

A Day in the Life of a Large Thermostat Program

Demand Response Event Operations & Device Testing

Agenda

Overview

- NV Energy Highlights
- Demand Response Portfolio

Demand Side Management Engineering

- Device Testing / Certification Matrix
- Thermostat Offset Profiles

Demand Side Management Operations

- 2015 Event Statistics
- Event Types
- Event Forecasting

Overview

Demand Response

NV Energy

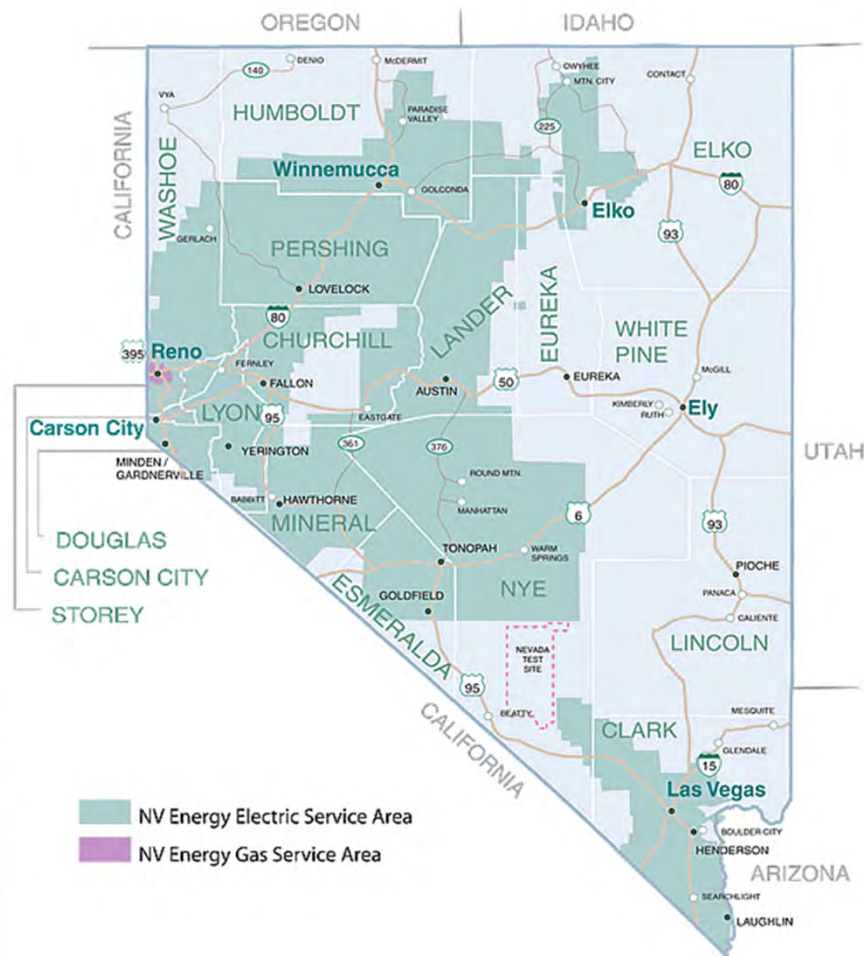
- IOU / Vertically Integrated
- State Commission Regulated
- 1.2 M Electric Customers
- 93% of Nevadans Served
- Peak Demand: 7,609 MW
 - South: 5,866 MW Peak Demand
 - North: 1,743 MW Peak Demand

Smart Grid Efforts

- Statewide AMI Deployment
- Sensus / Smart Meters
- Itron / Meter Data Management
- Aclara / Web Portal
- IBM / SOA

Demand Response Efforts

- ~200 MW Statewide
- ~2.5% of Peak
- Alstom (UISOL) DRMS
- HAN / OpenADR Deployment



