.519	Adjusted Observations	61
T_Ramp.Ramp15	35.816	49.642	0.721	Deg. of Freedom for Error	56
Loads.Hr10	0.293	0.086	3.415	Adjusted R-Squared	0.973
Loads.Hr20	0.529	0.068	7.772	F-Statistic	549.704
WthrData.CTHI	56.491	16.625	3.398	Std. Error of Regression	165.80
				Mean Abs. % Err. (MAPE)	1.23%

Hour Beginning 17 - Model Parameters & Statistics					
Variable	Coefficient	StdErr	T-Stat	Regression Statistics	Value
CONST	1127.965	416.863	2.706	Adjusted Observations	61
T_Ramp.Ramp16	94.465	40.587	2.327	Deg. of Freedom for Error	56
Loads.Hr10	0.241	0.074	3.280	Adjusted R-Squared	0.980
Loads.Hr20	0.609	0.063	9.728	F-Statistic	754.565
WthrData.CTHI	47.402	14.085	3.365	Std. Error of Regression	142.82
				Mean Abs. % Err. (MAPE)	1.15%

Hour Beginning 18 - Model Parameters & Statistics					
Variable	Coefficient	StdErr	T-Stat	Regression Statistics	Value
CONST	623.482	392.437	1.589	Adjusted Observations	61
Loads.Hr10	0.125	0.065	1.919	Deg. of Freedom for Error	57
Loads.Hr20	0.777	0.055	14.142	Adjusted R-Squared	0.983
WthrData.CTHI	33.734	13.308	2.535	F-Statistic	1171.773
				Std. Error of Regression	134.94
				Mean Abs. % Err. (MAPE)	1.06%

Hour Beginning 19 - Model Parameters & Statistics					
Variable	Coefficient	StdErr	T-Stat	Regression Statistics	Value
CONST	-319.871	202.427	-1.580	Adjusted Observations	61
Loads.GWh_DRAdj	58.359	8.332	7.004	Deg. of Freedom for Error	55
Loads.MinMW	-0.456	0.065	-7.065	Adjusted R-Squared	0.997
Loads.Hr10	-0.383	0.079	-4.827	F-Statistic	4574.722
Loads.Hr20	0.466	0.064	7.263	Std. Error of Regression	50.23
WthrData.CTHI_2	-0.212	0.175	-1.211	Mean Abs. % Err. (MAPE)	0.45%

Hour Beginning 20 - Model Parameters & Statistics					
Variable	Coefficient	StdErr	T-Stat	Regression Statistics	Value
CONST	244.006	77.945	3.131	Adjusted Observations	61
Loads.GWh_DRAdj	-11.968	3.837	-3.119	Deg. of Freedom for Error	56
Loads.MinMW	0.160	0.050	3.230	Adjusted R-Squared	0.997
Loads.Hr19	0.534	0.087	6.111	F-Statistic	5942.620
Loads.Hr21	0.592	0.070	8.515	Std. Error of Regression	48.63
				Mean Abs. % Err. (MAPE)	0.49%

Table A.5 - Zone K Models, Hours 10 to 15

Hour Beginning 10 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	-200.057	83.599	-2.393		Adjusted Observations	61
Loads.GWh_DRAdj	24.478	5.995	4.083		Deg. of Freedom for Error	55
Loads.MinMW	-0.281	0.049	-5.678		Adjusted R-Squared	0.995
Loads.Hr9	0.922	0.076	12.180		F-Statistic	2511.099
Loads.Hr20	-0.161	0.056	-2.869		Std. Error of Regression	32.10
WthrData.CTHI	-0.340	3.938	-0.086		Mean Abs. % Err. (MAPE)	0.59%

Hour Beginning 11 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	-167.530	97.064	-1.726		Adjusted Observations	61
Loads.GWh_DRAdj	15.189	8.195	1.853		Deg. of Freedom for Error	55
Loads.MinMW	-0.277	0.061	-4.525		Adjusted R-Squared	0.995
Loads.Hr10	1.008	0.084	11.957		F-Statistic	2243.681
Loads.Hr20	-0.082	0.072	-1.124		Std. Error of Regression	38.55
WthrData.CTHI	3.273	4.729	0.692		Mean Abs. % Err. (MAPE)	0.70%

Hour Beginning 12 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	-371.819	194.143	-1.915		Adjusted Observations	61
T_Ramp.Ramp11	46.923	18.053	2.599		Deg. of Freedom for Error	56
Loads.Hr10	0.935	0.086	10.914		Adjusted R-Squared	0.982
Loads.Hr20	0.176	0.055	3.181		F-Statistic	811.980
WthrData.CTHI	12.069	8.966	1.346		Std. Error of Regression	79.07
					Mean Abs. % Err. (MAPE)	1.41%

Hour Beginning 13 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	-158.189	211.741	-0.747		Adjusted Observations	61
Loads.Hr10	0.701	0.106	6.588		Deg. of Freedom for Error	57
Loads.Hr20	0.305	0.070	4.343		Adjusted R-Squared	0.971
WthrData.CTHI	30.725	10.685	2.876		F-Statistic	661.513
					Std. Error of Regression	105.10
					Mean Abs. % Err. (MAPE)	1.96%

Hour Beginning 14 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	45.226	266.153	0.170		Adjusted Observations	61
Loads.Hr10	0.433	0.119	3.636		Deg. of Freedom for Error	57
Loads.Hr20	0.475	0.078	6.066		Adjusted R-Squared	0.968
WthrData.CTHI	42.839	12.125	3.533		F-Statistic	606.798
					Std. Error of Regression	111.86
					Mean Abs. % Err. (MAPE)	2.07%

Hour Beginning 15 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	230.077	294.048	0.782		Adjusted Observations	61
T_Ramp.Ramp14	-8.402	24.717	-0.340		Deg. of Freedom for Error	56
Loads.Hr10	0.154	0.136	1.138		Adjusted R-Squared	0.961
Loads.Hr20	0.675	0.096	7.061		F-Statistic	375.403
WthrData.CTHI	49.975	13.521	3.696		Std. Error of Regression	123.56
					Mean Abs. % Err. (MAPE)	2.23%

Table A.6 - Zone K Models, Hours 16 to 20

Hour Beginning 16 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	340.730	298.127	1.143		Adjusted Observations	61
T_Ramp.Ramp15	73.909	33.702	2.193		Deg. of Freedom for Error	56
Loads.Hr10	0.054	0.143	0.377		Adjusted R-Squared	0.960
Loads.Hr20	0.735	0.099	7.406		F-Statistic	356.599
WthrData.CTHI	51.349	13.570	3.784		Std. Error of Regression	125.19
					Mean Abs. % Err. (MAPE)	2.32%

Hour Beginning 17 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	271.563	282.015	0.963		Adjusted Observations	61
Loads.Hr10	-0.133	0.126	-1.052		Deg. of Freedom for Error	57
Loads.Hr20	0.971	0.083	11.698		Adjusted R-Squared	0.962
WthrData.CTHI	39.804	12.848	3.098		F-Statistic	506.578
					Std. Error of Regression	118.53
					Mean Abs. % Err. (MAPE)	2.26%

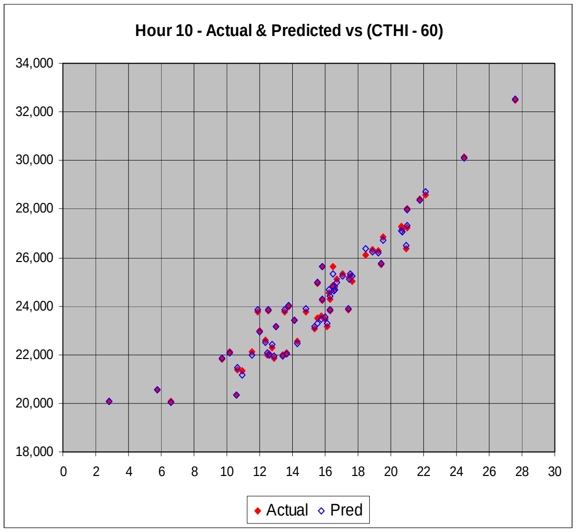
Hour Beginning 18 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	130.923	226.776	0.577		Adjusted Observations	61
Loads.Hr10	-0.076	0.101	-0.752		Deg. of Freedom for Error	57
Loads.Hr20	0.973	0.067	14.567		Adjusted R-Squared	0.974
WthrData.CTHI	28.068	10.331	2.717		F-Statistic	741.078
					Std. Error of Regression	95.31
					Mean Abs. % Err. (MAPE)	1.91%

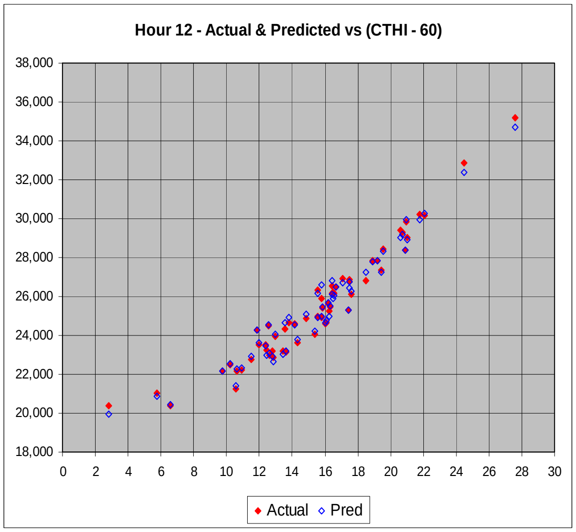
Hour Beginning 19 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	-113.483	129.510	-0.876		Adjusted Observations	61
Loads.GWh_DRAdj	51.018	8.215	6.210		Deg. of Freedom for Error	55
Loads.MinMW	-0.347	0.064	-5.394		Adjusted R-Squared	0.995
Loads.Hr10	-0.372	0.085	-4.395		F-Statistic	2321.474
Loads.Hr20	0.532	0.074	7.193		Std. Error of Regression	38.57
WthrData.CTHI_2	-0.020	0.162	-0.121		Mean Abs. % Err. (MAPE)	0.80%

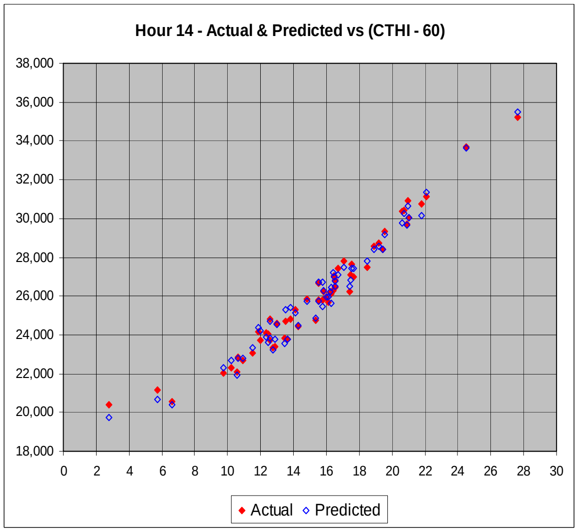
Hour Beginning 20 - Model Parameters & Statistics						
Variable	Coefficient	StdErr	T-Stat		Regression Statistics	Value
CONST	12.301	64.911	0.190		Adjusted Observations	61
Loads.GWh_DRAdj	-7.488	4.648	-1.611		Deg. of Freedom for Error	56
Loads.MinMW	0.142	0.069	2.056		Adjusted R-Squared	0.993
Loads.Hr19	0.562	0.107	5.267		F-Statistic	2180.802
Loads.Hr21	0.515	0.098	5.273		Std. Error of Regression	41.67
					Mean Abs. % Err. (MAPE)	0.88%

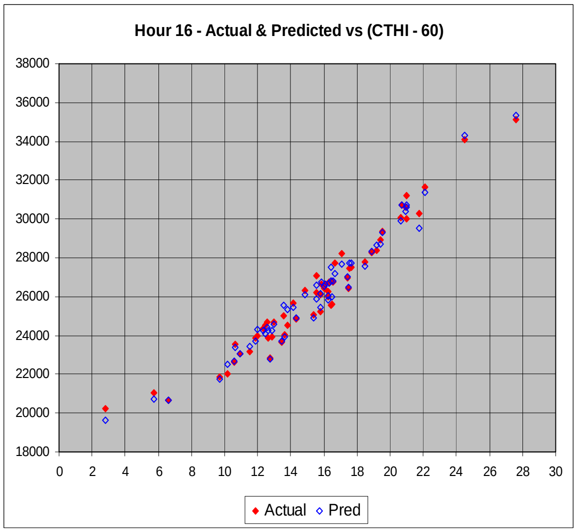
B - Scatter Plots of Hourly Loads versus Temperature-Humidity Indexes

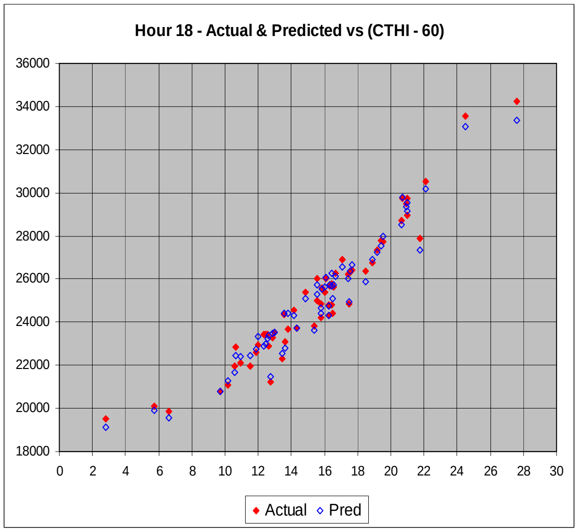
Actual & Predicted Model Results - NYCA

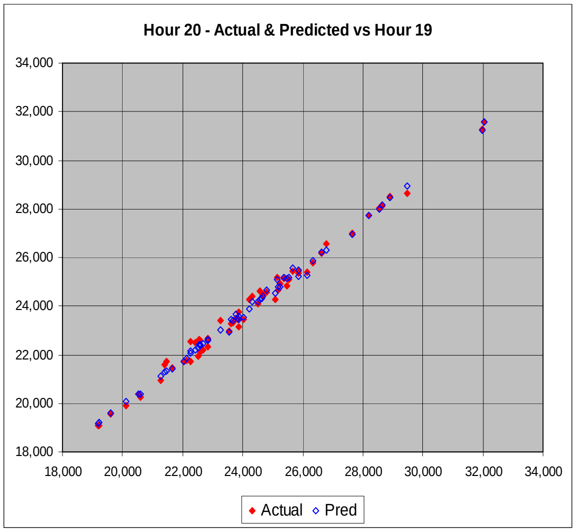




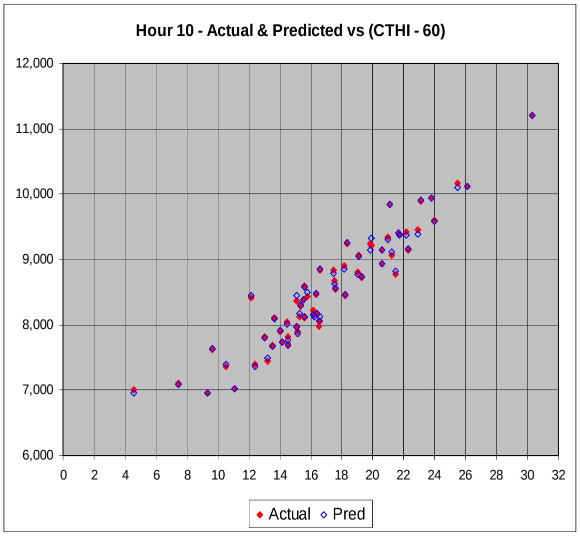


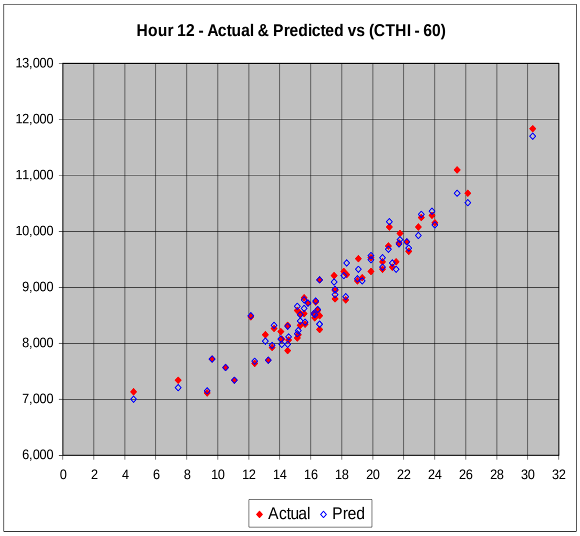


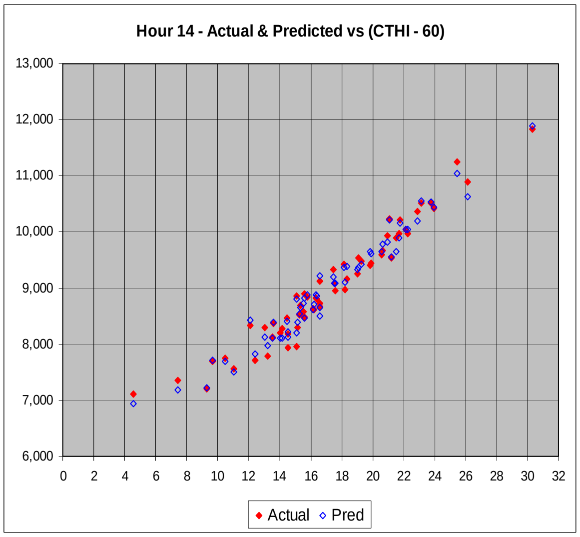


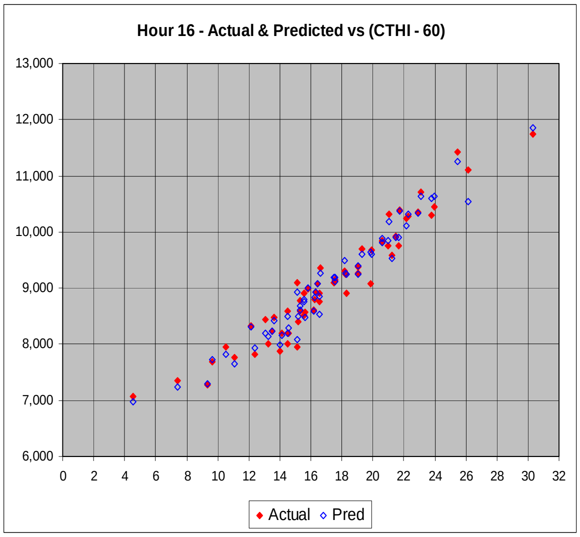


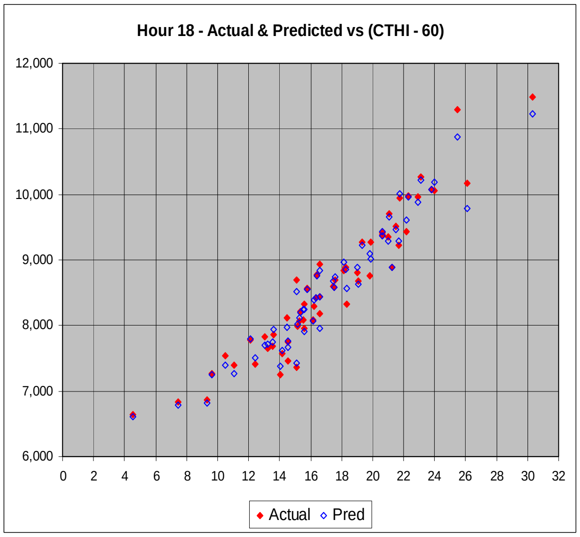
Actual & Predicted Model Results - Zone J

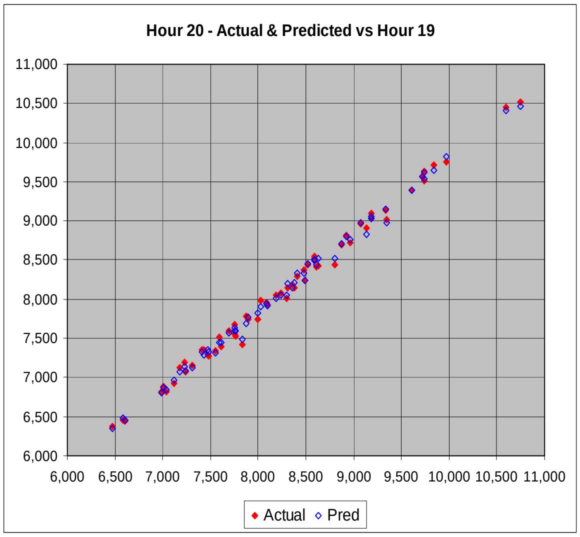




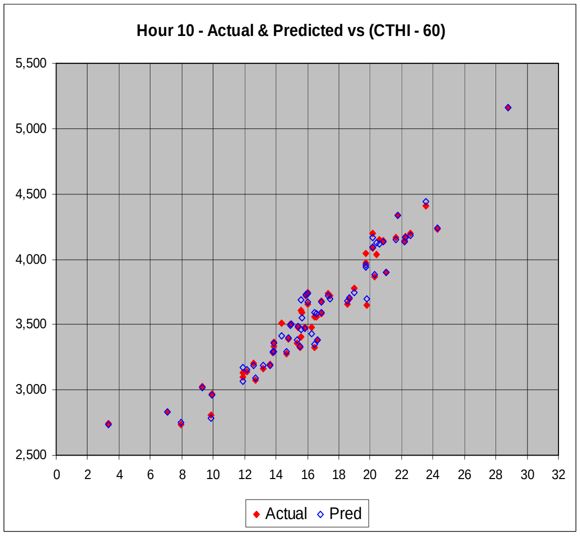


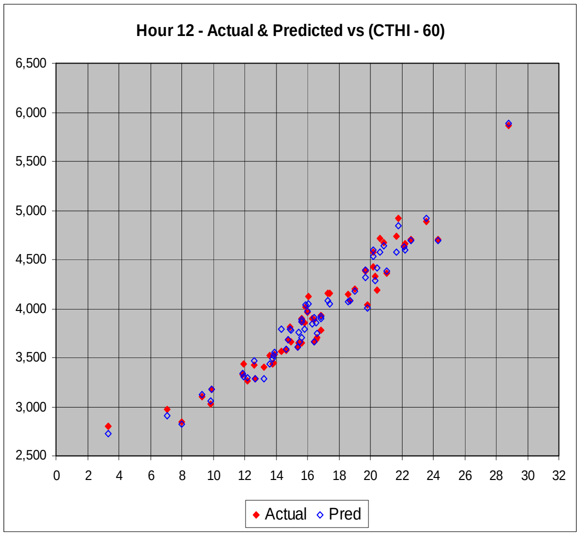


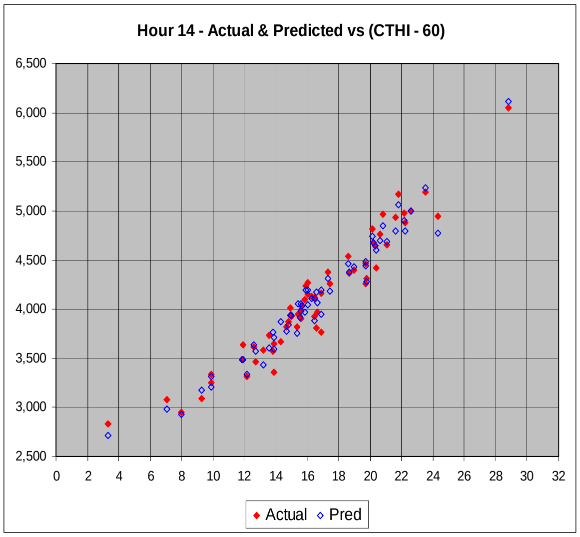


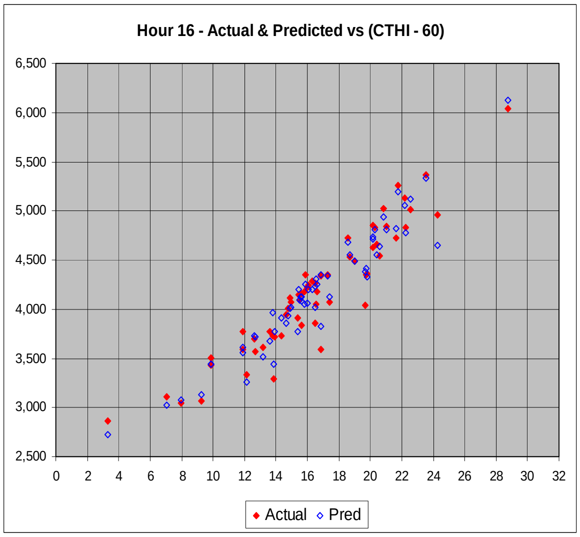


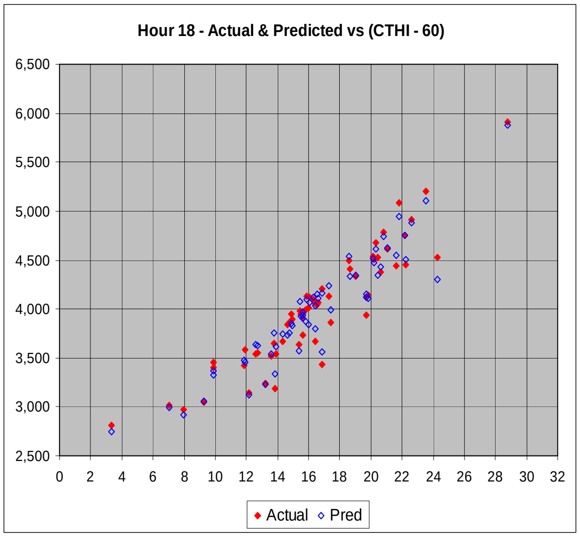
Actual & Predicted Model Results - Zone K

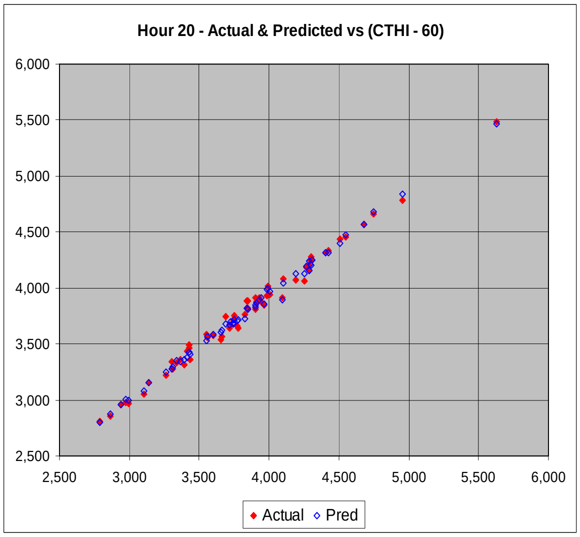






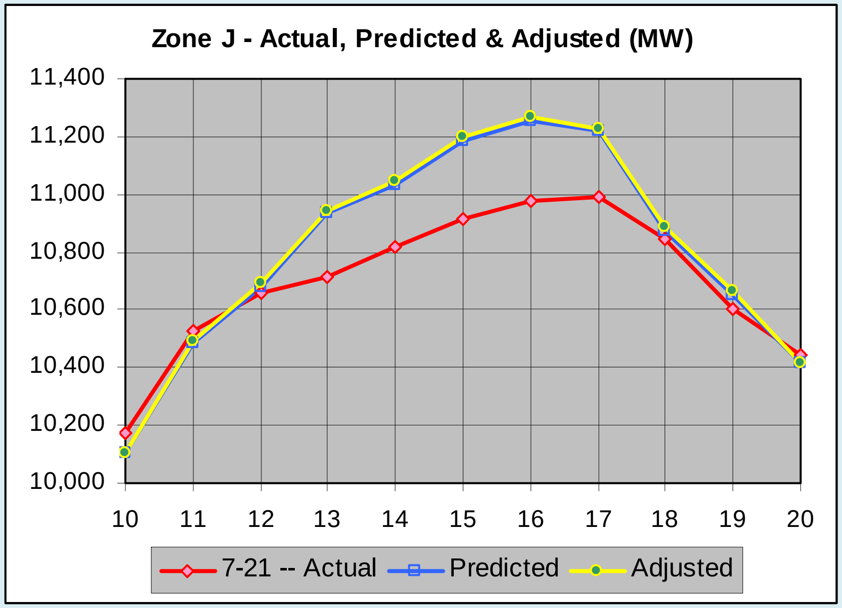


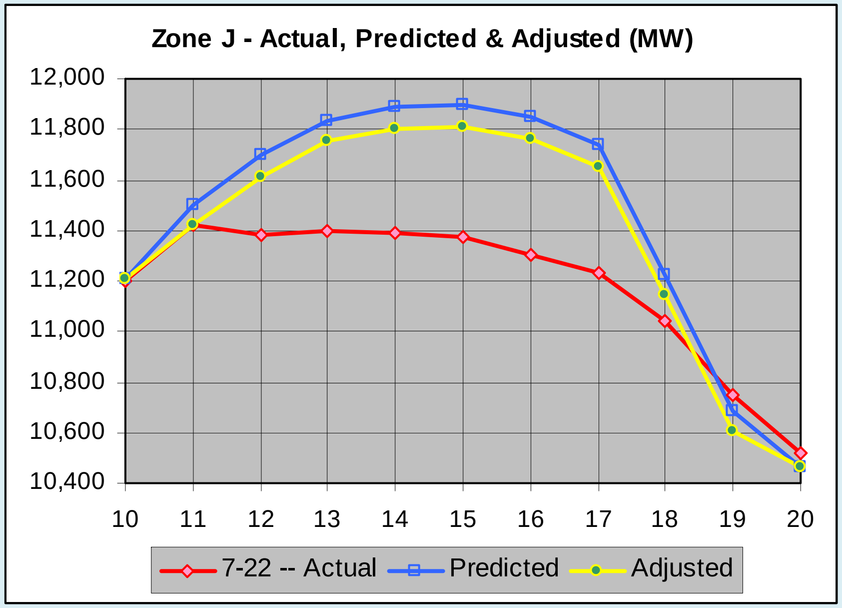


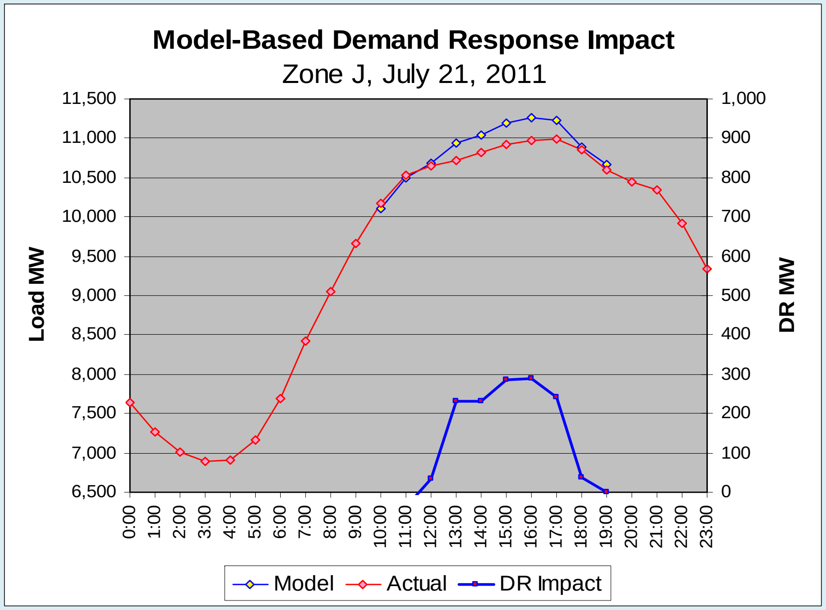


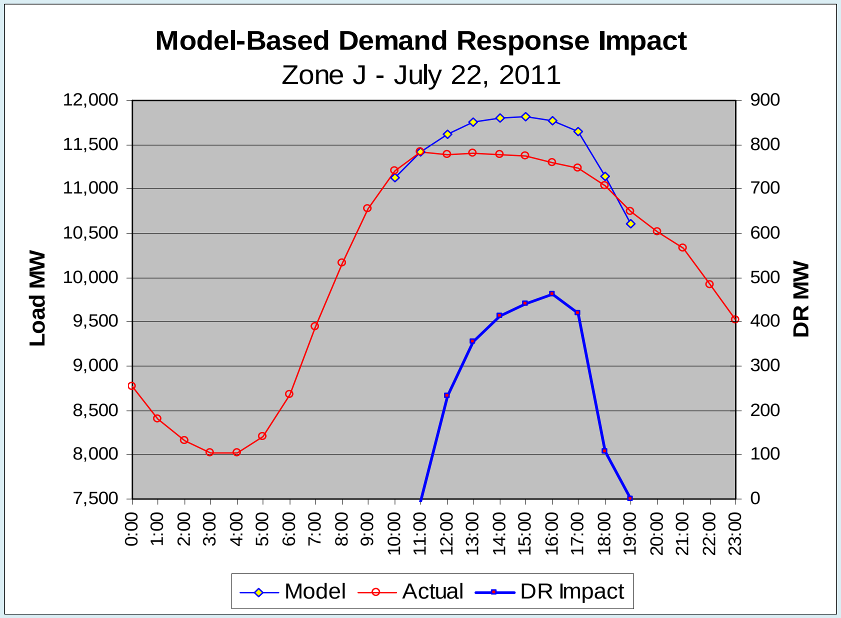
C - Daily Plots of Zone J Actual, Predicted and Adjusted Hourly Loads

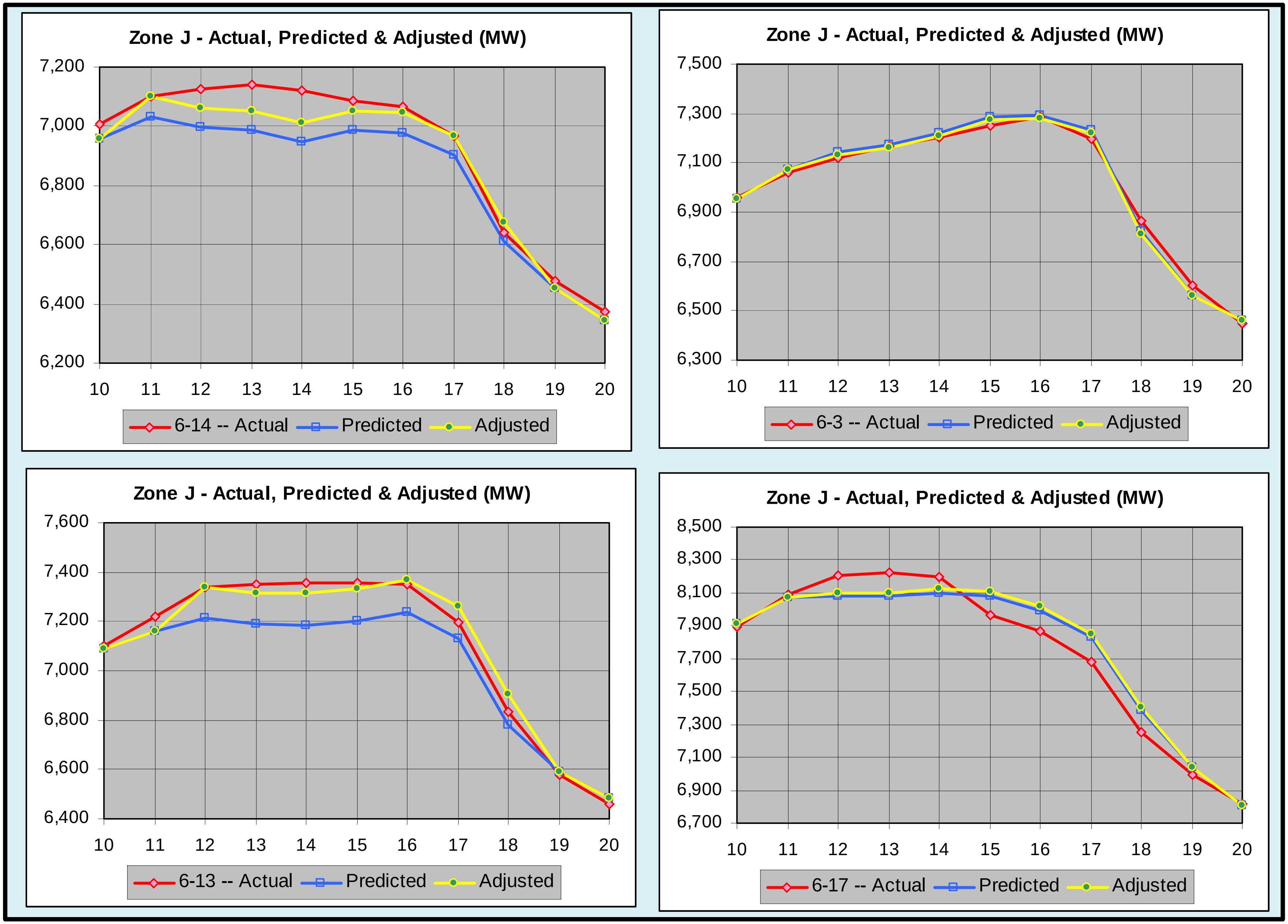
The charts below are not in calendar order. The first two charts show the days in which Demand Response resources were activated (July 21 and July 22, 2011). The subsequent series of charts are ordered in terms of increasing load levels.

