

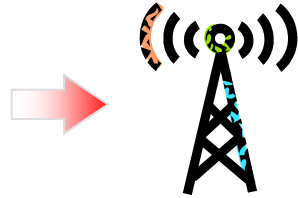
Process for Performing VEE for AMS

- **Meter Data Flow**
- **Uniform Business Practice – UBP**
- **Inside the MDM**
 - WAVE
 - iWAVE
 - Estimation Hierarchy
- **Data Quality Assurance**
- **Summary**

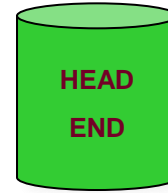
METER DATA FLOW



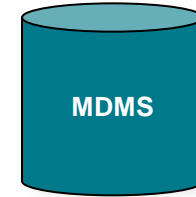
Daily Register Read
Interval Usage Data



COLLECTOR

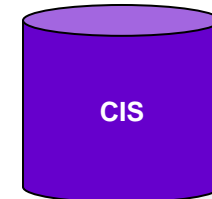


HEAD
END



MDMS

“Bill-Cycle”
Meter Data



CIS



Data Store

Interval &
Register Data



MARKET

Market is
defined as
ERCOT and
REPS

300,000,000

Daily Interval
Values

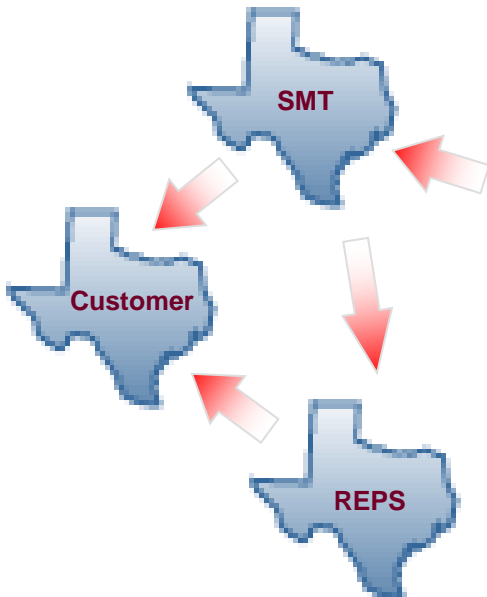
4 Places



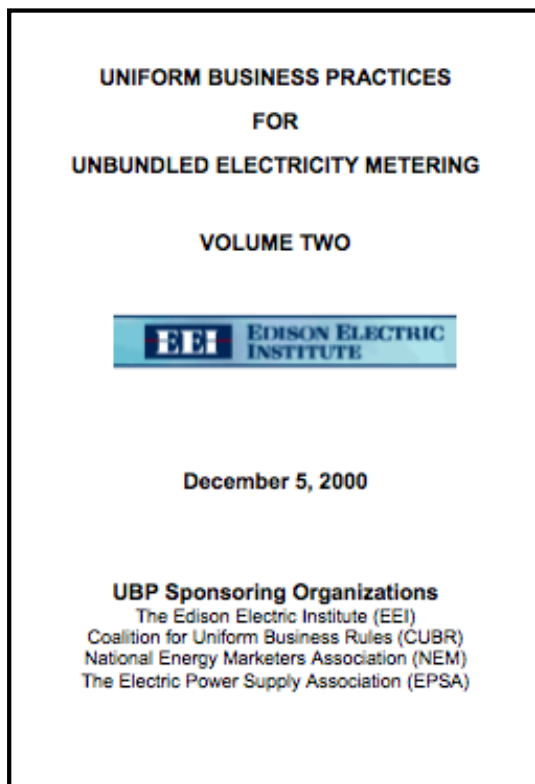
ERCOT

150,000

Consumption Values
DAILY



UBP IS THE BASIS FOR AMS VEE



<http://www.naesb.org/pdf/ubp120500.pdf>

AMS VEE RULES

- Missing Intervals
- Pulse Overflow
- Test Mode
- Reverse Rotation
- Meter Reset
- Time Change
- Power On/Off
- Maximum Demand
- Spike Check
- Sum Check
- Consecutive Zeros

AMS ESTIMATION RULES

- Maximum Interpolation Span
- Maximum Estimation Span
- Like Day Estimation Criteria
- Register Allocation
- Class Profile Estimation

EXPERIENCE IN THE AMS WORLD MAY IDENTIFY AREAS FOR CHANGE IN THE UNIFORM BUSINESS PRACTICES

PRIOR VALIDATION RULES THAT WERE DESIGNED TO IDENTIFY "HUMAN ERROR" MAY NO LONGER BE APPLICABLE

PRIOR INTERVAL DATA ESTIMATION PROCESSES WERE MANUAL

VALIDATION RULES EXAMPLE



NUM	RULE	DEFINITION
1	Time check of meter reading device/system	Ensure collection device time clocks are synchronized to the national time standard
2	Time Check of the meter	Ensure meter time clocks are synchronized
3	Time Tolerance Check [meter and data]	Minimize “clock drift” between the meter and the collection device/system
4	“Power-On”	Identify if electricity is currently available at the meter location
5	Pulse Overflow	Identify interval value exceeds the registration range
6	Test Mode	Confirms data collected during test modes are “flagged”
7	Sum Check	Ensure the sum of the intervals matches the Register
8	Usage for Inactive meters	Identify a location that should not be consuming electricity
9	Missing Intervals	Selects how the system will handle missing interval data

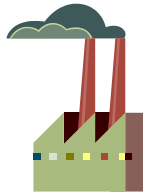
ESTIMATION METHOD EXAMPLES

System Allows for GROUP Specific Rules



Wave performs ADU calculation:

Customer Previous Month X (Group Current Month / Group Previous Month)



iWAVE Calculation:

- Residential Scales ERCOT Forecast Profiles
- C&I Scales the past Same days average shape



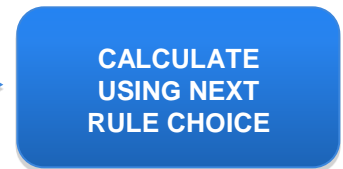
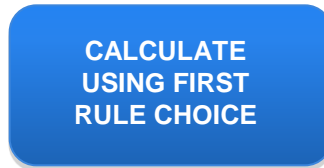
Same Day Average → Tues is Tues is Tues



Like Day Average → Weekday, Weekend, Holiday

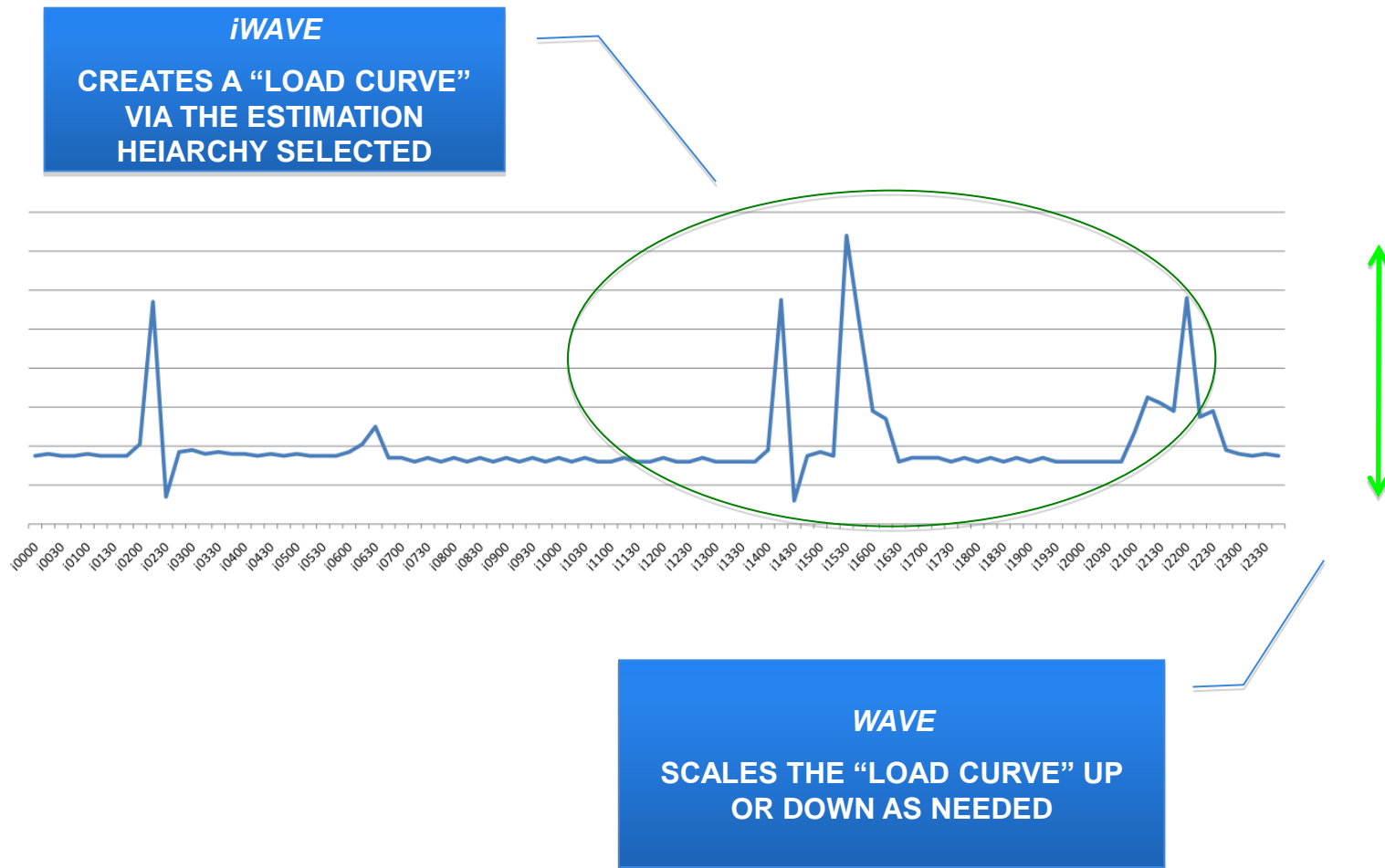


Load Profile Shape



Is the Required Historical Actual Data Available to Use Rule?

