Technical Advisory Committee on Distributed Generation and Storage

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NVEnergy

Agenda

- NV Energy Technology and Communications Investments
  - Smart Meter Installation Project
  - Leveraging Technology to Provide Customer Offerings
  - Transmission and Generation System Operations
  - Monitoring and Diagnostic Center
  - Distribution System Operation
  - Energy Efficiency and Customer Demand Response

Smart Grid of the Future

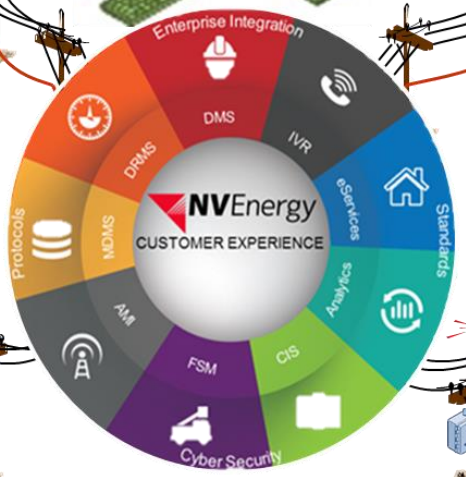
The NV Energy Smart Grid Vision

System Monitoring
- Voltage Regulation
- Outage Detection

Substation
- Monitoring
- Control
- Supervisory Control and Data Acquisition (SCADA)
- Automated Restoration

Customers
- Usage Information
- Communication Preference
- Payment Options
- Outage Information
- Service Reliability
- Energy Programs
- Pricing Options

Core Systems



Communications
- Communications Infrastructure Statewide
- Cyber Secure Base Stations
- 900 MHz Licensed Frequency
- Dedicated AMI and DA Spectrums

Secure Backhaul

Fiber

Distribution Automation
- Intelligent Switching
- Capacitor Control
- Fault Isolation

Advanced Metering
- 15-Minute Interval Billing
- Remote Connect & Disconnect

Demand Management
- Demand Response
- Home area Network (HAN)
- Distributed Generation

Modernization of the Grid
Smart Meters

- Smart meter deployment significantly changed the way NV Energy communicates and conducts business with customers
  - NV Energy pursued aggressive implementation of smart meter technology, spurred by a $139 million US Department of Energy grant. Over 1.4 million electric and gas meters were exchanged from 2010-2015.
  - Implemented essential communication networks necessary to collect and manage metering information. These are the regional network interface (RNI), the meter data management system (MDMS) and the demand response management system (DRMS).
  - The project achieved three primary objectives:
    1. Substantially reduce operating costs while improving meter data and billing quality.
    2. Support operational improvement, specifically outage detection and restoration.
    3. Provide a technology platform that automates and optimizes enhanced customer communications and demand management solutions.

Modernization of the Grid
Smart Meters

- Smart meters – continued
  - Provides operating cost reductions of $20 million annually
    - Over 600,000 avoided annual truck rolls (3.5 million during course of project).
    - Creates and improves a cyber secure network that also provides transmission and distribution operational benefits.
  - Customers benefit by having reduced operating costs, improved metering and billing accuracy, real-time outage and restoration information, remote connect and disconnect services and enhanced data analysis/communications regarding energy usage