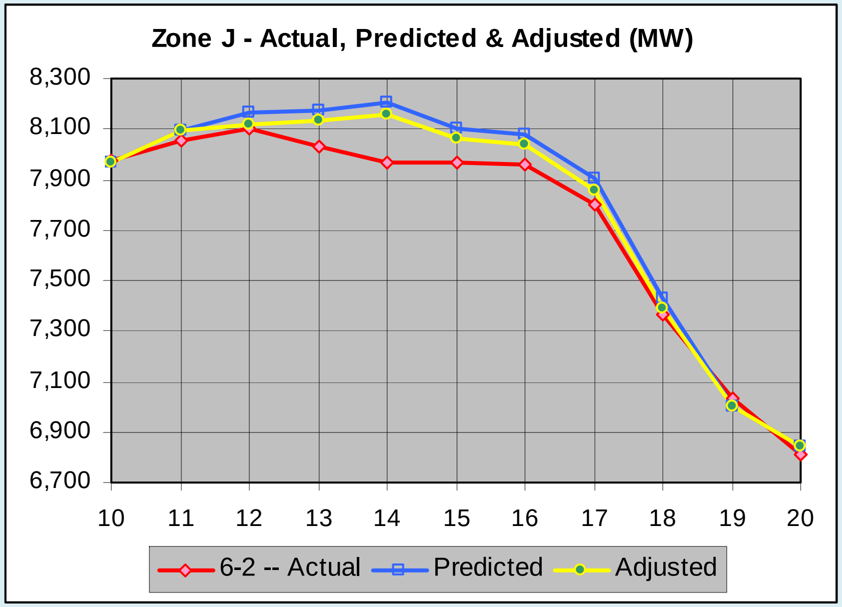

Zone J - Actual, Predicted & Adjusted (MW)
11,400
11,200
11,000
10,800
10,600
10,400
10,200
10,000
10 11 12 13 14 15 16 17 18 19 20
7-21 -- Actual
Predicted
Adjusted

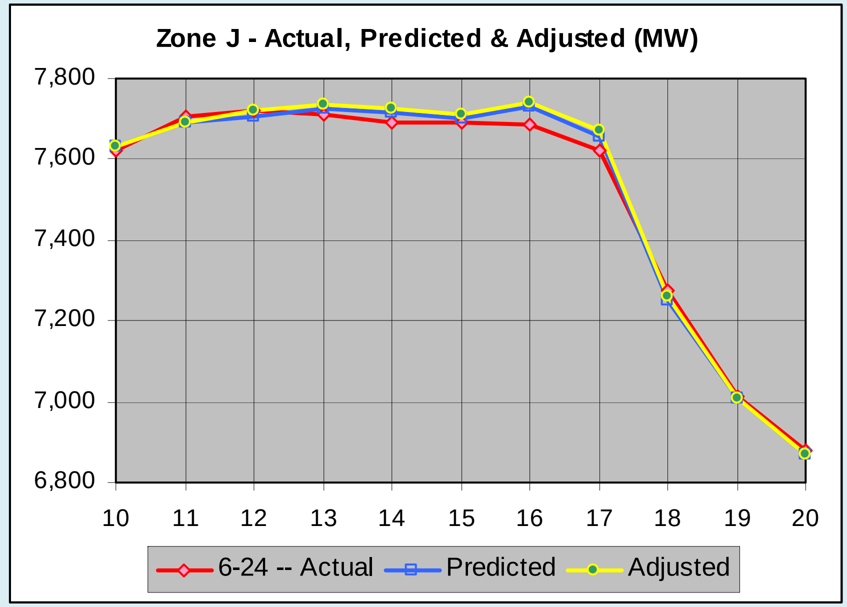

Zone J - Actual, Predicted & Adjusted (MW)
12,000
11,800
11,600
11,400
11,200
11,000
10,800
10,600
10,400
10 11 12 13 14 15 16 17 18 19 20
7-22 -- Actual
Predicted
Adjusted

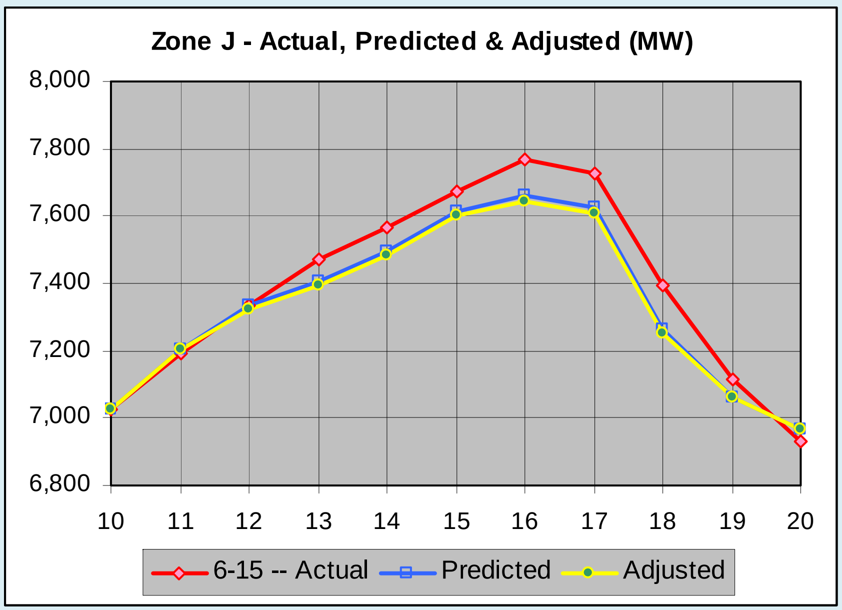

Model-Based Demand Response Impact
Zone J, July 21, 2011
Load MW
DR MW
11,500
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
1,000
900
800
700
600
500
400
300
200
100
0
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00
Model
Actual
DR Impact

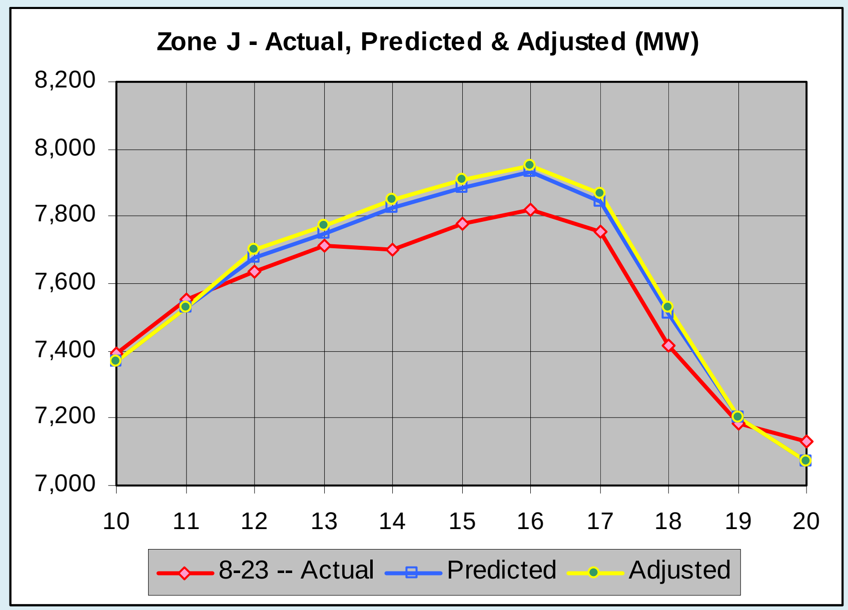

Model-Based Demand Response Impact
Zone J - July 22, 2011
Load MW
DR MW
12,000
11,500
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
900
800
700
600
500
400
300
200
100
0
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00
Model
Actual
DR Impact

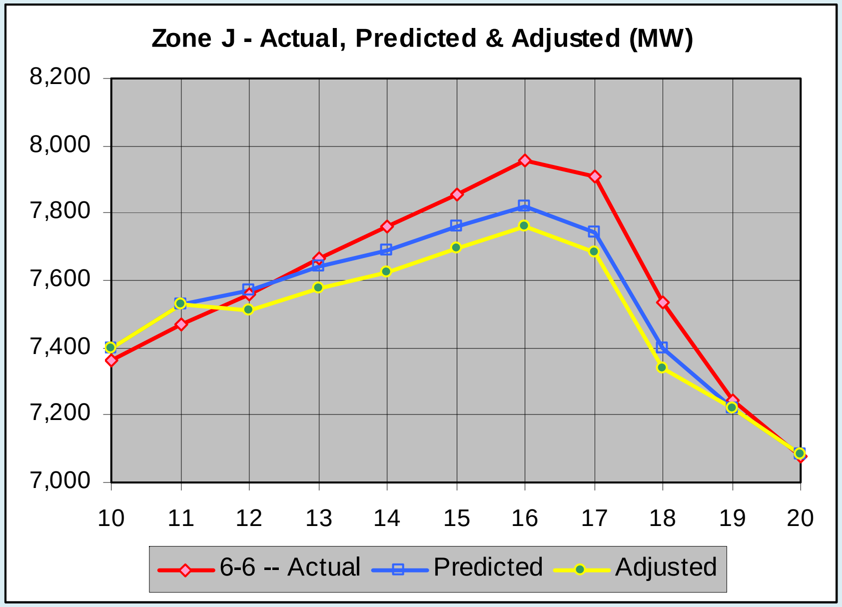

Zone J - Actual, Predicted & Adjusted (MW)
7,200
7,000
6,800
6,600
6,400
6,200
10 11 12 13 14 15 16 17 18 19 20
6-14 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
7,500
7,300
7,100
6,900
6,700
6,500
6,300
10 11 12 13 14 15 16 17 18 19 20
6-3 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
7,600
7,400
7,200
7,000
6,800
6,600
6,400
10 11 12 13 14 15 16 17 18 19 20
6-13 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
8,500
8,300
8,100
7,900
7,700
7,500
7,300
7,100
6,900
6,700
10 11 12 13 14 15 16 17 18 19 20
6-17 -- Actual
Predicted
Adjusted

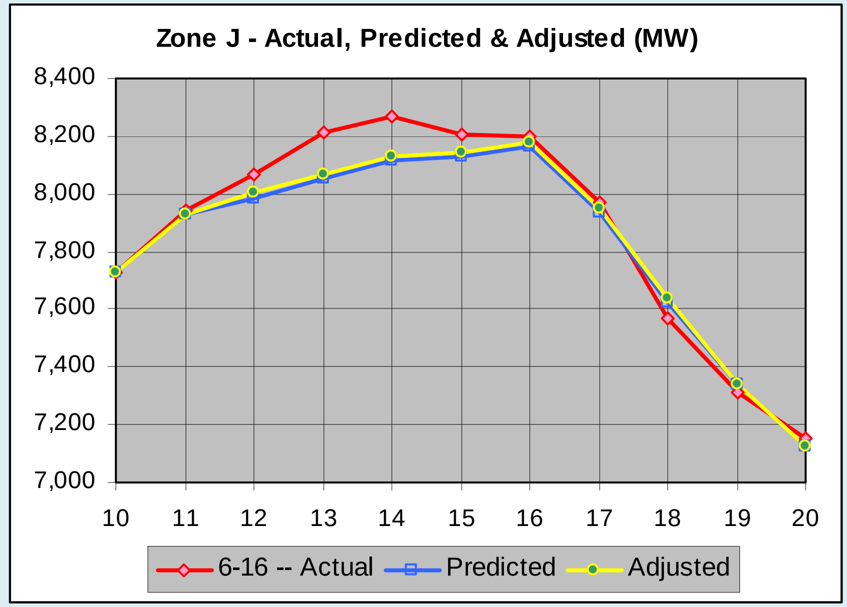

Zone J - Actual, Predicted & Adjusted (MW)
8,300
8,100
7,900
7,700
7,500
7,300
7,100
6,900
6,700
10 11 12 13 14 15 16 17 18 19 20
6-2 -- Actual
Predicted
Adjusted

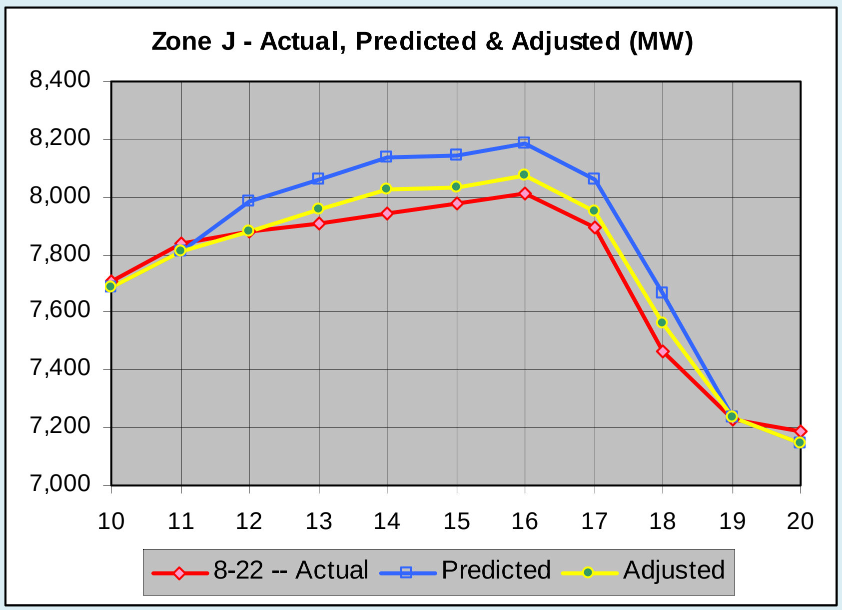

Zone J - Actual, Predicted & Adjusted (MW)
7,800
7,600
7,400
7,200
7,000
6,800
10 11 12 13 14 15 16 17 18 19 20
6-24 -- Actual
Predicted
Adjusted

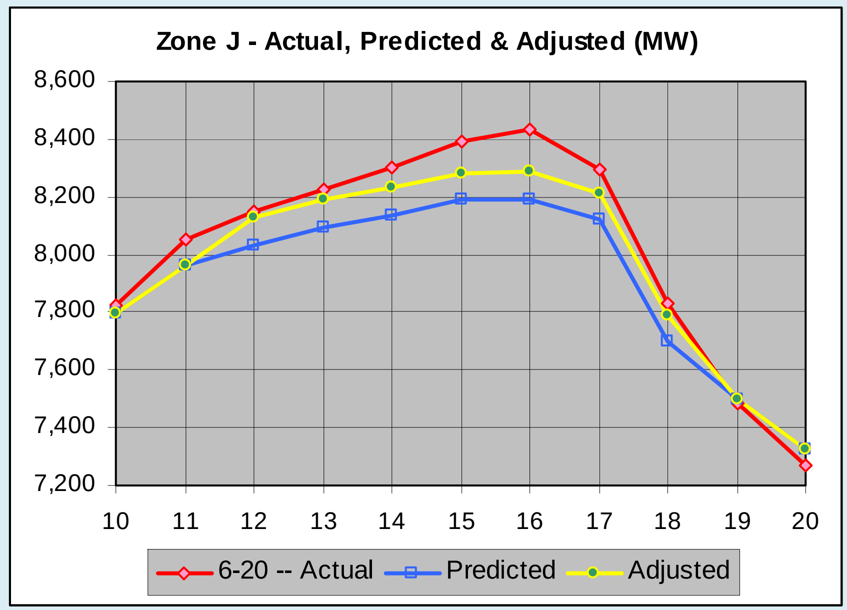

Zone J - Actual, Predicted & Adjusted (MW)
8,000
7,800
7,600
7,400
7,200
7,000
6,800
10 11 12 13 14 15 16 17 18 19 20
6-15 -- Actual
Predicted
Adjusted

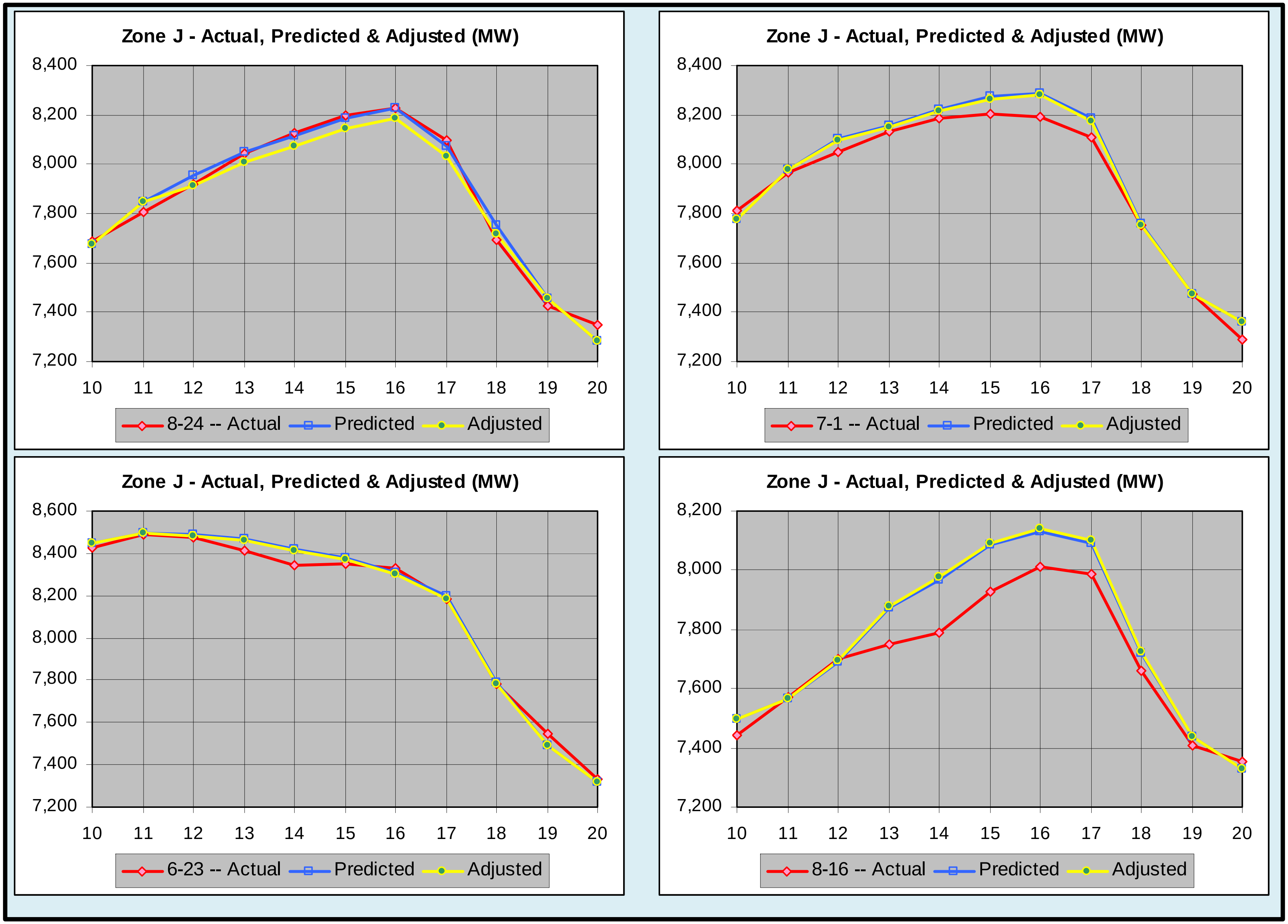

Zone J - Actual, Predicted & Adjusted (MW)
8,200
8,000
7,800
7,600
7,400
7,200
7,000
10 11 12 13 14 15 16 17 18 19 20
8-23 -- Actual
Predicted
Adjusted

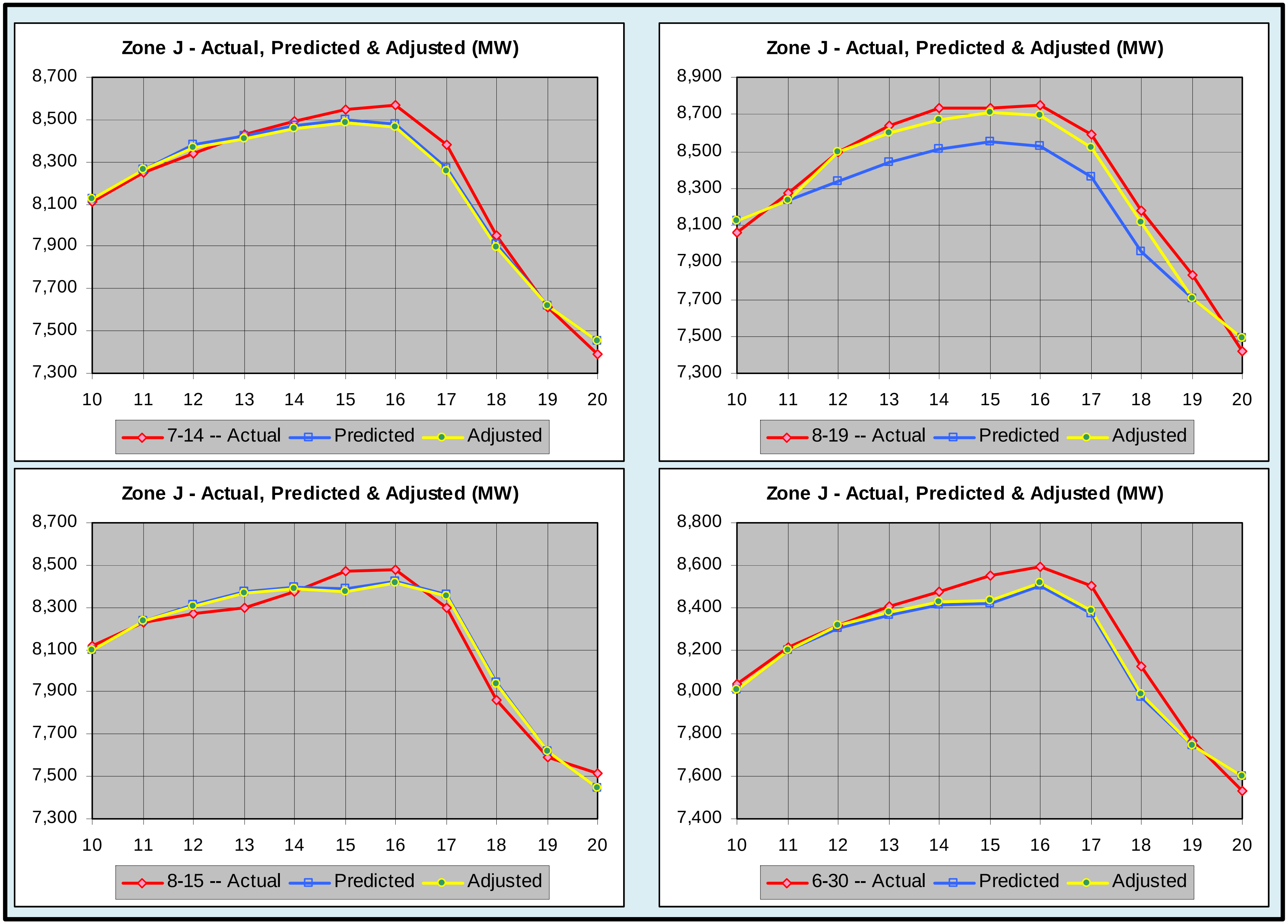

Zone J - Actual, Predicted & Adjusted (MW)
8,200
8,000
7,800
7,600
7,400
7,200
7,000
10 11 12 13 14 15 16 17 18 19 20
6-6 -- Actual
Predicted
Adjusted

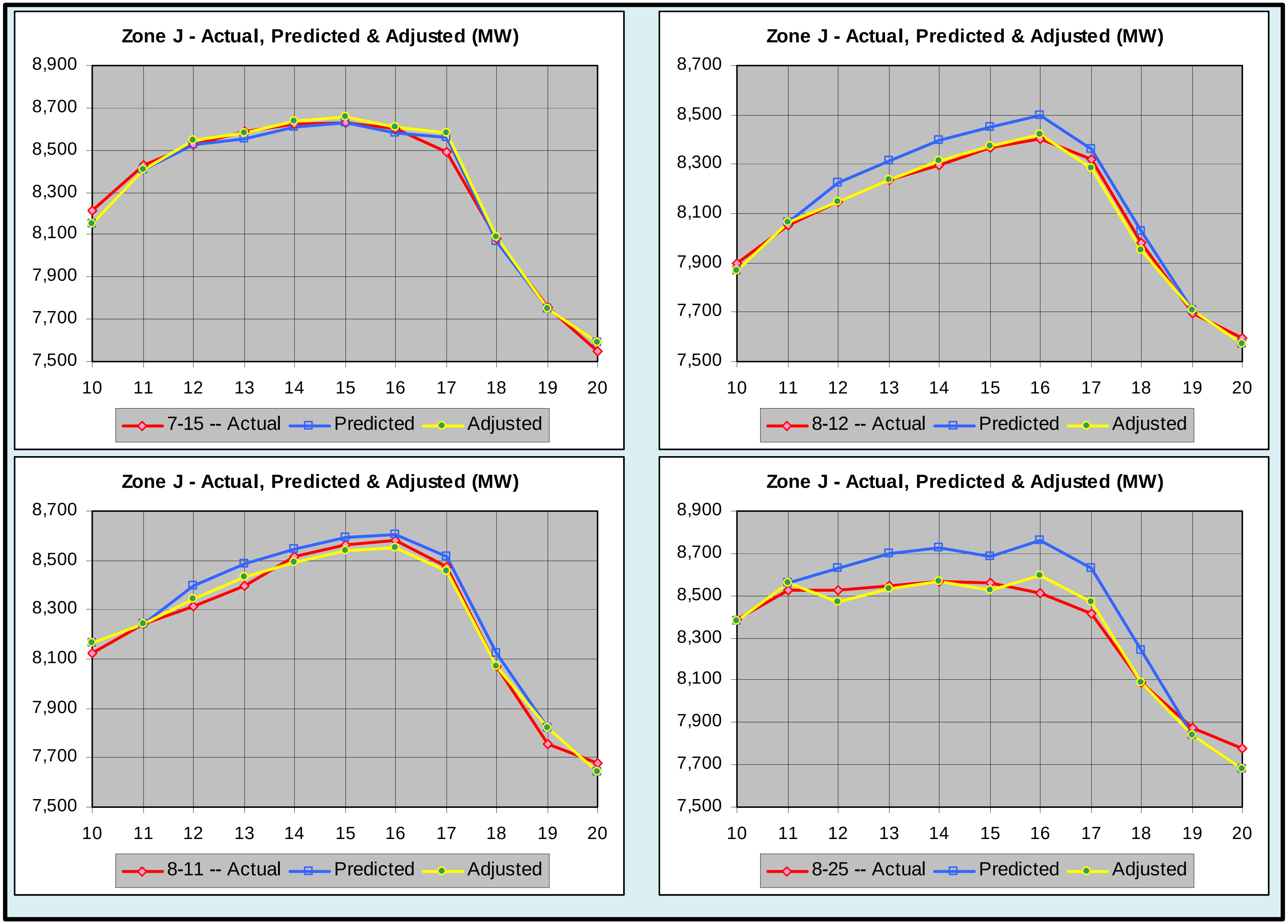

Zone J - Actual, Predicted & Adjusted (MW)
8,400
8,200
8,000
7,800
7,600
7,400
7,200
7,000
10 11 12 13 14 15 16 17 18 19 20
6-16 -- Actual
Predicted
Adjusted

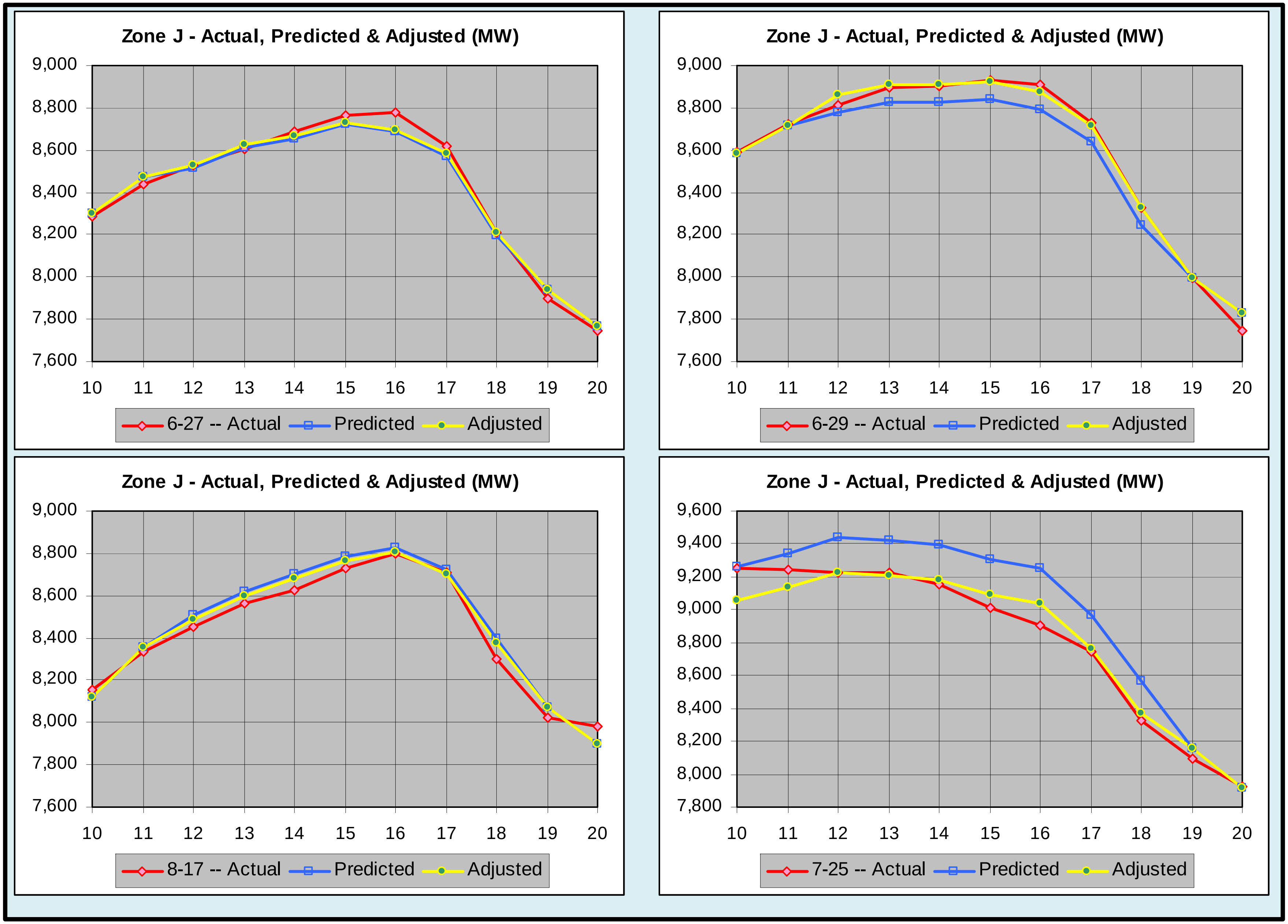

Zone J - Actual, Predicted & Adjusted (MW)
8,400
8,200
8,000
7,800
7,600
7,400
7,200
7,000
10 11 12 13 14 15 16 17 18 19 20
8-22 -- Actual
Predicted
Adjusted

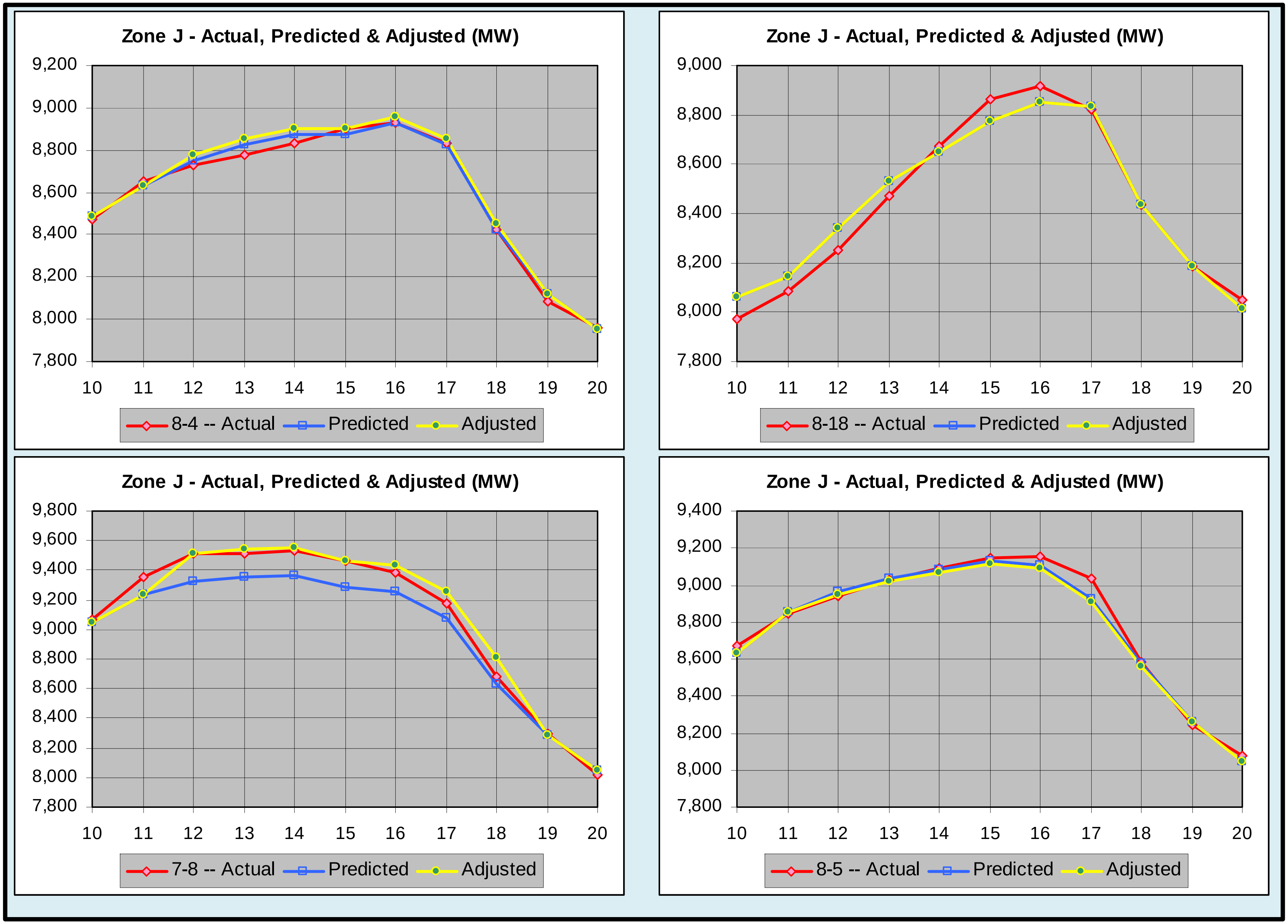

Zone J - Actual, Predicted & Adjusted (MW)
8,600
8,400
8,200
8,000
7,800
7,600
7,400
7,200
10 11 12 13 14 15 16 17 18 19 20
6-20 -- Actual
Predicted
Adjusted

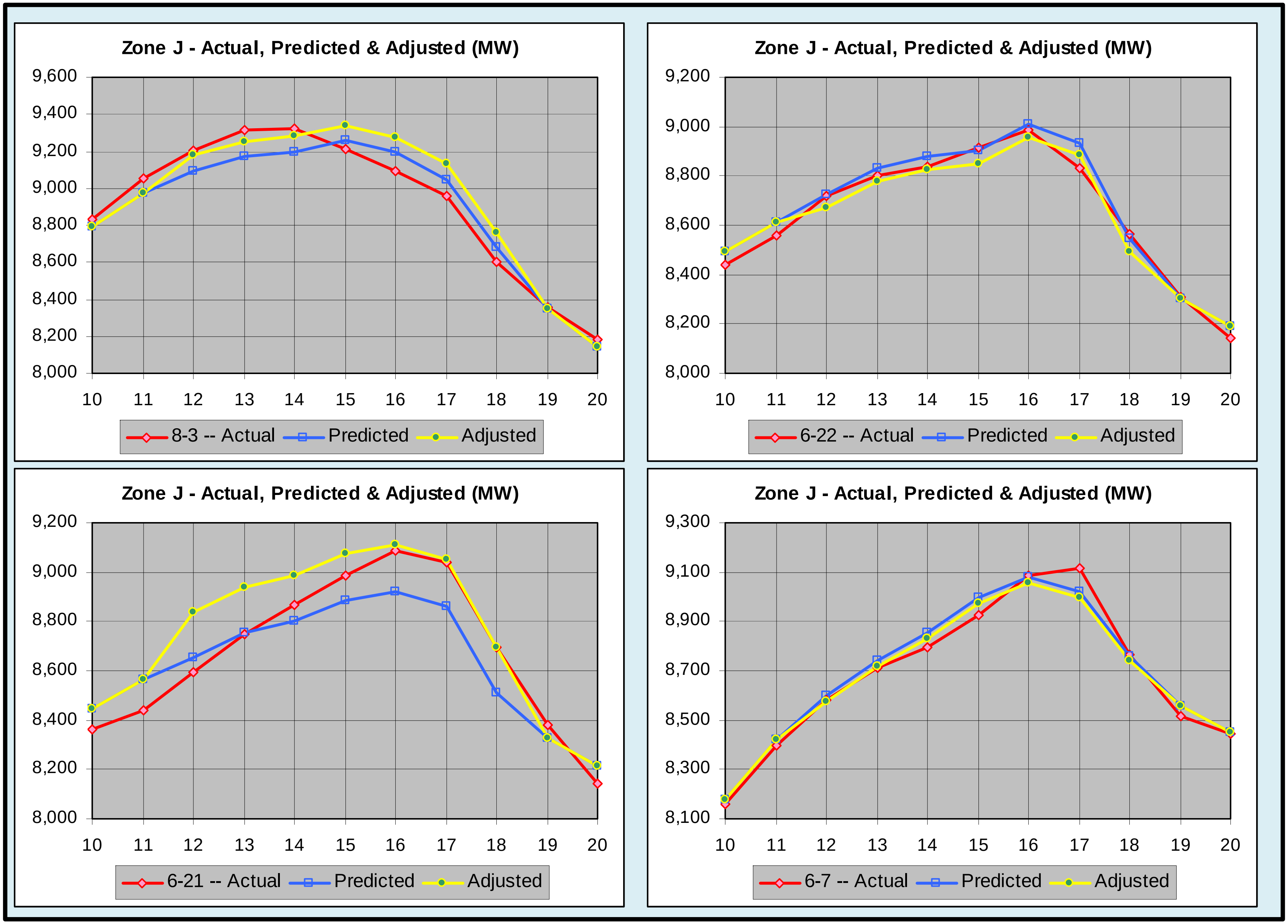

Zone J - Actual, Predicted & Adjusted (MW)
8,400
8,200
8,000
7,800
7,600
7,400
7,200
10 11 12 13 14 15 16 17 18 19 20
8-24 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
8,400
8,200
8,000
7,800
7,600
7,400
7,200
10 11 12 13 14 15 16 17 18 19 20
7-1 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
8,600
8,400
8,200
8,000
7,800
7,600
7,400
7,200
10 11 12 13 14 15 16 17 18 19 20
6-23 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
8,200
8,000
7,800
7,600
7,400
7,200
10 11 12 13 14 15 16 17 18 19 20
8-16 -- Actual
Predicted
Adjusted