Demand Response Portfolio

Distributed Energy Resources Portfolio

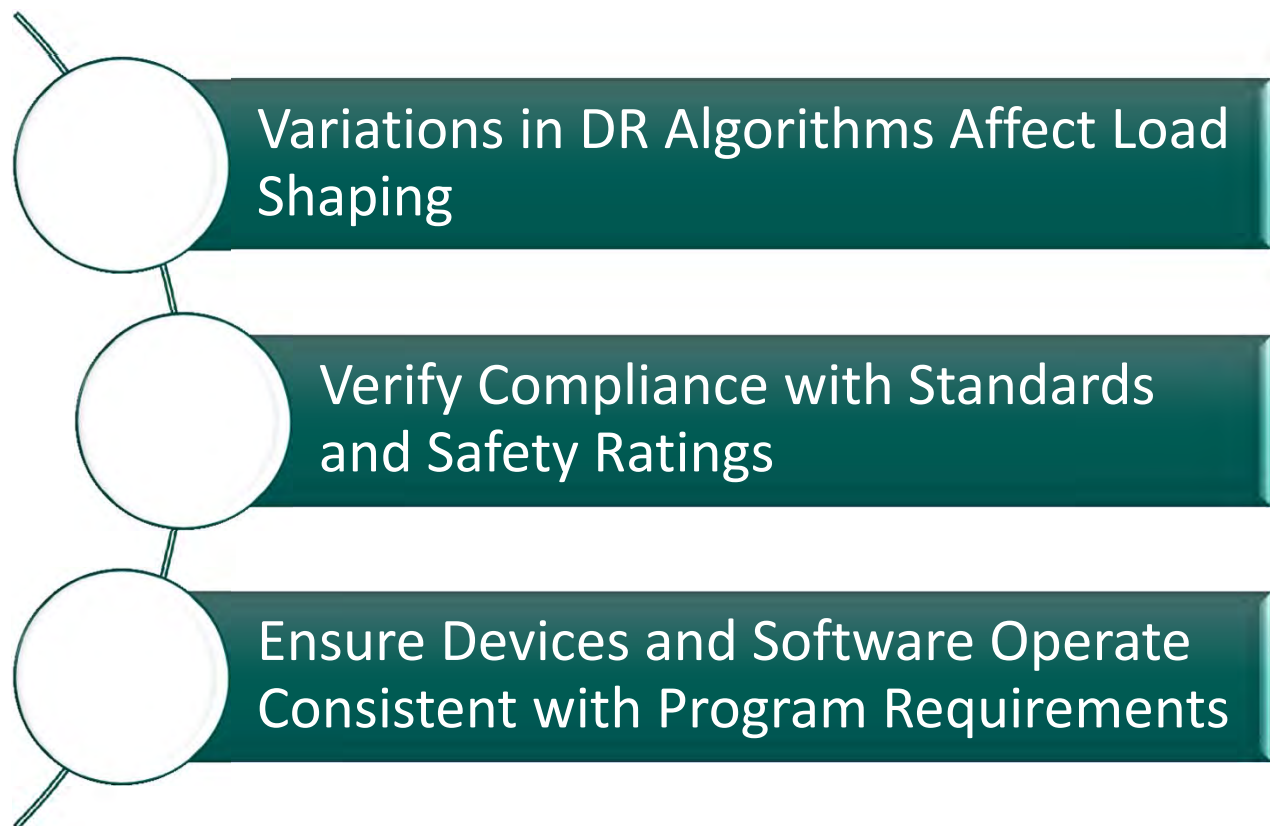
mPowered Residential	<ul style="list-style-type: none">• Deploy Advanced iDSM Home Area Network (HAN) solution• 40 MW Target in 2014 & 115 MW total IRP target• 44MW Installed across 15k Customers
Cool Share Residential/Small Commercial	<ul style="list-style-type: none">• Programmable Communicating Thermostats (Paging)• 140 MW across 70k Customers
IS-2 Agricultural	<ul style="list-style-type: none">• Emergency DR at Sierra / Irrigation Pump Control• 35 MW across 800 Customers
Commercial Programs	<ul style="list-style-type: none">• Energy Efficiency & Demand Response control integrated with a C&I Building Management System• 25 MW Target in 2014 & 75 MW total IRP target• 1.2MW installed
Industrial	<ul style="list-style-type: none">• Industrial load reduction pilot to demonstrate fast DR and Operating Reserve strategies
Distributed Energy Resources	<ul style="list-style-type: none">• Residential Energy Storage (Villa Trieste Pilot)• Net metering of homes with renewable generation• Reduce whole house daily peak consumption
Agricultural Pilot	<ul style="list-style-type: none">• Agricultural irrigation pivot load control pilot

