



Knowledge to Shape Your Future

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Peak Time Rebates: An Integral part of a Utility's Demand Response Portfolio

*National Town Meeting On Demand Response and Smart Grid
National Action Plan Day Pre-Conference Workshop*

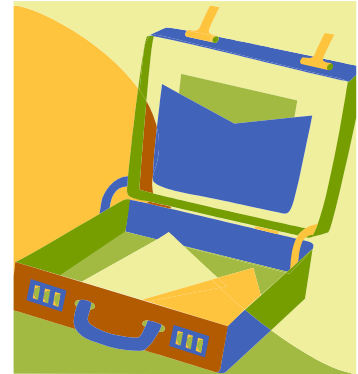


Itron Highlights

- > **Market Leader in Automation** 50%
- > **Leading Worldwide Supplier of Meters** 43%
- > **Leading Software Provider for Meter Data Collection** 50%
- > **9,000 Valued Employees**
- > **8,000 Customers in 130 Countries Around the World**
- > **\$1.69 Billion in Revenue**

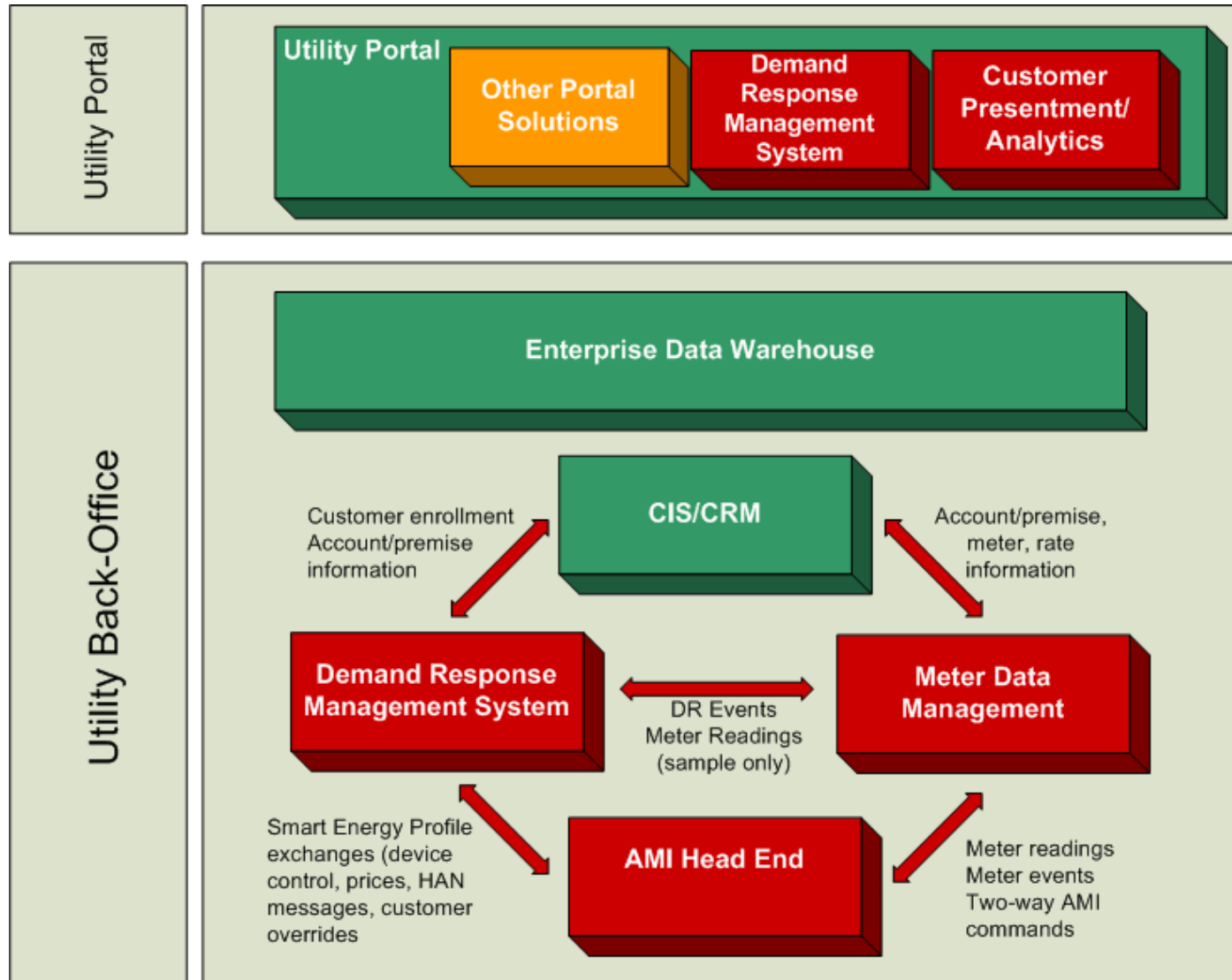
The AMI Business Case

- Labor Savings
- Call Center Cost Reductions
- Reduced Theft
- Increased Customer Satisfaction
- Demand Response/Dynamic Rates*
 - > Southern California Edison: ~40% (\$3B 2005-2032)
 - > SDG&E: ~40% (\$268M NPV 2005-2021)
 - > PG&E: \$149-\$223M per year
 - > Central Maine Power: Approved study to quantify benefits