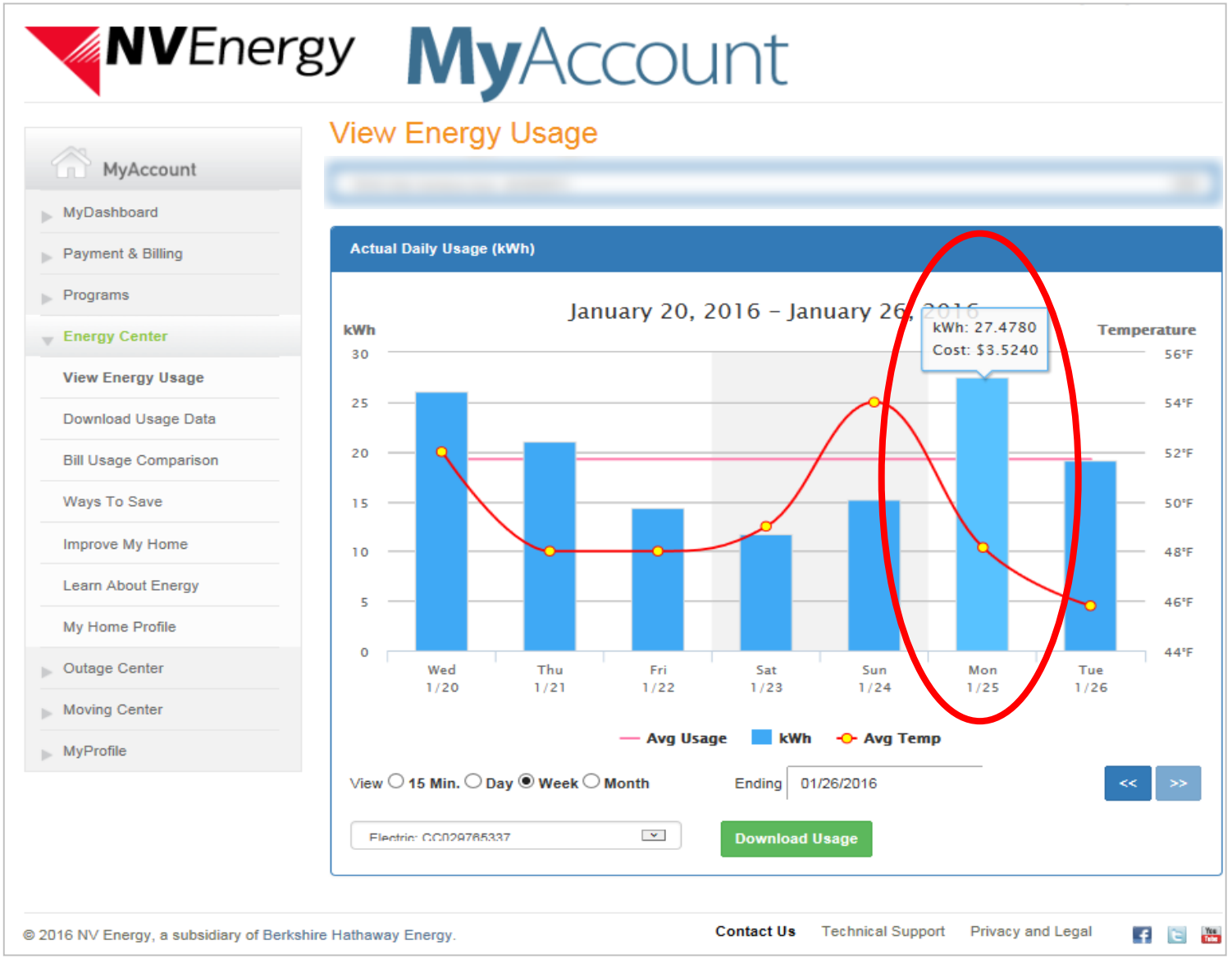
Smart Meters
Leading The Way to New Customers Offerings

- MyAccount
  - Over 600,000 accounts (70,000+ annual increase)
  - Multiple new features added in December 2015
  - New dashboard
  - Scroll over data on temperature, use and cost
  - Downloadable two-year data
  - New net metering usage/production graphs
  - Time of use and demand (for commercial customers)
  - Outage map utilization growing dramatically
  - Serves as a product and service customer awareness platform