Total Available DR Capacity: ~ 200MW

Demand Side Management Engineering

Device Testing & System Evaluation

Importance of Testing





Device Testing Process

Lab Testing

- Validates base functionality and compliance with program requirements

Field Testing

- Demonstration of technology with real loads
- Actual load reduction and energy savings data collection

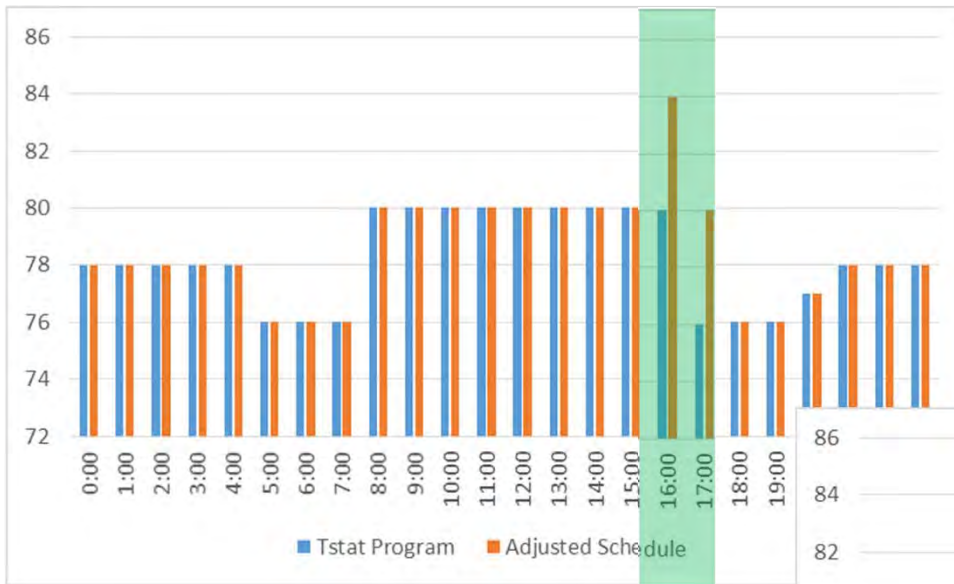
Testing Evaluation

- Preliminary cost effectiveness evaluation
- Potential Production Program Recommendations

Certification Matrix

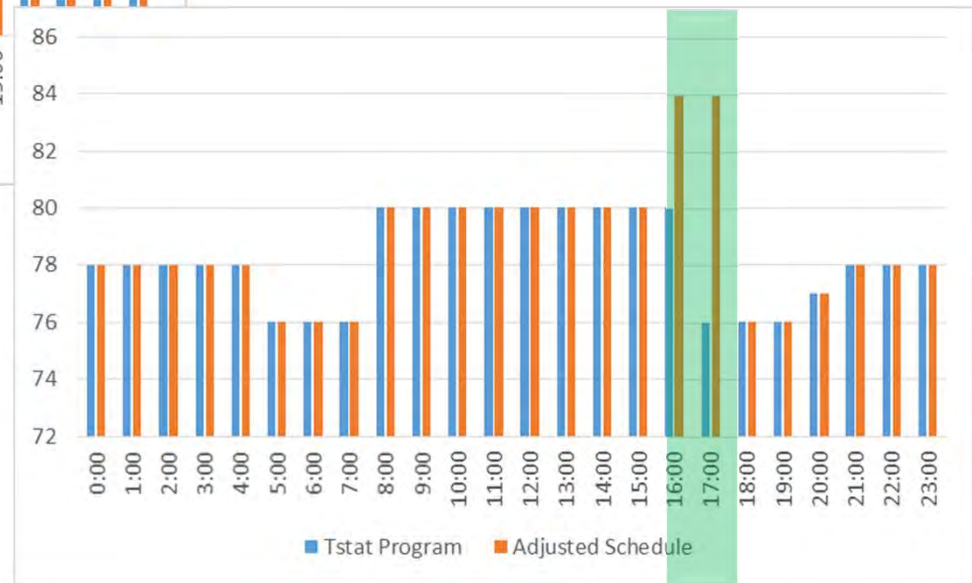
TECHNOLOGY CERTIFICATION MATRIX			
Testing Categories	Test Cases		Total
	Required	Optional	
Upon Receipt of Hardware	8	1	9
Thermostat Functionality	13	3	16
Demand Response Functionality of Thermostat	17	11	28
Energy Efficiency Functionality of Thermostat	1	4	5
External Customer Web Portal GUI	9	6	15
Utility Web Portal GUI	9	1	10
Measurement and Verification Data	9	0	9
Gateway Functionality	13	2	15
Headend Server Internet Communications	9	2	11
Safety & Compliance	2	0	2
IHD Functionality	10	0	10
DCU Functionality	7	2	9
Demand Response Functionality of Cycling Switch (DCU)	13	4	17
Wireless Communication Range Extenders	16	0	16
Sensus Smart Meter Collar	5	1	6
TOTAL			178