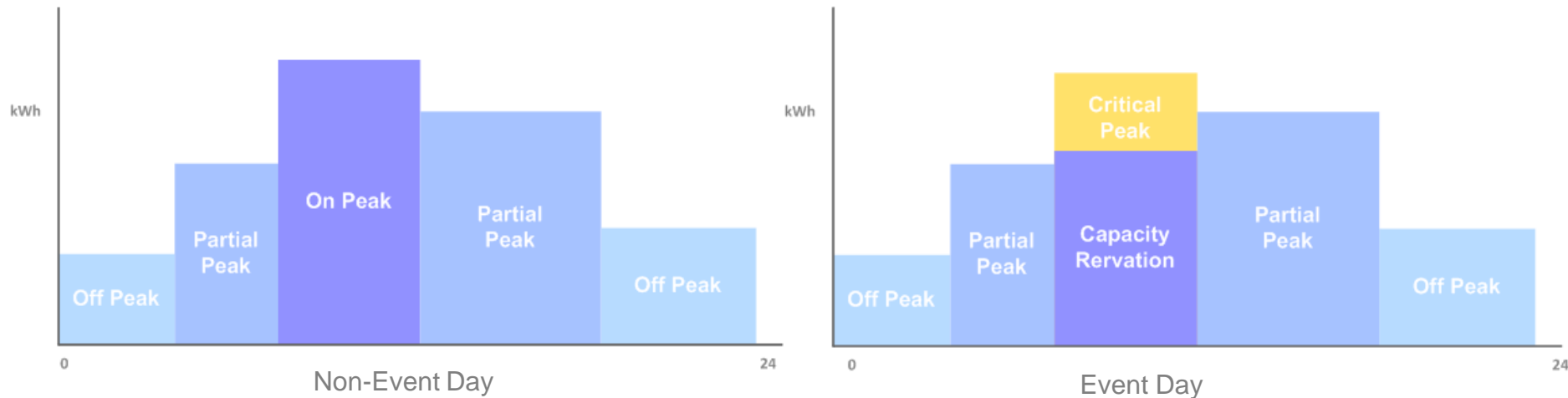
*Source: *Utility Commission Filings*

Itron DR Solution Reference Architecture



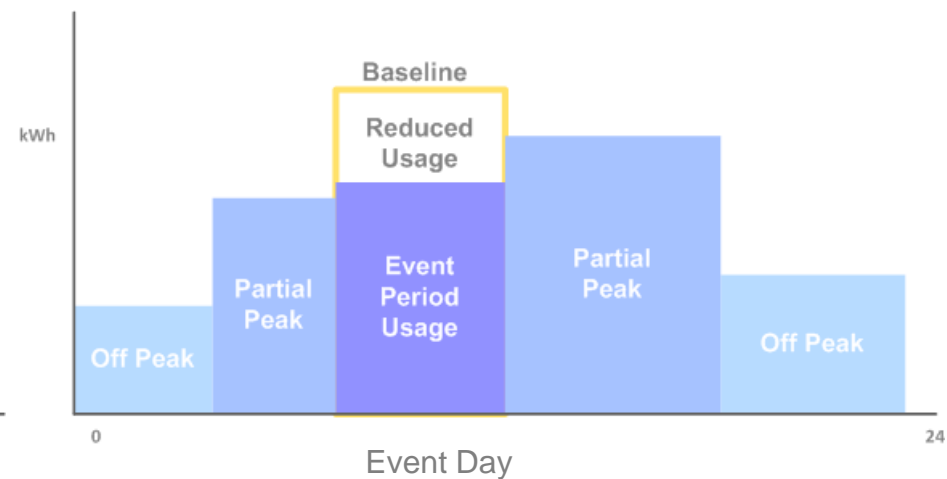
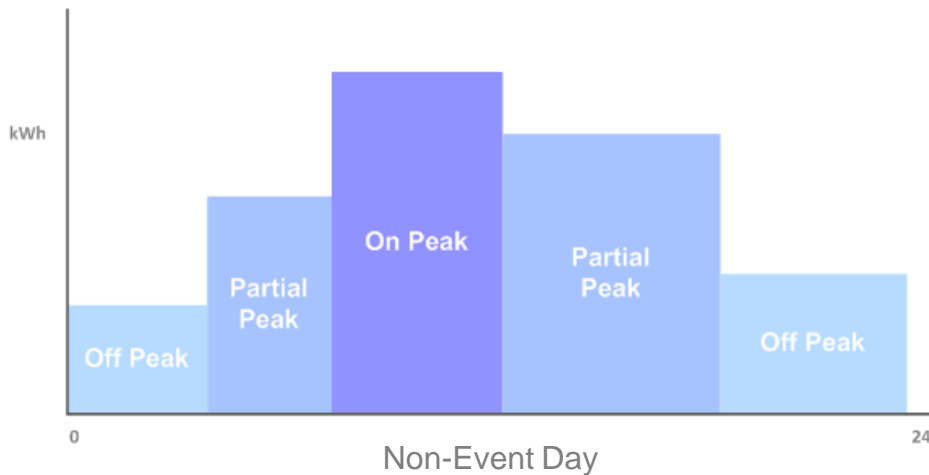
Critical Peak Pricing Programs