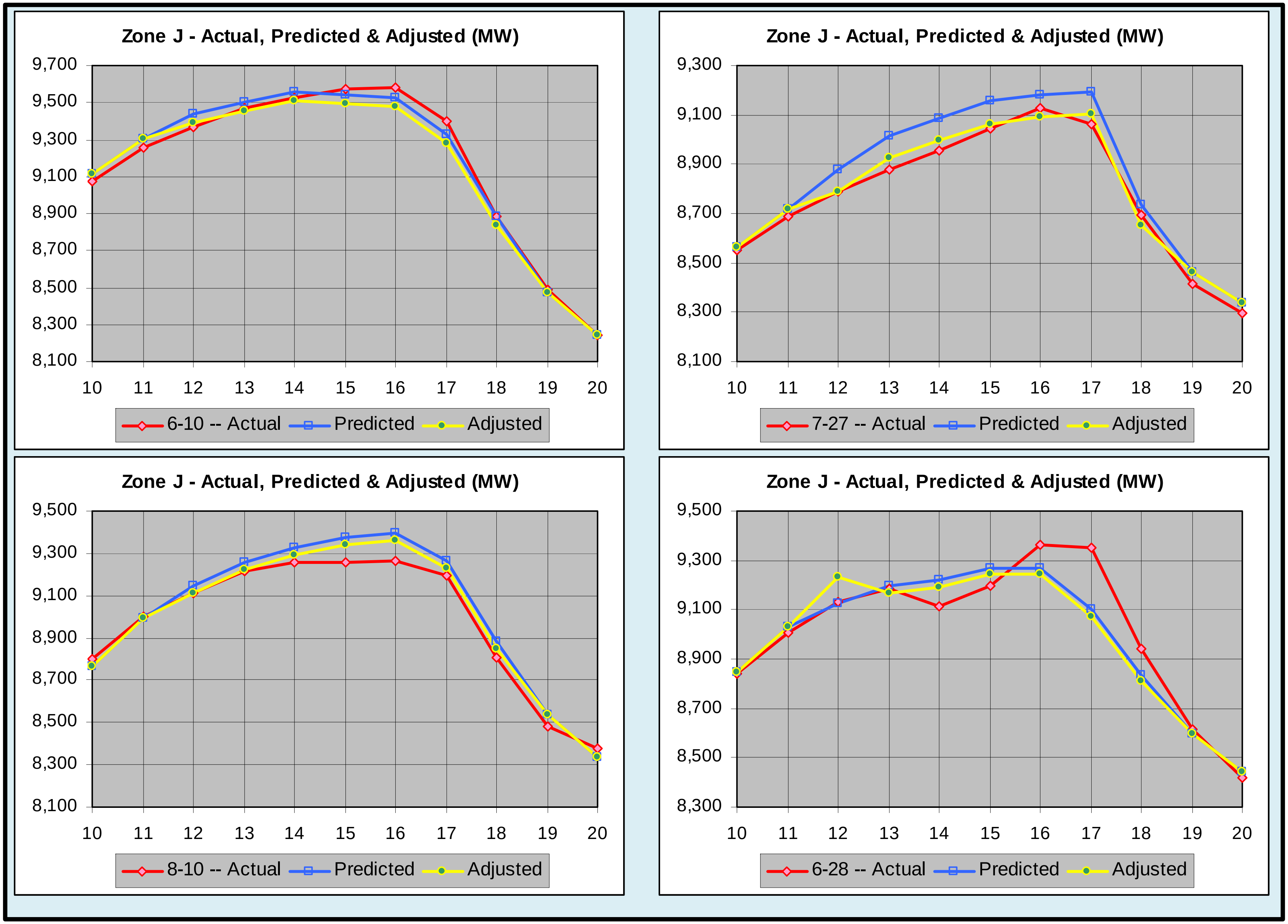

Zone J - Actual, Predicted & Adjusted (MW)
8,700
8,500
8,300
8,100
7,900
7,700
7,500
7,300
10 11 12 13 14 15 16 17 18 19 20
7-14 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
8,900
8,700
8,500
8,300
8,100
7,900
7,700
7,500
7,300
10 11 12 13 14 15 16 17 18 19 20
8-19 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
8,700
8,500
8,300
8,100
7,900
7,700
7,500
7,300
10 11 12 13 14 15 16 17 18 19 20
8-15 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
8,800
8,600
8,400
8,200
8,000
7,800
7,600
7,400
10 11 12 13 14 15 16 17 18 19 20
6-30 -- Actual
Predicted
Adjusted

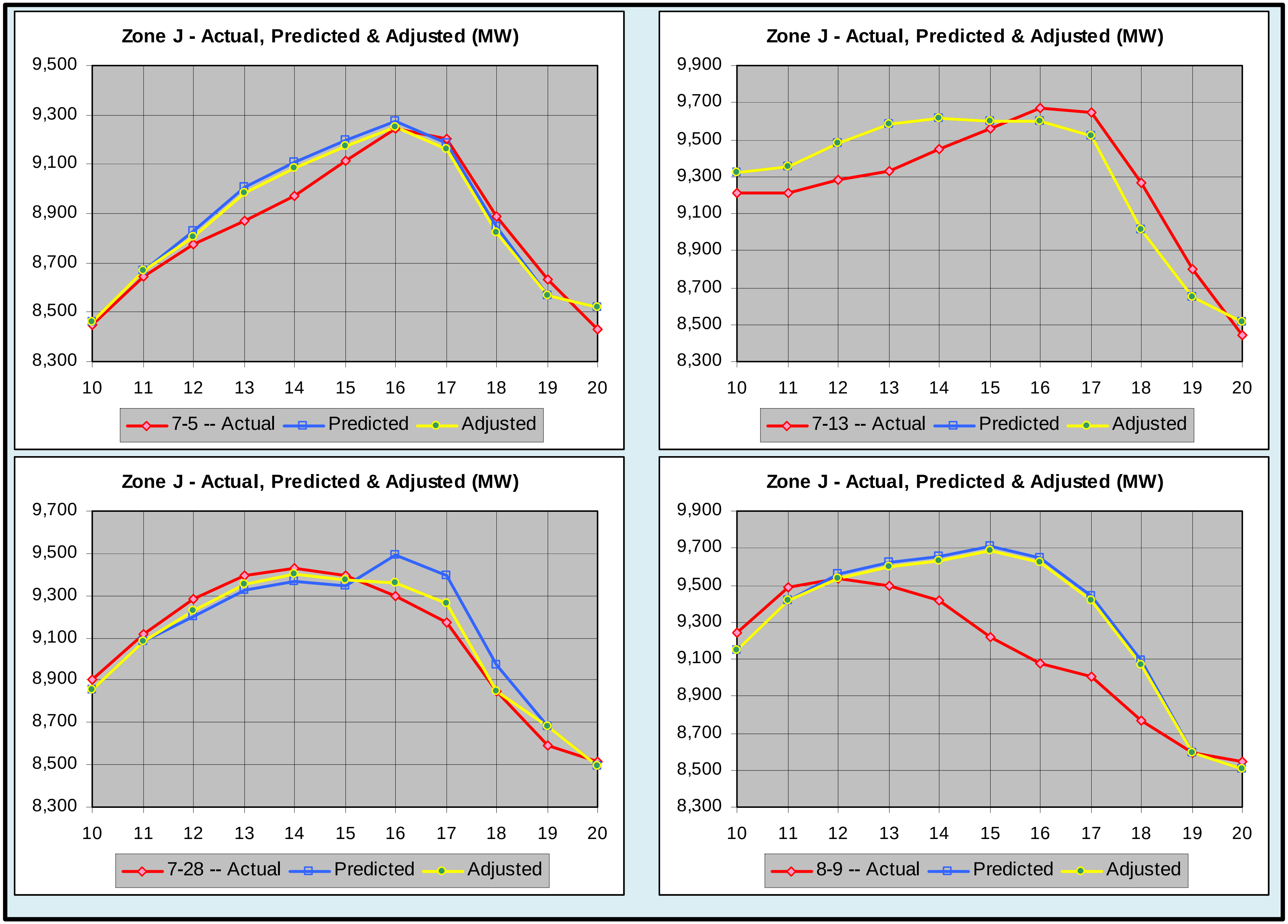

Zone J - Actual, Predicted & Adjusted (MW)
8,900
8,700
8,500
8,300
8,100
7,900
7,700
7,500
10 11 12 13 14 15 16 17 18 19 20
7-15 -- Actual Predicted Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
8,700
8,500
8,300
8,100
7,900
7,700
7,500
10 11 12 13 14 15 16 17 18 19 20
8-12 -- Actual Predicted Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
8,700
8,500
8,300
8,100
7,900
7,700
7,500
10 11 12 13 14 15 16 17 18 19 20
8-11 -- Actual Predicted Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
8,900
8,700
8,500
8,300
8,100
7,900
7,700
7,500
10 11 12 13 14 15 16 17 18 19 20
8-25 -- Actual Predicted Adjusted

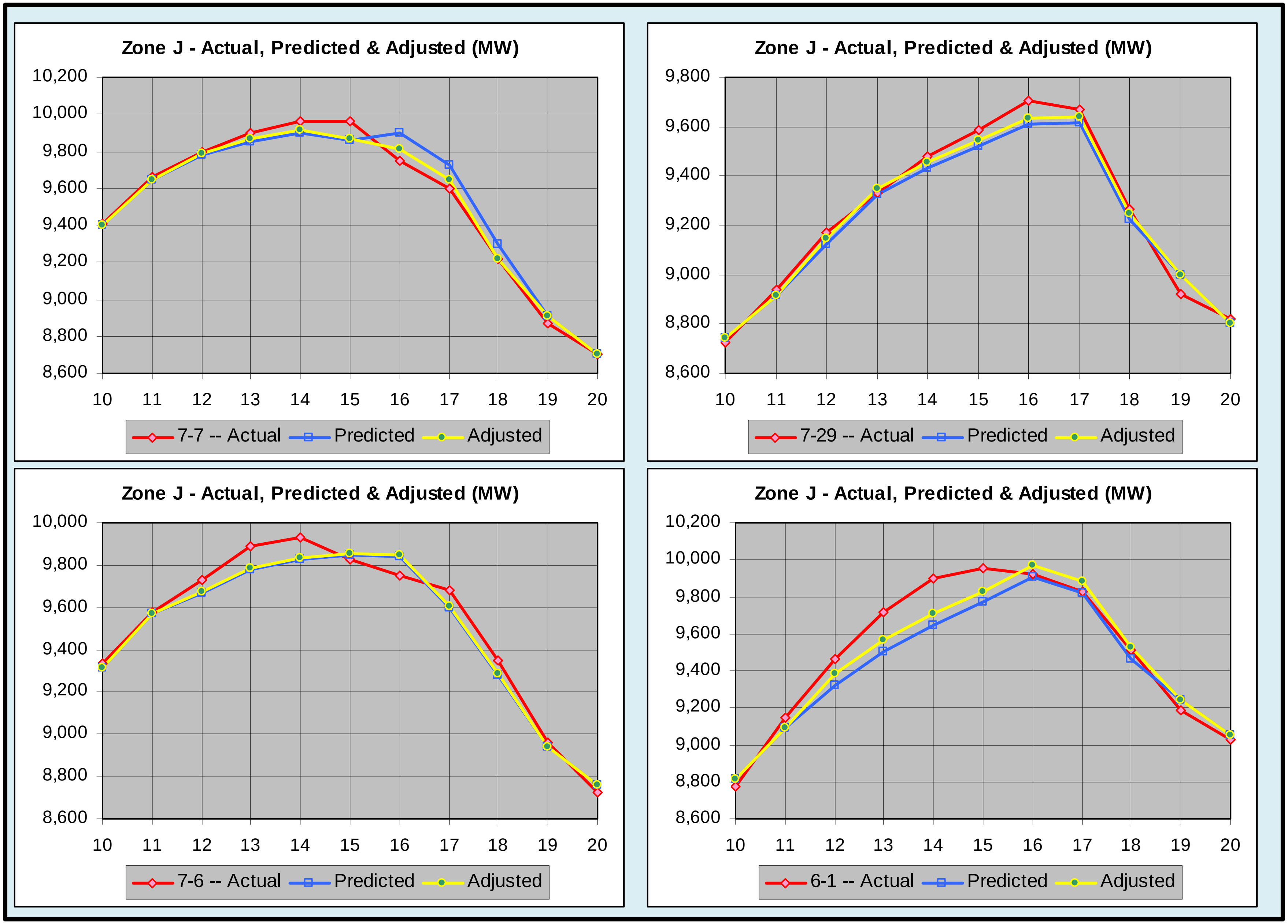

Zone J - Actual, Predicted & Adjusted (MW)
9,000
8,800
8,600
8,400
8,200
8,000
7,800
7,600
10
11
12
13
14
15
16
17
18
19
20
6-27 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
6-29 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
8-17 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
9,600
9,400
9,200
9,000
8,800
8,600
8,400
8,200
8,000
7,800
7-25 -- Actual
Predicted
Adjusted

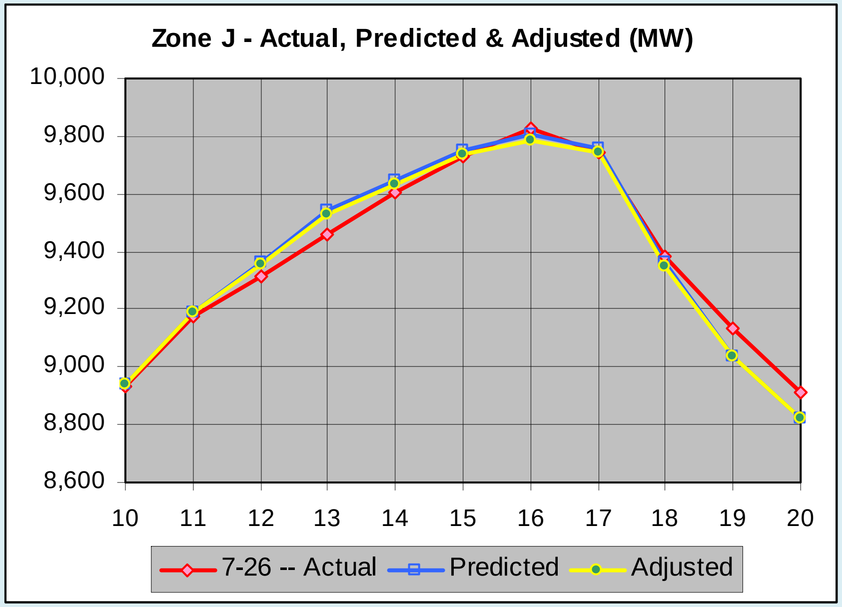

Zone J - Actual, Predicted & Adjusted (MW)
9,200
9,000
8,800
8,600
8,400
8,200
8,000
7,800
10 11 12 13 14 15 16 17 18 19 20
8-4 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
9,000
8,800
8,600
8,400
8,200
8,000
7,800
10 11 12 13 14 15 16 17 18 19 20
8-18 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
9,800
9,600
9,400
9,200
9,000
8,800
8,600
8,400
8,200
8,000
7,800
10 11 12 13 14 15 16 17 18 19 20
7-8 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
9,400
9,200
9,000
8,800
8,600
8,400
8,200
8,000
7,800
10 11 12 13 14 15 16 17 18 19 20
8-5 -- Actual
Predicted
Adjusted

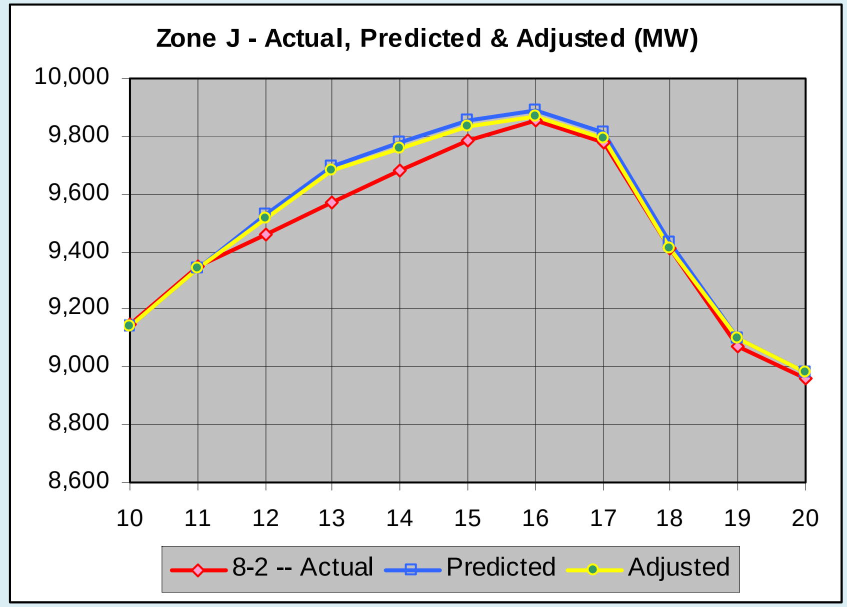

Zone J - Actual, Predicted & Adjusted (MW)
8-3 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
6-22 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
6-21 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
6-7 -- Actual
Predicted
Adjusted

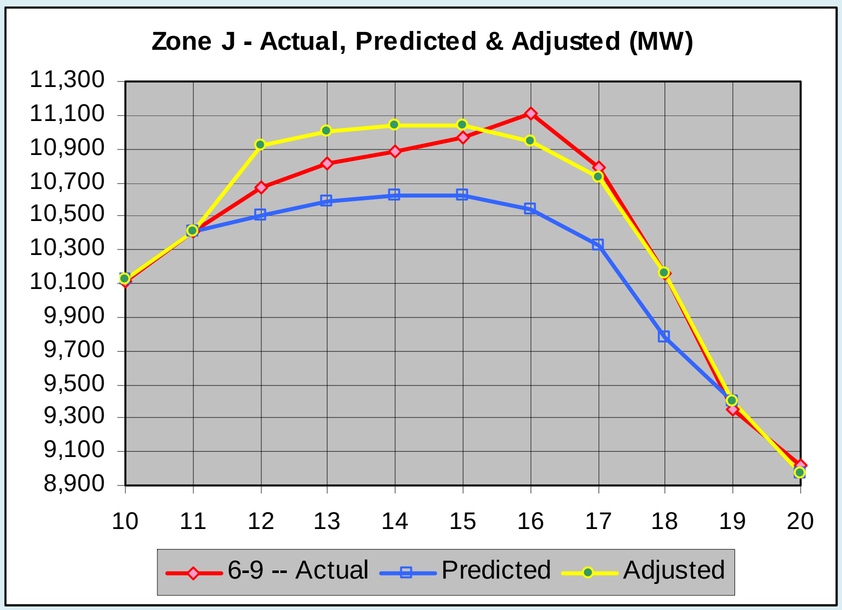

Zone J - Actual, Predicted & Adjusted (MW)
9,700
9,500
9,300
9,100
8,900
8,700
8,500
8,300
8,100
10 11 12 13 14 15 16 17 18 19 20
6-10 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
9,300
9,100
8,900
8,700
8,500
8,300
8,100
10 11 12 13 14 15 16 17 18 19 20
7-27 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
9,500
9,300
9,100
8,900
8,700
8,500
8,300
8,100
10 11 12 13 14 15 16 17 18 19 20
8-10 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
9,500
9,300
9,100
8,900
8,700
8,500
8,300
10 11 12 13 14 15 16 17 18 19 20
6-28 -- Actual
Predicted
Adjusted

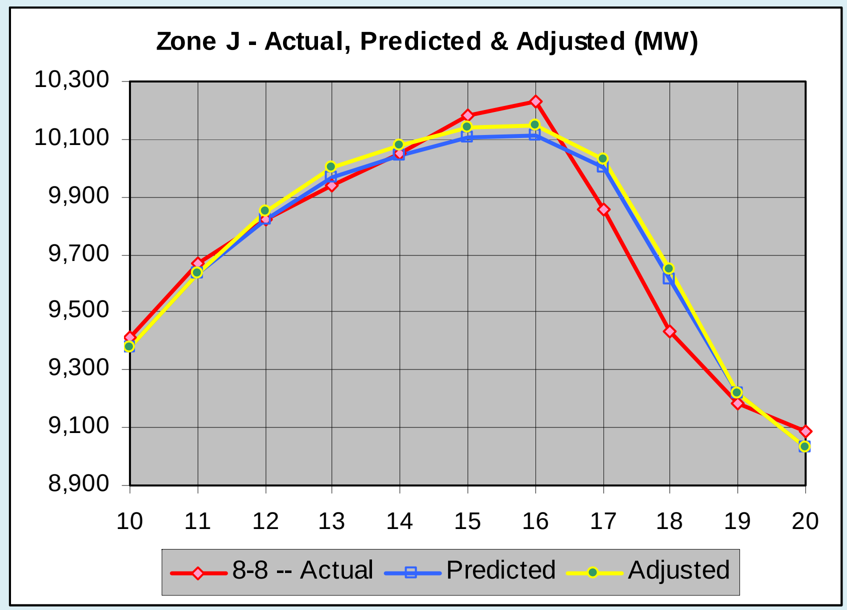

Zone J - Actual, Predicted & Adjusted (MW)
9,500
9,300
9,100
8,900
8,700
8,500
8,300
10 11 12 13 14 15 16 17 18 19 20
7-5 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
9,900
9,700
9,500
9,300
9,100
8,900
8,700
8,500
8,300
10 11 12 13 14 15 16 17 18 19 20
7-13 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
9,700
9,500
9,300
9,100
8,900
8,700
8,500
8,300
10 11 12 13 14 15 16 17 18 19 20
7-28 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
9,900
9,700
9,500
9,300
9,100
8,900
8,700
8,500
8,300
10 11 12 13 14 15 16 17 18 19 20
8-9 -- Actual
Predicted
Adjusted

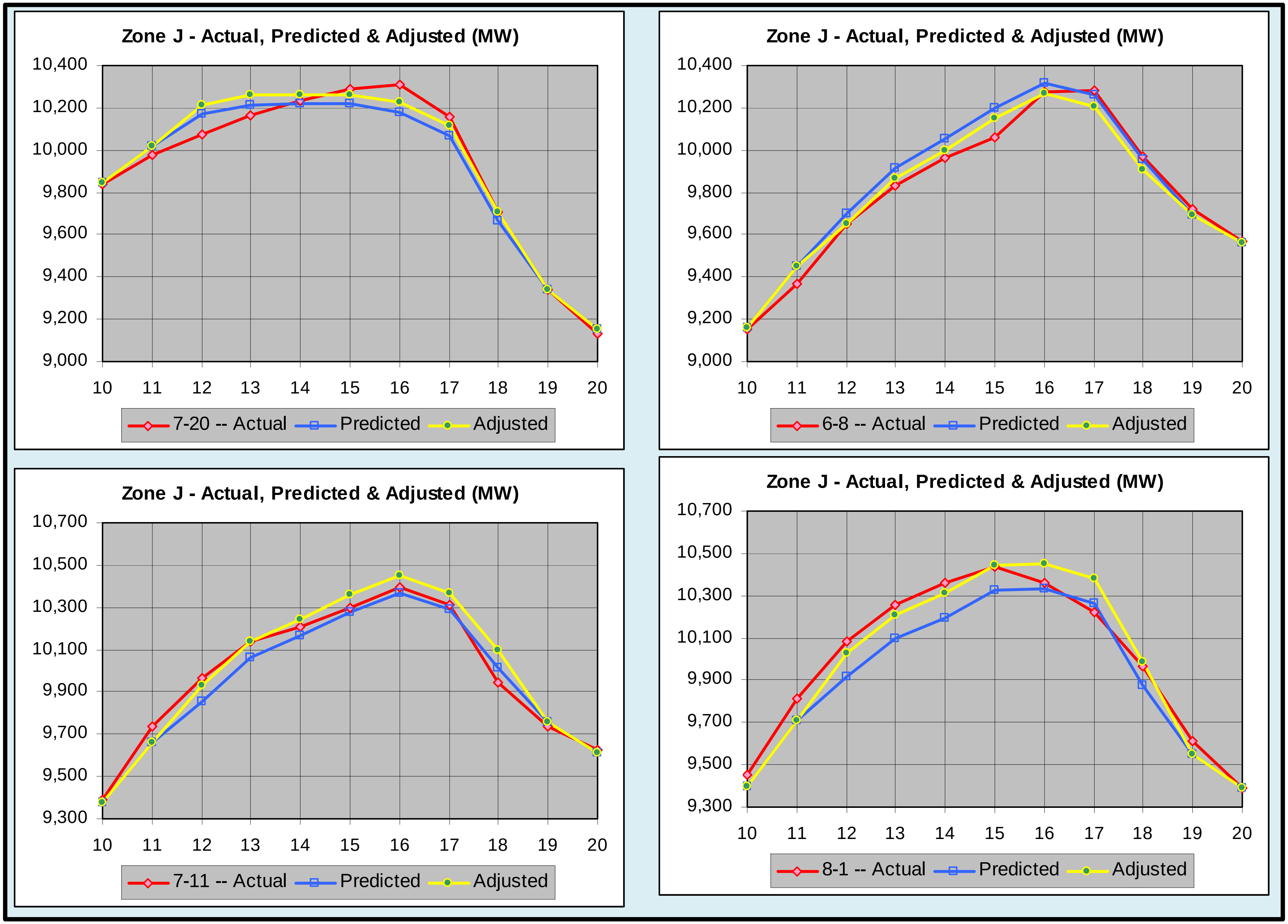

Zone J - Actual, Predicted & Adjusted (MW)
10,200
10,000
9,800
9,600
9,400
9,200
9,000
8,800
8,600
10 11 12 13 14 15 16 17 18 19 20
7-7 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
9,800
9,600
9,400
9,200
9,000
8,800
8,600
10 11 12 13 14 15 16 17 18 19 20
7-29 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
10,000
9,800
9,600
9,400
9,200
9,000
8,800
8,600
10 11 12 13 14 15 16 17 18 19 20
7-6 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
10,200
10,000
9,800
9,600
9,400
9,200
9,000
8,800
8,600
10 11 12 13 14 15 16 17 18 19 20
6-1 -- Actual
Predicted
Adjusted

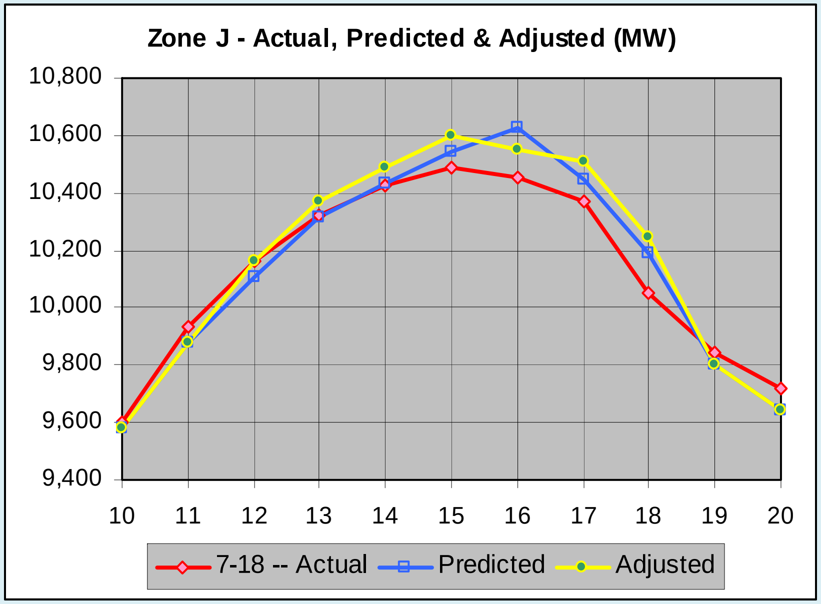

Zone J - Actual, Predicted & Adjusted (MW)
10,000
9,800
9,600
9,400
9,200
9,000
8,800
8,600
10 11 12 13 14 15 16 17 18 19 20
7-26 -- Actual
Predicted
Adjusted

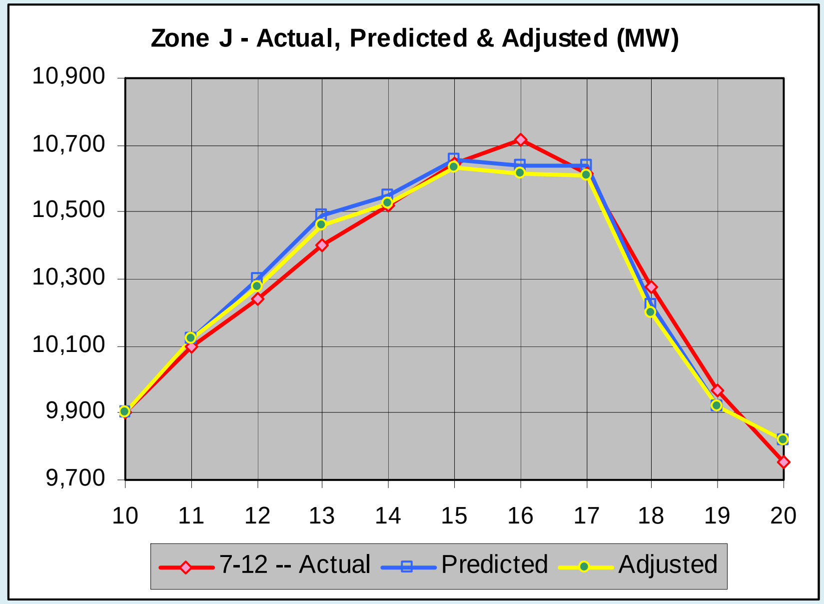

Zone J - Actual, Predicted & Adjusted (MW)
10,000
9,800
9,600
9,400
9,200
9,000
8,800
8,600
10 11 12 13 14 15 16 17 18 19 20
8-2 -- Actual
Predicted
Adjusted


Zone J - Actual, Predicted & Adjusted (MW)
11,300
11,100
10,900
10,700
10,500
10,300
10,100
9,900
9,700
9,500
9,300
9,100
8,900
10 11 12 13 14 15 16 17 18 19 20
6-9 -- Actual
Predicted
Adjusted


Zone J - Actual, Predicted & Adjusted (MW)
10,300
10,100
9,900
9,700
9,500
9,300
9,100
8,900
10 11 12 13 14 15 16 17 18 19 20
8-8 -- Actual
Predicted
Adjusted

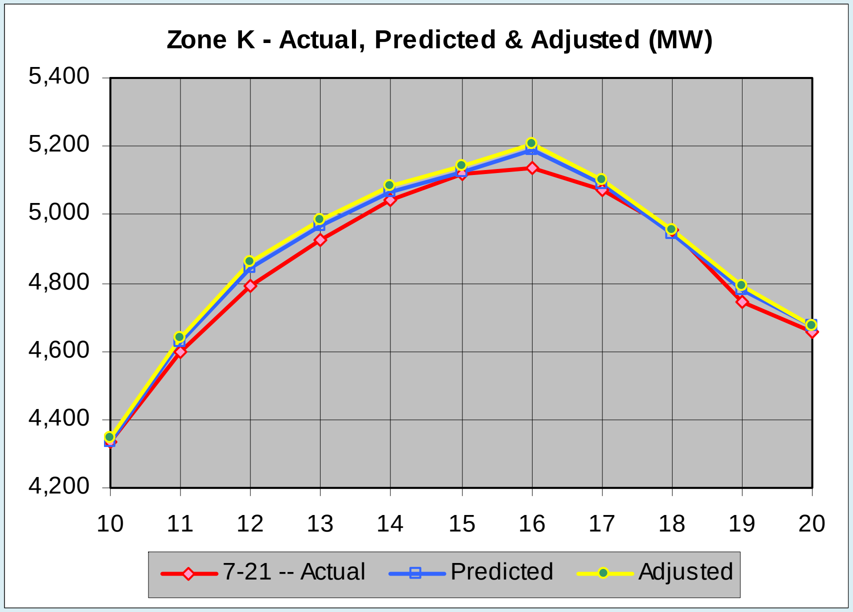

Zone J - Actual, Predicted & Adjusted (MW)
7-20 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
6-8 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
7-11 -- Actual
Predicted
Adjusted
Zone J - Actual, Predicted & Adjusted (MW)
8-1 -- Actual
Predicted
Adjusted

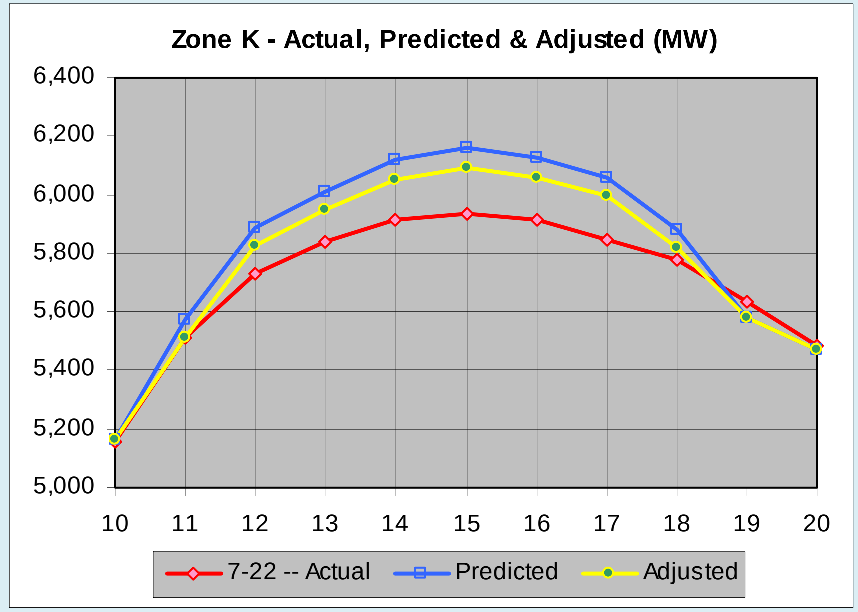

Zone J - Actual, Predicted & Adjusted (MW)
10,800
10,600
10,400
10,200
10,000
9,800
9,600
9,400
10
11
12
13
14
15
16
17
18
19
20
7-18 -- Actual
Predicted
Adjusted

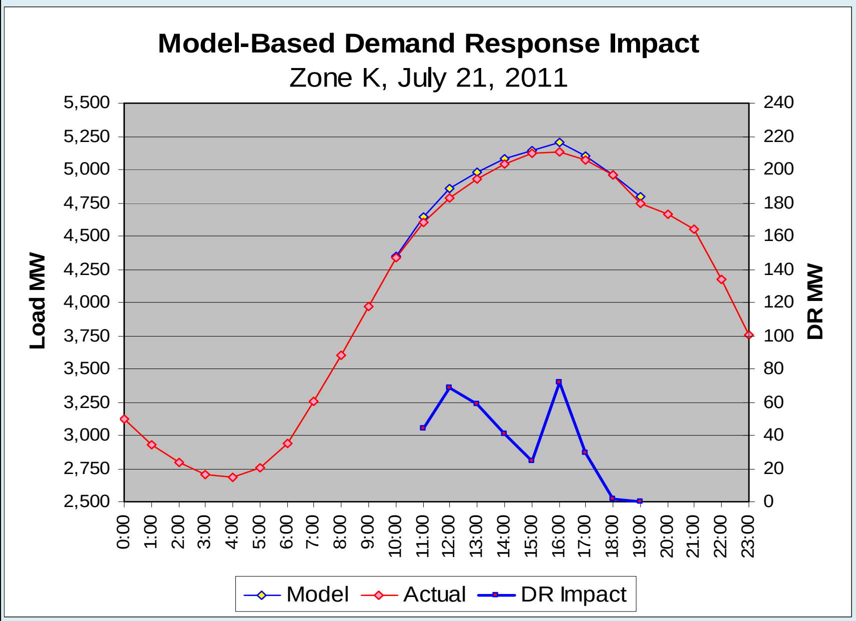

Zone J - Actual, Predicted & Adjusted (MW)
10,900
10,700
10,500
10,300
10,100
9,900
9,700
10
11
12
13
14
15
16
17
18
19
20
7-12 -- Actual
Predicted
Adjusted