VISUAL ESTIMATION EXPLANATION



INITIAL SETTING SELECTED



WAVE

Scaled ADU calculated using data for similar customers and for the same customer, location, day type, climate zone from the prior billing month.	1
Scaled average daily usage (ADU) which is calculated using data for similar customers and for the same customer and location from the prior billing month.	2
Scaled average daily usage (ADU) which is calculated using data for similar customers and for the same customer and location from the prior year's same billing month.	3
Calculated average daily usage (ADU) for the same rate code and climate zone as the scaling factor to be applied to the average daily usage (ADU) for the previous billing month for the same customer and location	4
Calculated average daily usage (ADU) for the same rate and climate zone as the scaling factor to be applied to the average daily usage (ADU) for the prior year 's same billing month for the same customer and location	5

INITIAL SETTING SELECTED

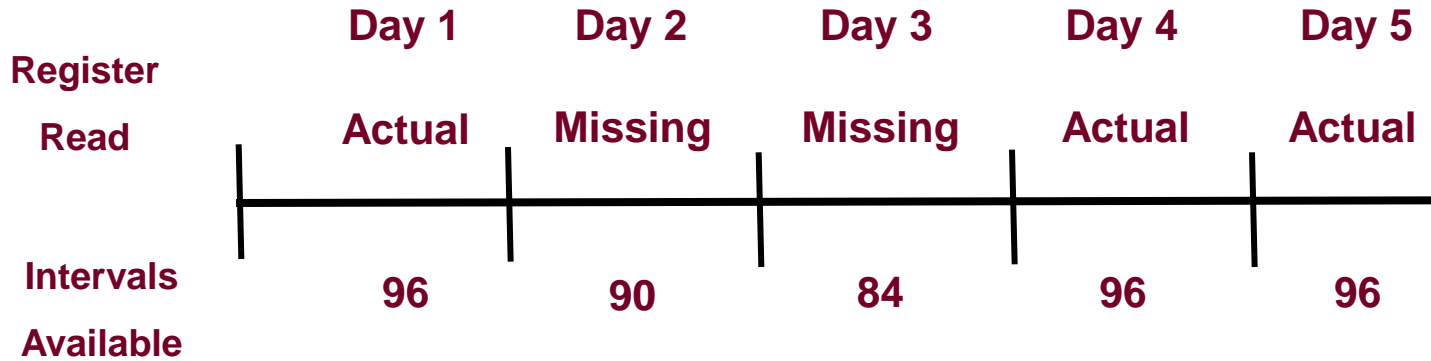


iWAVE

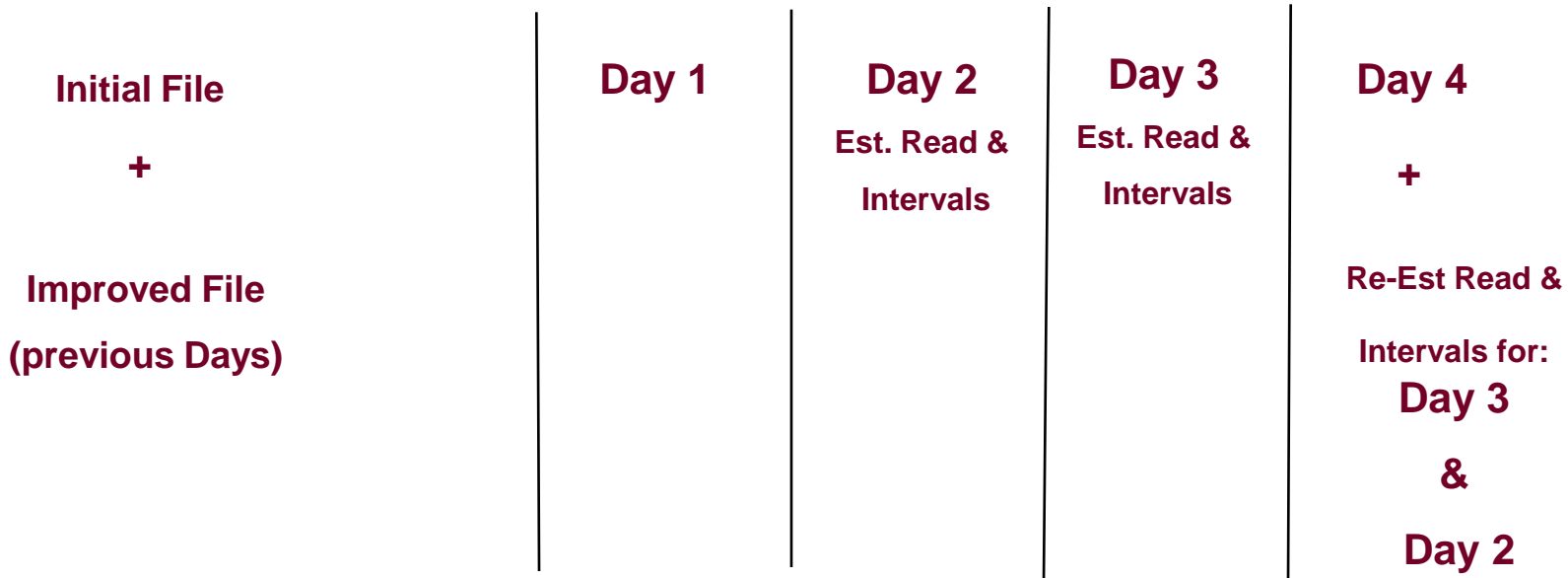
Rule	Priority C&I	Priority Residential
Same days estimation for the same customer and location	1	3
Like days estimation for the same customer and location	2	2
Reference Load Profile Data *	3	1
Static Load Profile Data	N/A	N/A