- Event periods coincide with On Peak TOU periods
- May or may not include Capacity Reservation
- Pricing somewhat reflects market
- Customer choices (event frequency, CRC, event period)



Rebate Programs

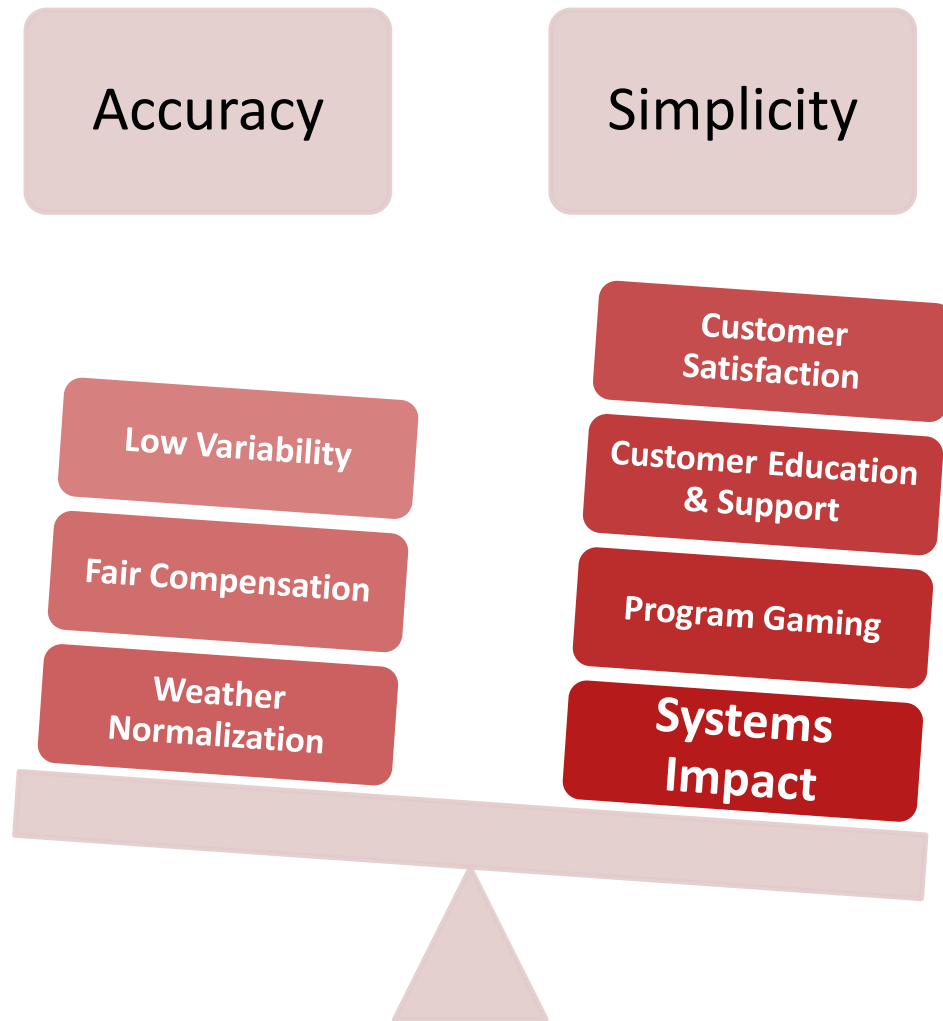
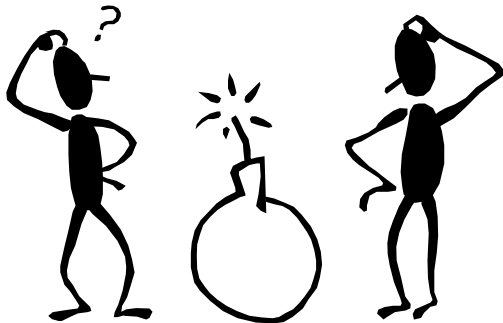
- Peak Time Rebate / Critical Peak Rebate
- Requires calculation of event baseline and reduction value
- Incentive payment for reduced usage
- No penalty for lack of reduction or increased usage



The Baseline Challenge

“A well-designed baseline benefits all stakeholders by aligning the incentives, actions and interests of end-user participants, aggregators, utilities, grid operators and ratepayers.”