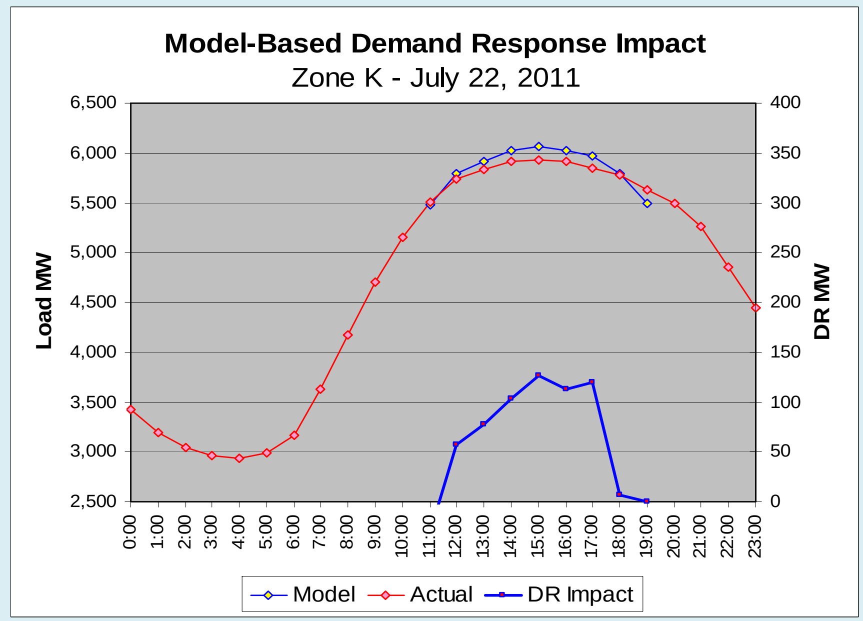
D - Daily Plots of Zone K Actual, Predicted and Adjusted Hourly Loads

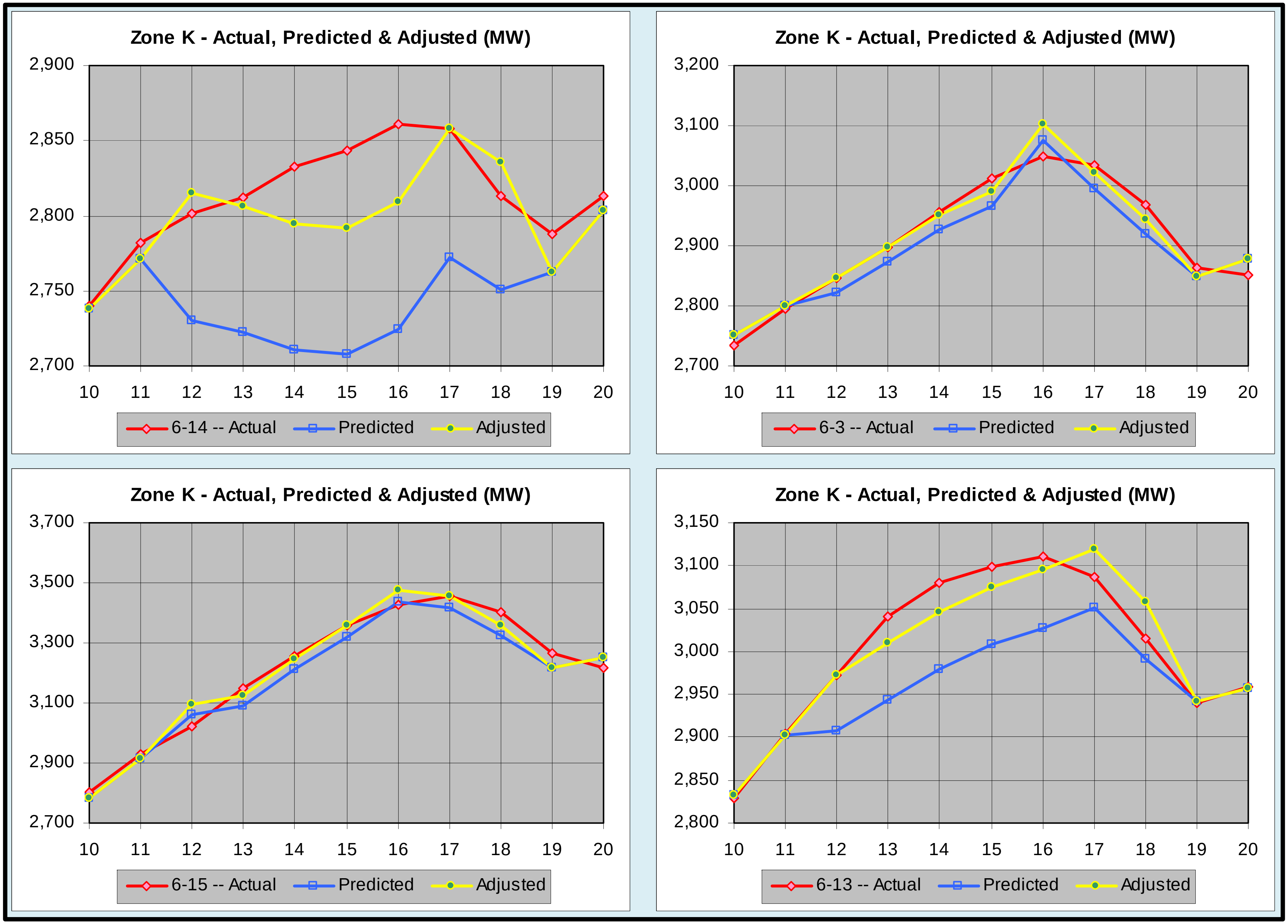
The charts below are not in calendar order. The first two charts show the days in which Demand Response resources were activated (July 21 and July 22, 2011). The subsequent series of charts are ordered in terms of increasing load levels.

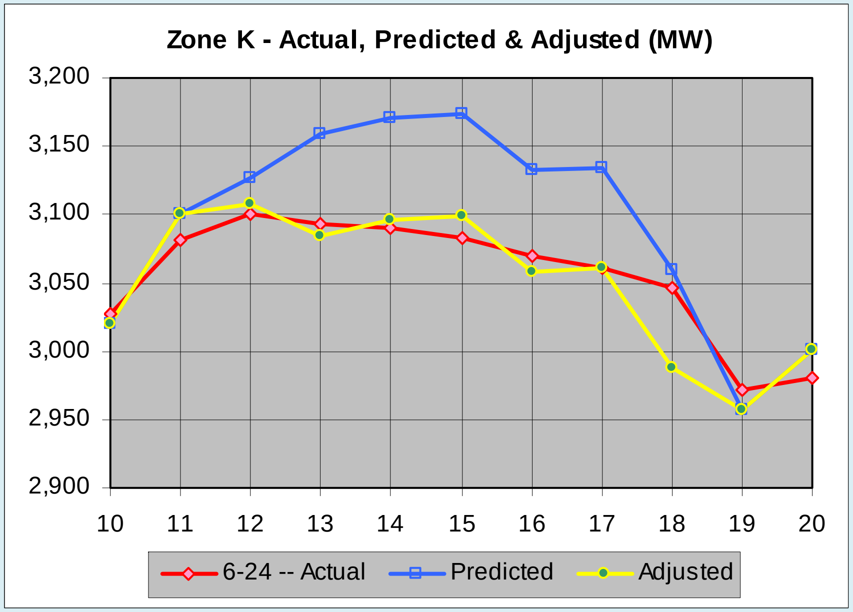

Zone K - Actual, Predicted & Adjusted (MW)
5,400
5,200
5,000
4,800
4,600
4,400
4,200
10 11 12 13 14 15 16 17 18 19 20
7-21 -- Actual
Predicted
Adjusted

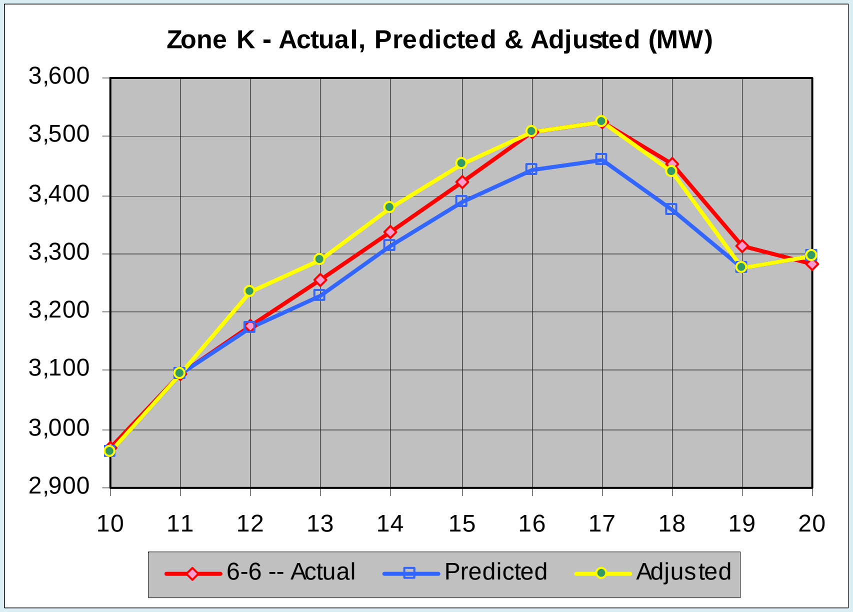

Zone K - Actual, Predicted & Adjusted (MW)
6,400
6,200
6,000
5,800
5,600
5,400
5,200
5,000
10 11 12 13 14 15 16 17 18 19 20
7-22 -- Actual
Predicted
Adjusted

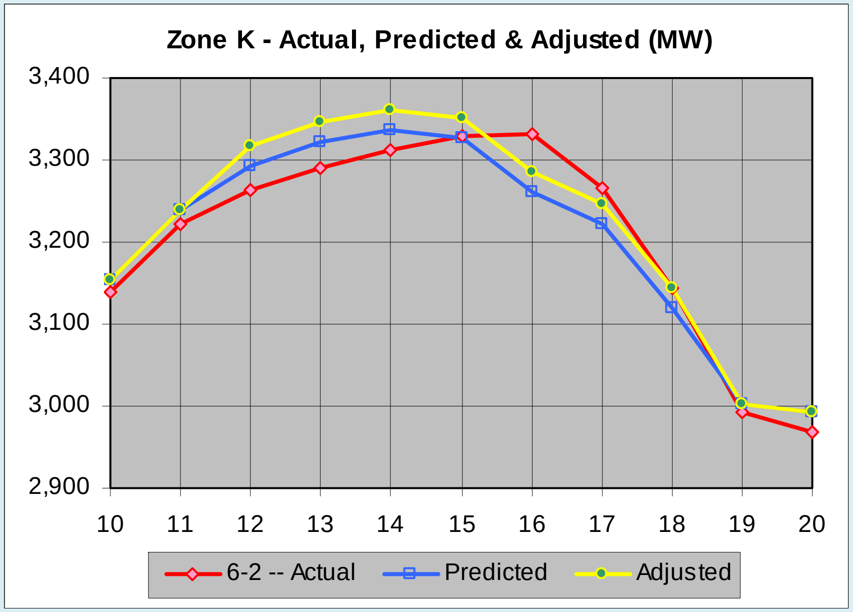

Model-Based Demand Response Impact
Zone K, July 21, 2011
Load MW
DR MW
5,500 5,250 5,000 4,750 4,500 4,250 4,000 3,750 3,500 3,250 3,000 2,750 2,500
240 220 200 180 160 140 120 100 80 60 40 20 0
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00
Model
Actual
DR Impact

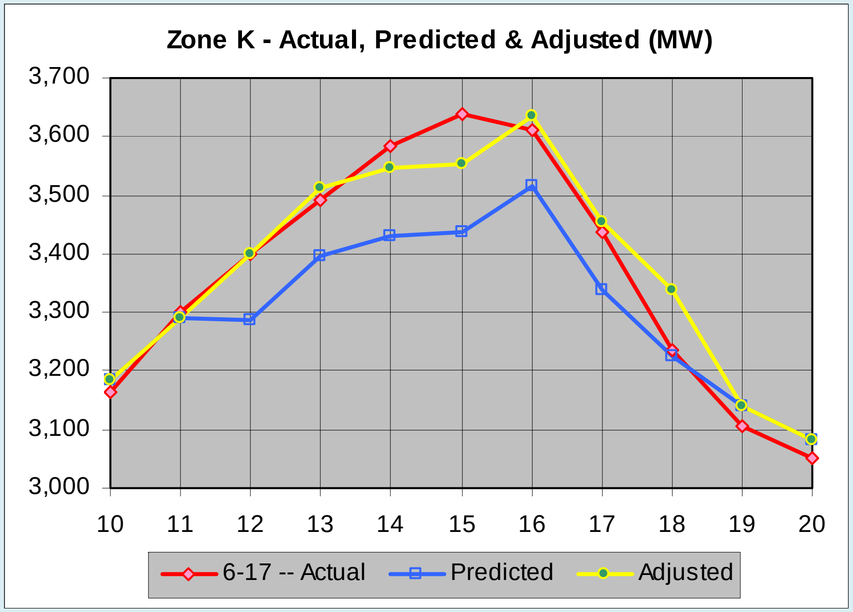

Model-Based Demand Response Impact
Zone K - July 22, 2011
Load MW
DR MW
6,500 6,000 5,500 5,000 4,500 4,000 3,500 3,000 2,500
400 350 300 250 200 150 100 50 0
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00
Model
Actual
DR Impact

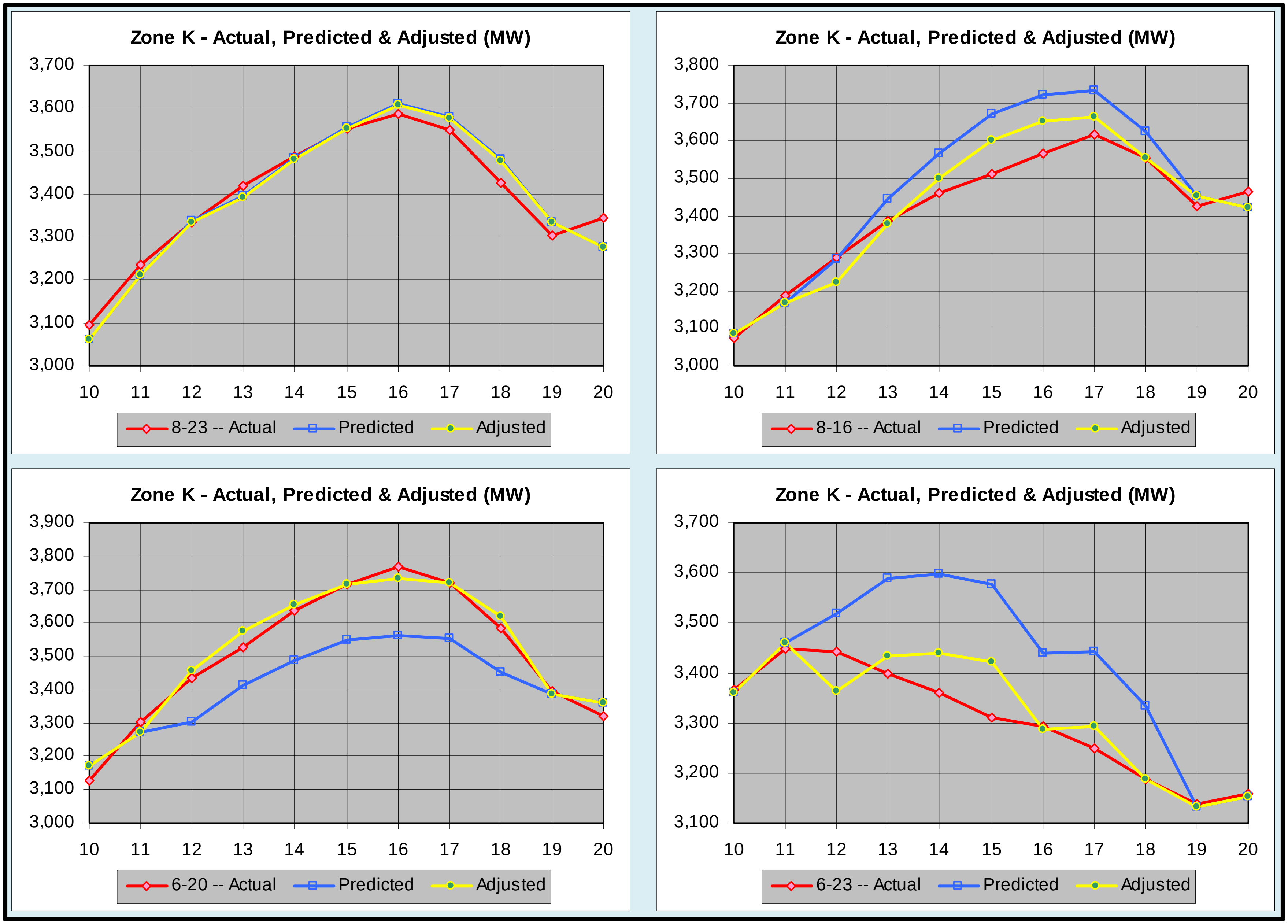

Zone K - Actual, Predicted & Adjusted (MW)
2,900
2,850
2,800
2,750
2,700
10 11 12 13 14 15 16 17 18 19 20
6-14 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
3,200
3,100
3,000
2,900
2,800
2,700
10 11 12 13 14 15 16 17 18 19 20
6-3 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
3,700
3,500
3,300
3,100
2,900
2,700
10 11 12 13 14 15 16 17 18 19 20
6-15 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
3,150
3,100
3,050
3,000
2,950
2,900
2,850
2,800
10 11 12 13 14 15 16 17 18 19 20
6-13 -- Actual
Predicted
Adjusted

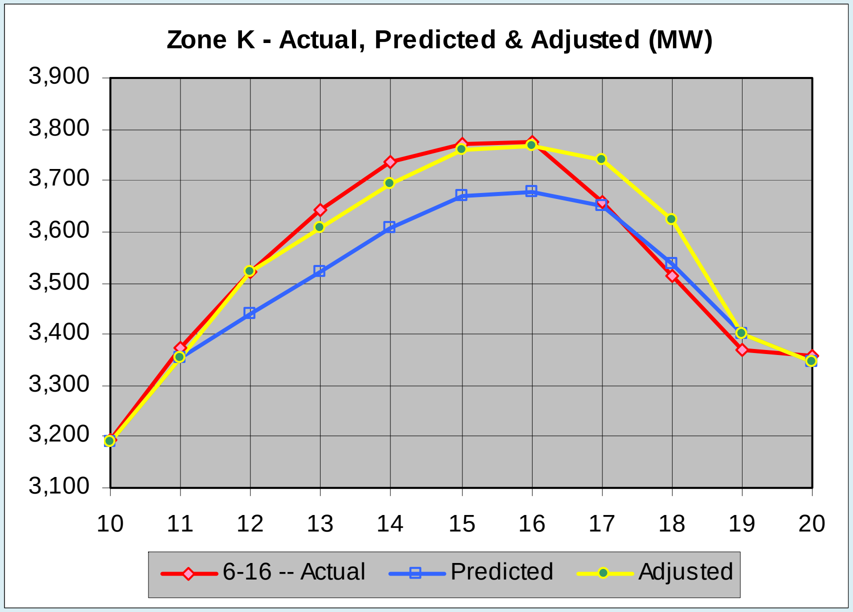

Zone K - Actual, Predicted & Adjusted (MW)
3,200
3,150
3,100
3,050
3,000
2,950
2,900
10
11
12
13
14
15
16
17
18
19
20
6-24 -- Actual
Predicted
Adjusted

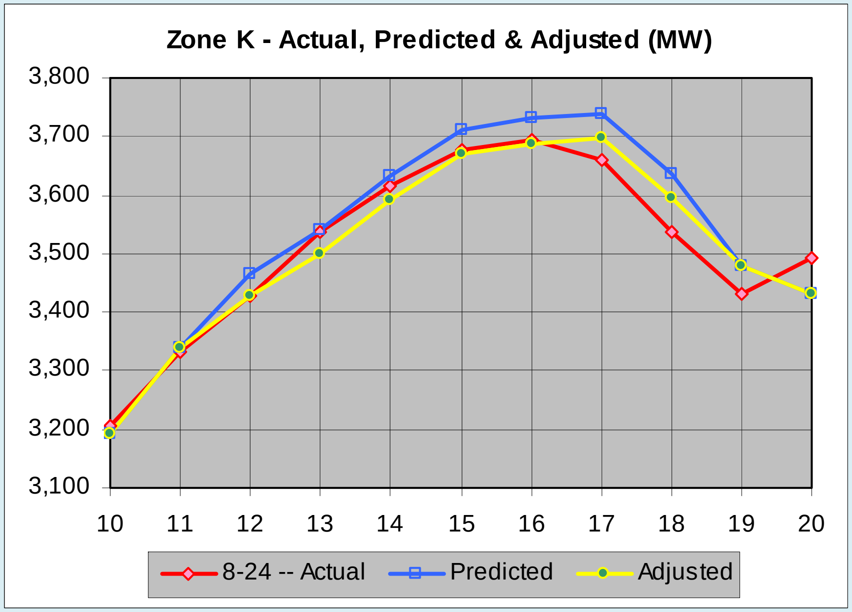

Zone K - Actual, Predicted & Adjusted (MW)
3,600
3,500
3,400
3,300
3,200
3,100
3,000
2,900
10
11
12
13
14
15
16
17
18
19
20
6-6 -- Actual
Predicted
Adjusted

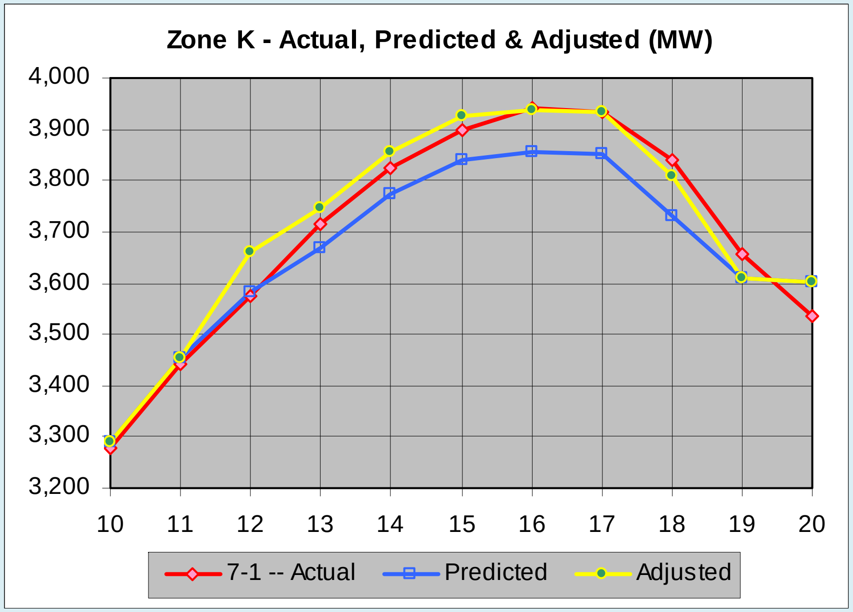

Zone K - Actual, Predicted & Adjusted (MW)
3,400
3,300
3,200
3,100
3,000
2,900
10
11
12
13
14
15
16
17
18
19
20
6-2 -- Actual
Predicted
Adjusted

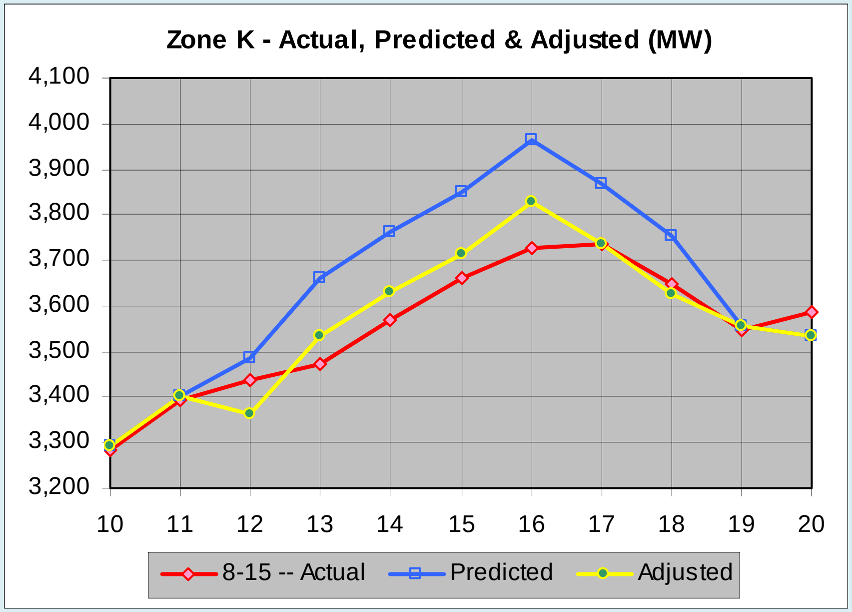

Zone K - Actual, Predicted & Adjusted (MW)
3,700
3,600
3,500
3,400
3,300
3,200
3,100
3,000
10
11
12
13
14
15
16
17
18
19
20
6-17 -- Actual
Predicted
Adjusted

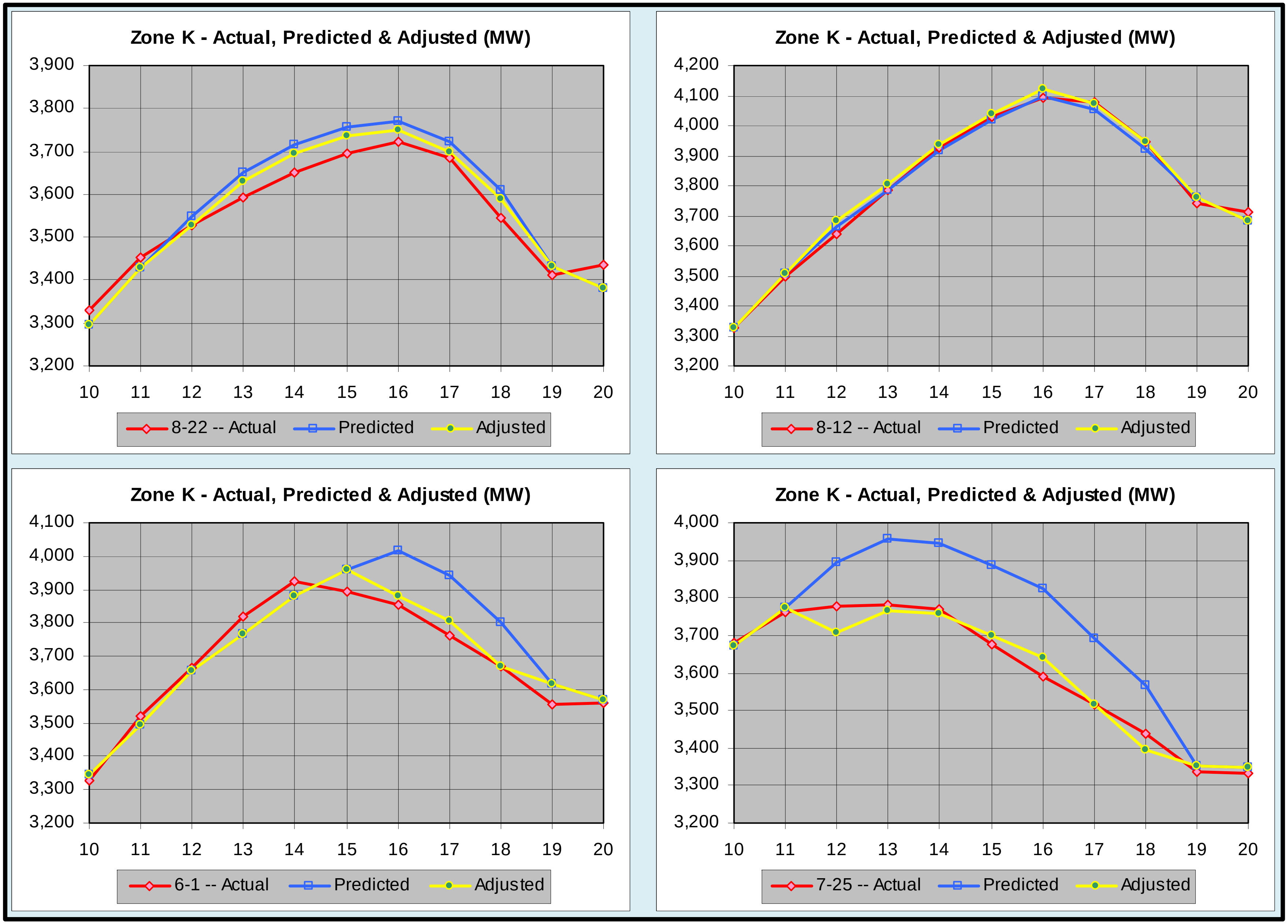

Zone K - Actual, Predicted & Adjusted (MW)
3,700
3,600
3,500
3,400
3,300
3,200
3,100
3,000
10 11 12 13 14 15 16 17 18 19 20
8-23 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
3,800
3,700
3,600
3,500
3,400
3,300
3,200
3,100
3,000
10 11 12 13 14 15 16 17 18 19 20
8-16 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
3,900
3,800
3,700
3,600
3,500
3,400
3,300
3,200
3,100
3,000
10 11 12 13 14 15 16 17 18 19 20
6-20 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
3,700
3,600
3,500
3,400
3,300
3,200
3,100
10 11 12 13 14 15 16 17 18 19 20
6-23 -- Actual
Predicted
Adjusted

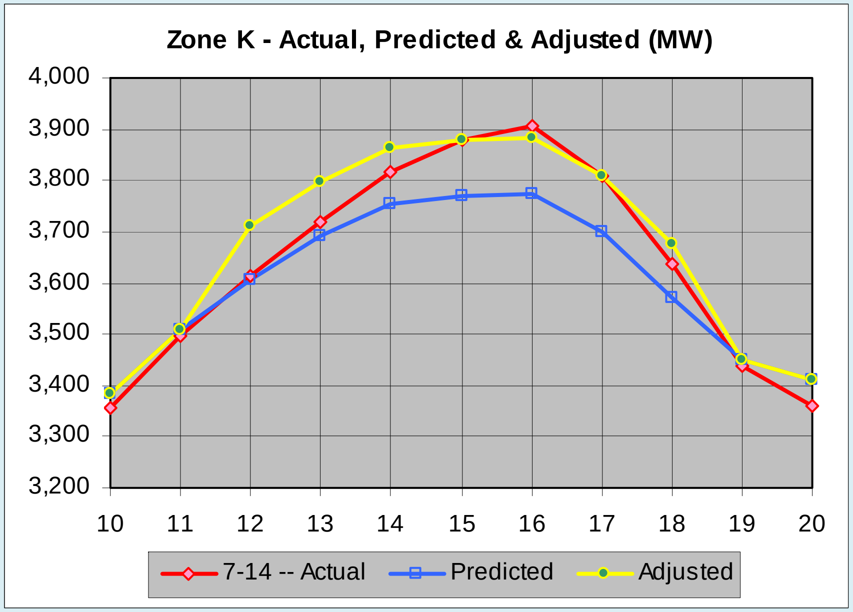

Zone K - Actual, Predicted & Adjusted (MW)
3,900
3,800
3,700
3,600
3,500
3,400
3,300
3,200
3,100
10
11
12
13
14
15
16
17
18
19
20
6-16 -- Actual
Predicted
Adjusted

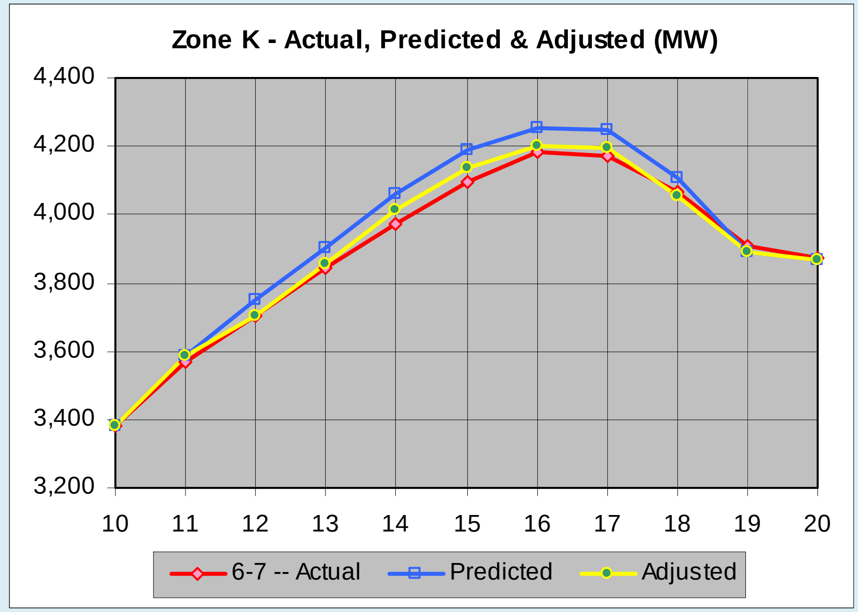

Zone K - Actual, Predicted & Adjusted (MW)
3,800
3,700
3,600
3,500
3,400
3,300
3,200
3,100
10
11
12
13
14
15
16
17
18
19
20
8-24 -- Actual
Predicted
Adjusted

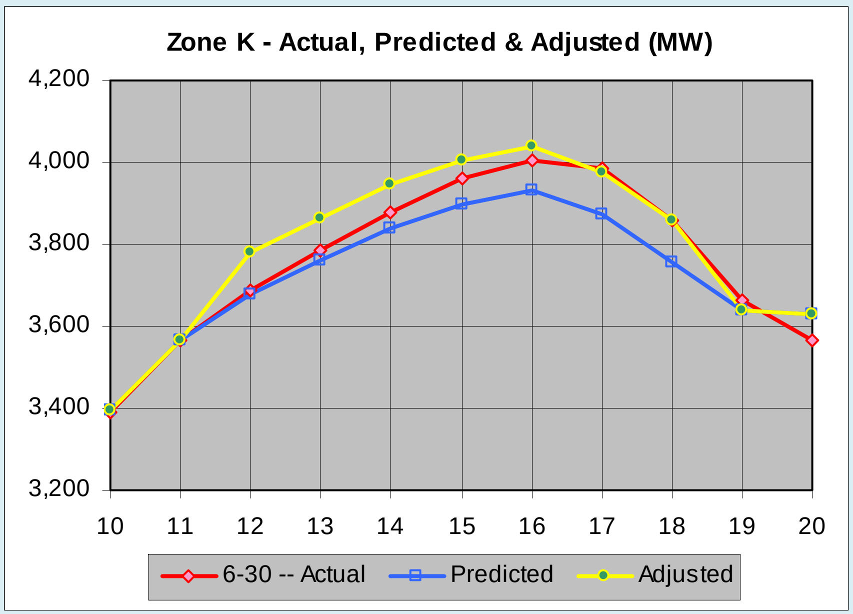

Zone K - Actual, Predicted & Adjusted (MW)
4,000
3,900
3,800
3,700
3,600
3,500
3,400
3,300
3,200
10
11
12
13
14
15
16
17
18
19
20
7-1 -- Actual
Predicted
Adjusted

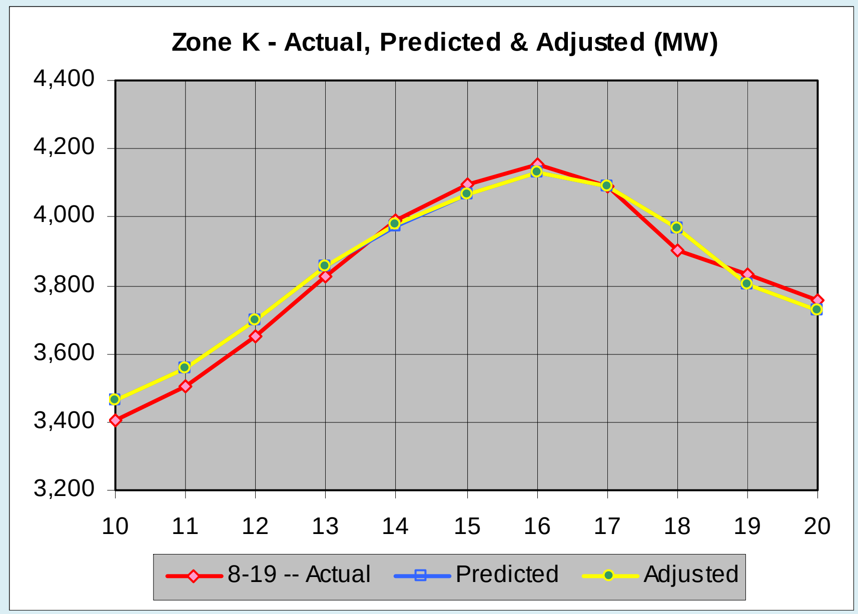

Zone K - Actual, Predicted & Adjusted (MW)
4,100
4,000
3,900
3,800
3,700
3,600
3,500
3,400
3,300
3,200
10
11
12
13
14
15
16
17
18
19
20
8-15 -- Actual
Predicted
Adjusted