Example: ESIID Estimation Sequence

Consumption Day



DATA Delivered



Smart Meter Portal Shows Estimated Usage

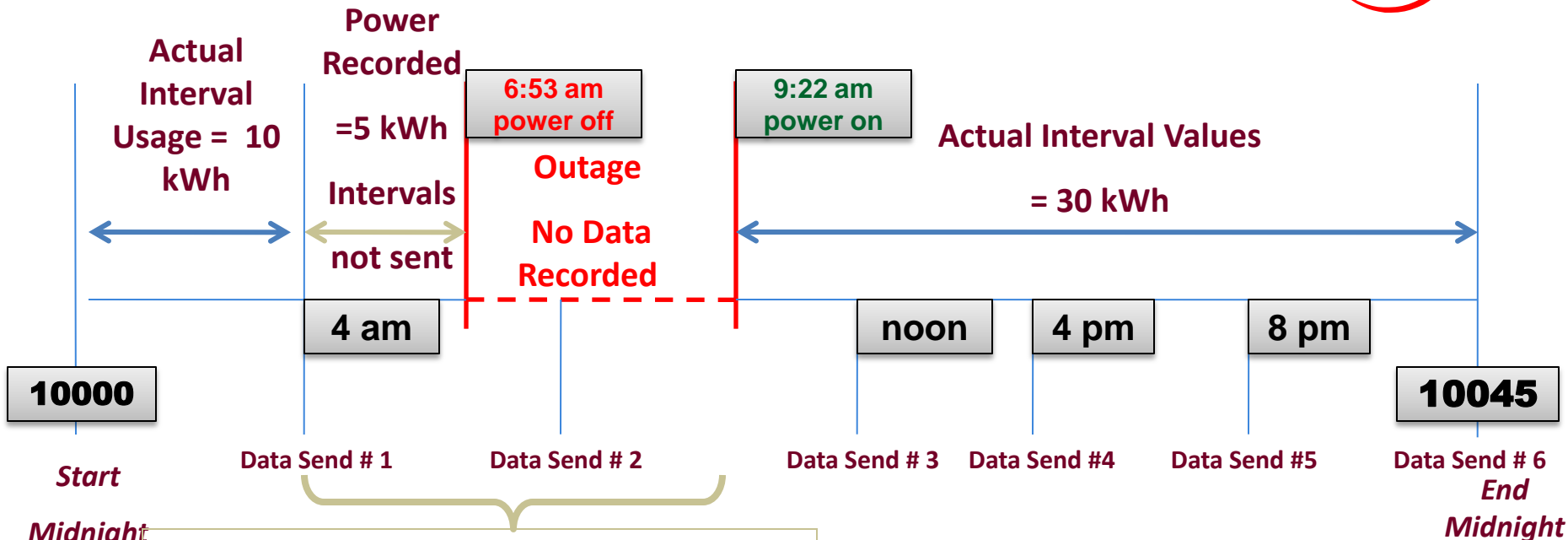
Q. Why does the Smart Meter Portal show estimated usage ?

A. If a Smart meter cannot send its usage data at the time the meters in the area are sending data, the intervals missed are estimated based on the daily use. Rare events that cause data to be missed include power outages or temporary network communication failure. You will not be billed for power you did not use.

Oncor's system fills in the missing 15 minute interval(s) by spreading un-allotted register read consumption for the day.

- **This automated process starts by taking the register reads at the beginning of the day and the end of day to find the total kWh usage for the day.**
- **Then the calculation for filling missing period(s) is determined by subtracting all the actual interval period(s) from the daily usage.**
- **The remaining usage is spread across all the missing intervals and displays as estimated interval usage.**

Smart Meter Portal Shows Estimated Usage



Midnight Register Read

Data Send #1 - Midnight to 4 am -Premise consumed 10 kWh.

Data Send #2 – 4 am to 8 am period - No Data is sent due to Power Outage – Premise consumed 5 kWh from 4 am to 6:53 am.

Power On at 9:22 am – Premise consumption begins

Data Send #3 – Meter reports no interval data for 8 am to 9:22 and appropriate values for 9:22 to noon

* Result of Daily Interval SUM CHECK Validation:

5 kWh - 4 am to 6:53 am is spread across the intervals with no meter data from 4 am to 9:30 am.