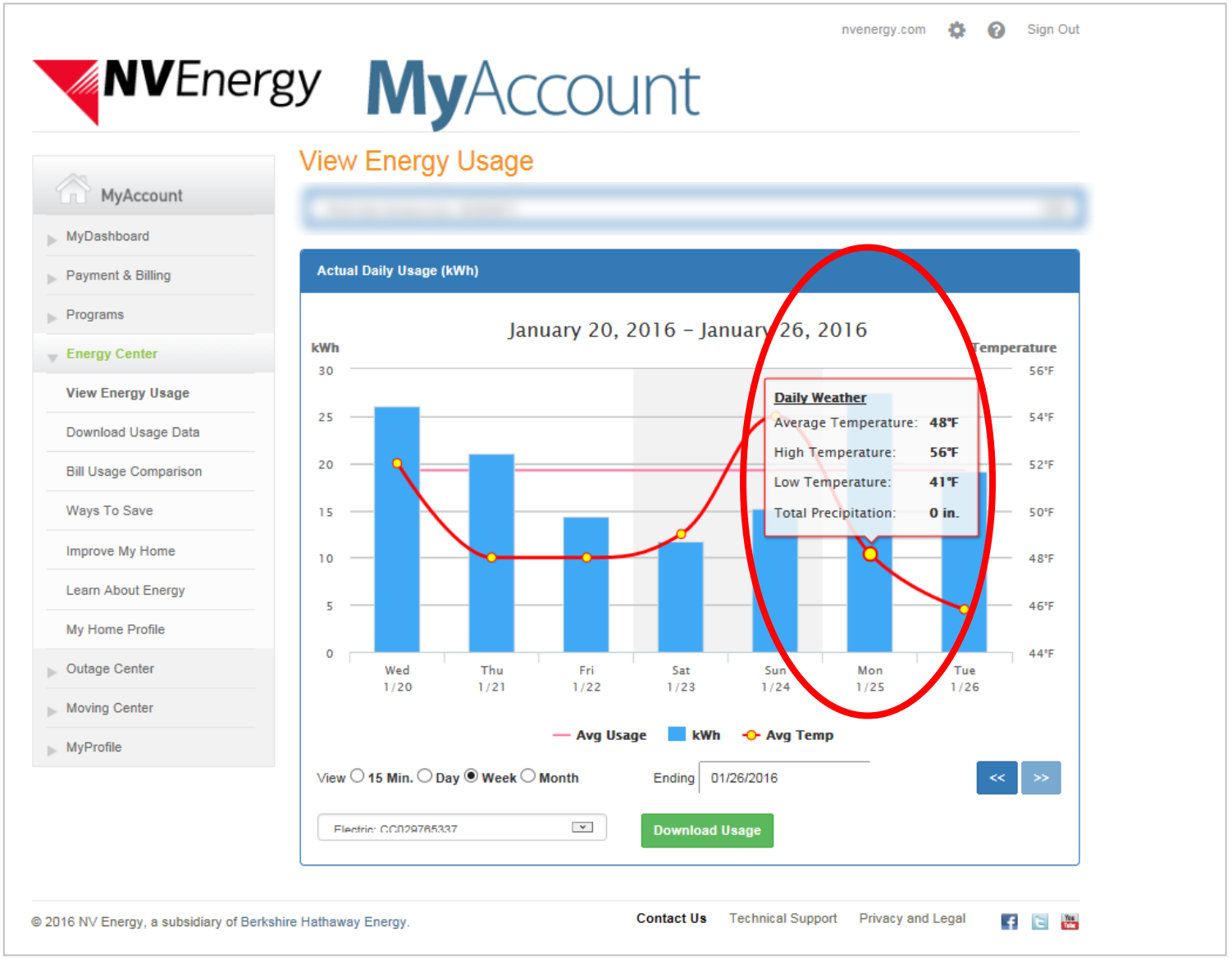
MyAccount Dashboard

MyAccount
Daily Energy Usage Data