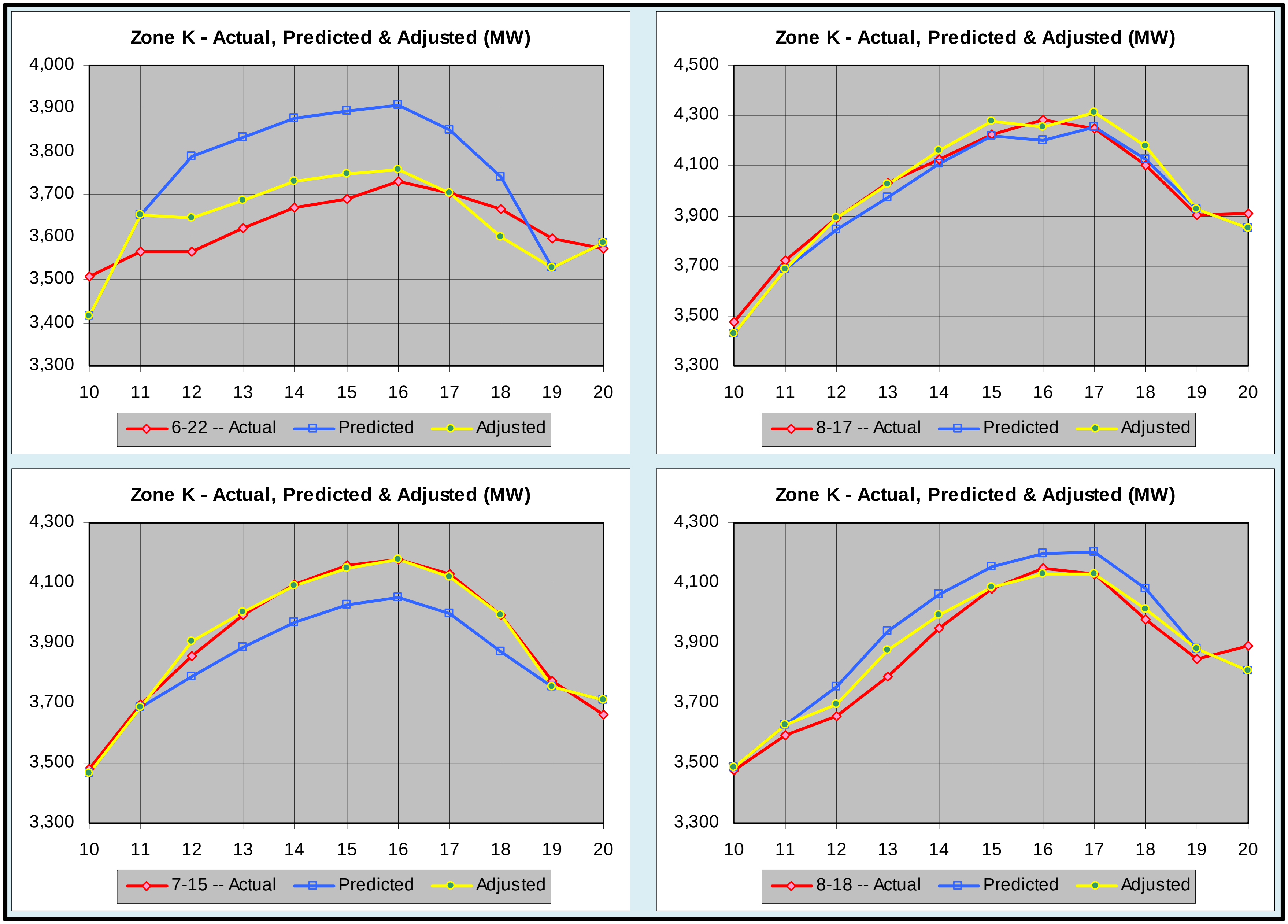

Zone K - Actual, Predicted & Adjusted (MW)
3,900
3,800
3,700
3,600
3,500
3,400
3,300
3,200
10 11 12 13 14 15 16 17 18 19 20
8-22 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
4,200
4,100
4,000
3,900
3,800
3,700
3,600
3,500
3,400
3,300
3,200
10 11 12 13 14 15 16 17 18 19 20
8-12 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
4,100
4,000
3,900
3,800
3,700
3,600
3,500
3,400
3,300
3,200
10 11 12 13 14 15 16 17 18 19 20
6-1 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
4,000
3,900
3,800
3,700
3,600
3,500
3,400
3,300
3,200
10 11 12 13 14 15 16 17 18 19 20
7-25 -- Actual
Predicted
Adjusted

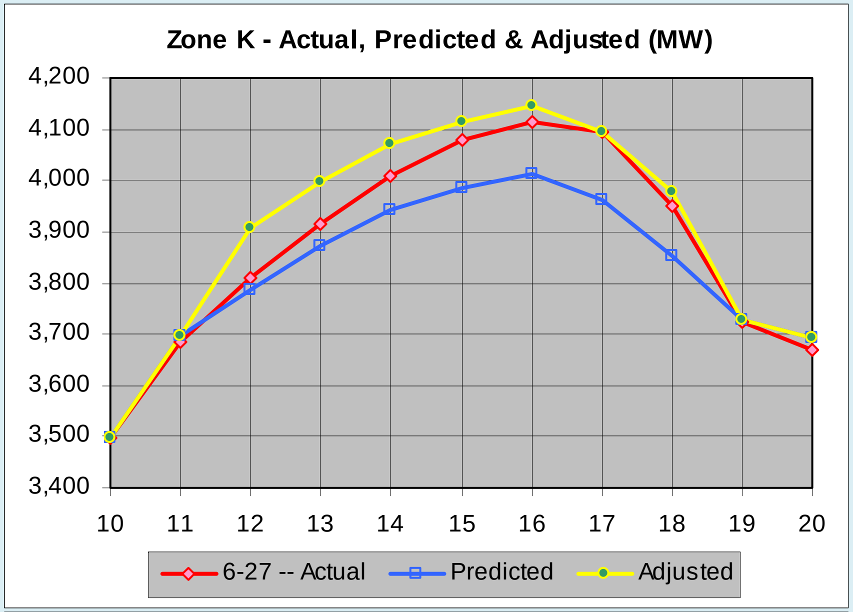

Zone K - Actual, Predicted & Adjusted (MW)
4,000
3,900
3,800
3,700
3,600
3,500
3,400
3,300
3,200
10 11 12 13 14 15 16 17 18 19 20
7-14 -- Actual
Predicted
Adjusted

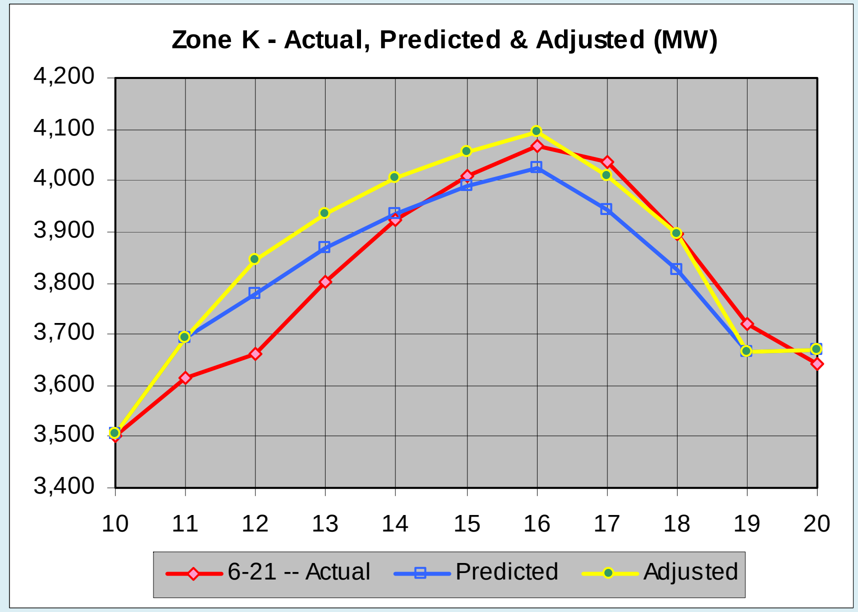

Zone K - Actual, Predicted & Adjusted (MW)
4,400
4,200
4,000
3,800
3,600
3,400
3,200
10 11 12 13 14 15 16 17 18 19 20
6-7 -- Actual
Predicted
Adjusted

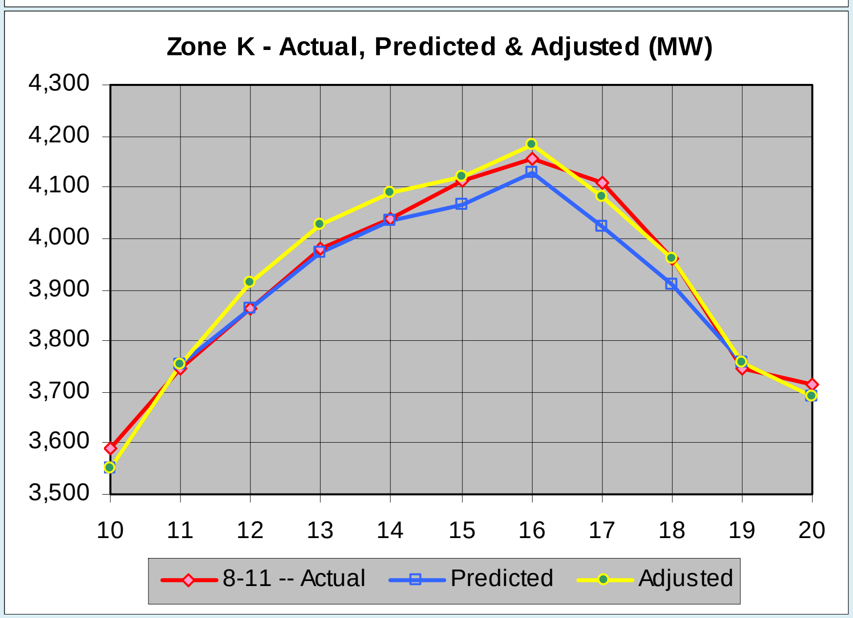

Zone K - Actual, Predicted & Adjusted (MW)
4,200
4,000
3,800
3,600
3,400
3,200
10 11 12 13 14 15 16 17 18 19 20
6-30 -- Actual
Predicted
Adjusted

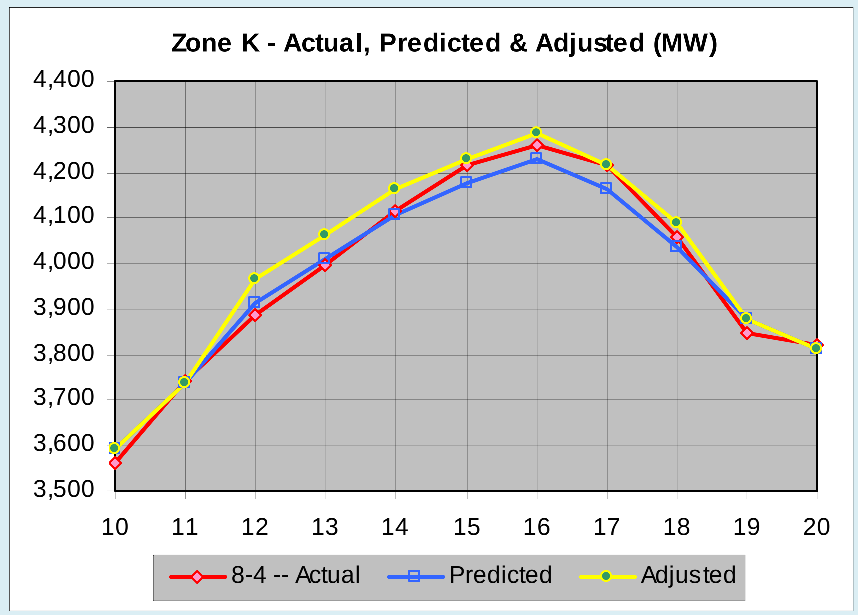

Zone K - Actual, Predicted & Adjusted (MW)
4,400
4,200
4,000
3,800
3,600
3,400
3,200
10 11 12 13 14 15 16 17 18 19 20
8-19 -- Actual
Predicted
Adjusted

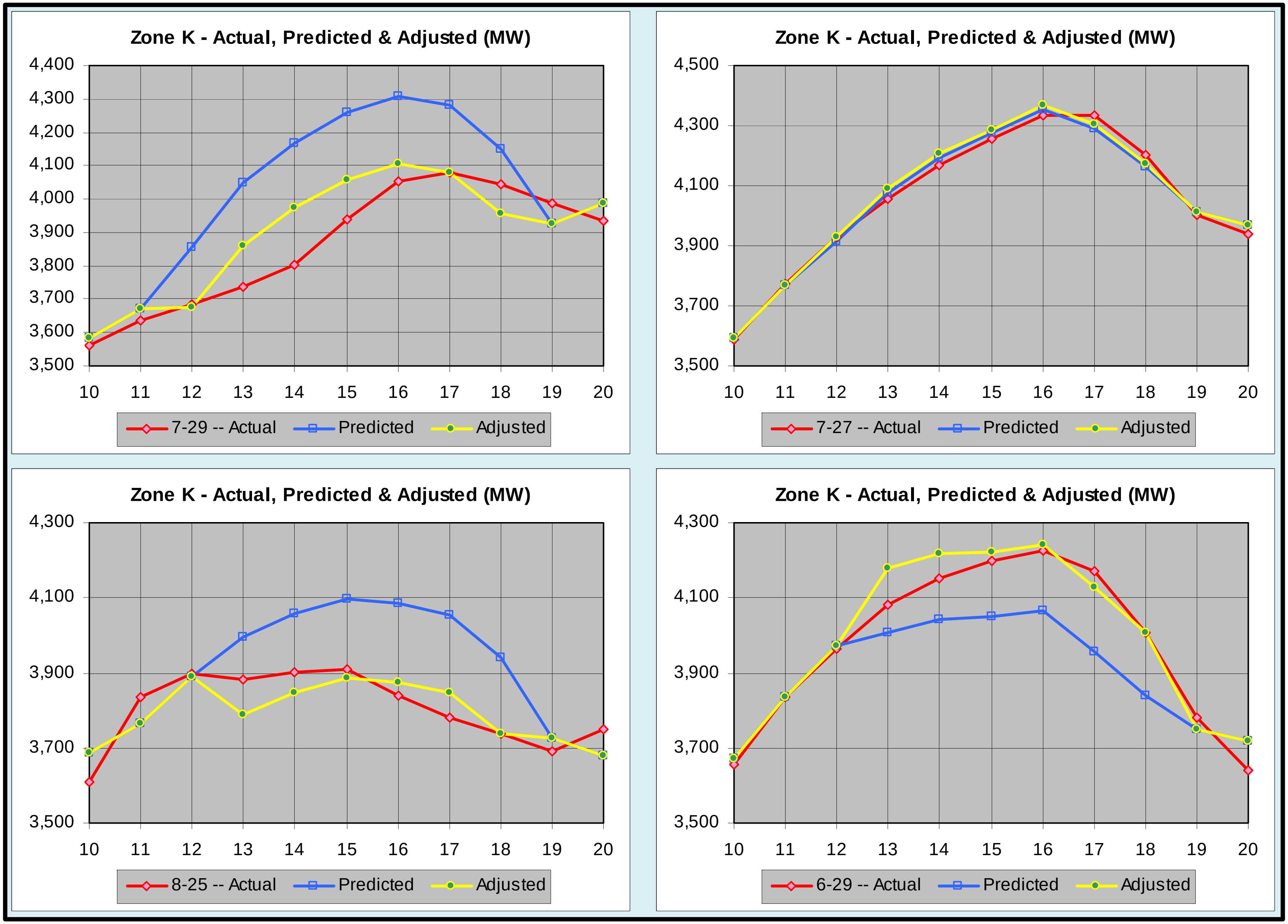

Zone K - Actual, Predicted & Adjusted (MW)
4,000
3,900
3,800
3,700
3,600
3,500
3,400
3,300
10 11 12 13 14 15 16 17 18 19 20
6-22 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
4,500
4,300
4,100
3,900
3,700
3,500
3,300
10 11 12 13 14 15 16 17 18 19 20
8-17 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
4,300
4,100
3,900
3,700
3,500
3,300
10 11 12 13 14 15 16 17 18 19 20
7-15 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
4,300
4,100
3,900
3,700
3,500
3,300
10 11 12 13 14 15 16 17 18 19 20
8-18 -- Actual
Predicted
Adjusted

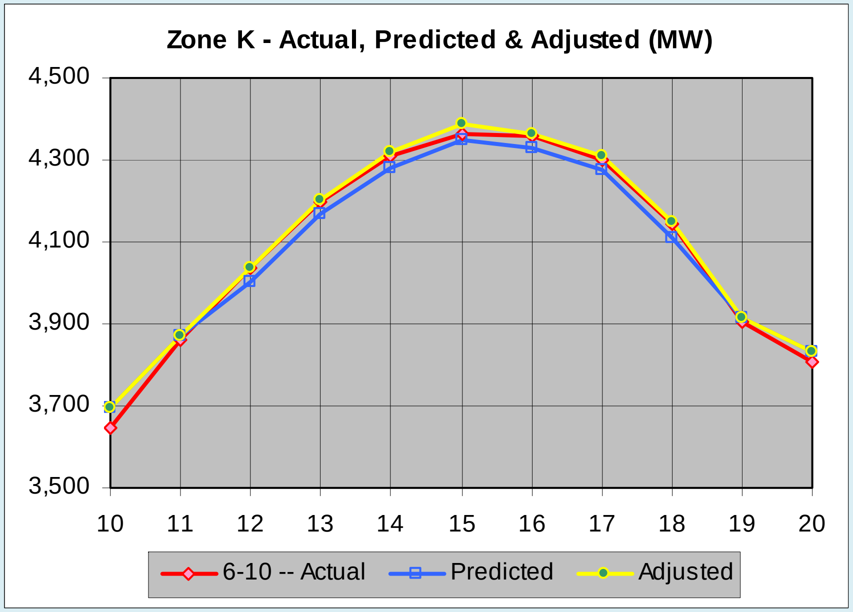

Zone K - Actual, Predicted & Adjusted (MW)
4,200
4,100
4,000
3,900
3,800
3,700
3,600
3,500
3,400
10 11 12 13 14 15 16 17 18 19 20
6-27 -- Actual
Predicted
Adjusted

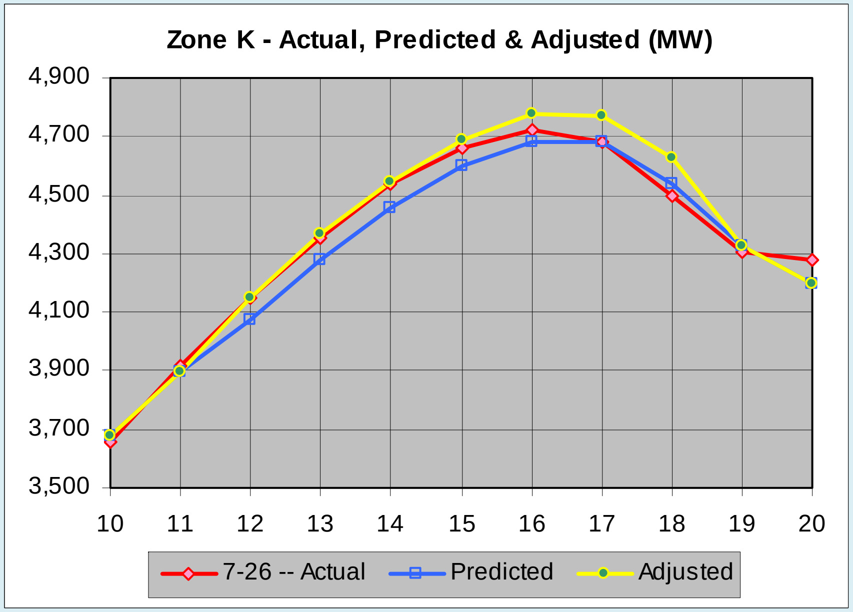

Zone K - Actual, Predicted & Adjusted (MW)
4,200
4,100
4,000
3,900
3,800
3,700
3,600
3,500
3,400
10 11 12 13 14 15 16 17 18 19 20
6-21 -- Actual
Predicted
Adjusted

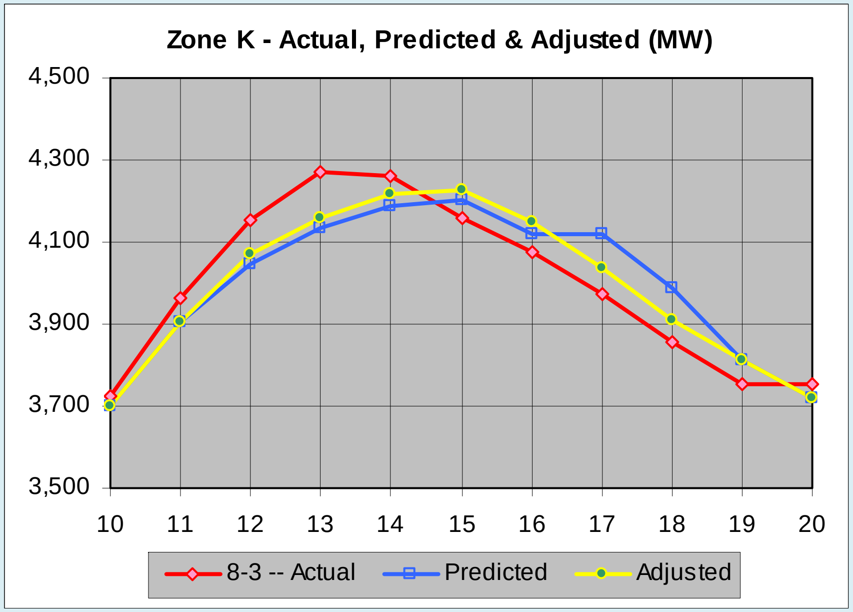

Zone K - Actual, Predicted & Adjusted (MW)
4,300
4,200
4,100
4,000
3,900
3,800
3,700
3,600
3,500
10 11 12 13 14 15 16 17 18 19 20
8-11 -- Actual
Predicted
Adjusted

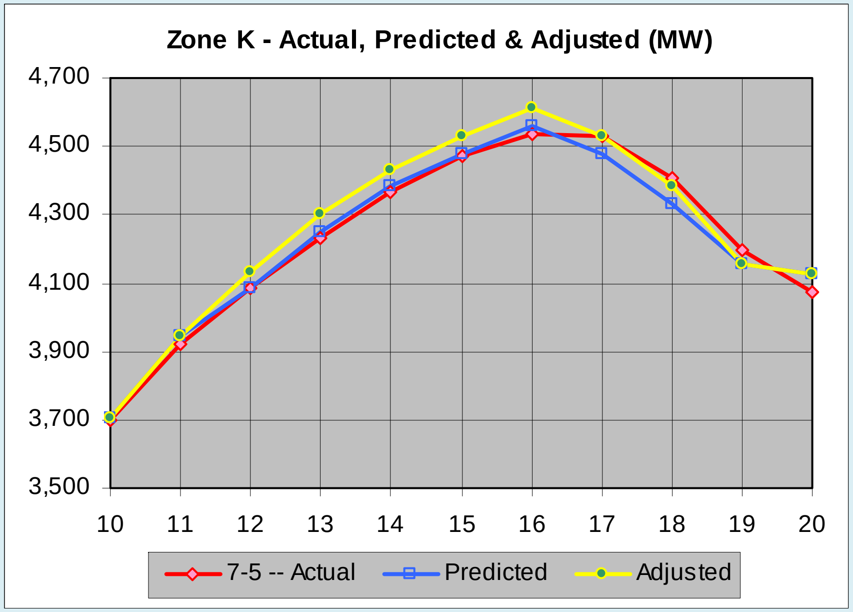

Zone K - Actual, Predicted & Adjusted (MW)
4,400
4,300
4,200
4,100
4,000
3,900
3,800
3,700
3,600
3,500
10 11 12 13 14 15 16 17 18 19 20
8-4 -- Actual
Predicted
Adjusted

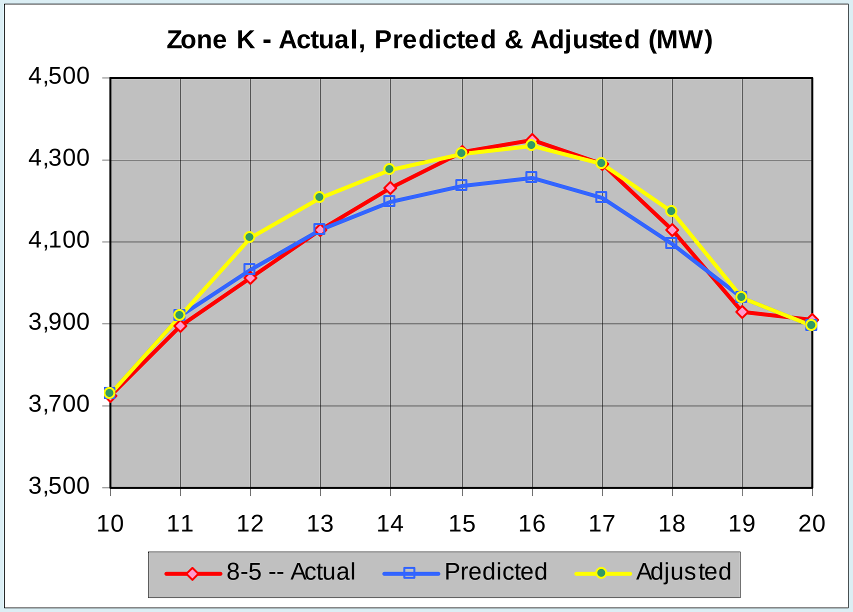

Zone K - Actual, Predicted & Adjusted (MW)
7-29 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
7-27 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
8-25 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
6-29 -- Actual
Predicted
Adjusted

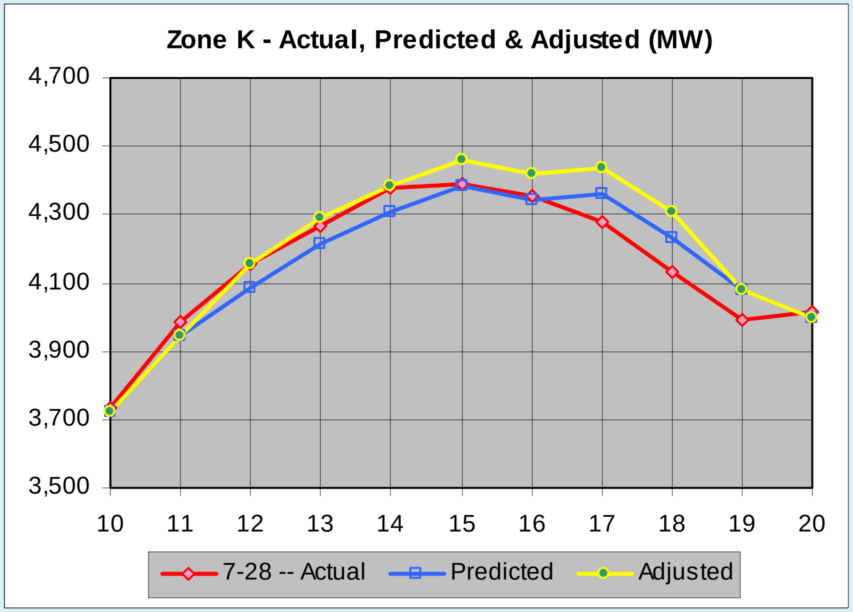

Zone K - Actual, Predicted & Adjusted (MW)
4,500
4,300
4,100
3,900
3,700
3,500
10 11 12 13 14 15 16 17 18 19 20
6-10 -- Actual
Predicted
Adjusted

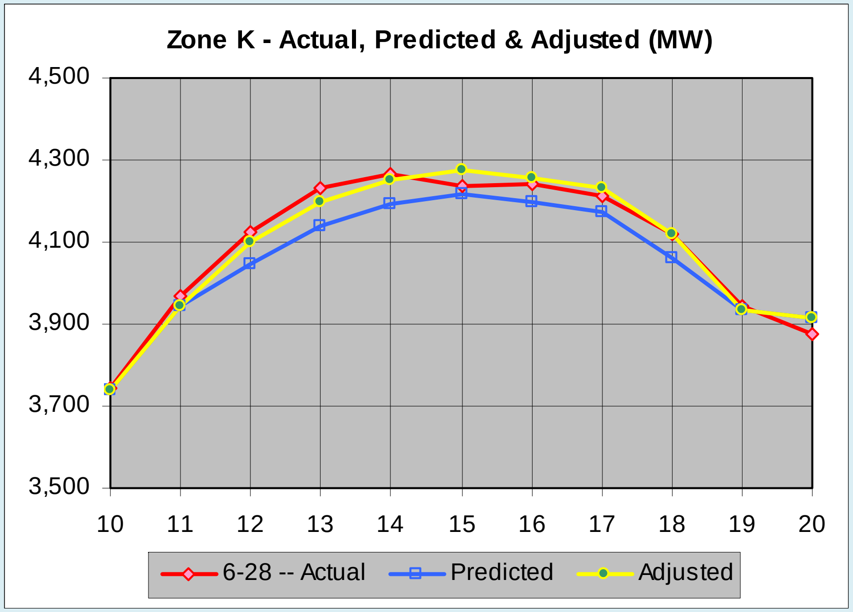

Zone K - Actual, Predicted & Adjusted (MW)
4,900
4,700
4,500
4,300
4,100
3,900
3,700
3,500
10 11 12 13 14 15 16 17 18 19 20
7-26 -- Actual
Predicted
Adjusted

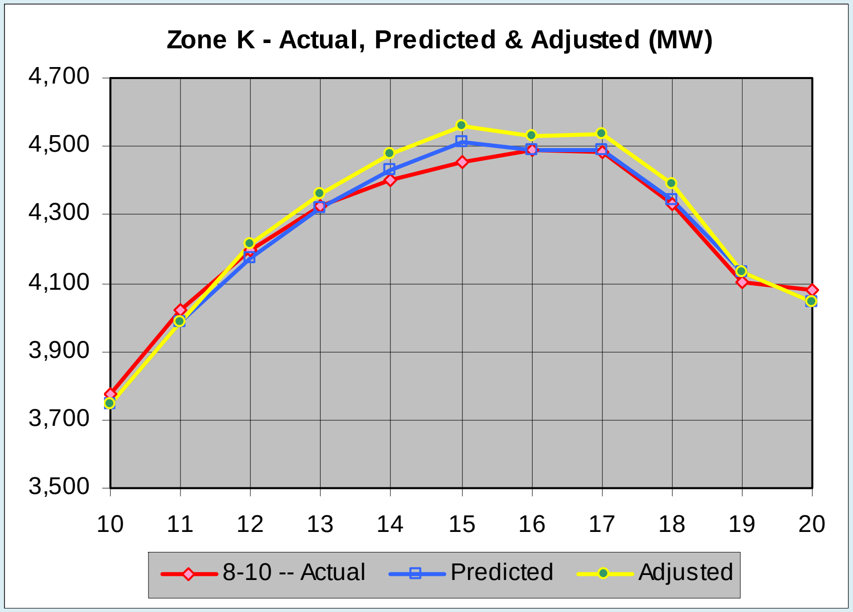

Zone K - Actual, Predicted & Adjusted (MW)
4,500
4,300
4,100
3,900
3,700
3,500
10 11 12 13 14 15 16 17 18 19 20
8-3 -- Actual
Predicted
Adjusted

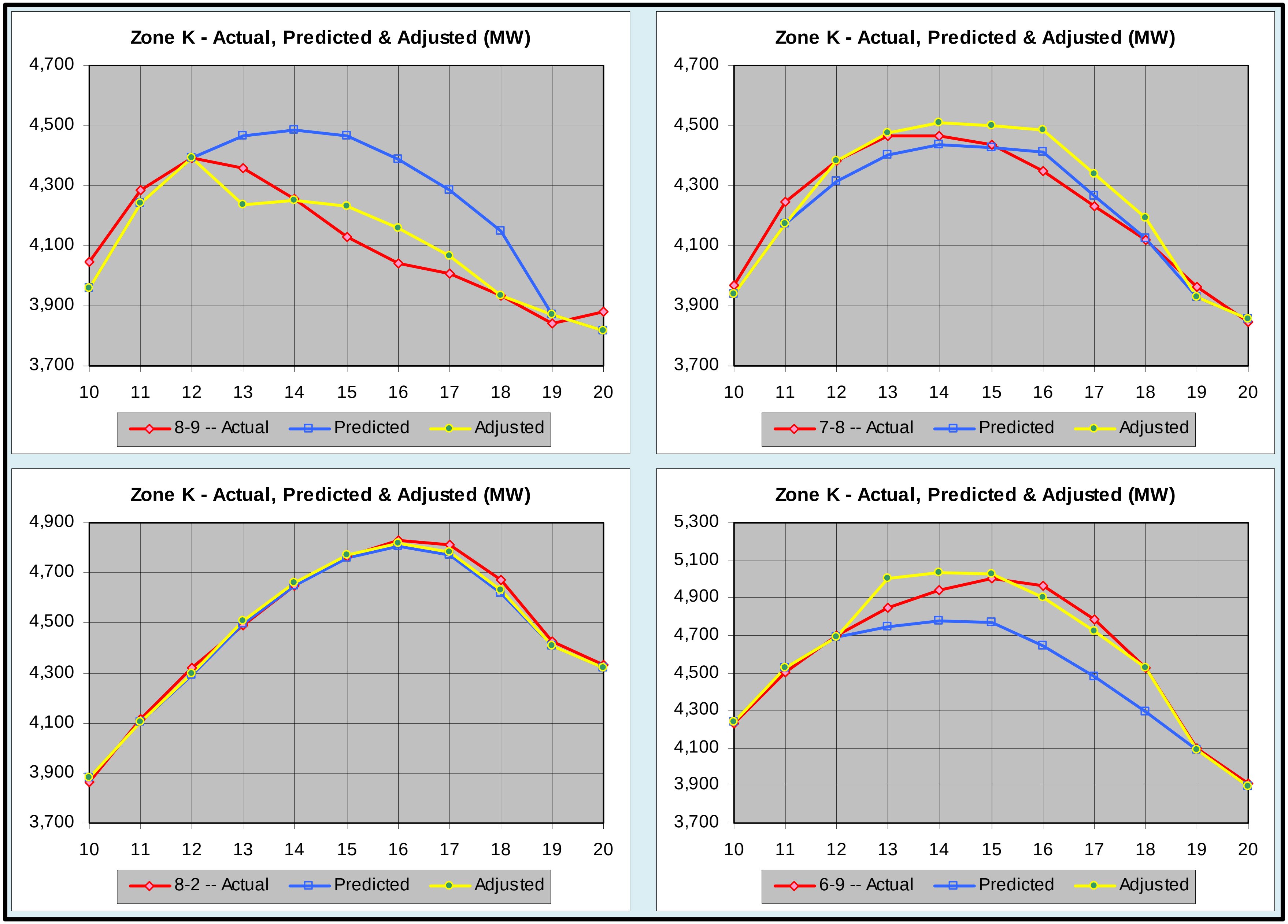

Zone K - Actual, Predicted & Adjusted (MW)
4,700
4,500
4,300
4,100
3,900
3,700
3,500
10 11 12 13 14 15 16 17 18 19 20
7-5 -- Actual
Predicted
Adjusted

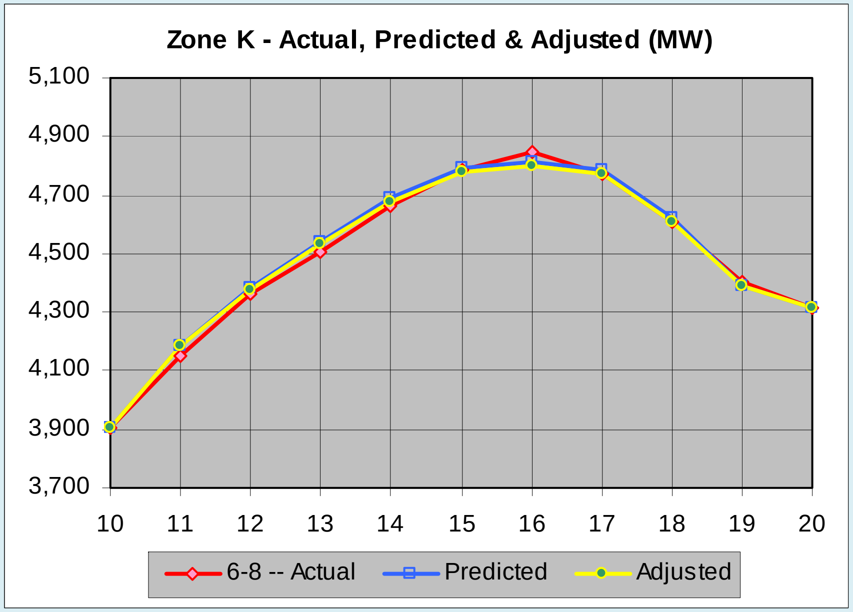

Zone K - Actual, Predicted & Adjusted (MW)
4,500
4,300
4,100
3,900
3,700
3,500
10
11
12
13
14
15
16
17
18
19
20
8-5 -- Actual
Predicted
Adjusted