Total Actual Consumption for the day

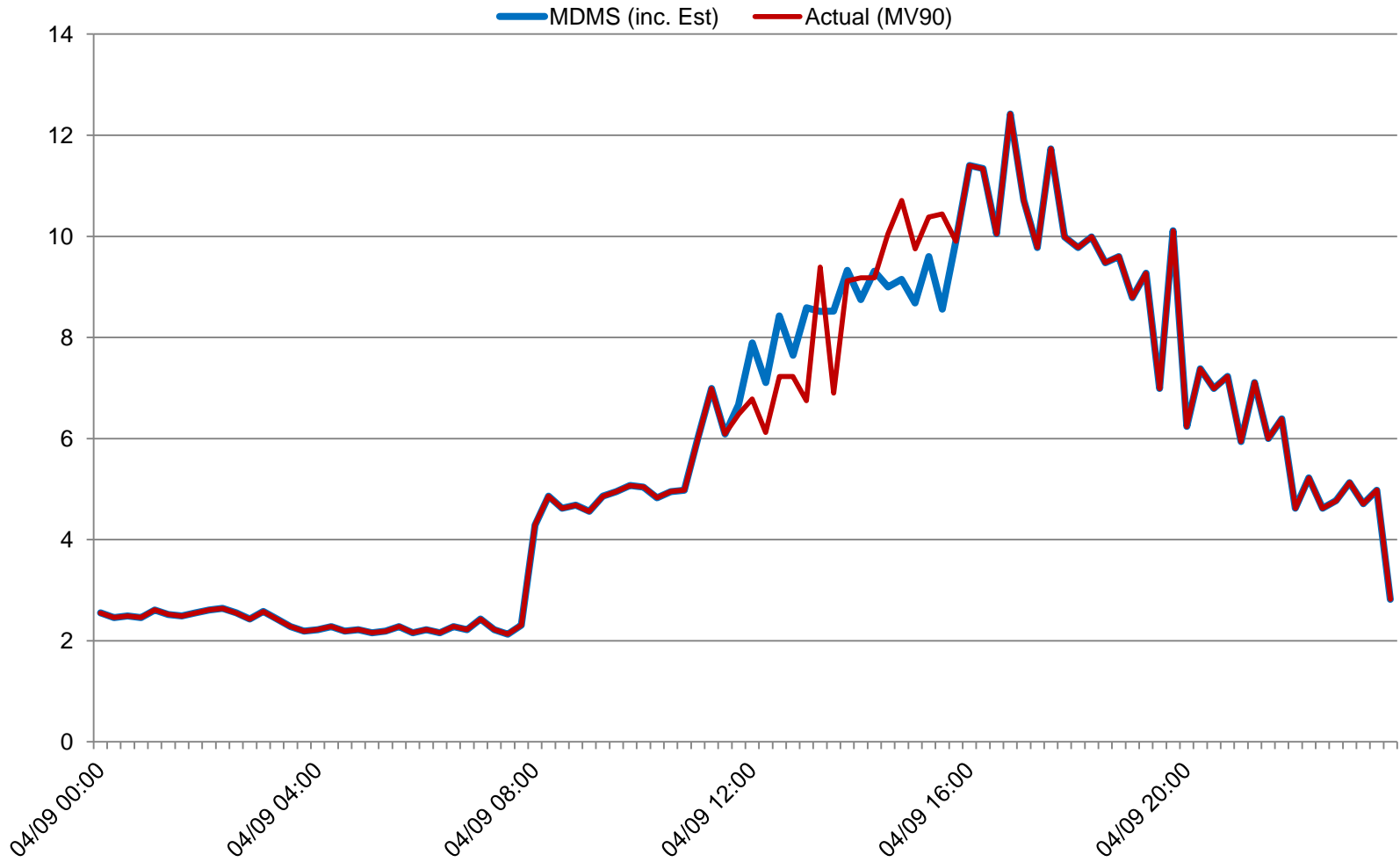
Stop Read - Start Read

$$10045 - 10000 = 45 \text{ kWh}$$

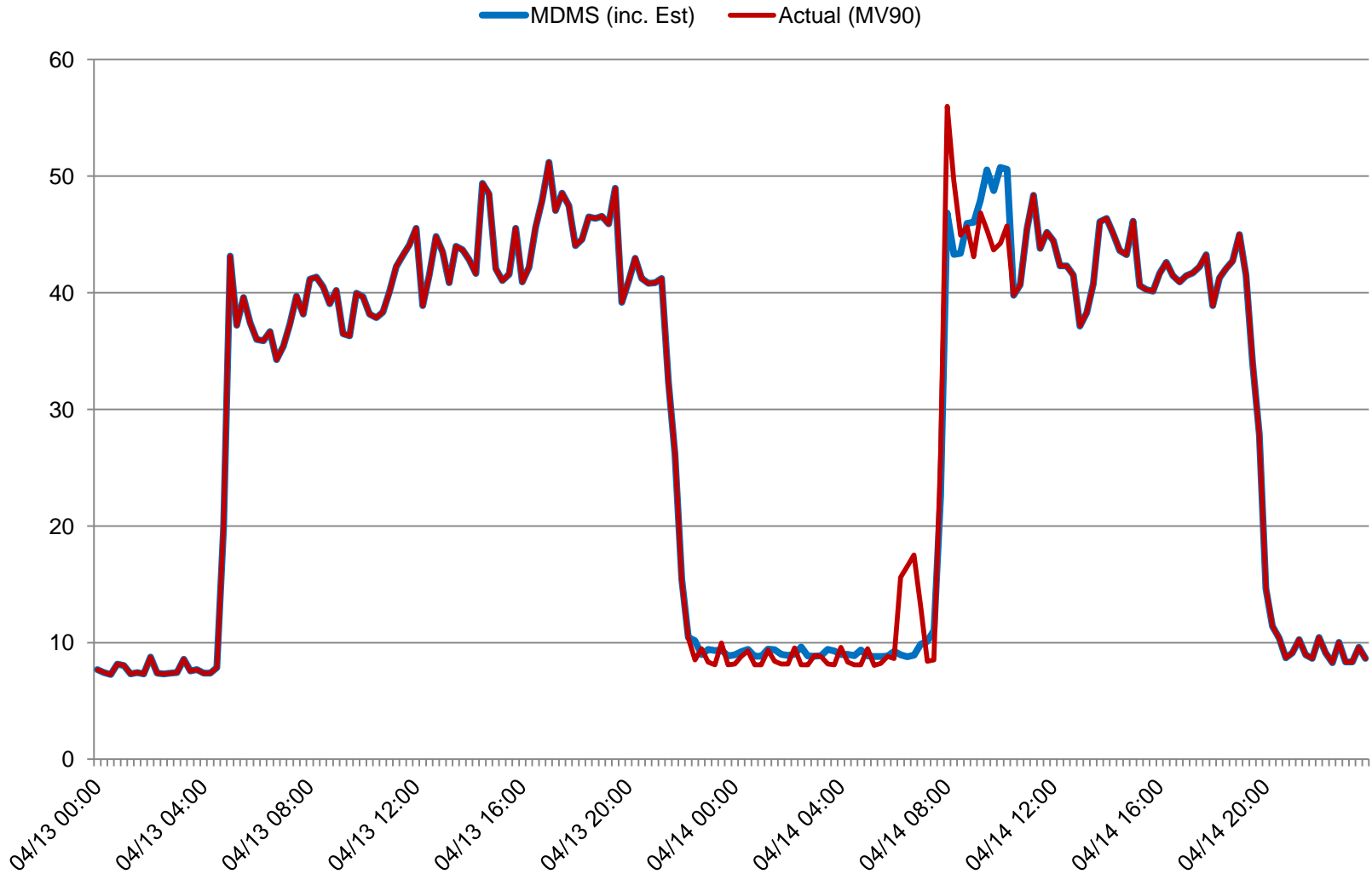