Thermostat Offset Variations

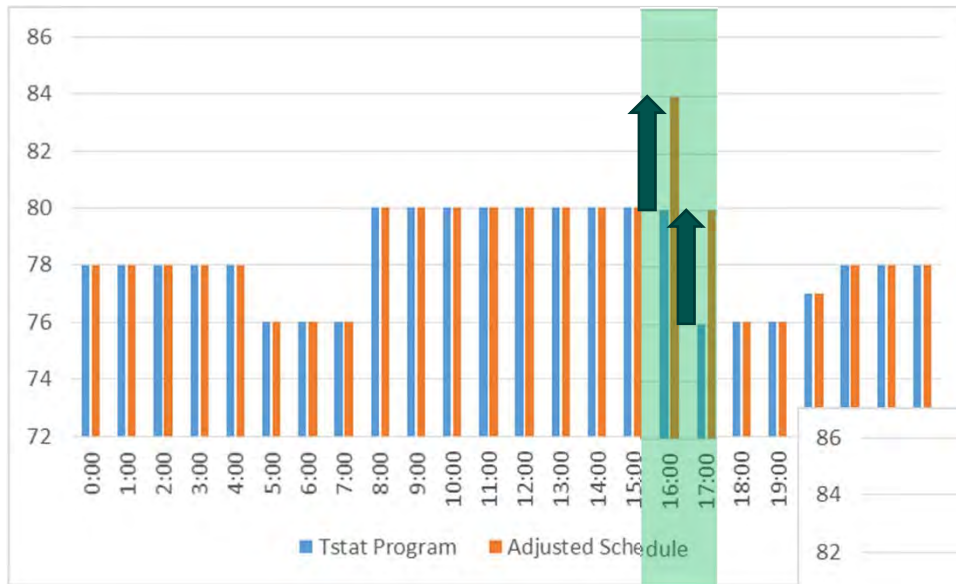


4-Degree Offset:
No Pre-Cooling
Holds Start of Event Offset

4-Degree Offset:
No Pre-Cooling
Follows Program