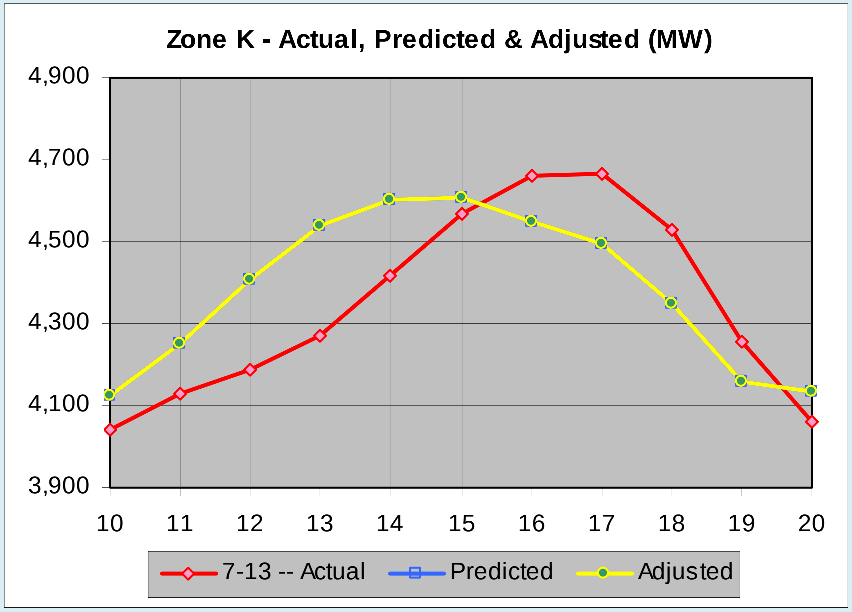

Zone K - Actual, Predicted & Adjusted (MW)
4,700
4,500
4,300
4,100
3,900
3,700
3,500
10
11
12
13
14
15
16
17
18
19
20
7-28 -- Actual
Predicted
Adjusted

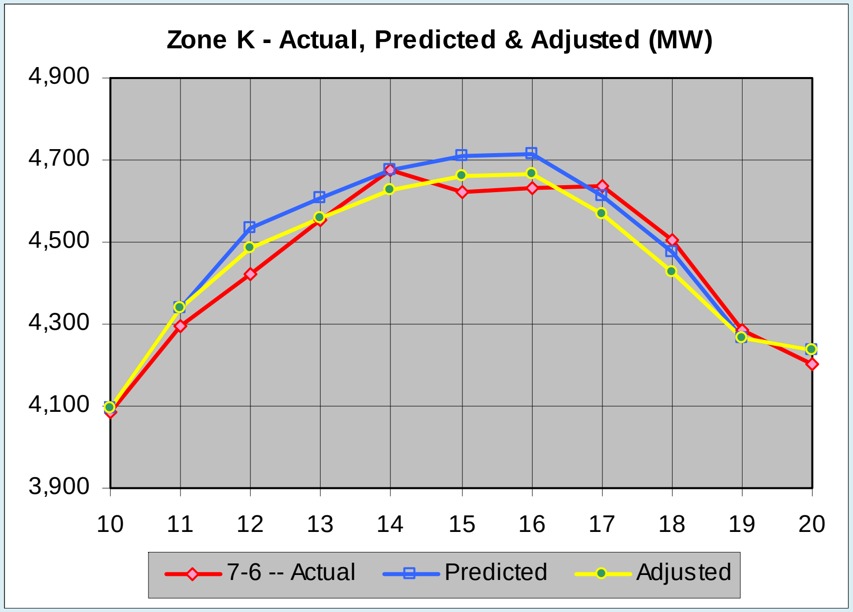

Zone K - Actual, Predicted & Adjusted (MW)
4,500
4,300
4,100
3,900
3,700
3,500
10
11
12
13
14
15
16
17
18
19
20
6-28 -- Actual
Predicted
Adjusted

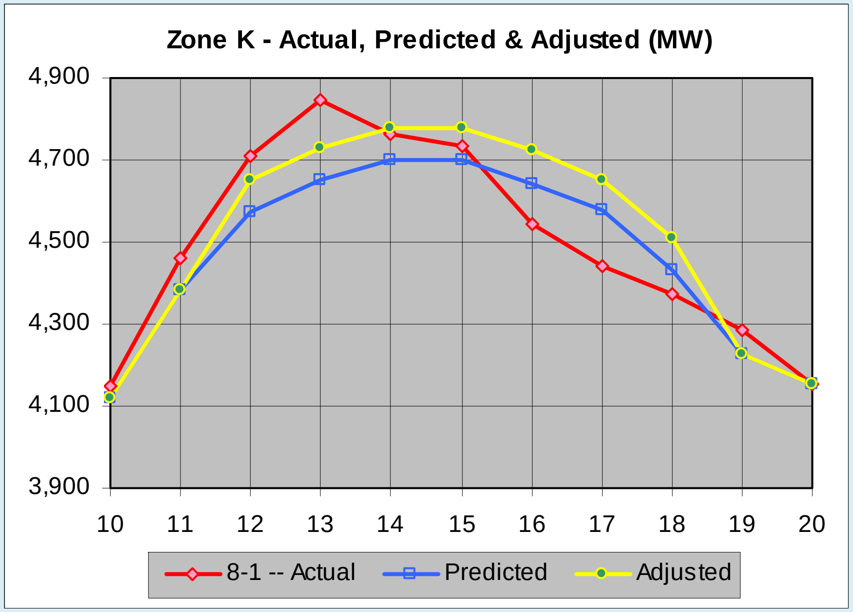

Zone K - Actual, Predicted & Adjusted (MW)
4,700
4,500
4,300
4,100
3,900
3,700
3,500
10
11
12
13
14
15
16
17
18
19
20
8-10 -- Actual
Predicted
Adjusted

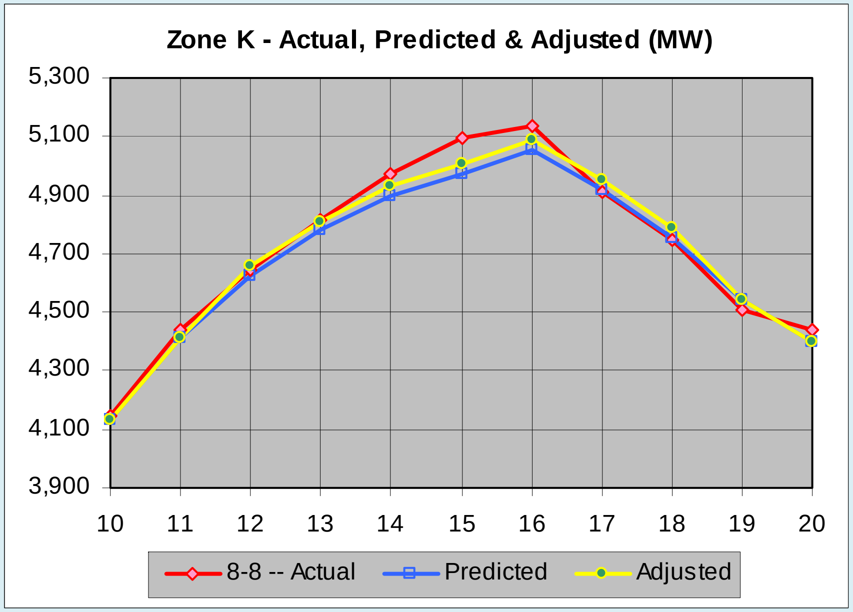

Zone K - Actual, Predicted & Adjusted (MW)
4,700
4,500
4,300
4,100
3,900
3,700
10
11
12
13
14
15
16
17
18
19
20
8-9 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
4,700
4,500
4,300
4,100
3,900
3,700
10
11
12
13
14
15
16
17
18
19
20
7-8 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
4,900
4,700
4,500
4,300
4,100
3,900
3,700
10
11
12
13
14
15
16
17
18
19
20
8-2 -- Actual
Predicted
Adjusted
Zone K - Actual, Predicted & Adjusted (MW)
5,300
5,100
4,900
4,700
4,500
4,300
4,100
3,900
3,700
10
11
12
13
14
15
16
17
18
19
20
6-9 -- Actual
Predicted
Adjusted

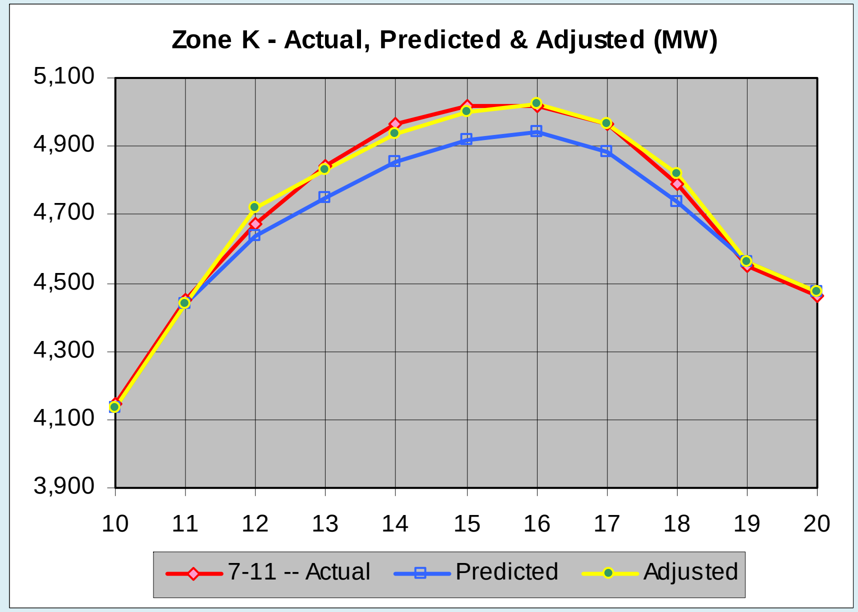

Zone K - Actual, Predicted & Adjusted (MW)
5,100
4,900
4,700
4,500
4,300
4,100
3,900
3,700
10 11 12 13 14 15 16 17 18 19 20
6-8 -- Actual
Predicted
Adjusted

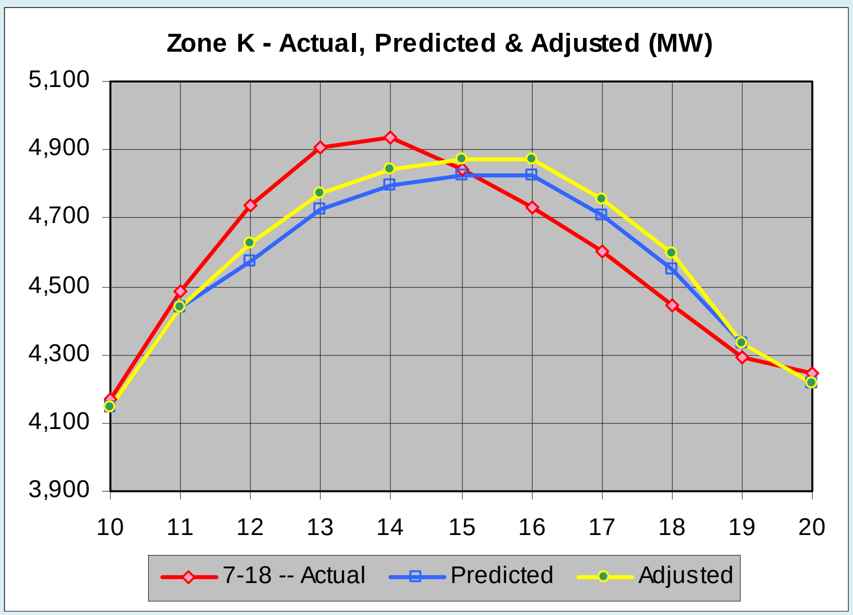

Zone K - Actual, Predicted & Adjusted (MW)
4,900
4,700
4,500
4,300
4,100
3,900
10 11 12 13 14 15 16 17 18 19 20
7-13 -- Actual
Predicted
Adjusted

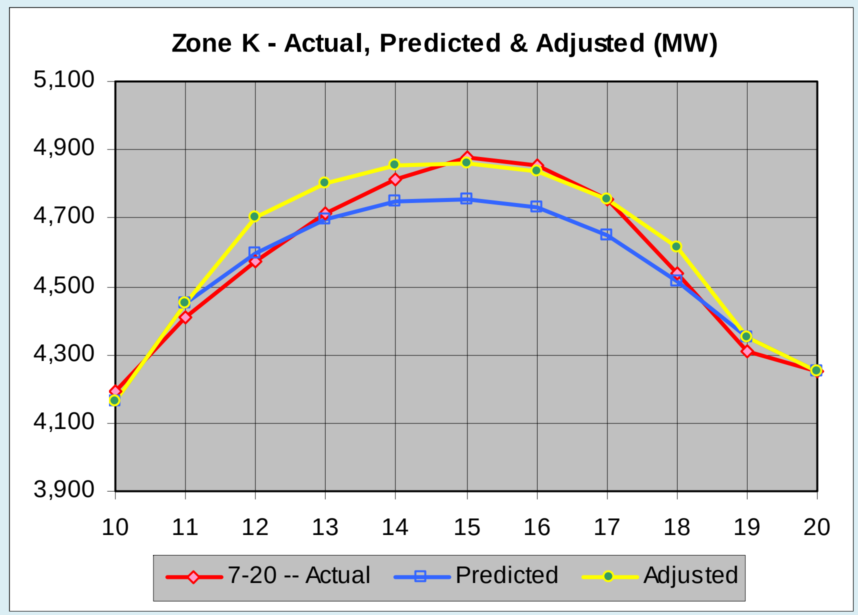

Zone K - Actual, Predicted & Adjusted (MW)
4,900
4,700
4,500
4,300
4,100
3,900
10 11 12 13 14 15 16 17 18 19 20
7-6 -- Actual
Predicted
Adjusted

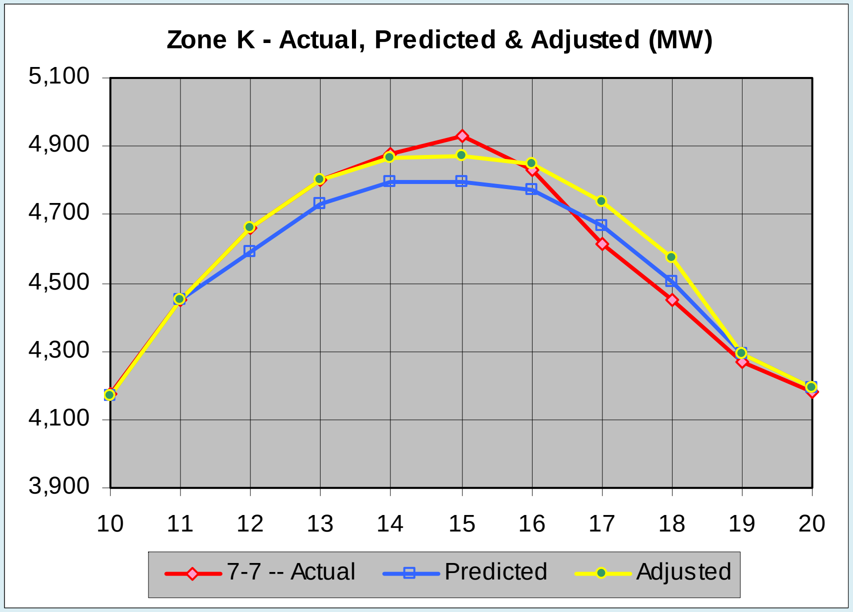

Zone K - Actual, Predicted & Adjusted (MW)
4,900
4,700
4,500
4,300
4,100
3,900
10 11 12 13 14 15 16 17 18 19 20
8-1 -- Actual
Predicted
Adjusted

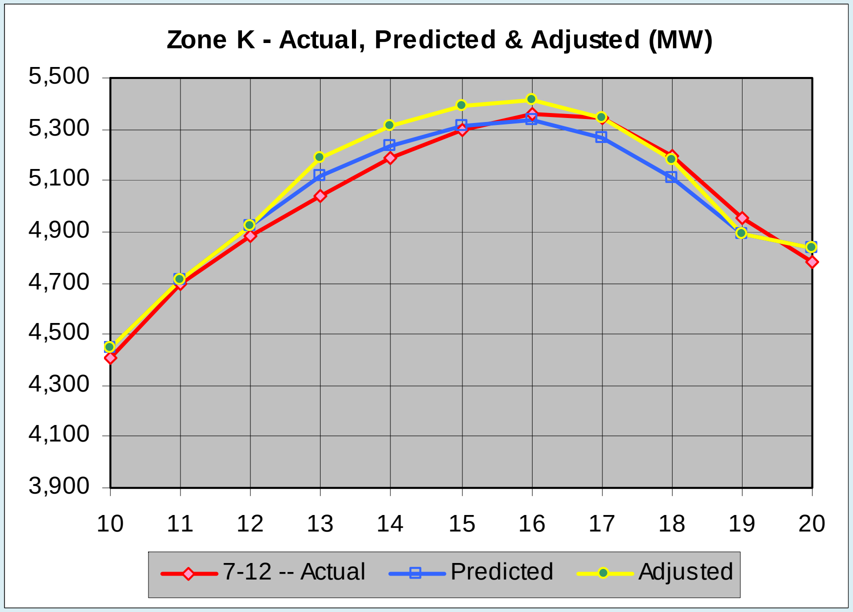

Zone K - Actual, Predicted & Adjusted (MW)
5,300
5,100
4,900
4,700
4,500
4,300
4,100
3,900
10 11 12 13 14 15 16 17 18 19 20
8-8 -- Actual
Predicted
Adjusted


Zone K - Actual, Predicted & Adjusted (MW)
5,100
4,900
4,700
4,500
4,300
4,100
3,900
10 11 12 13 14 15 16 17 18 19 20
7-11 -- Actual
Predicted
Adjusted


Zone K - Actual, Predicted & Adjusted (MW)
5,100
4,900
4,700
4,500
4,300
4,100
3,900
10 11 12 13 14 15 16 17 18 19 20
7-18 -- Actual
Predicted
Adjusted

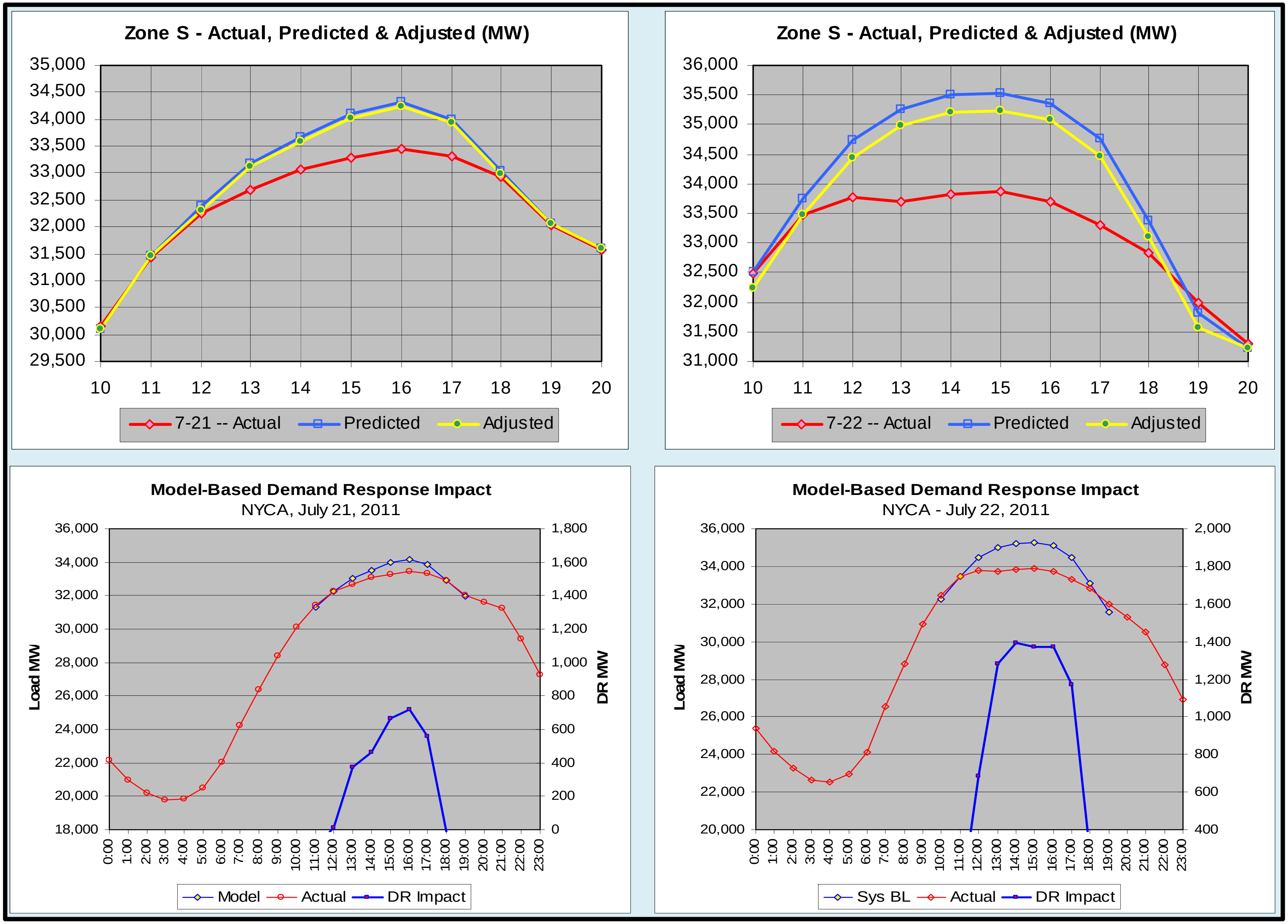

Zone K - Actual, Predicted & Adjusted (MW)
5,100
4,900
4,700
4,500
4,300
4,100
3,900
10 11 12 13 14 15 16 17 18 19 20
7-20 -- Actual
Predicted
Adjusted

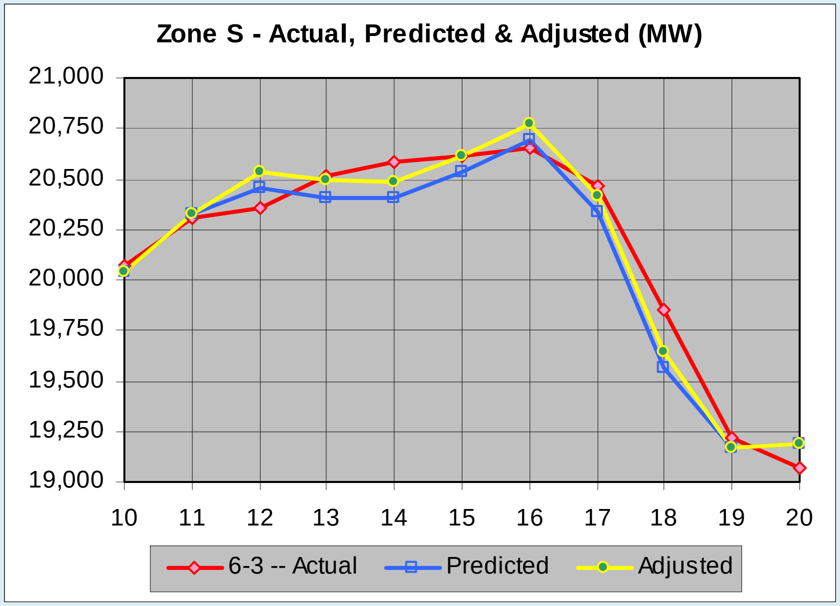

Zone K - Actual, Predicted & Adjusted (MW)
5,100
4,900
4,700
4,500
4,300
4,100
3,900
10 11 12 13 14 15 16 17 18 19 20
7-7 -- Actual
Predicted
Adjusted

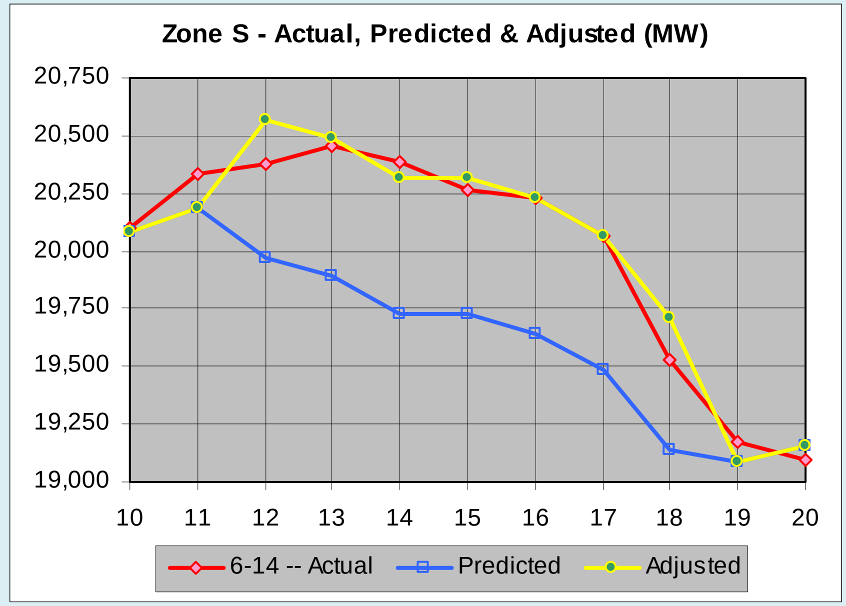

Zone K - Actual, Predicted & Adjusted (MW)
5,500
5,300
5,100
4,900
4,700
4,500
4,300
4,100
3,900
10 11 12 13 14 15 16 17 18 19 20
7-12 -- Actual
Predicted
Adjusted

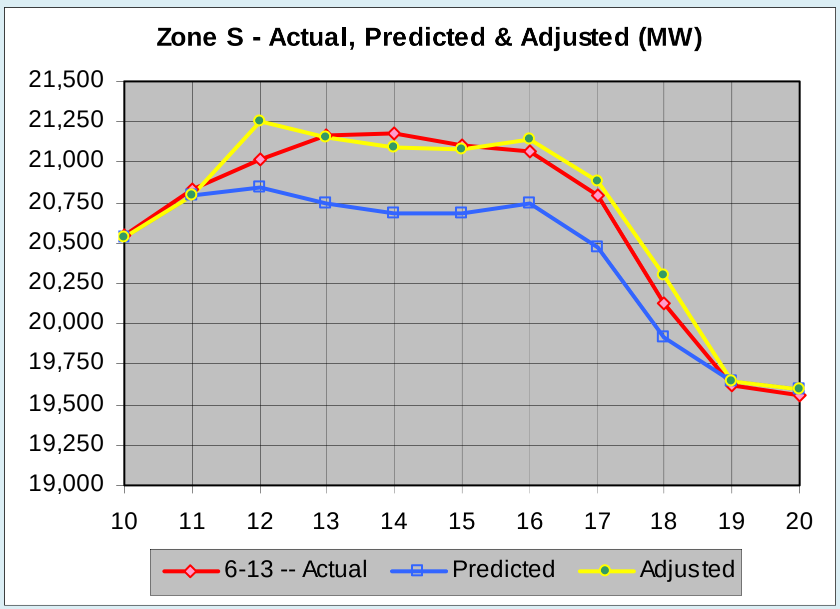
E - Daily Plots of NYCA Actual, Predicted and Adjusted Hourly Loads

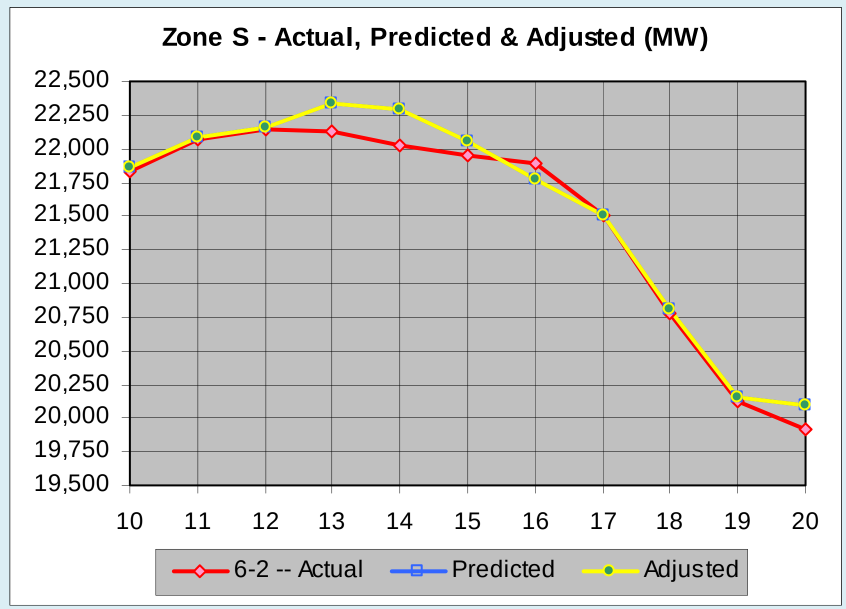
The charts below are not in calendar order. The first two charts show the days in which Demand Response resources were activated (July 21 and July 22, 2011). The subsequent series of charts are ordered in terms of increasing load levels.

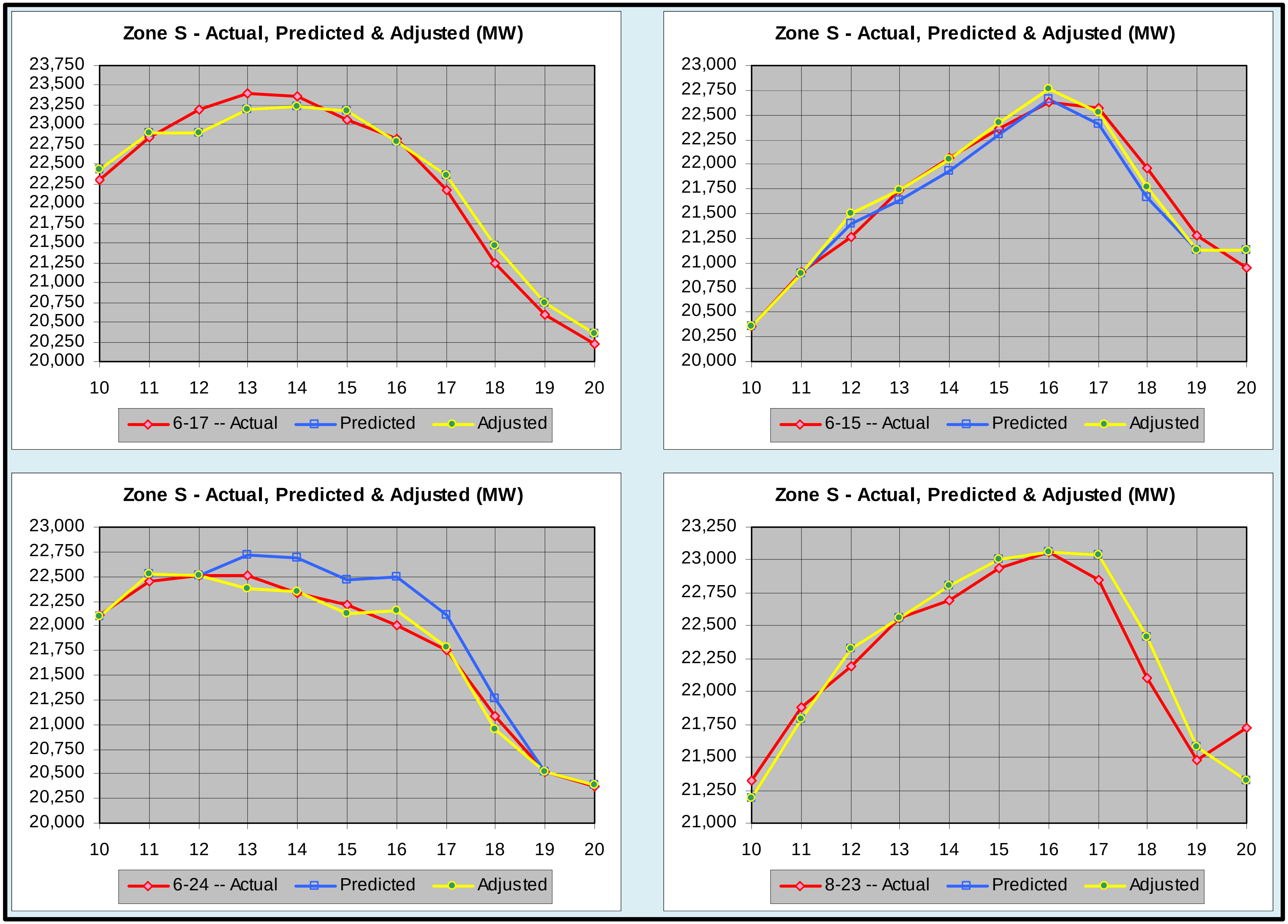

Zone S - Actual, Predicted & Adjusted (MW)
7-21 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
7-22 -- Actual
Predicted
Adjusted
Model-Based Demand Response Impact
NYCA, July 21, 2011
Load MW
DR MW
Model
Actual
DR Impact
Model-Based Demand Response Impact
NYCA - July 22, 2011
Load MW
DR MW
Sys BL
Actual
DR Impact

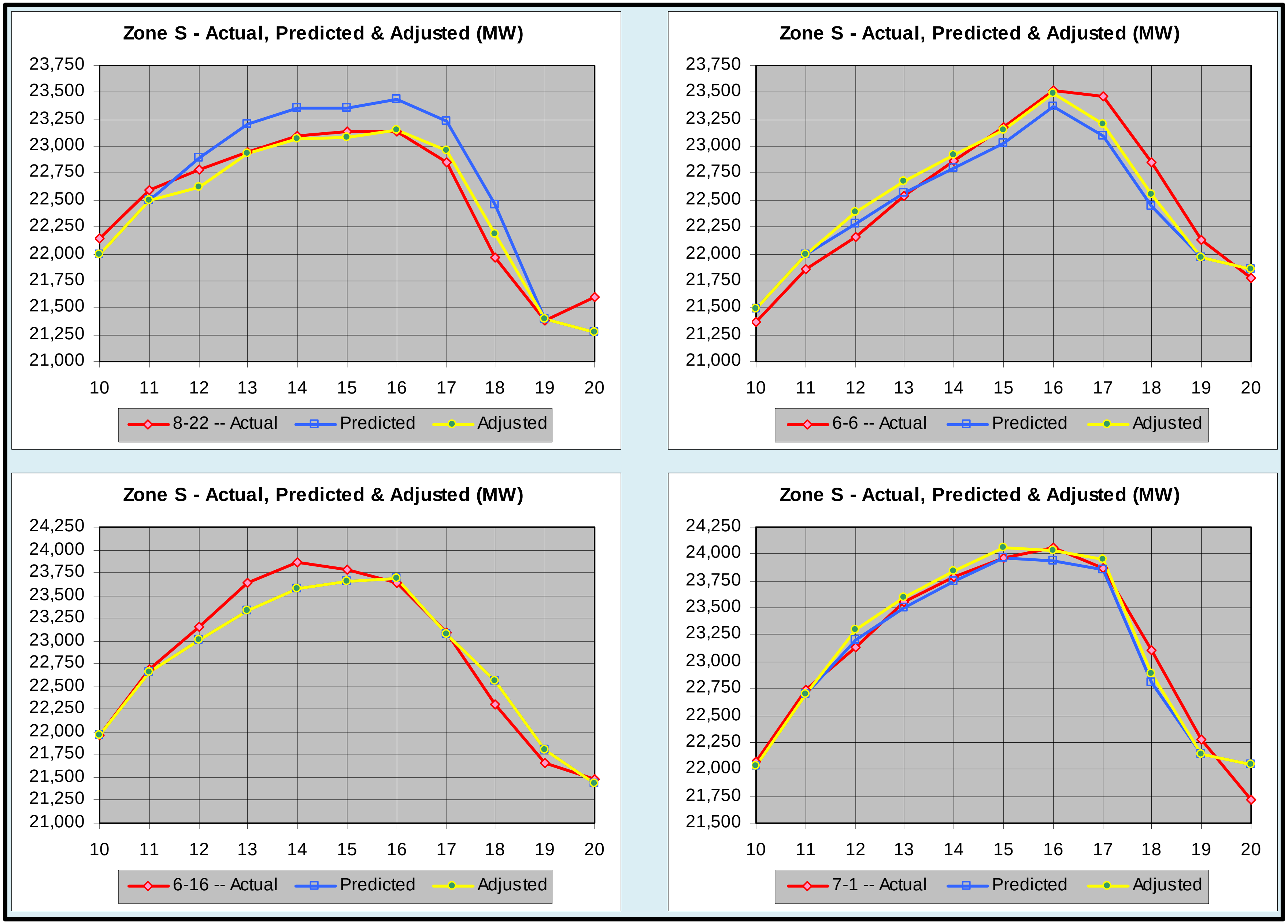

Zone S - Actual, Predicted & Adjusted (MW)
21,000
20,750
20,500
20,250
20,000
19,750
19,500
19,250
19,000
10 11 12 13 14 15 16 17 18 19 20
6-3 -- Actual
Predicted
Adjusted