Actual Interval Values Sent - 40 kWh

Register Read - Actual Intervals 5 kWh*

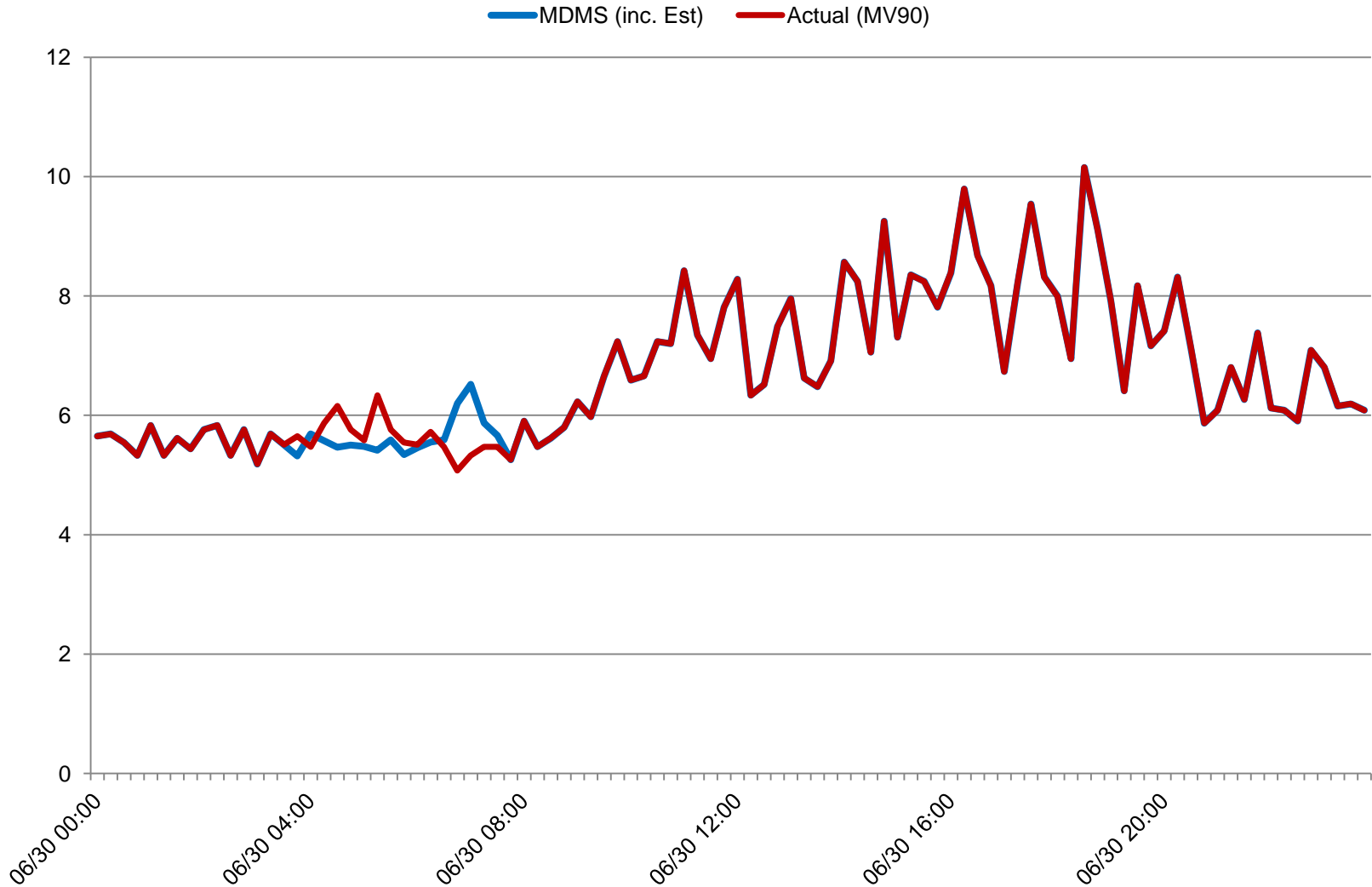
Example Estimated vs Actual Noon to 4 pm