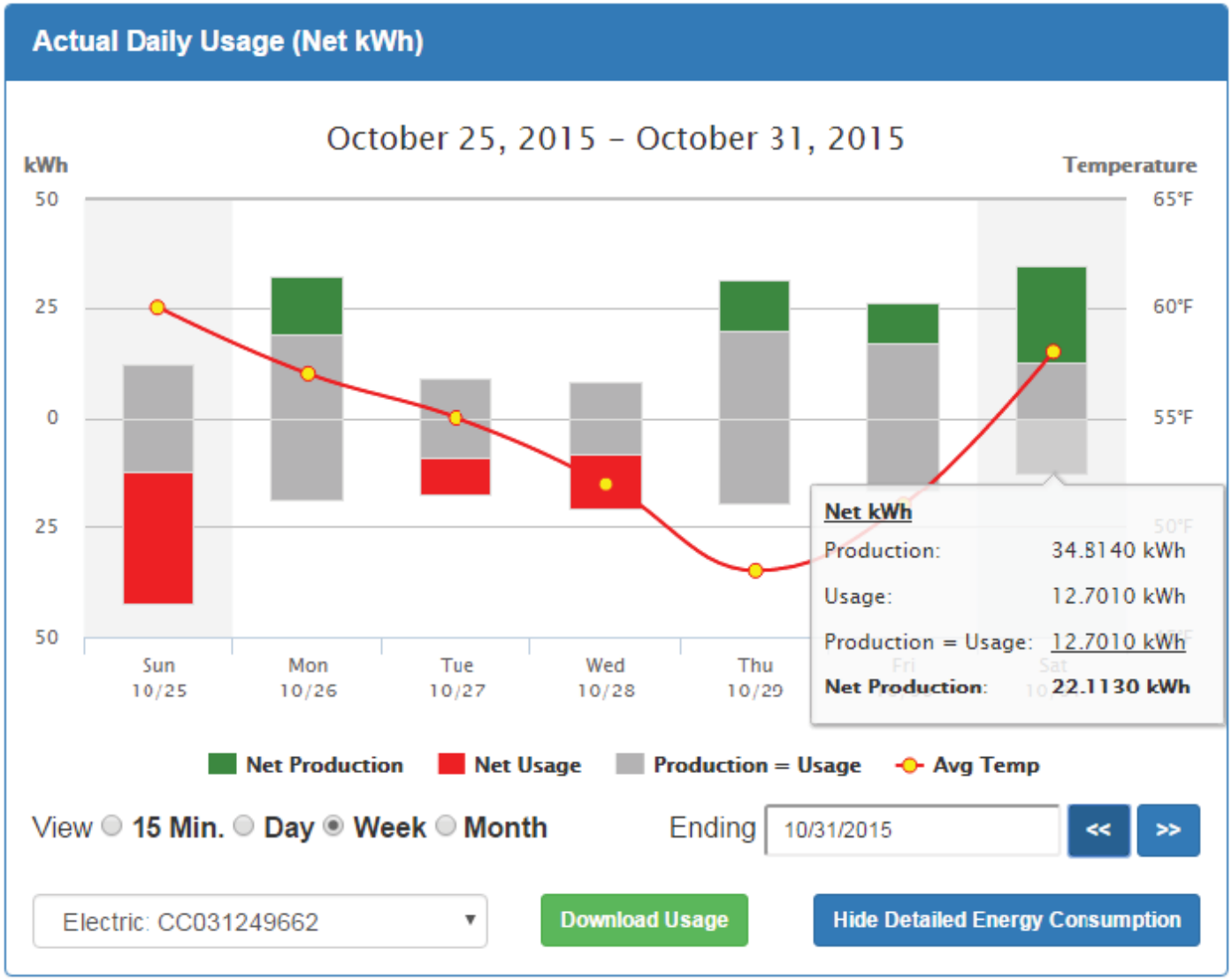
MyAccount
Daily Energy Usage & Cost Data