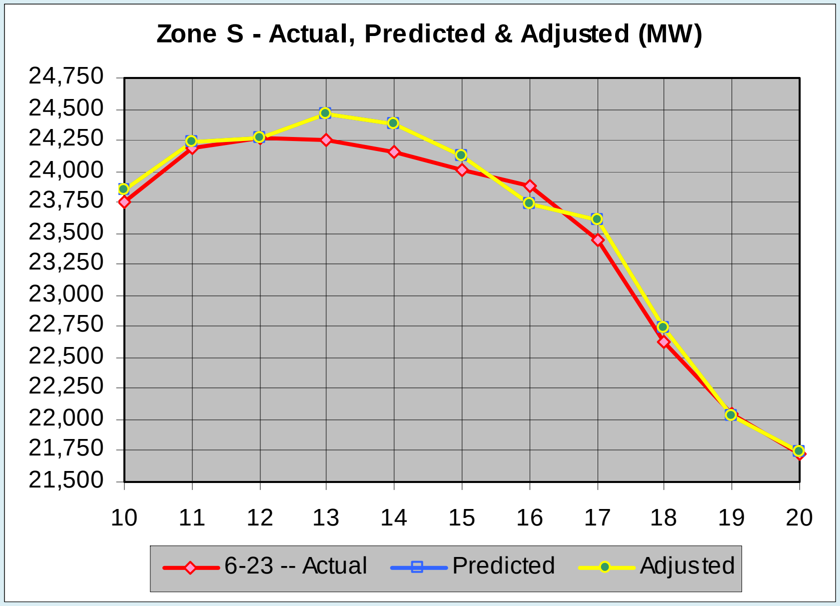

Zone S - Actual, Predicted & Adjusted (MW)
20,750
20,500
20,250
20,000
19,750
19,500
19,250
19,000
10 11 12 13 14 15 16 17 18 19 20
6-14 -- Actual
Predicted
Adjusted

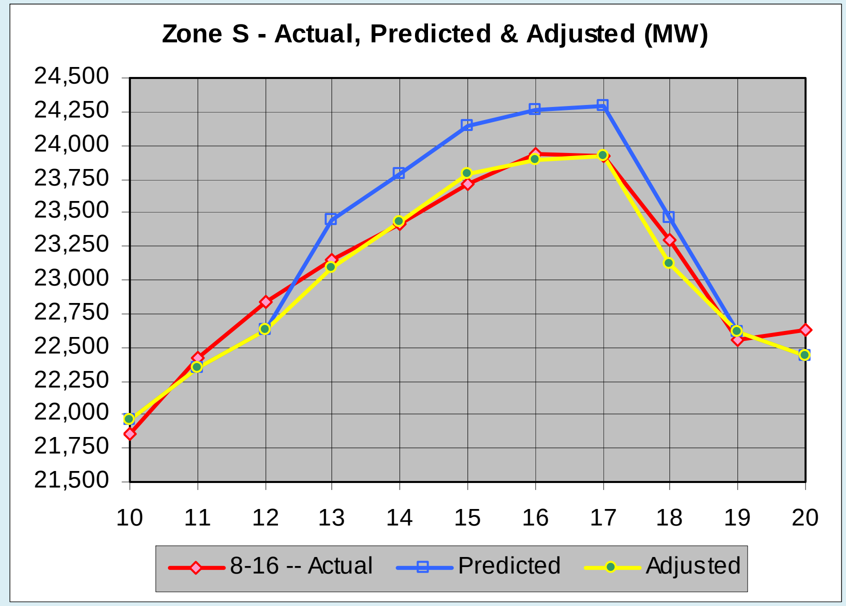

Zone S - Actual, Predicted & Adjusted (MW)
21,500
21,250
21,000
20,750
20,500
20,250
20,000
19,750
19,500
19,250
19,000
10 11 12 13 14 15 16 17 18 19 20
6-13 -- Actual
Predicted
Adjusted

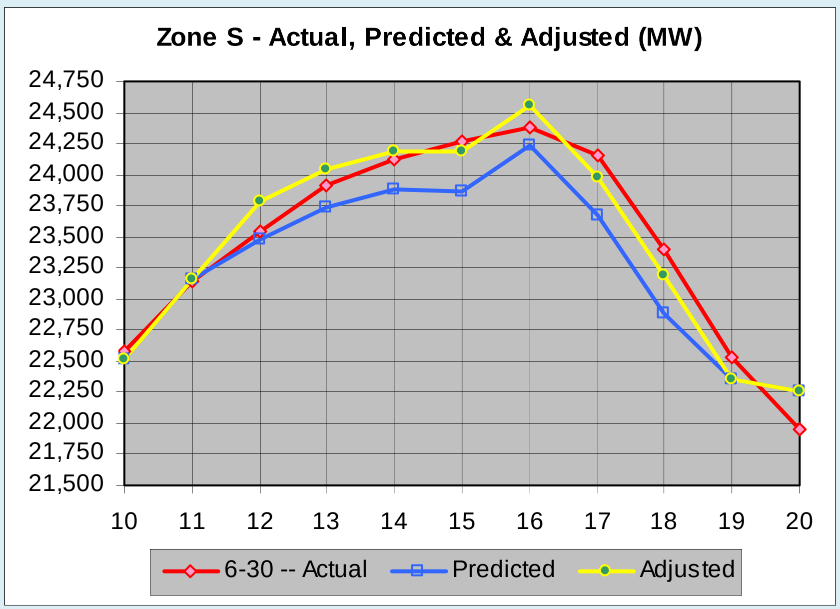

Zone S - Actual, Predicted & Adjusted (MW)
22,500
22,250
22,000
21,750
21,500
21,250
21,000
20,750
20,500
20,250
20,000
19,750
19,500
10 11 12 13 14 15 16 17 18 19 20
6-2 -- Actual
Predicted
Adjusted

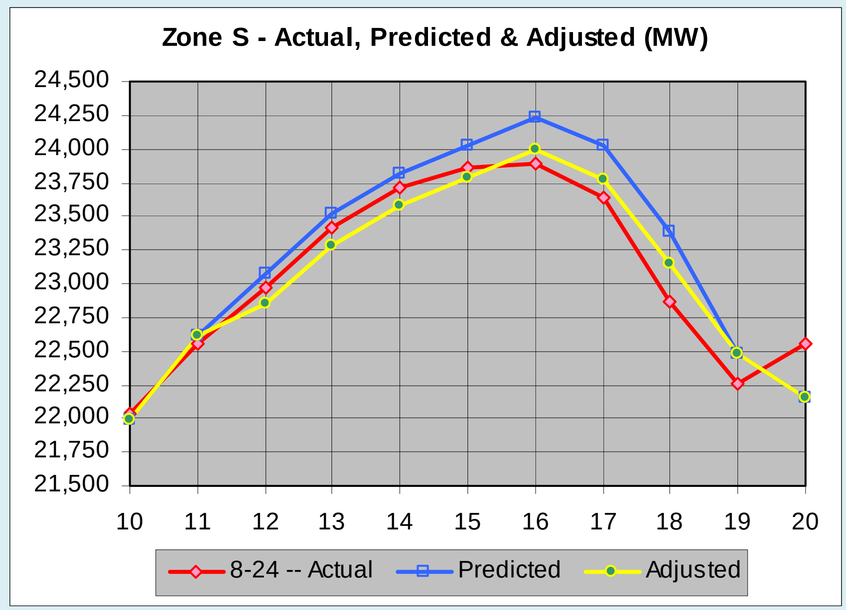

Zone S - Actual, Predicted & Adjusted (MW)
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
21,750
21,500
21,250
21,000
20,750
20,500
20,250
20,000
10 11 12 13 14 15 16 17 18 19 20
6-17 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
23,000
22,750
22,500
22,250
22,000
21,750
21,500
21,250
21,000
20,750
20,500
20,250
20,000
10 11 12 13 14 15 16 17 18 19 20
6-15 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
23,000
22,750
22,500
22,250
22,000
21,750
21,500
21,250
21,000
20,750
20,500
20,250
20,000
10 11 12 13 14 15 16 17 18 19 20
6-24 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
23,250
23,000
22,750
22,500
22,250
22,000
21,750
21,500
21,250
21,000
10 11 12 13 14 15 16 17 18 19 20
8-23 -- Actual
Predicted
Adjusted

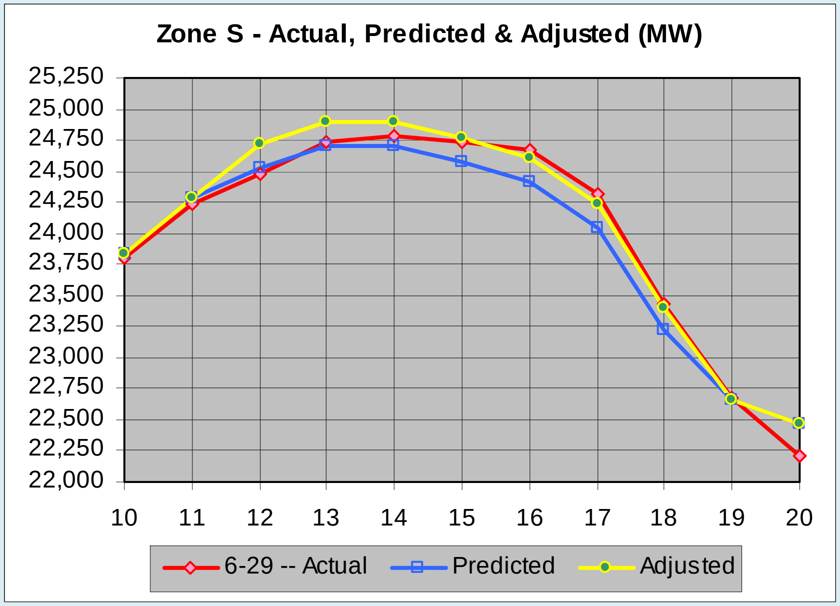

Zone S - Actual, Predicted & Adjusted (MW)
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
21,750
21,500
21,250
21,000
10 11 12 13 14 15 16 17 18 19 20
8-22 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
21,750
21,500
21,250
21,000
10 11 12 13 14 15 16 17 18 19 20
6-6 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
21,750
21,500
21,250
21,000
10 11 12 13 14 15 16 17 18 19 20
6-16 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
21,750
21,500
10 11 12 13 14 15 16 17 18 19 20
7-1 -- Actual
Predicted
Adjusted

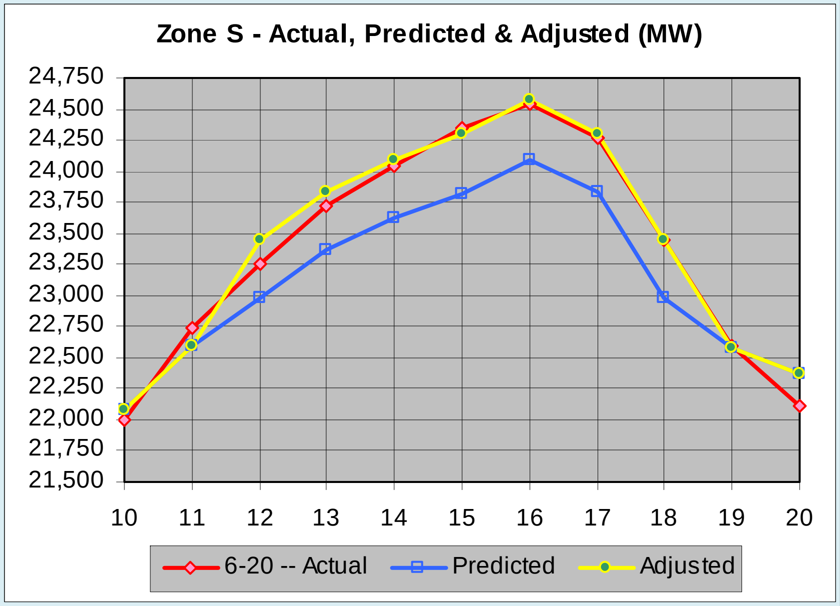

Zone S - Actual, Predicted & Adjusted (MW)
24,750
24,500
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
21,750
21,500
10 11 12 13 14 15 16 17 18 19 20
6-23 -- Actual
Predicted
Adjusted

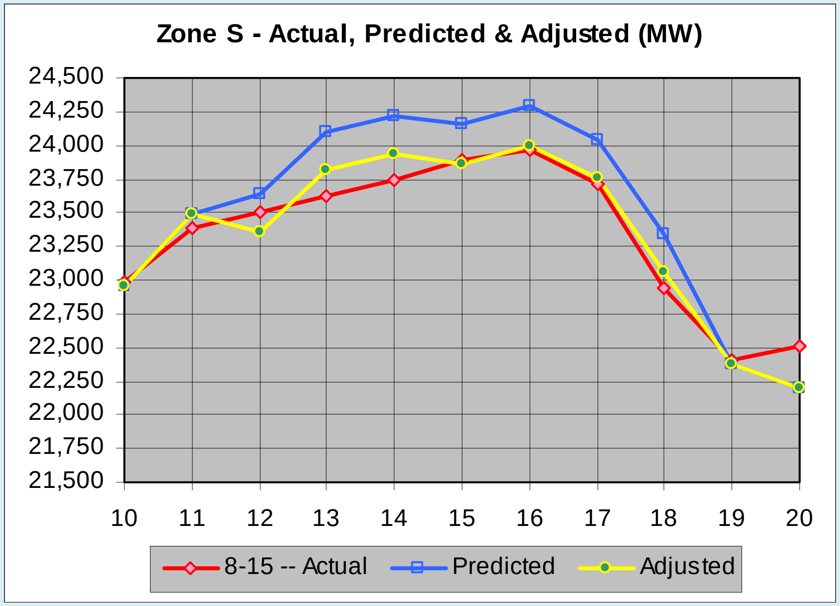

Zone S - Actual, Predicted & Adjusted (MW)
24,500
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
21,750
21,500
10 11 12 13 14 15 16 17 18 19 20
8-16 -- Actual
Predicted
Adjusted

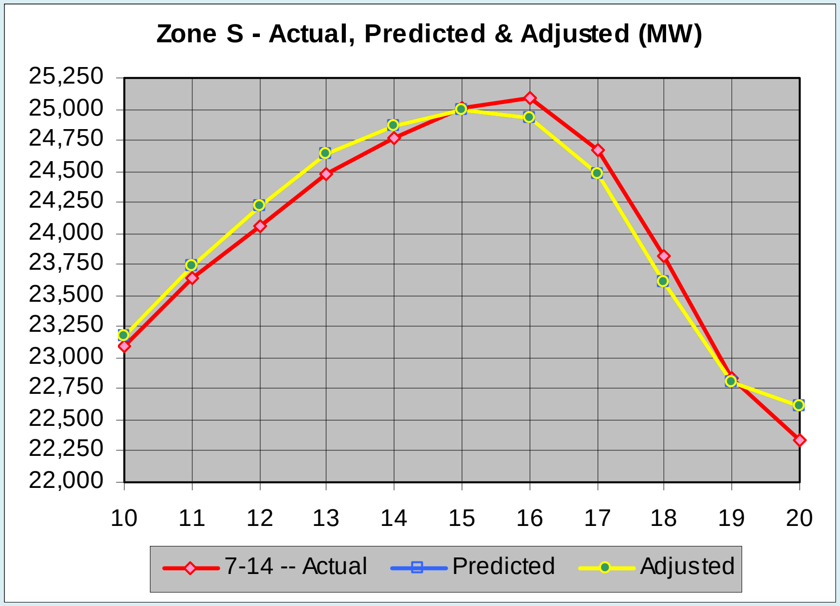

Zone S - Actual, Predicted & Adjusted (MW)
24,750
24,500
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
21,750
21,500
10 11 12 13 14 15 16 17 18 19 20
6-30 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
24,500
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
21,750
21,500
10 11 12 13 14 15 16 17 18 19 20
8-24 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
25,250
25,000
24,750
24,500
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
10 11 12 13 14 15 16 17 18 19 20
6-29 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
24,750
24,500
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
21,750
21,500
10 11 12 13 14 15 16 17 18 19 20
6-20 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
24,500
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
21,750
21,500
10 11 12 13 14 15 16 17 18 19 20
8-15 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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25,000
24,750
24,500
24,250
24,000
23,750
23,500
23,250
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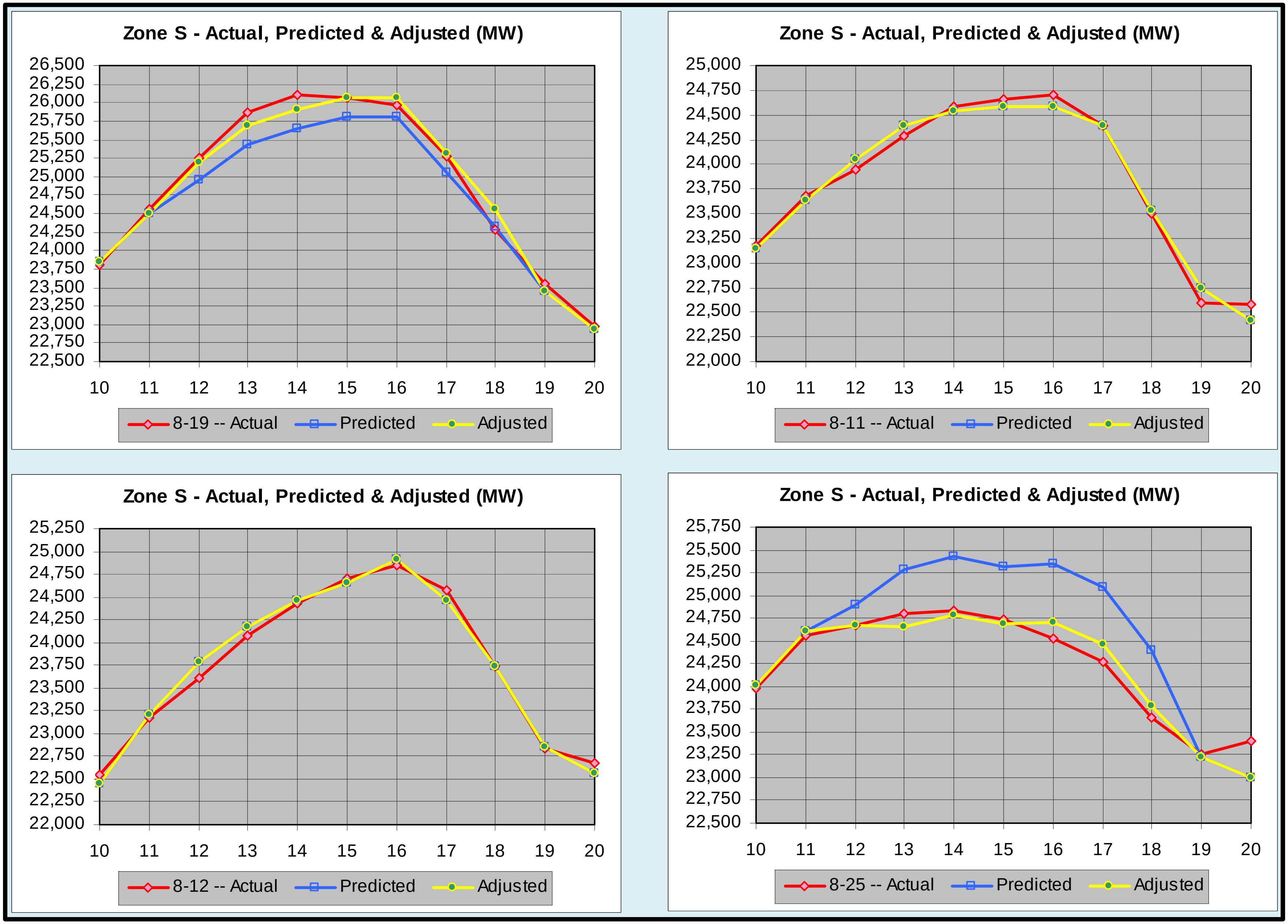
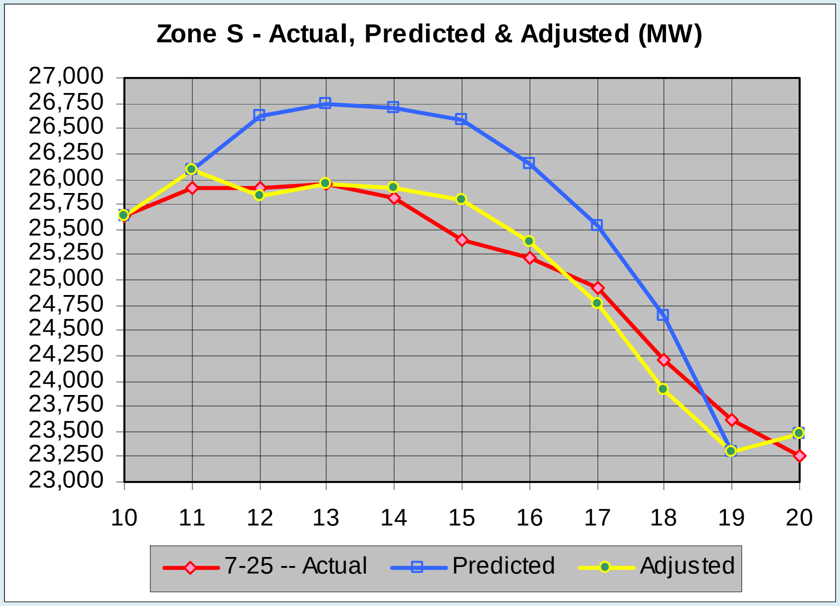
22,750
22,500
22,250
22,000
10 11 12 13 14 15 16 17 18 19 20
7-14 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
26,500
26,250
26,000
25,750
25,500
25,250
25,000
24,750
24,500
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
10 11 12 13 14 15 16 17 18 19 20
8-19 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
25,000
24,750
24,500
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
10 11 12 13 14 15 16 17 18 19 20
8-11 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
25,250
25,000
24,750
24,500
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
22,250
22,000
10 11 12 13 14 15 16 17 18 19 20
8-12 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
25,750
25,500
25,250
25,000
24,750
24,500
24,250
24,000
23,750
23,500
23,250
23,000
22,750
22,500
10 11 12 13 14 15 16 17 18 19 20
8-25 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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26,250
26,000
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24,750
24,500
24,250
24,000
23,750
23,500
23,250
23,000
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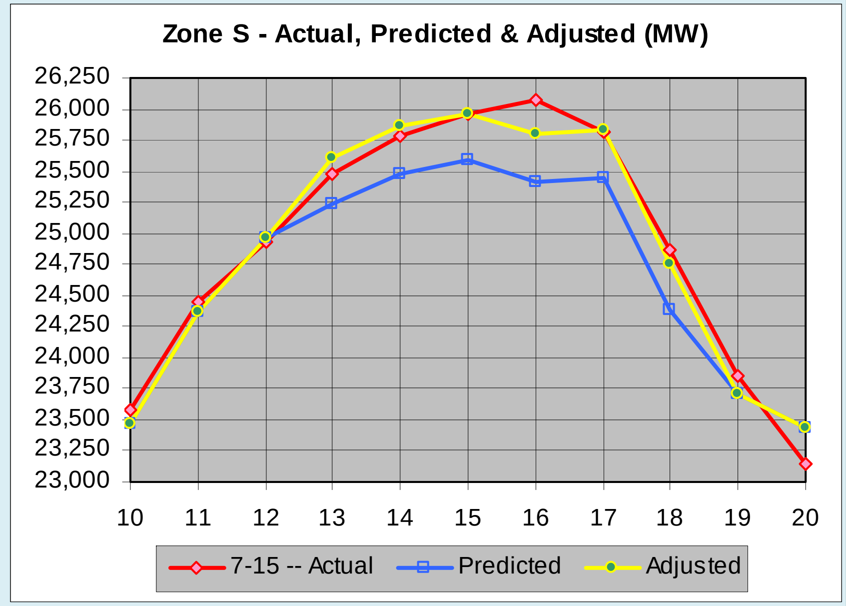
7-25 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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25,250
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23,750
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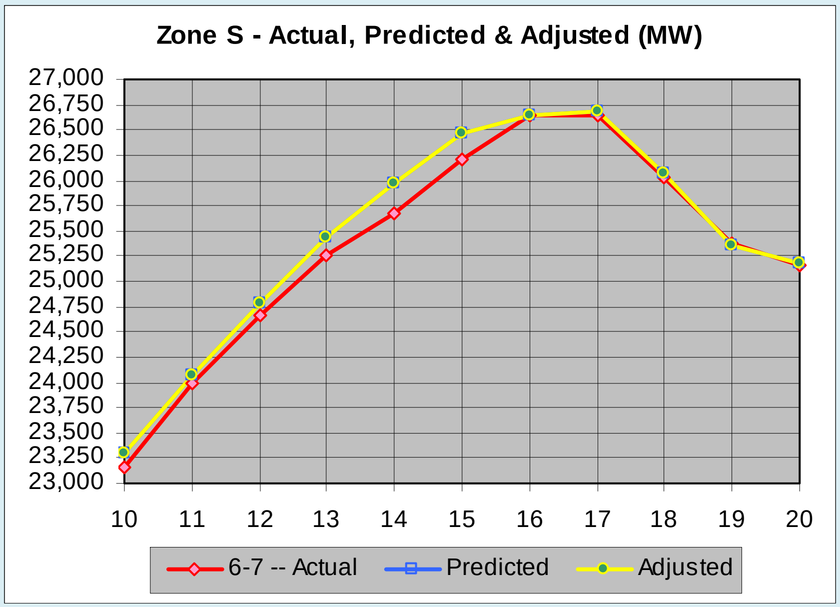
23,250
23,000
10 11 12 13 14 15 16 17 18 19 20
7-15 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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26,250
26,000
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25,250
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24,750
24,500
24,250
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23,750
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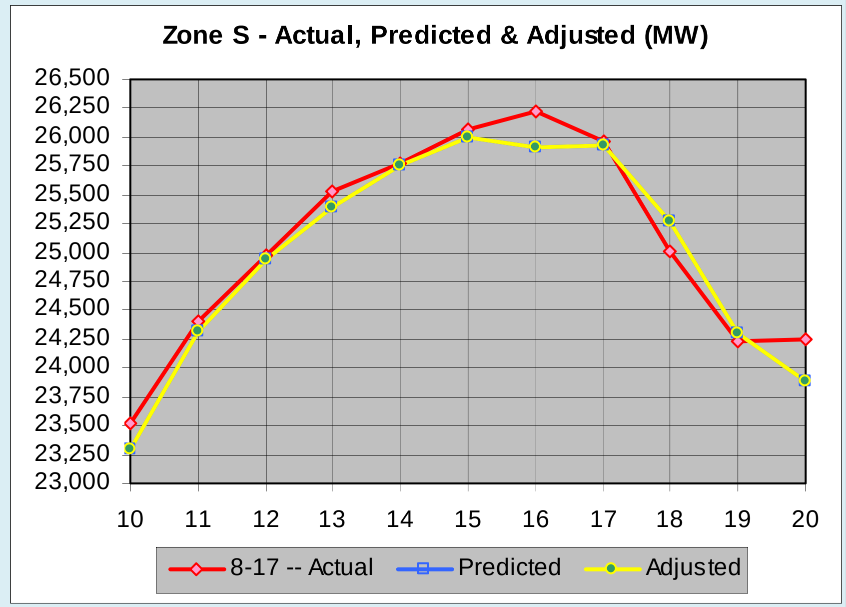
23,250
23,000
10 11 12 13 14 15 16 17 18 19 20
6-7 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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25,750
25,500
25,250
25,000
24,750
24,500
24,250
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23,750
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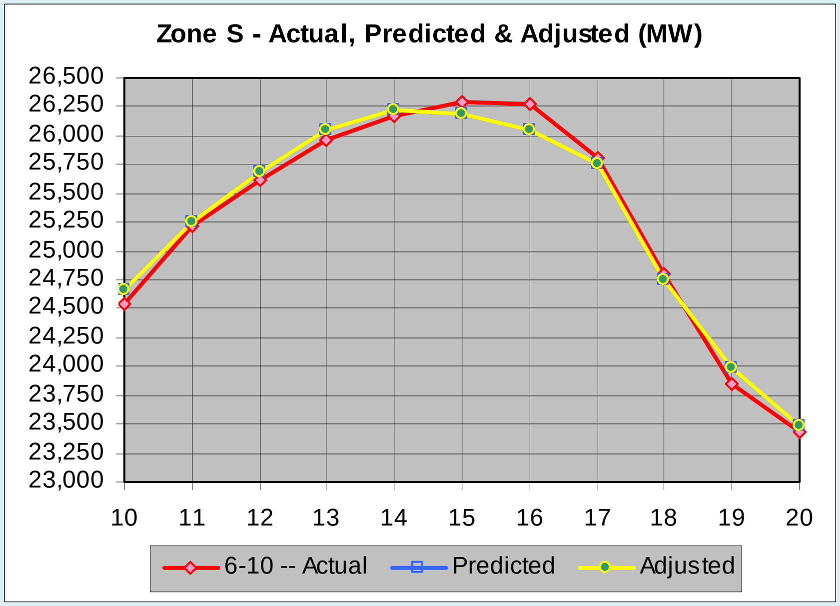
23,000
10 11 12 13 14 15 16 17 18 19 20
8-17 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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25,750
25,500
25,250
25,000
24,750
24,500
24,250
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23,750
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23,250
23,000
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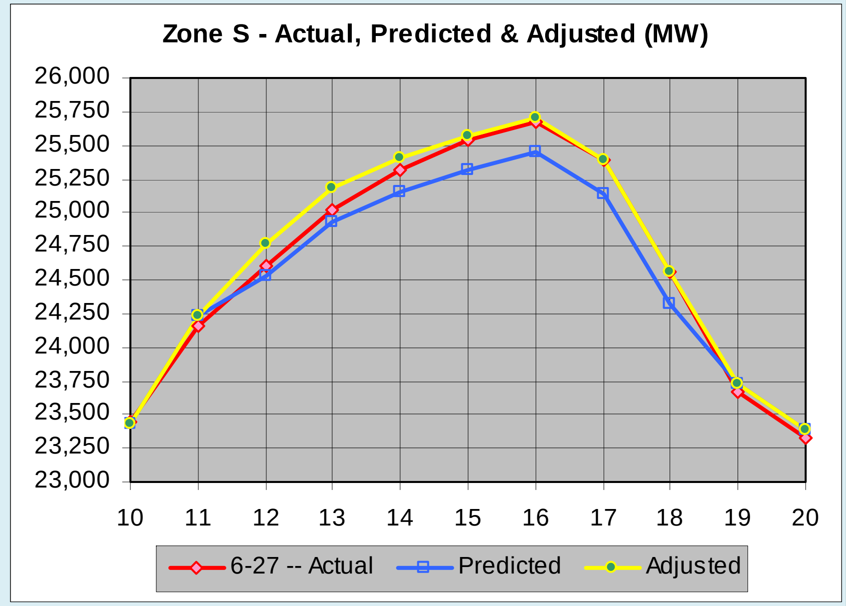
6-10 -- Actual
Predicted
Adjusted

Zone S - Actual, Predicted & Adjusted (MW)
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25,250
25,000
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24,500
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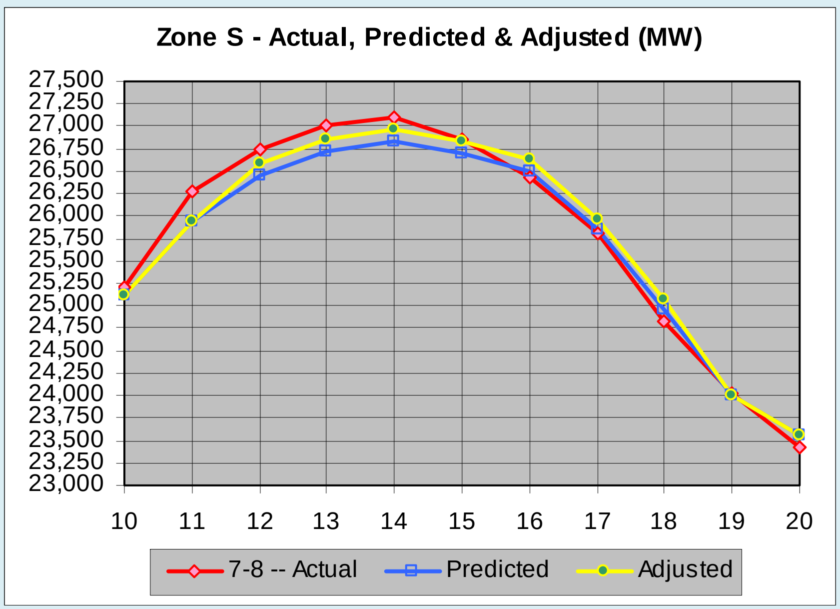
23,750
23,500
23,250
23,000
10 11 12 13 14 15 16 17 18 19 20
6-27 -- Actual
Predicted
Adjusted

Zone S - Actual, Predicted & Adjusted (MW)
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27,000
26,750
26,500
26,250
26,000
25,750
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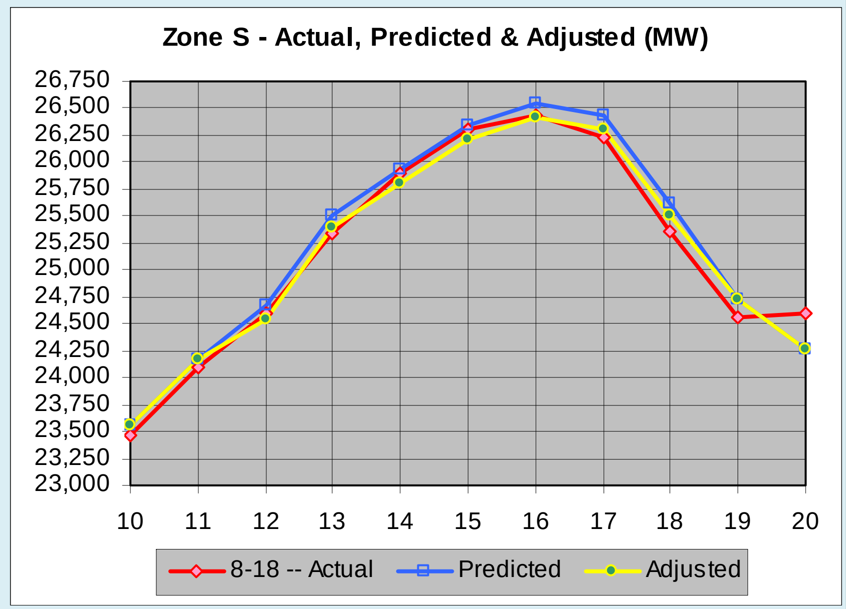
25,250
25,000
24,750
24,500
24,250
24,000
23,750
23,500
23,250
23,000
10 11 12 13 14 15 16 17 18 19 20
7-8 -- Actual
Predicted
Adjusted