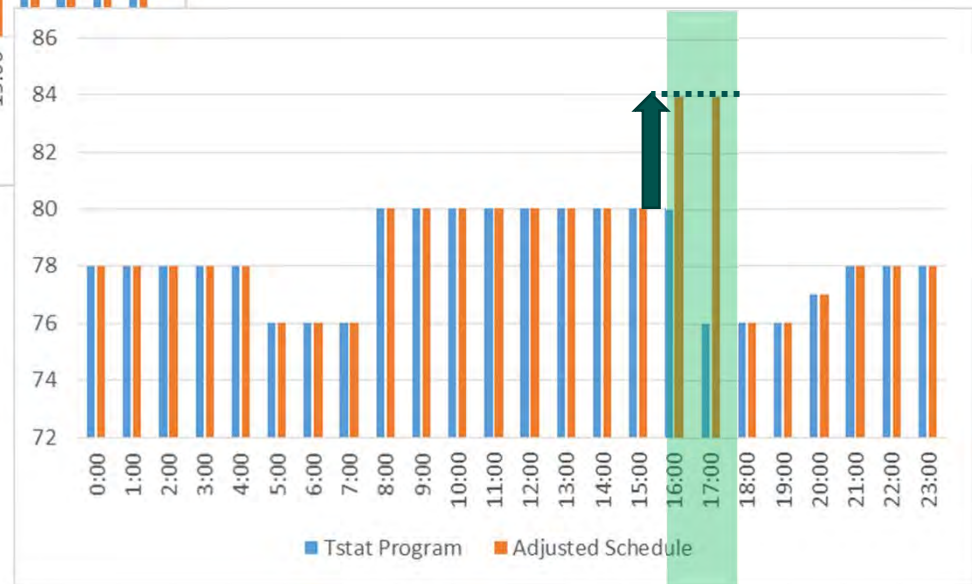


Thermostat Offset Variations

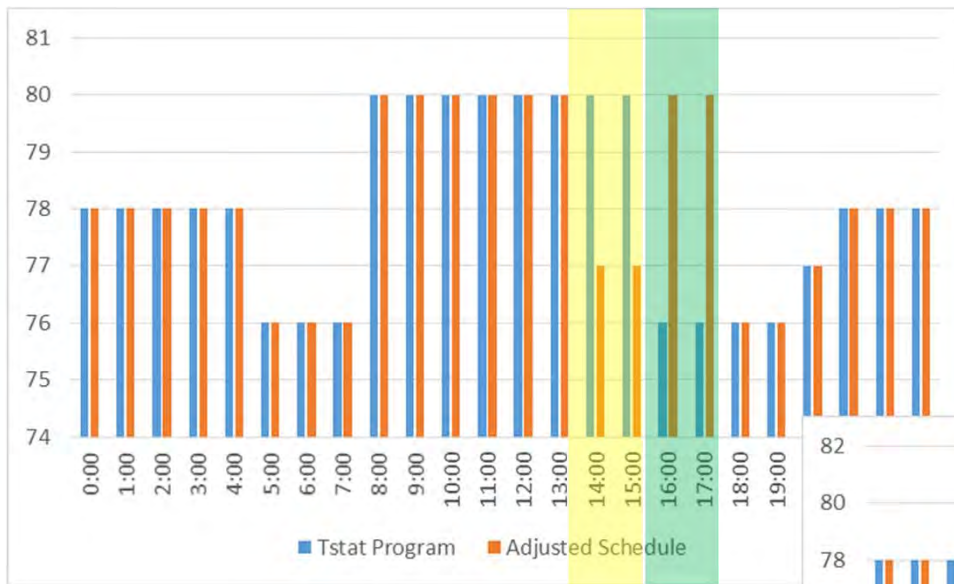


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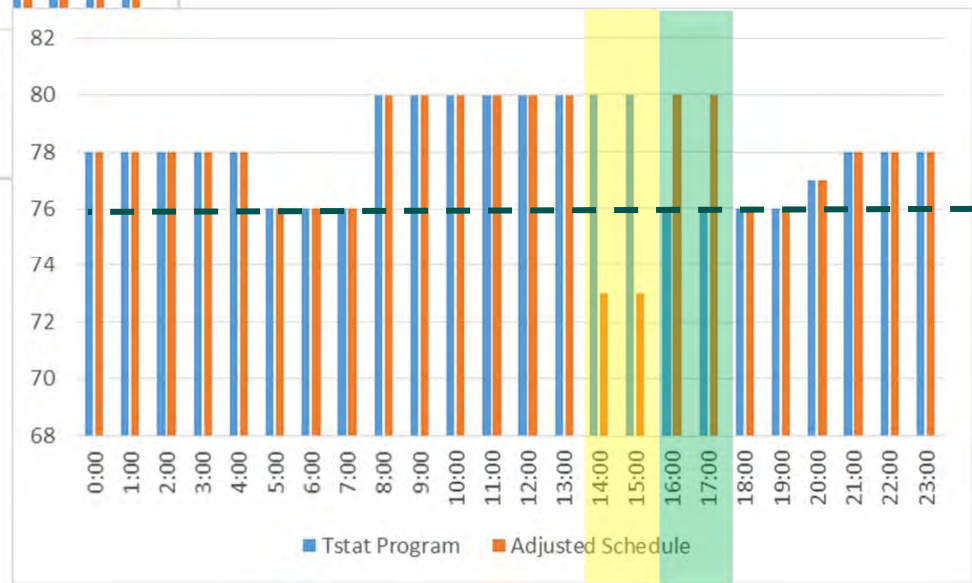