~EnerNOC, 2008



Existing DR Baseline Types



- **Straight Historical Average**
 - > Selects days prior to the event day based upon usage and excludes specific day types (i.e., weekend days, prior event days, holidays)
 - > Used by utilities throughout the U.S.
- **Iterative Historical Average**
 - > Calculates an average over some historic period and evaluates days just prior to the event against that average to eliminate low usage days from the selection. Also excludes specific day types. May also exclude days based upon LMP.
 - > Used by NYISO, PJM
- **Weather or Same Day Adjustment**
 - > Actual usage during a defined window of time prior to start of event compared with calculated baseline to determine an adjustment factor. May be based solely on usage or may include other weather factors such as humidity index.
 - > Becoming more widely adopted

Typical Straight Historic Baseline Rules



- Like-day selection rules
 - > Number of days to select (out of a candidate set)
 - > Usage evaluation hours for top day selection
 - > What days are not included
- Event day exclusions
 - > Customer-specific or Program-specific
- Like-day sufficiency (final or candidate set)
- Only use existing customer's data
- Historic data changes that impact like-day selection
- Use of “Weather Adjustment”
- Other: Timing of selection/calculation and customer presentation

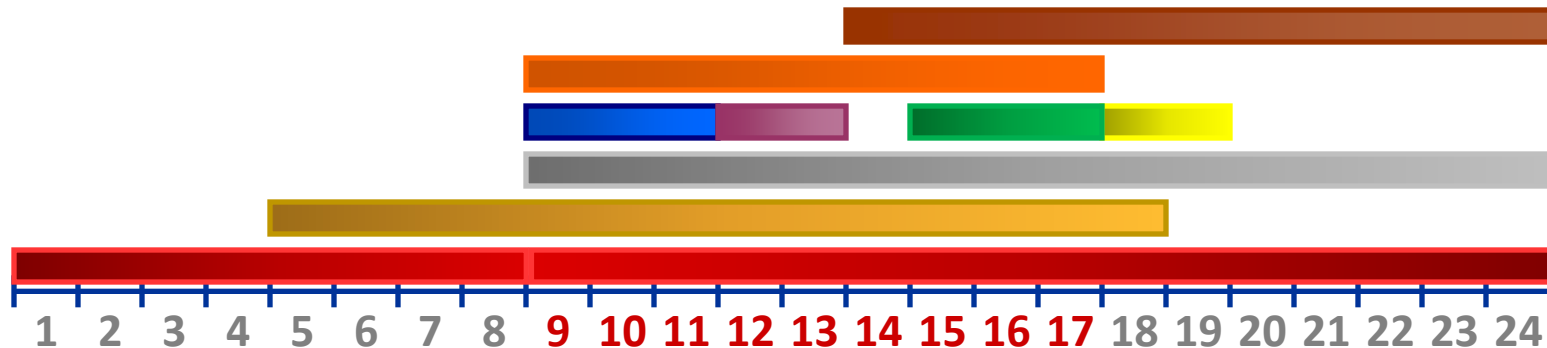
The Utility's Responsibilities

For its entire population of customers:

- Track events and determine participants
- Calculate baselines *(for all participants)*
- Collect meter reads *(every day for everyone)*
- Calculate bills *(working days for 1/20th of the full population)*
- Event alerts
- Present data and event results
- Device communications and tracking
- Scale example
 - > 2 million customers with 80% enrollment
 - > 1.6 million baselines for universal event
 - > 48 million hourly interval reads (or more) per day
 - > 100k bills per day



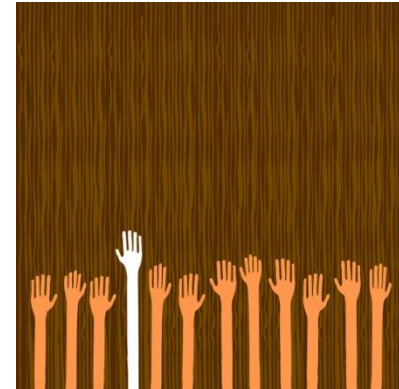
AMI MDM Business Day Timeline



- Prior day and historic readings import, validation, and estimation
- Meter Communications (remote connects/disconnects, pings)
- Gap fill interrogations
- On-cycle residential and C&I billing determinant calculations
- Demand response event result exports
- Demand response event import (next day events)
- Operational process analytics
- Exception management, meter/customer updates, CSR operations, operational reporting
- Various activities, depending on market and utility requirements (settlements exports, export to data warehouse, online presentment, etc)