Zone S - Actual, Predicted & Adjusted (MW)
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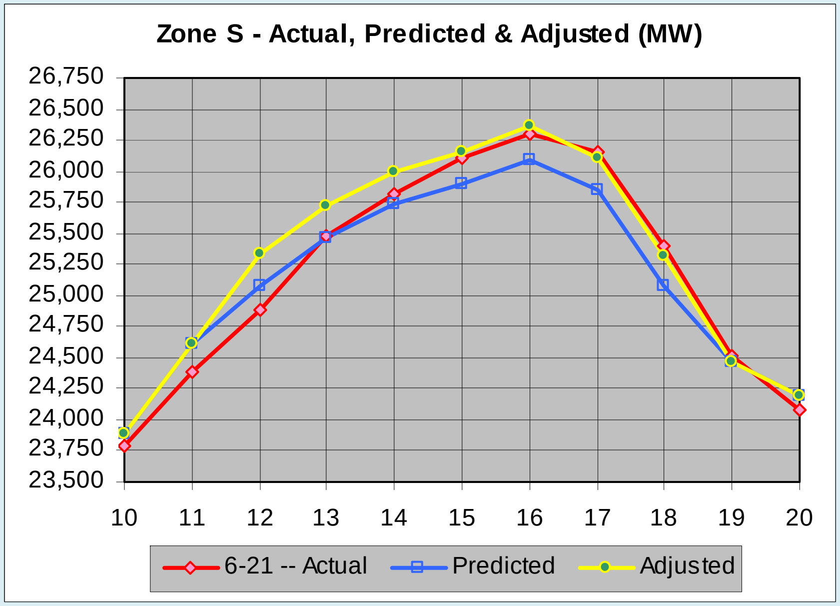
26,250
26,000
25,750
25,500
25,250
25,000
24,750
24,500
24,250
24,000
23,750
23,500
23,250
23,000
10 11 12 13 14 15 16 17 18 19 20
8-18 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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26,000
25,750
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25,250
25,000
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24,500
24,250
24,000
23,750
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11
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13
14
15
16
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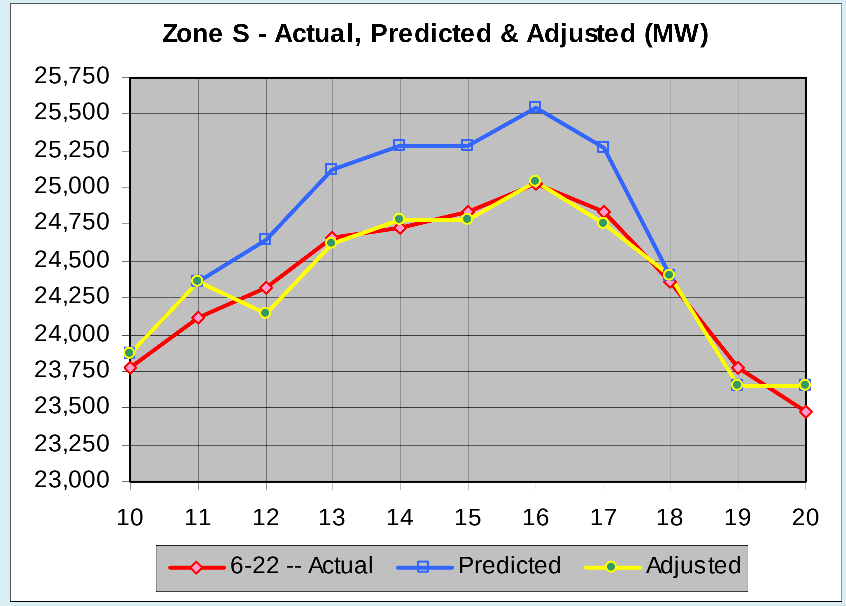
18
19
20
6-21 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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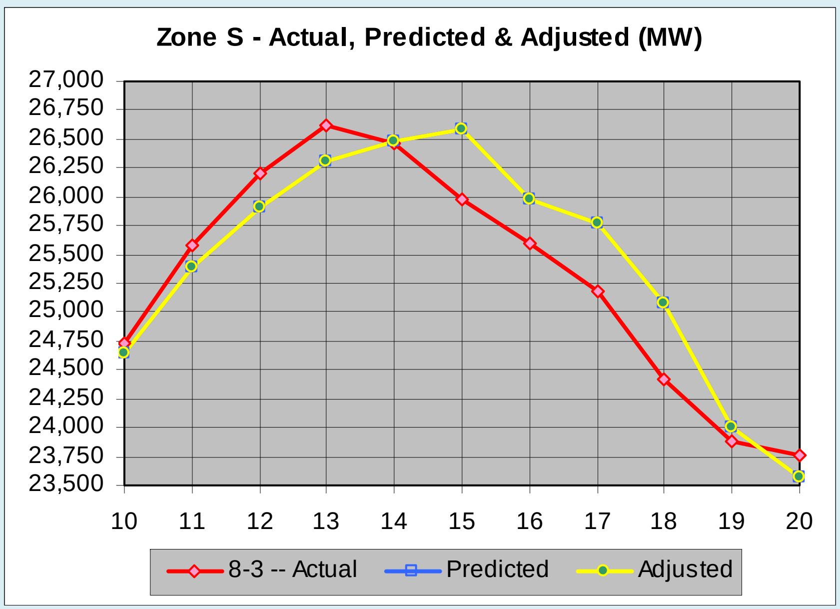
25,250
25,000
24,750
24,500
24,250
24,000
23,750
23,500
23,250
23,000
10
11
12
13
14
15
16
17
18
19
20
6-22 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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26,500
26,250
26,000
25,750
25,500
25,250
25,000
24,750
24,500
24,250
24,000
23,750
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10
11
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13
14
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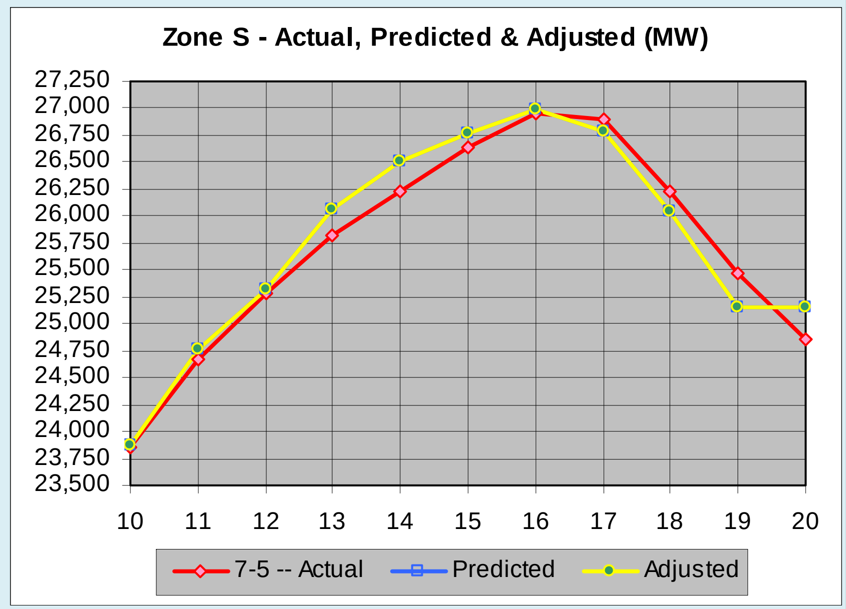
16
17
18
19
20
8-3 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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26,750
26,500
26,250
26,000
25,750
25,500
25,250
25,000
24,750
24,500
24,250
24,000
23,750
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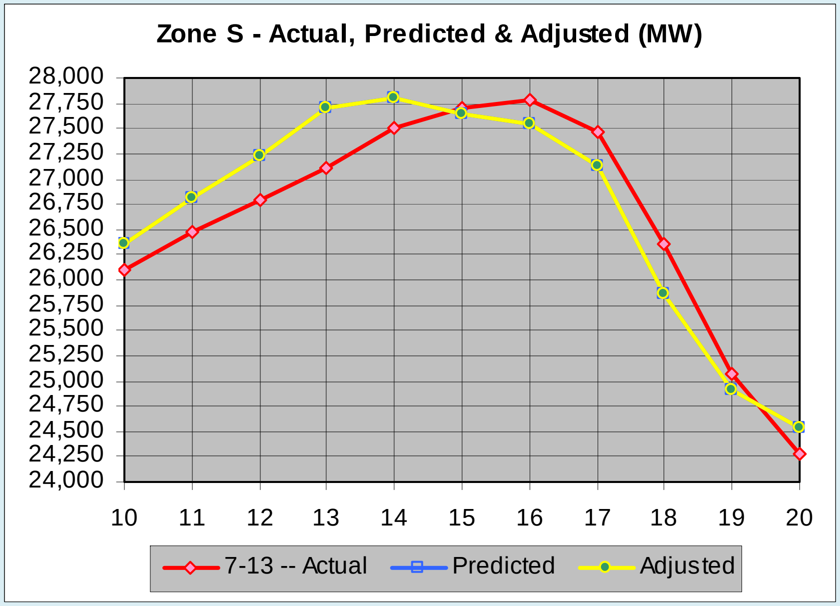
10
11
12
13
14
15
16
17
18
19
20
7-5 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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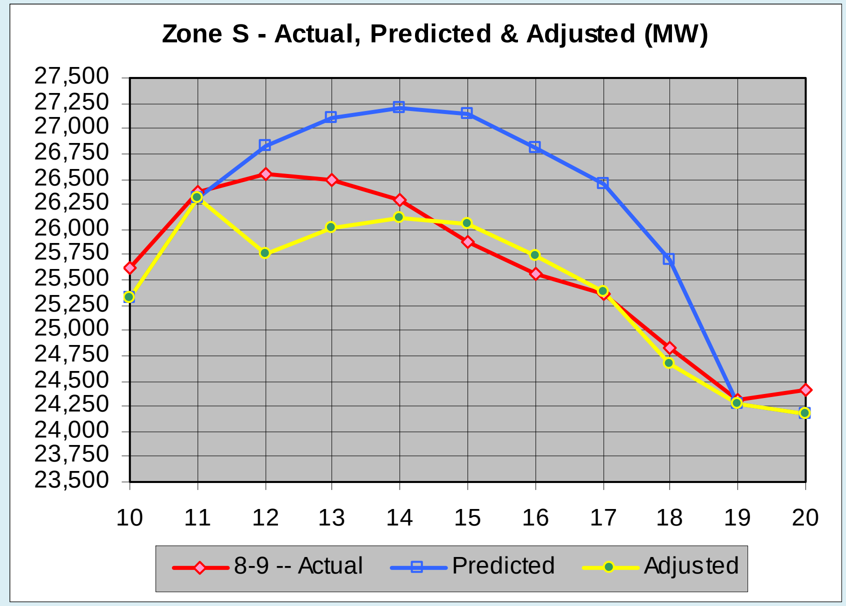
27,500
27,250
27,000
26,750
26,500
26,250
26,000
25,750
25,500
25,250
25,000
24,750
24,500
24,250
24,000
10 11 12 13 14 15 16 17 18 19 20
7-13 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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26,750
26,500
26,250
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25,750
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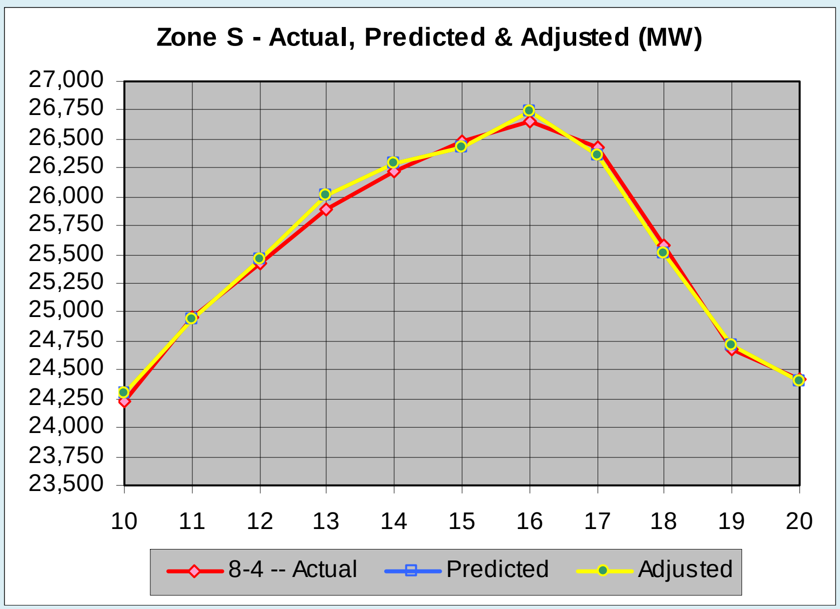
25,250
25,000
24,750
24,500
24,250
24,000
23,750
23,500
10 11 12 13 14 15 16 17 18 19 20
8-9 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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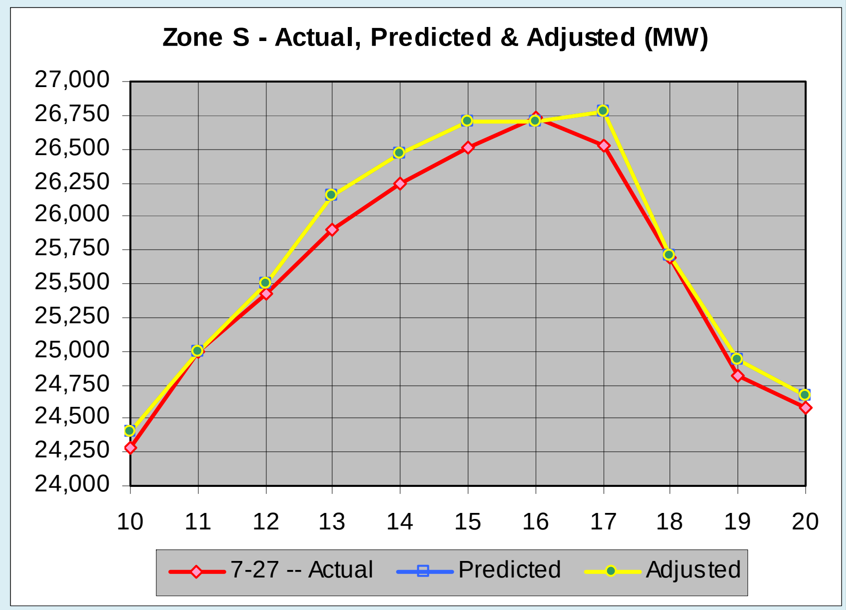
26,000
25,750
25,500
25,250
25,000
24,750
24,500
24,250
24,000
23,750
23,500
10 11 12 13 14 15 16 17 18 19 20
8-4 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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26,250
26,000
25,750
25,500
25,250
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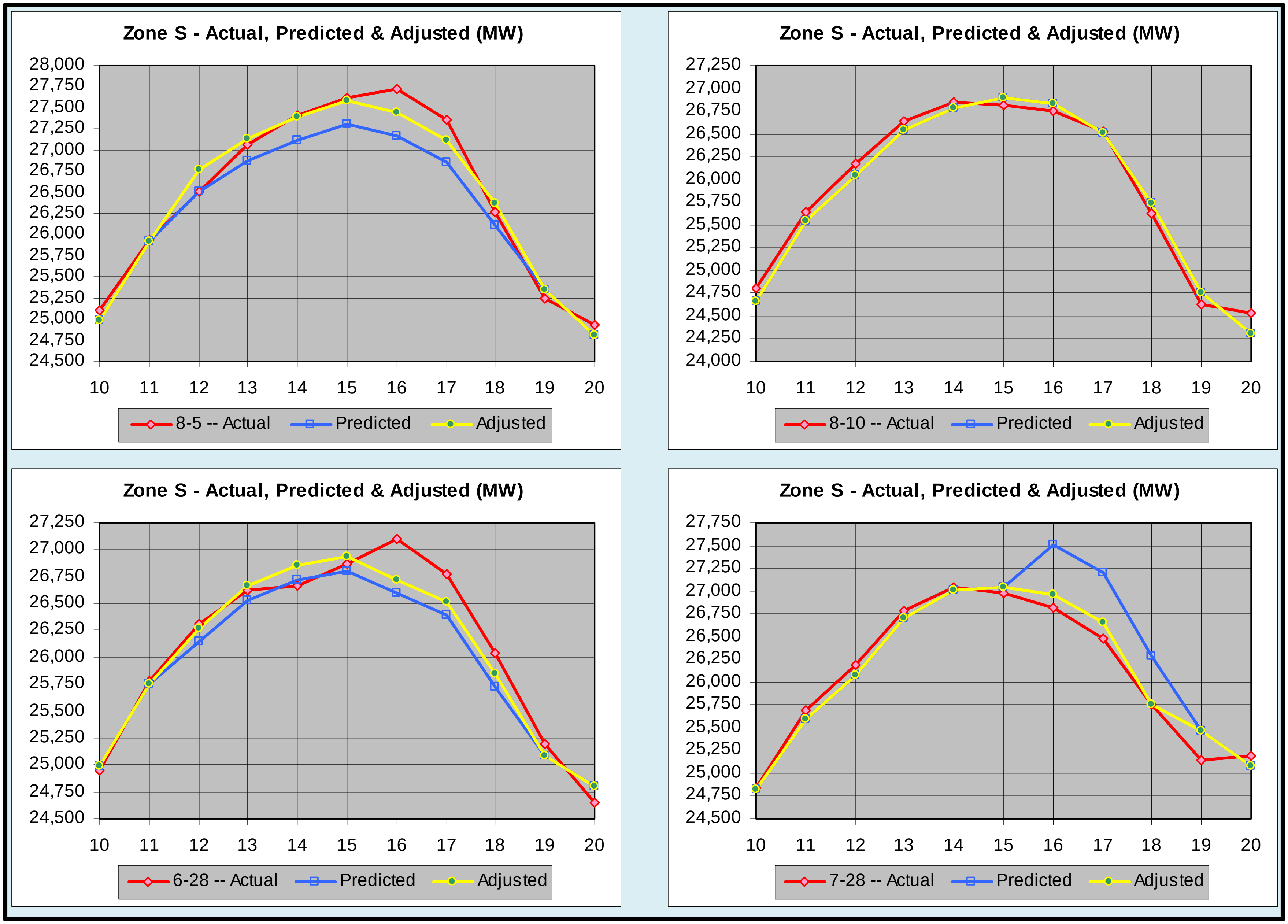
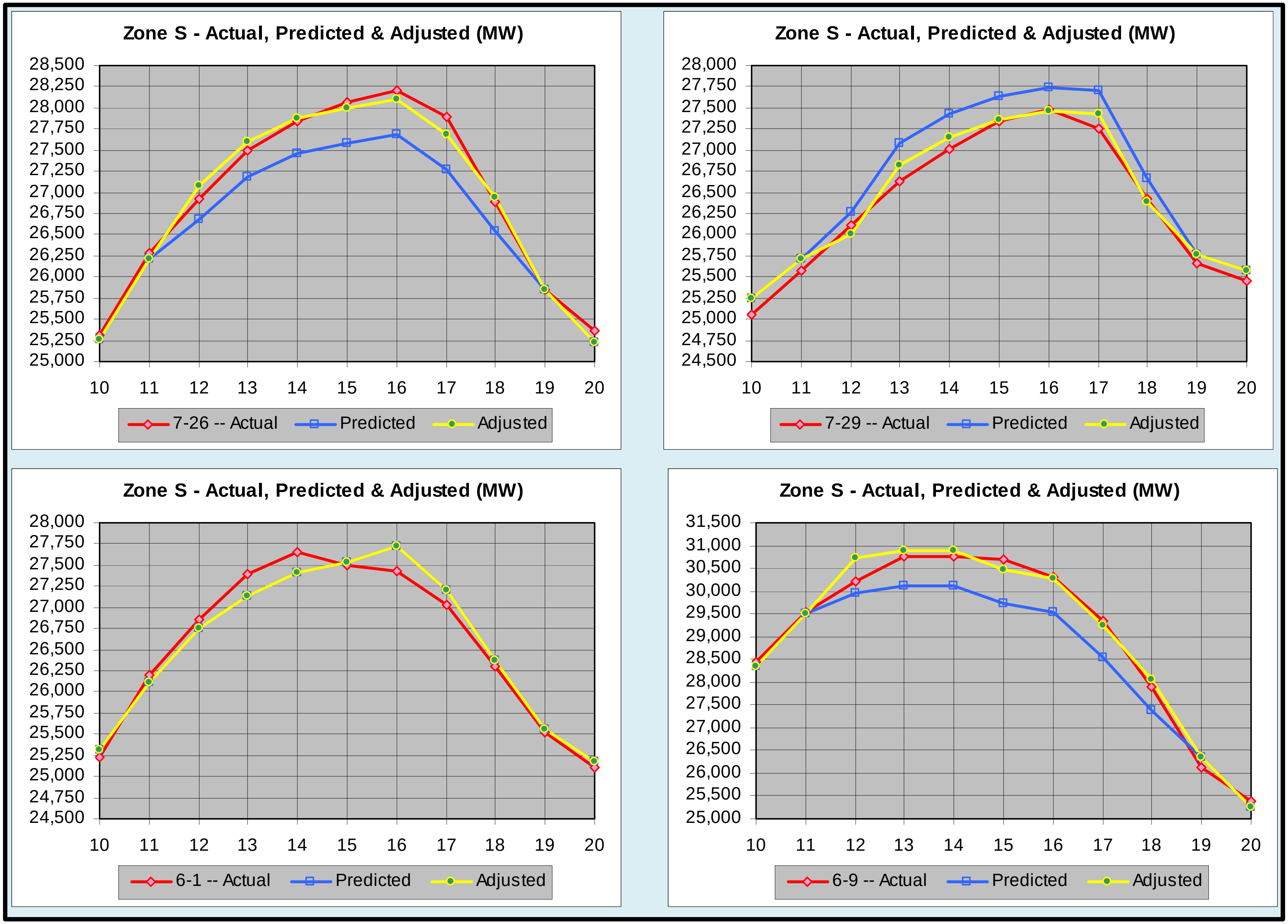
24,750
24,500
24,250
24,000
10 11 12 13 14 15 16 17 18 19 20
7-27 -- Actual
Predicted
Adjusted



Zone S - Actual, Predicted & Adjusted (MW)
8-5 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
8-10 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
6-28 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
7-28 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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27,750
27,500
27,250
27,000
26,750
26,500
26,250
26,000
25,750
25,500
25,250
25,000
10 11 12 13 14 15 16 17 18 19 20
7-26 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
28,000
27,750
27,500
27,250
27,000
26,750
26,500
26,250
26,000
25,750
25,500
25,250
25,000
24,750
24,500
10 11 12 13 14 15 16 17 18 19 20
7-29 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
28,000
27,750
27,500
27,250
27,000
26,750
26,500
26,250
26,000
25,750
25,500
25,250
25,000
24,750
24,500
10 11 12 13 14 15 16 17 18 19 20
6-1 -- Actual
Predicted
Adjusted
Zone S - Actual, Predicted & Adjusted (MW)
31,500
31,000
30,500
30,000
29,500
29,000
28,500
28,000
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26,500
26,000
25,500
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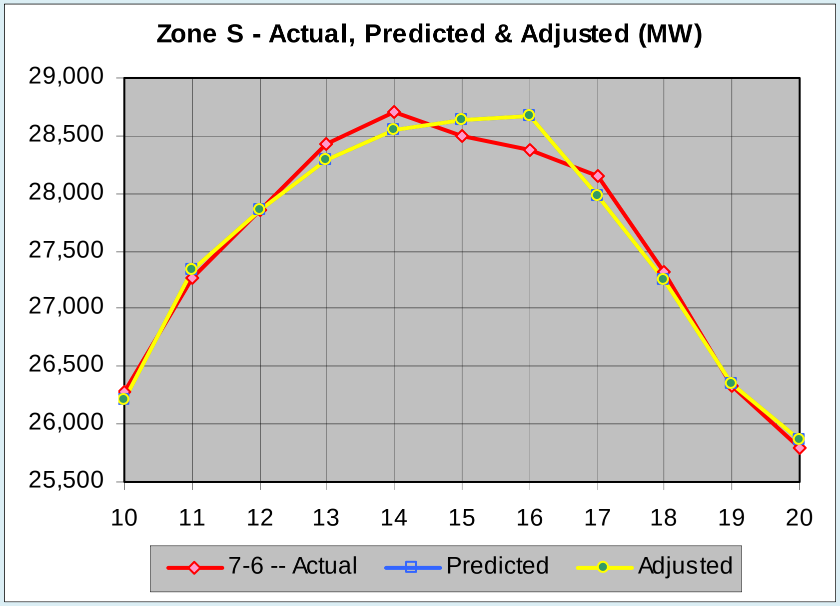
10 11 12 13 14 15 16 17 18 19 20
6-9 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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27,000
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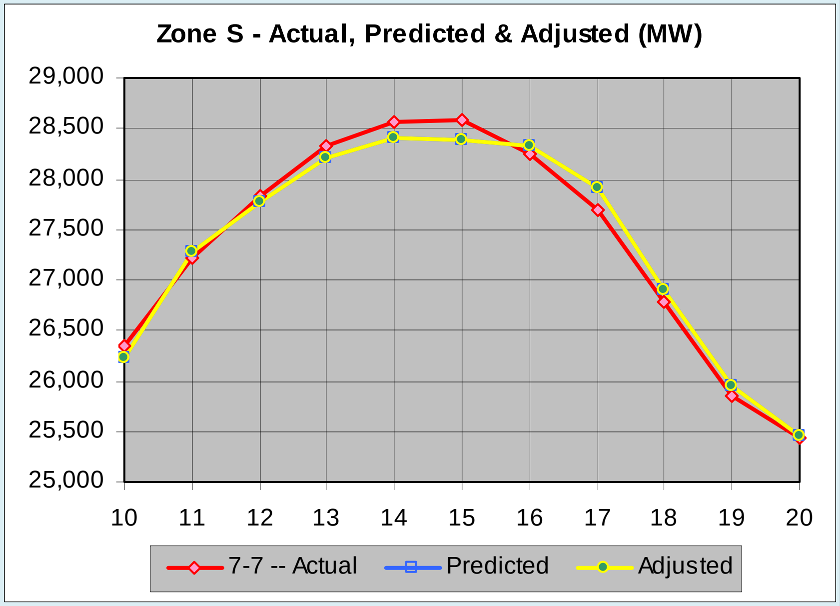
26,000
25,500
10 11 12 13 14 15 16 17 18 19 20
7-6 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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28,000
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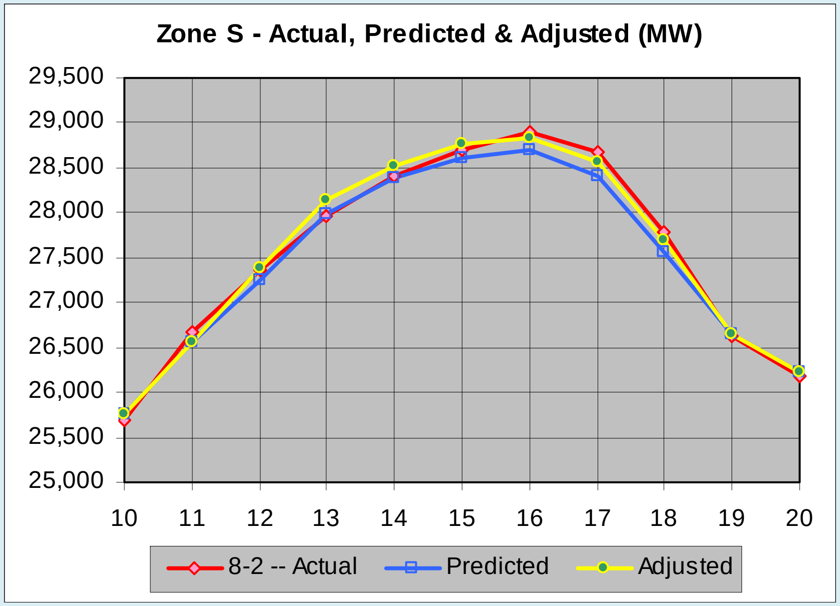
26,000
25,500
25,000
10 11 12 13 14 15 16 17 18 19 20
7-7 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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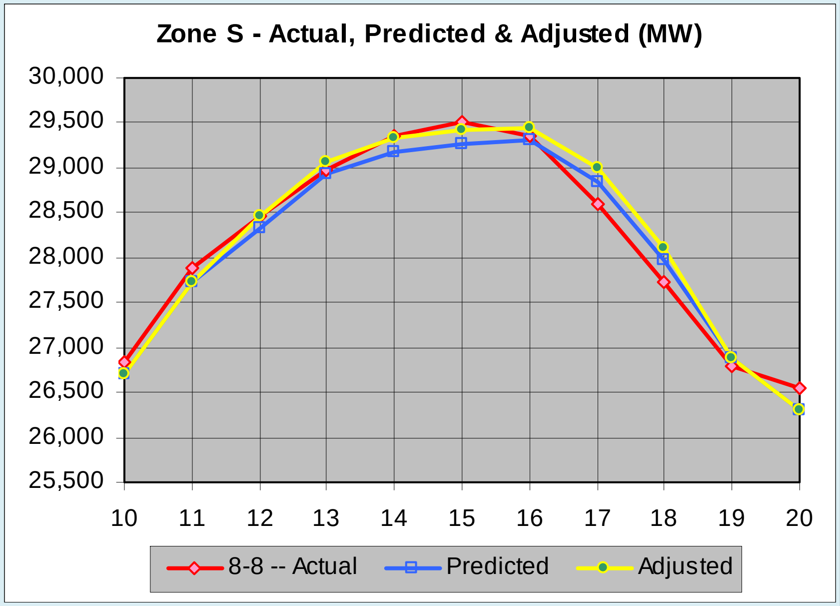
25,000
10 11 12 13 14 15 16 17 18 19 20
8-2 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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29,000
28,500
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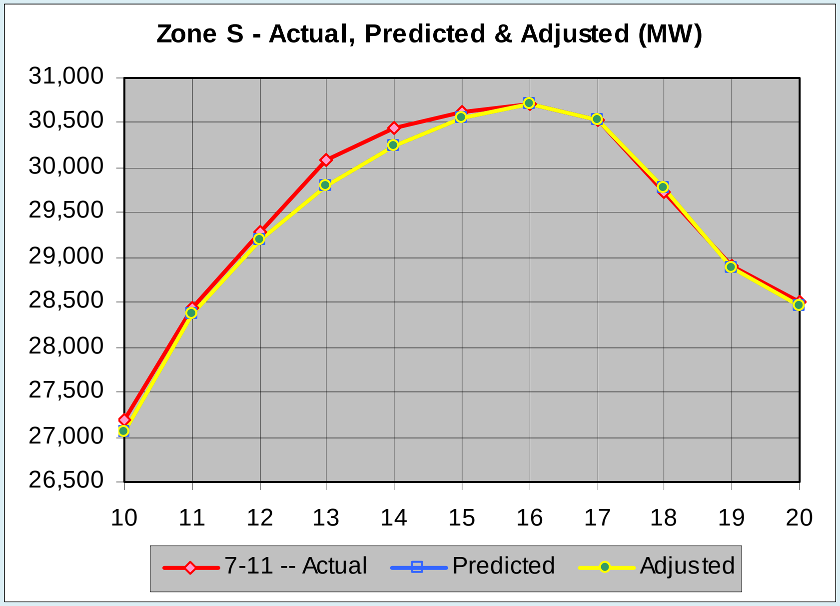
10 11 12 13 14 15 16 17 18 19 20
8-8 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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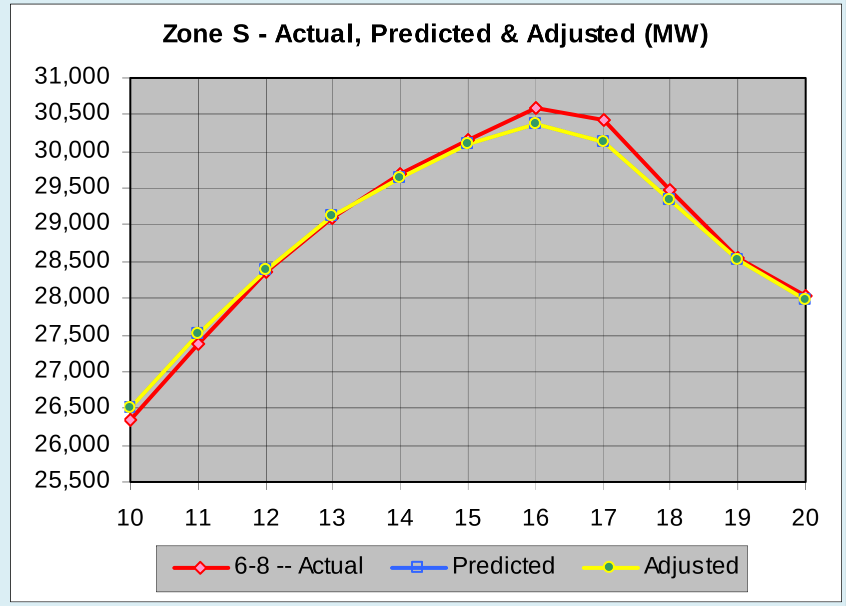
20
7-11 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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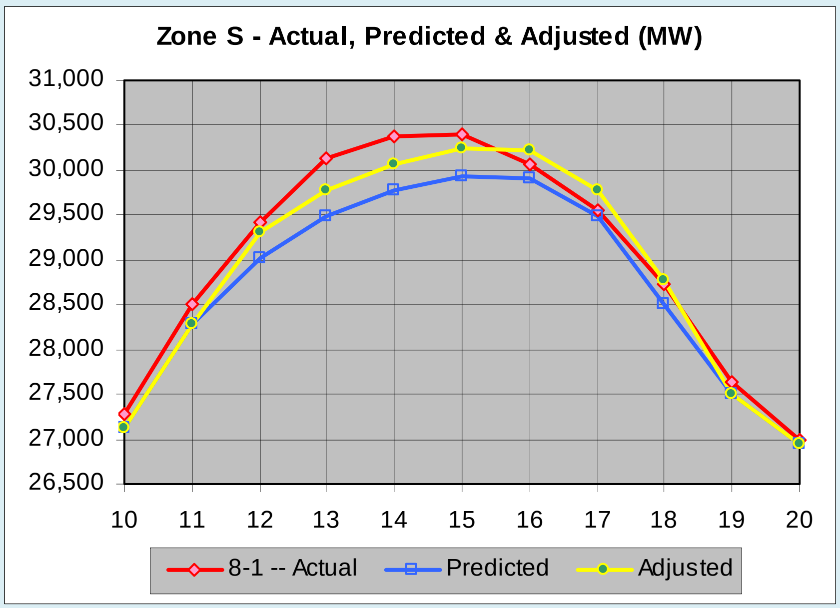
18
19
20
6-8 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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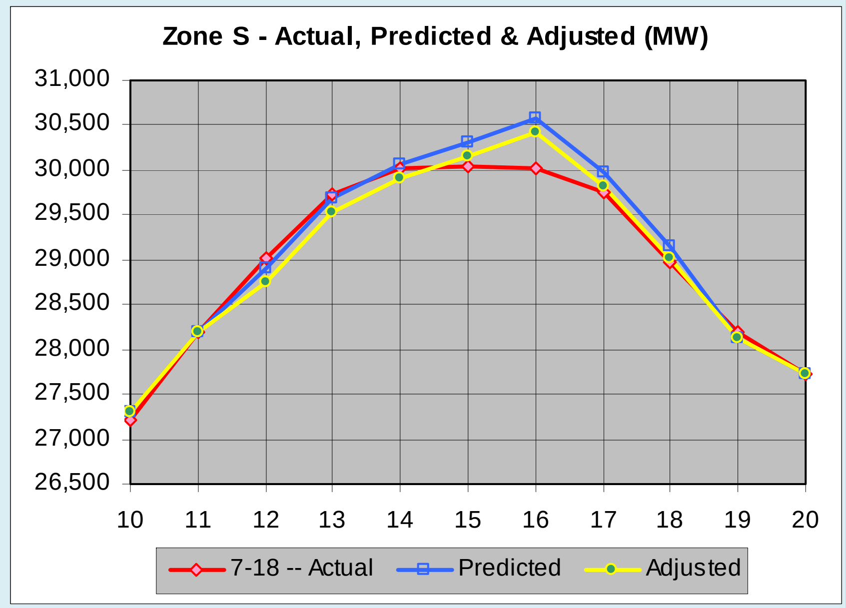
19
20
8-1 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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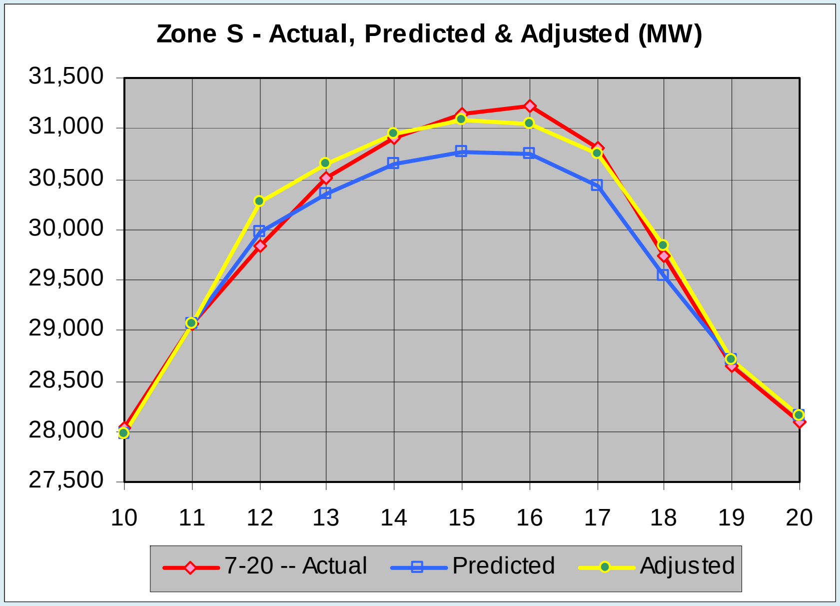
20
7-18 -- Actual
Predicted
Adjusted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30,000
29,500
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14
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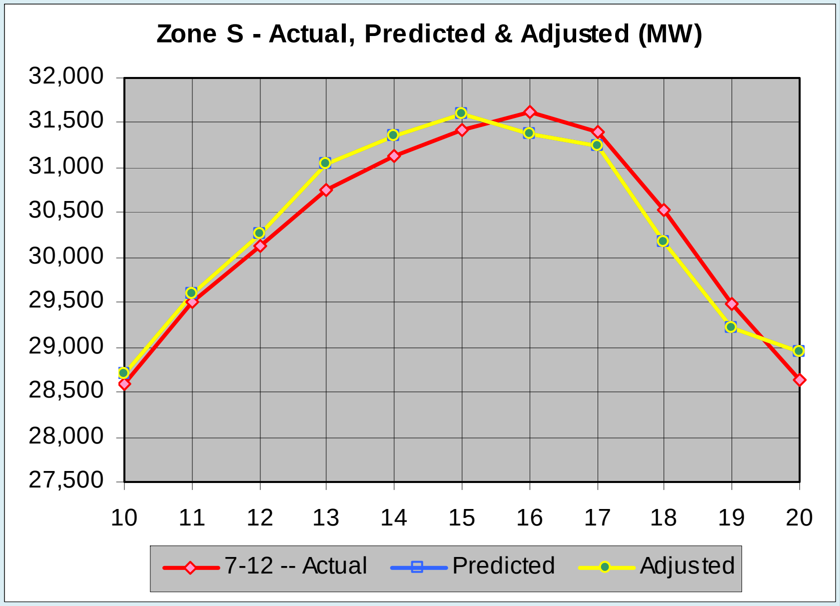
20
7-20 -- Actual
Predicted
Adjusted


Zone S - Actual, Predicted & Adjusted (MW)
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30,000
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27,500
10
11
12
13
14
15
16
17
18
19
20
7-12 -- Actual
Predicted
Adjusted