Thermostat Offset Variations

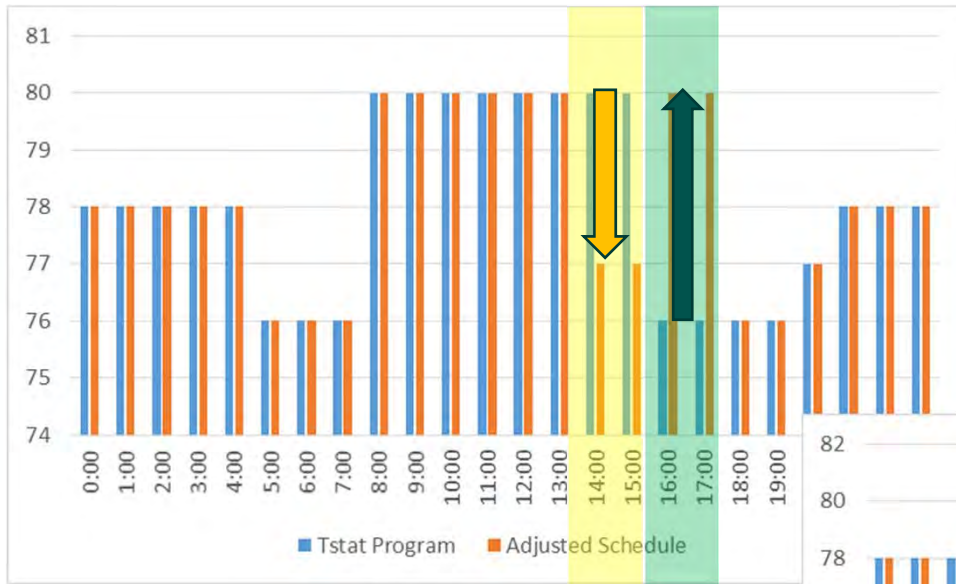


4-Degree Offset:
With Pre-cooling
Based on Reference Setpoint

4-Degree Offset:
With Pre-cooling
Follows Program

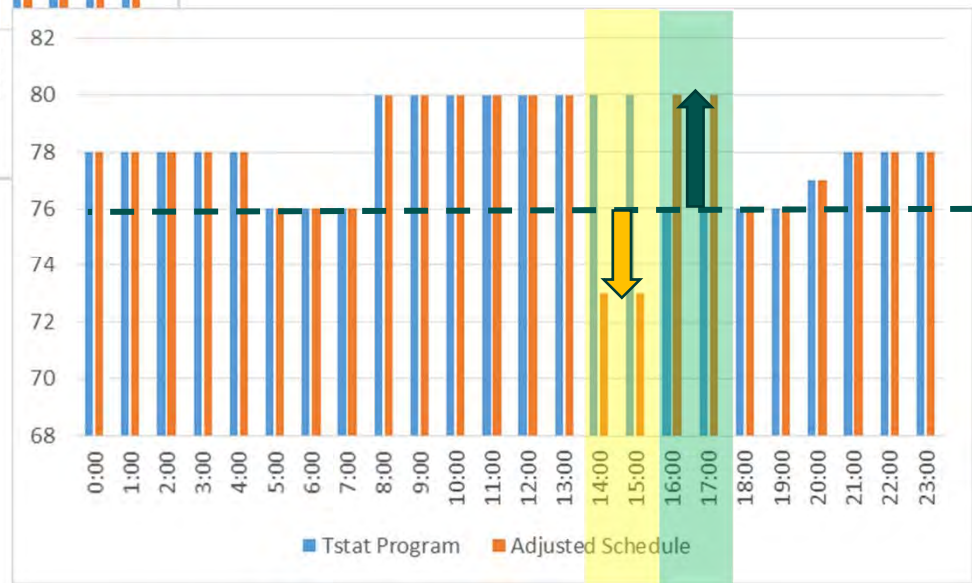


Thermostat Offset Variations



4-Degree Offset:
With Pre-cooling
Based on Reference Setpoint

4-Degree Offset:
With Pre-cooling
Follows Program



Testing Statistics

TESTING STATISTICS (1st ATTEMPT)			
Device Type	# Test Cases	Passed Test Cases (Avg)	% Passed (Avg)
Thermostat-IHD	101	85	84.20%
Thermostat Non-IHD	91	77	84.60%
DCU Switch	65	56	86.20%
In Home Display	71	59	83.10%
Wireless Repeater	32	29	90.60%
Wireless Gateway	146	126	86.30%
TOTAL			85.83%