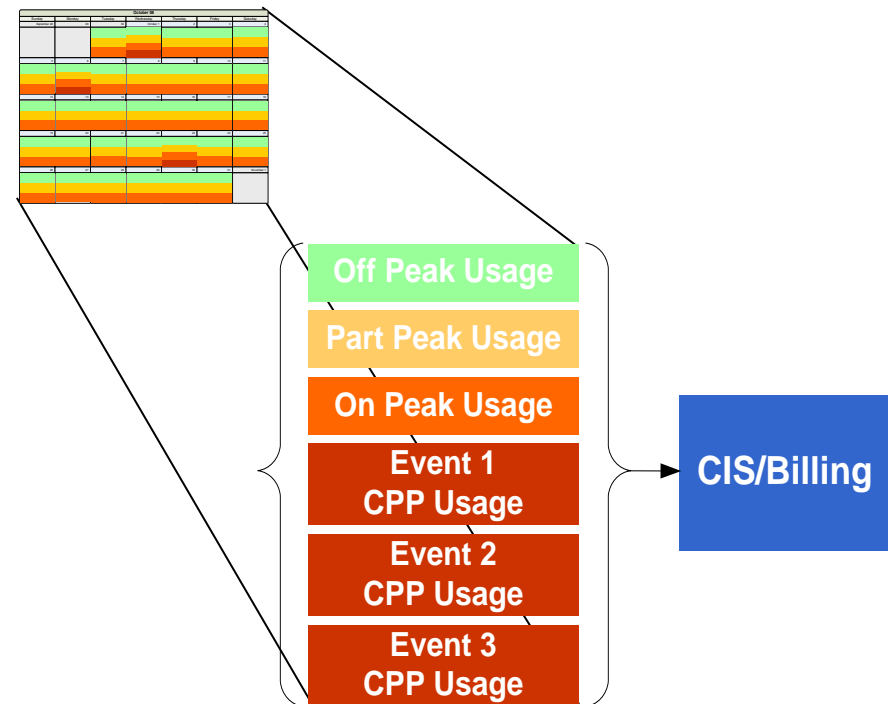
Event Participation Models

- How are event participants determined?
 - > All customers enrolled (Universal)
 - > Subset of customers (Targeted)
- How are enrollment groups defined?
 - > Grid topology (Substation, Feeder, etc.)
 - > Device types
 - > Subset of program (all events, odd events, even events)
 - > AMI network
 - > Other geographical identifier



Billing Determinant Calculations

- Billable values calculated from interval data
- Rate schedules (partially) modeled in MDM
- DR event results included in calculated values
- Time of Use Schedules



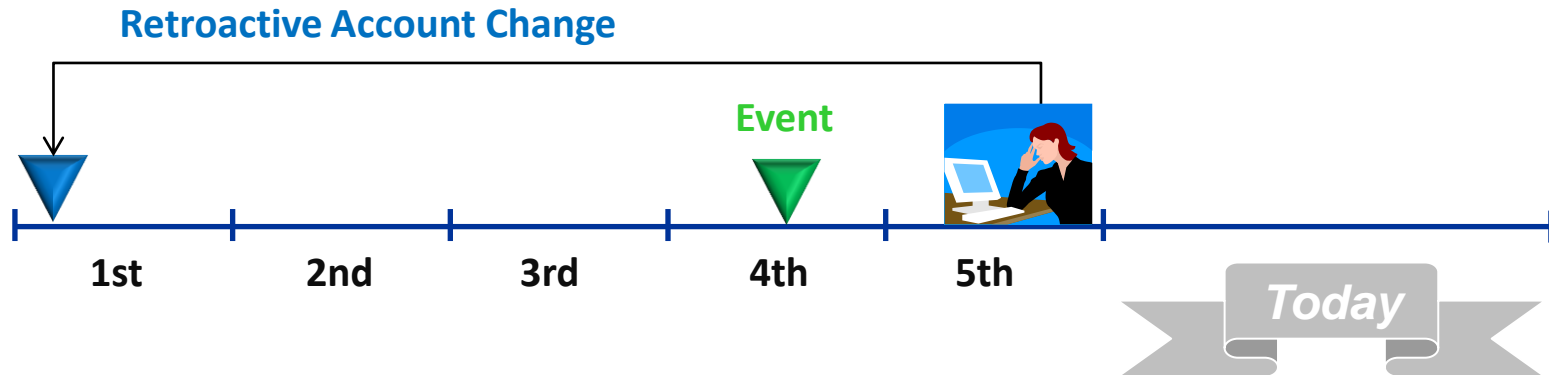
Retroactive Changes

Changes can occur retroactively that impact a Service Point's event participation eligibility, such as:

- Customer change – move in/move out
- Rate assignment change
- Reading data change – data edited or historic data loaded
- Past event created or cancelled

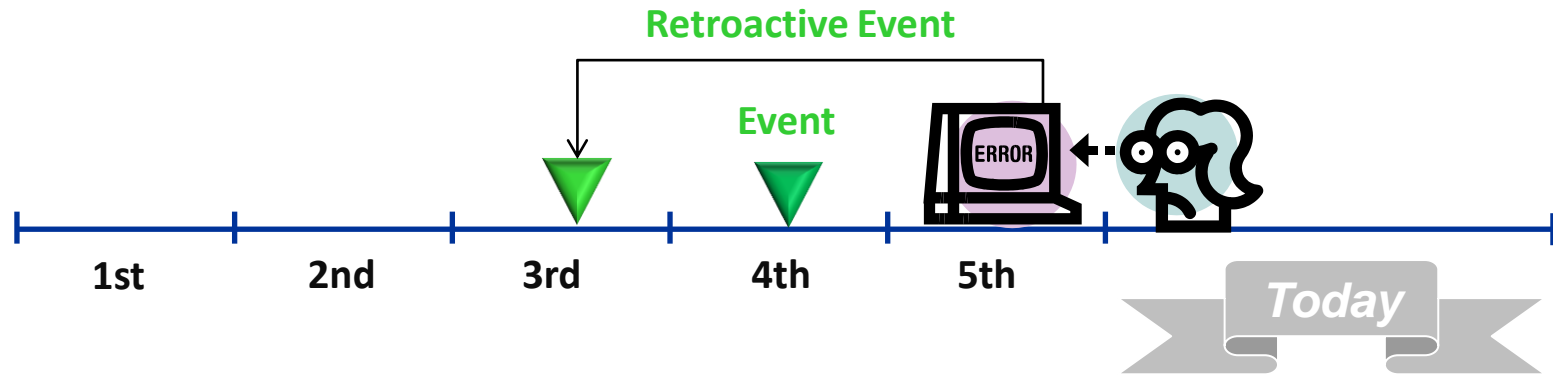


Event Participation – Account Changes



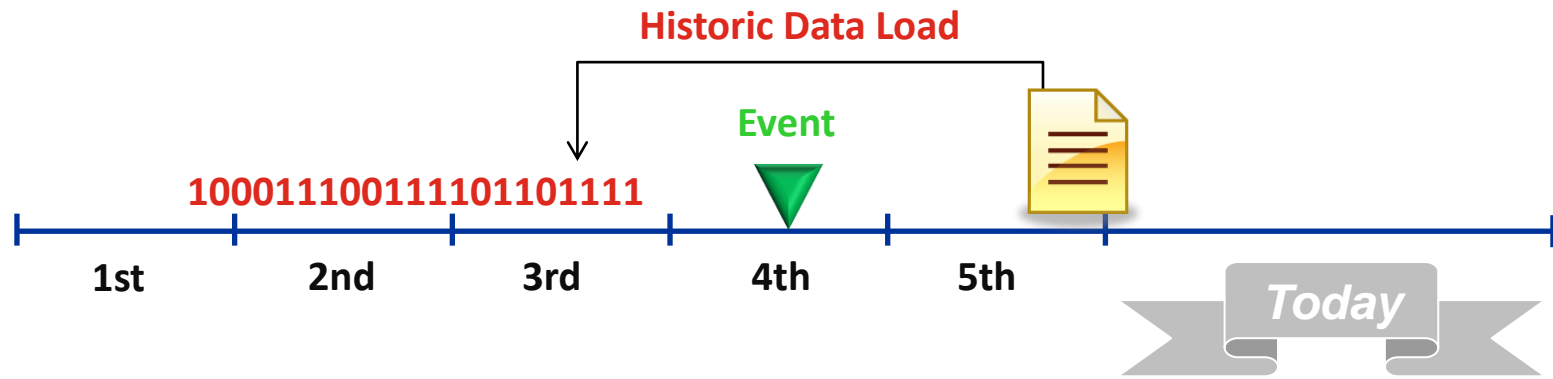
- Retroactive account change occurs after event occurs with effective date prior to event:
 - > Rate change before a past event, or
 - > Move-in or move-out before a past event
- Select like-days for new Service Point
- Determine event participation

Event Participation – Retroactive Event



- Event created in the past
- Select like-days for event on 3rd
- Determine event participants for event on the 3rd
- Re-evaluate like-days for event on the 4th
- Re-evaluate event participants for event on the 4th