Example Estimated vs Actual Missing Across Midnight



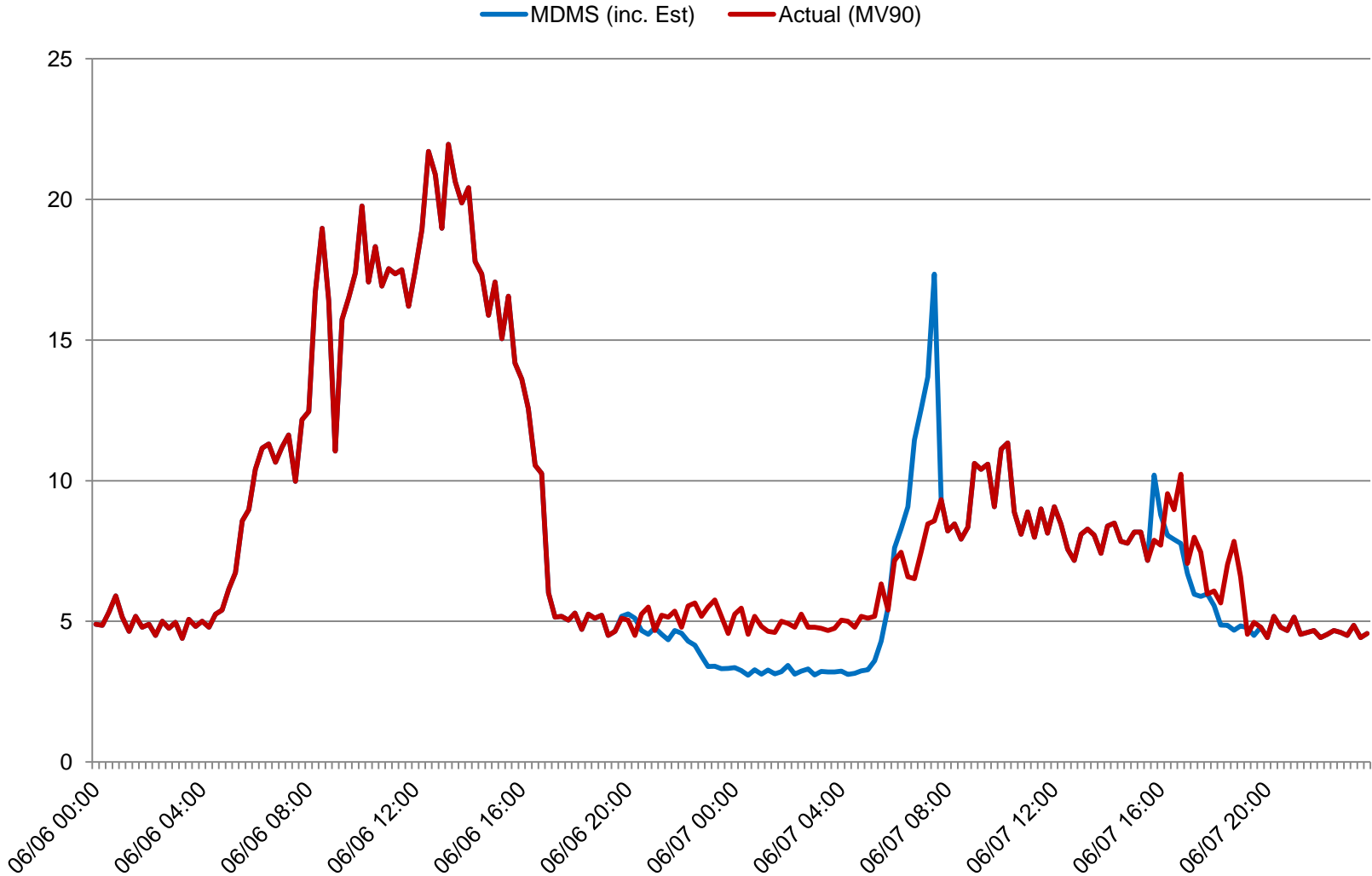
Example Estimated vs Actual 4 Pm to 8 pm