Demand Side Management Operations

Demand Response Events

Core Functions

System Testing

- Pre-Season Testing
- Daily Testing
- Post Season Testing

Operations Training

- Power Traders, Balancing Authority, Distribution Operations

Event Forecasting & Planning

- Strategy Creation
- Event Optimization

Event Management

- Real-Time Monitoring, Troubleshooting, & Reporting

2015 Event Statistics

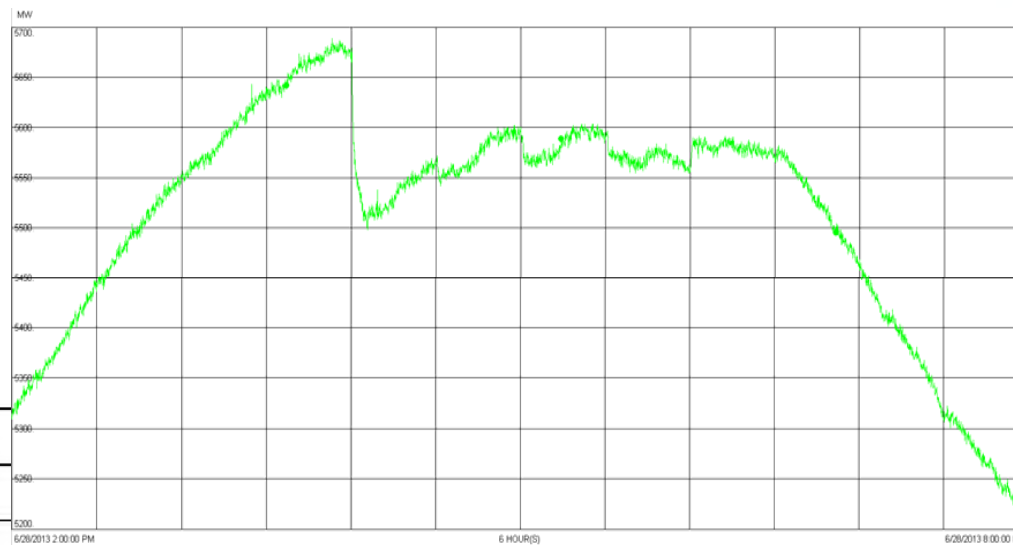
2015 EVENT STATISTICS		
	# Hours	# Events
NV Energy South		
Residential Events	80	40
Commercial Events	46	23
NV Energy North		
Residential Events	40	20
Agricultural Event	43	11
Commercial Events	8	4