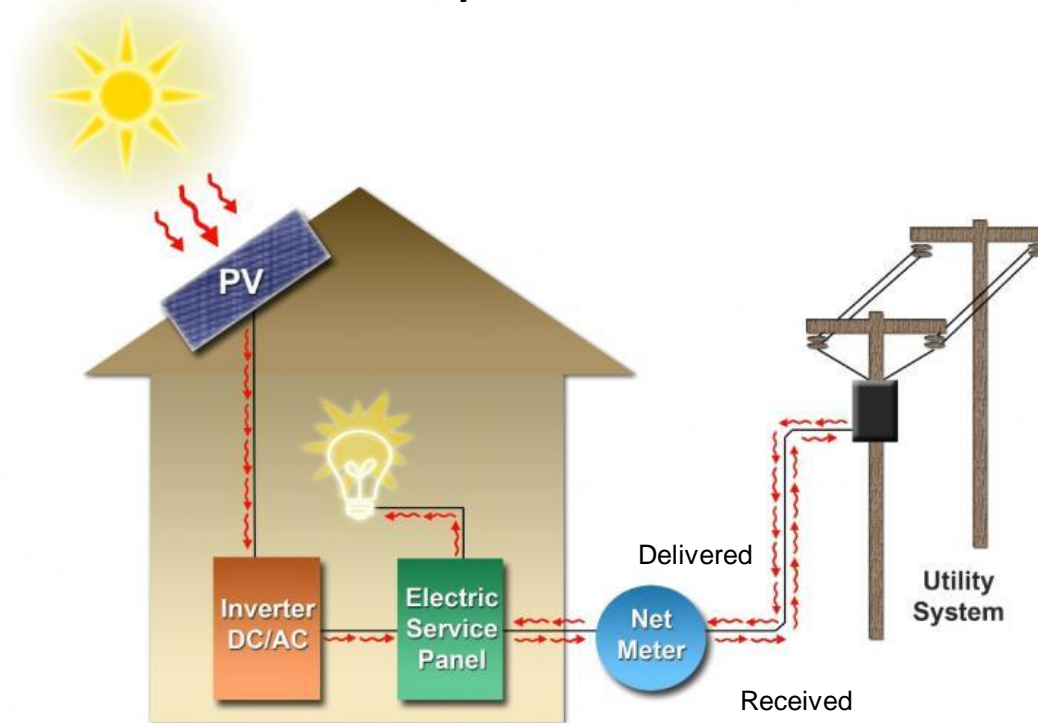
Event Participation – Historic Data Change



- Historic data loaded
- Data could impact like-day selection
- Reading group indicates SP needs like-days re-evaluation

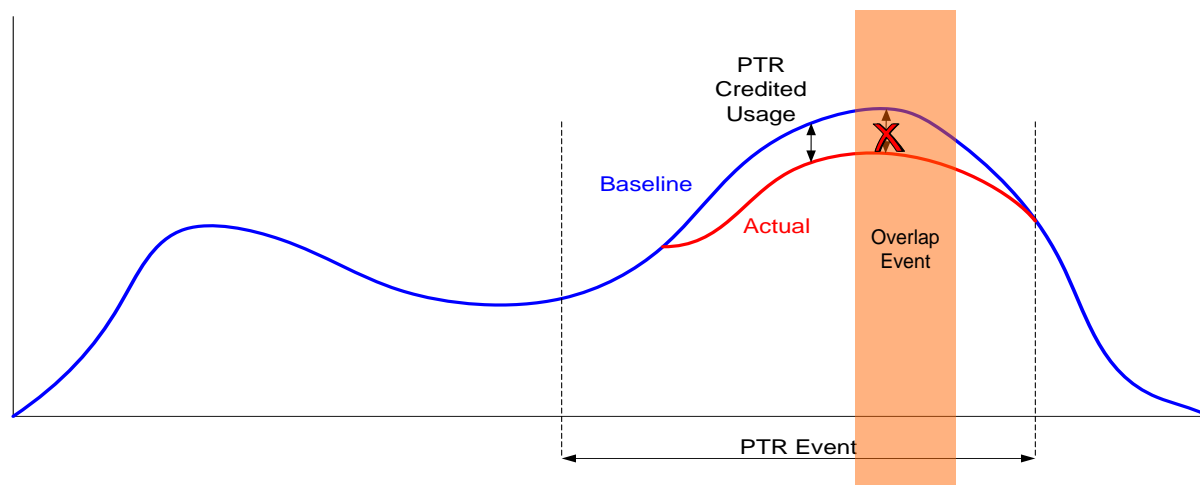
Generation (Solar) Customers

- Measured channels (Delivered and Received)
- Channels used for billing calculations
- Channel used for like-day selection