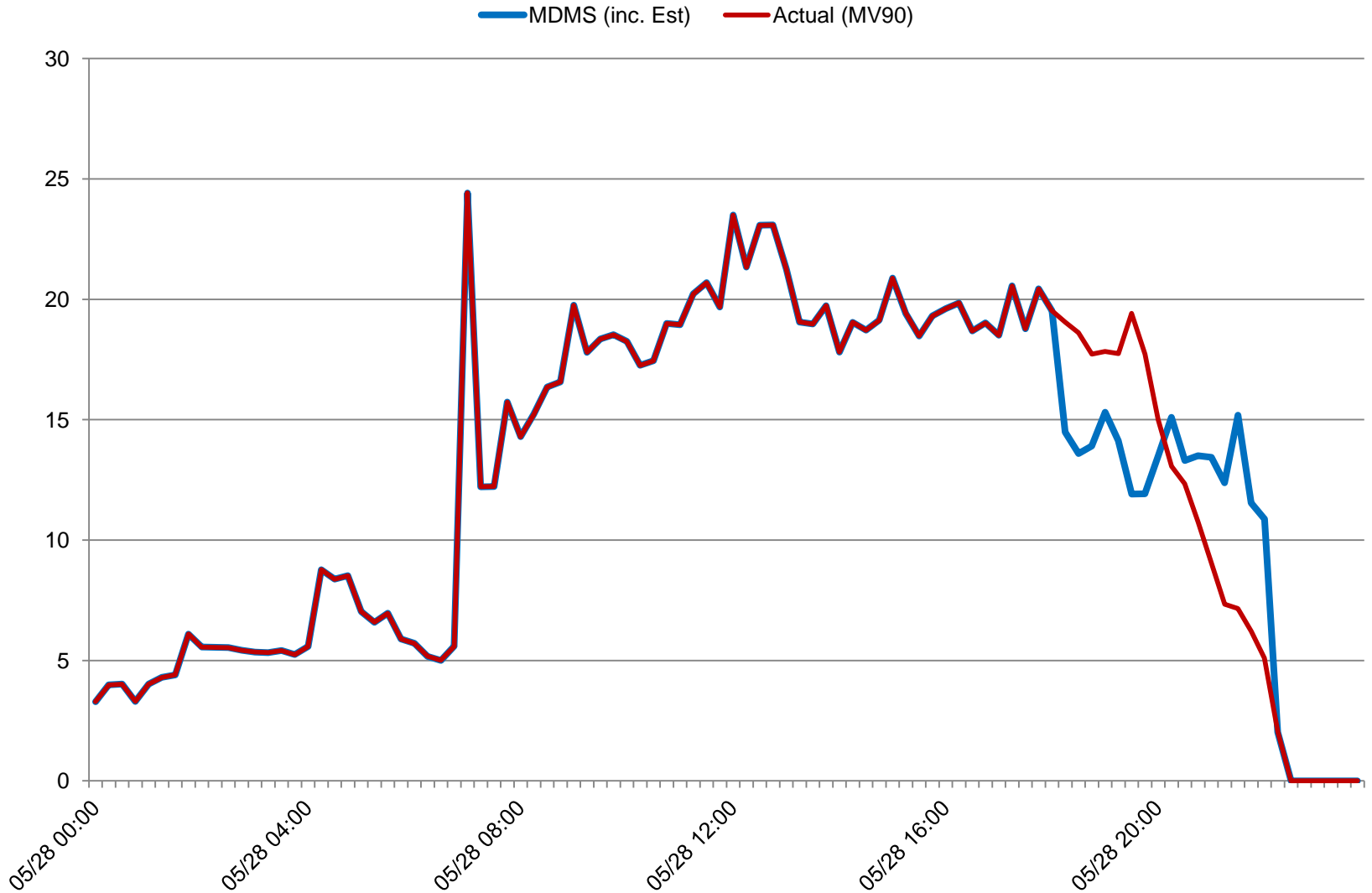
Example Estimated vs Actual



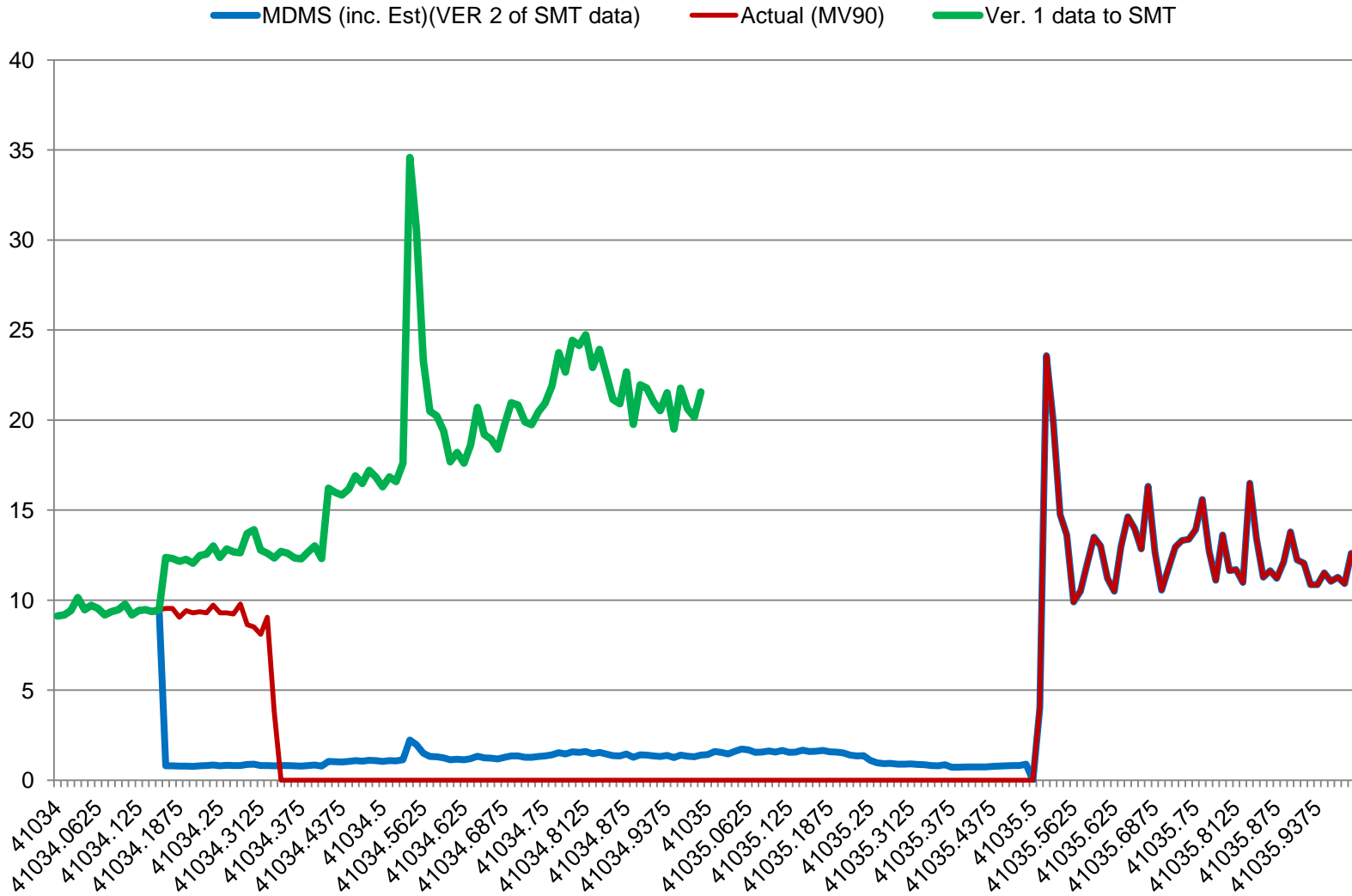
2 Blocks Missing: Across midnight and 4 to 8pm



Example Estimated vs Actual 6 pm to Midnight



Example Estimated vs Actual Power Outage



QUESTIONS?