Event Types

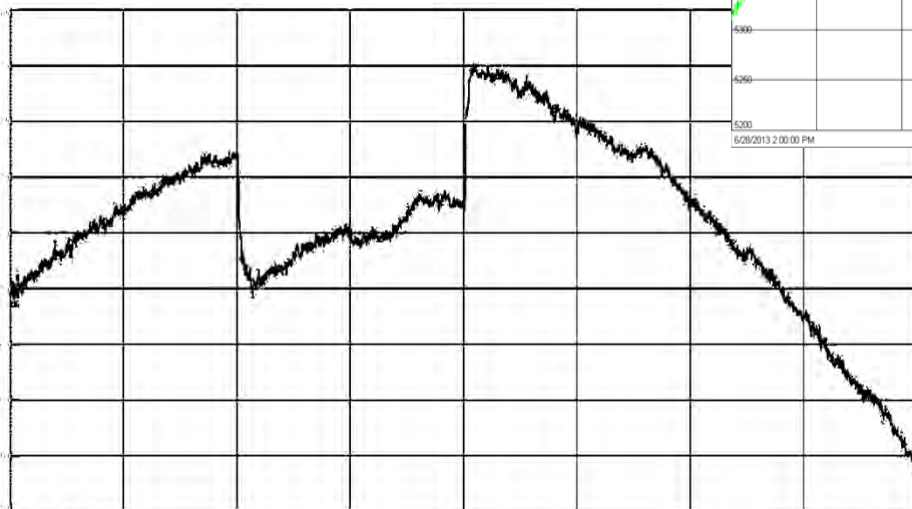


Emergency Events

Emergency Event With Optimization

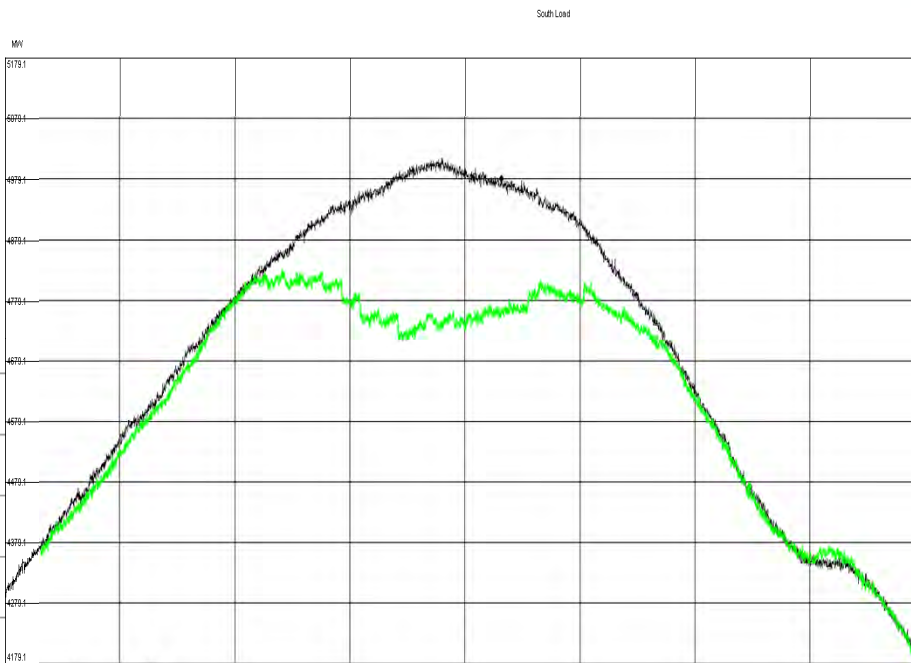


Emergency Event Without Optimization

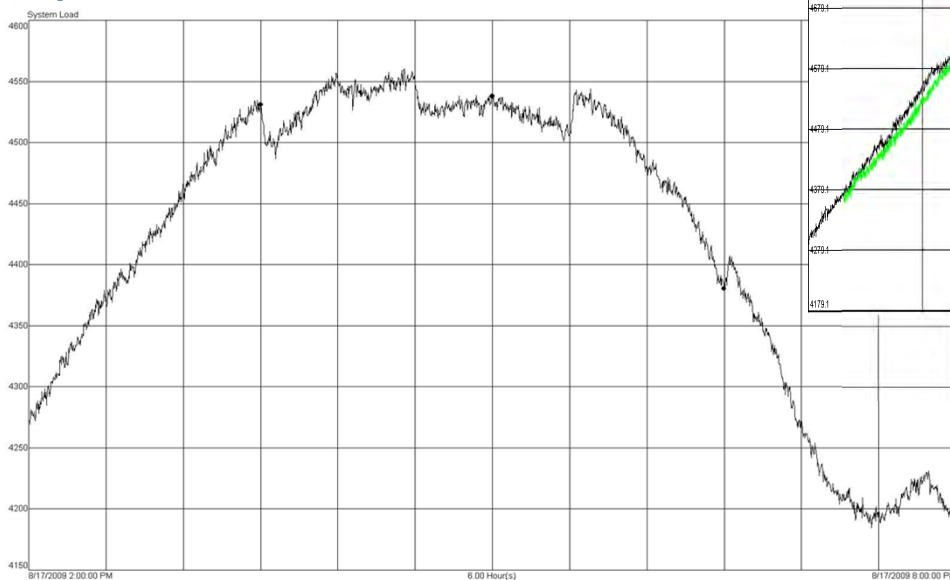


Economic Events

Improved Optimized Event – 8 Phase



Optimized Event – 3 Phase



THANK YOU!

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