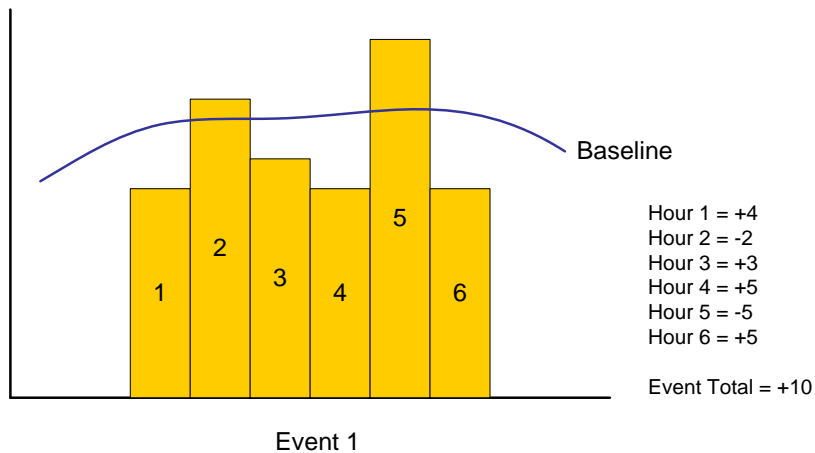
Overlapping Programs & Events

- Are customers eligible for enrollment in more than one program?
- Will events occur at the same or overlapping periods of time for the same customer?
- How is the customer rewarded for reduction?
- How is usage data and event results presented to the customer?

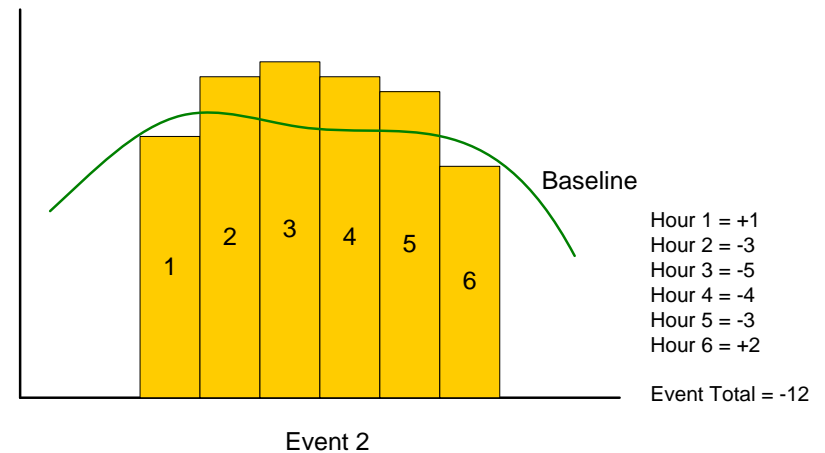


Delivery of DR Event Billing Results

- Report event results in total or for each event?
- How are event results totaled?
 - > Sum = -2
 - > Sum Positive = 10



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Recommendation

- Maximize process and cost efficiencies
 - > Find a common approach
 - > Tend toward simplicity for consumer compensation
 - > Weather or same day adjustment more effective than elimination of outliers
- Maximize accuracy
 - > Consider more complex approach for program performance measurement

Baseline Evaluation Studies

Assessment of Settlement Baseline Methods for Ontario Power Authority's Commercial & Industrial Event Based Demand Response Programs

September 28, 2010

Freeman, Sullivan & Co.
101 Montgomery St., 15th Floor
San Francisco, CA 94104

This report evaluates the accuracy of current and alternate baselines used for settlement of Ontario Power Authority's (OPA) large commercial and industrial Demand Response Program (DR). In total, 48 baseline methods were tested using a year of unperturbed pre-enrolment data from 95 customers. The evaluations presented here were designed to identify a baseline methodology that:

- Is accurate for both small and large customers;
- Is fair across settlement accounts and customers;
- Avoids extreme errors that could negatively affect individual settlement payments; and
- Is accurate not only for the most common event window but across all event windows.

In other words, the optimal baseline must provide OPA and program participants with small load-impact errors and therefore small settlement payment errors on average (accuracy), must have a narrow distribution of errors across accounts (fairness), and must lack extreme errors at the settlement account or individual customer level.

<http://www.fscgroup.com/news/demand-response-assessment-ontario-power-authority.pdf>

Other Recent Studies

- Numerous studies by the Demand Response Research Center (DRRC) at Lawrence Berkeley Labs
- PJM Empirical Analysis of Demand Response Baseline Methods, KEMA, April 2011

<http://www.pjm.com/~media/committees-groups/committees/mic/20110510/20110510-item-09a-cbl-analysis-report.ashx>

Thank You

To know more, start here: www.itron.com