MyAccount
Daily Energy & Weather Data



MyAccount
Additional Views For Net Metering Customers

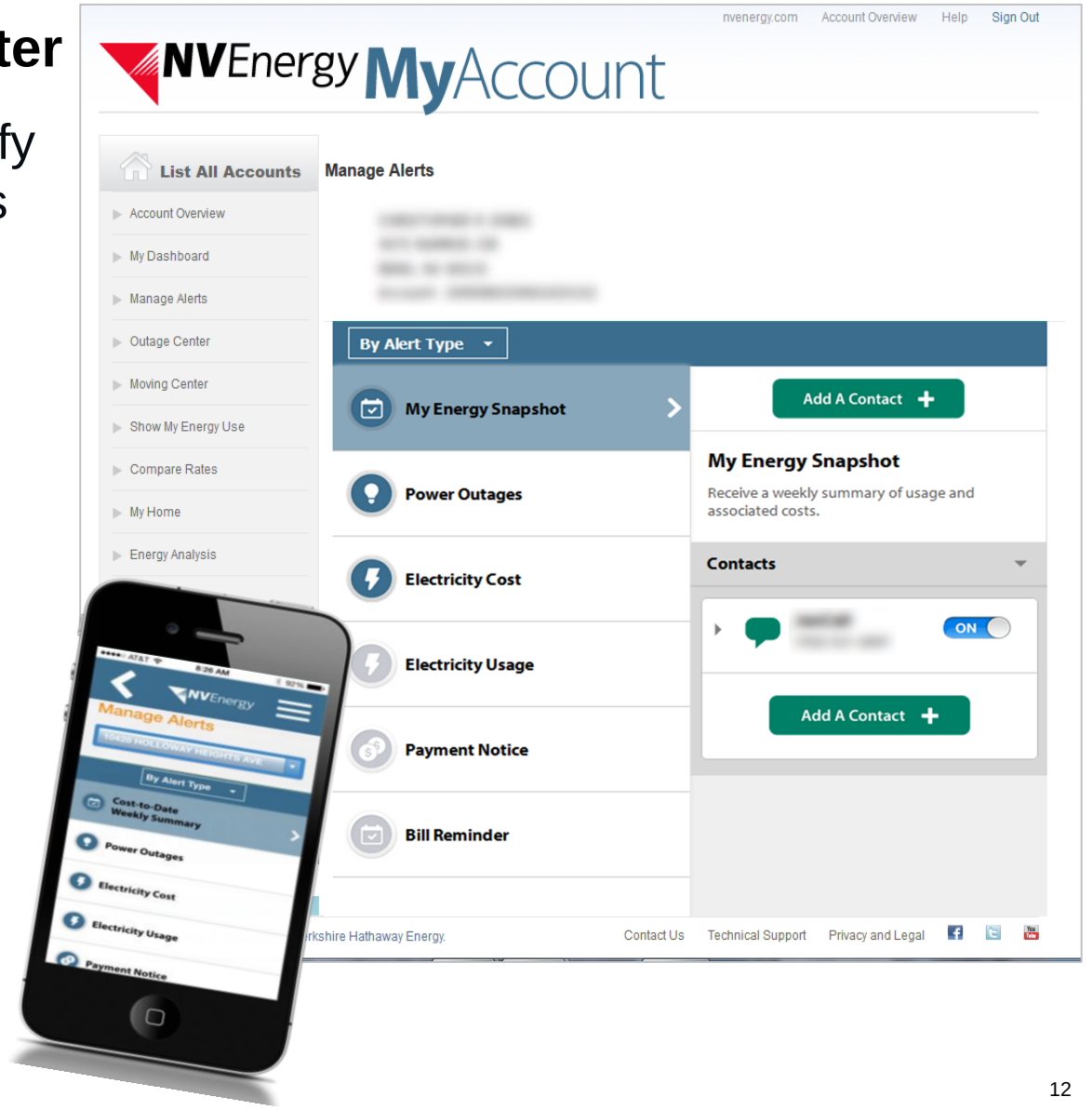


Net Metering Usage Graph

Modernization of the Grid
Customer Preferaence Center

Customer Preference Center

- Enables customers to specify which channels and devices they prefer to use when communicating with NV Energy
- Allows NVE to manage all customer communications from a single platform
- The Customer Preference Center enables reliable, consistent, effective, economical, and targeted communications



Leveraging Communication

- NV Energy has among best-in class technology-enabled communications
  - In April, surpassed 600,000 MyAccount customers
  - In less than a year, over 70,000 “app” downloads
  - In 2015, over 1.4 million outage website hits
  - 67% of payments received electronically
- Very positive impact on customer satisfaction
  - 10% increase in res customer sat (south) since 2013
  - #6 (of 66) in 2015 JD Power utility web site/mobile review
  - #3 (of 102) in eSource utility web site review
- Will enable proposed “FlexPay” prepay program

MyAccount
Weekly Energy Snapshot

NVEnergy

MY ENERGY SNAPSHOT

Billing Cycle: 01/21 - 02/18

Data as of 01/23

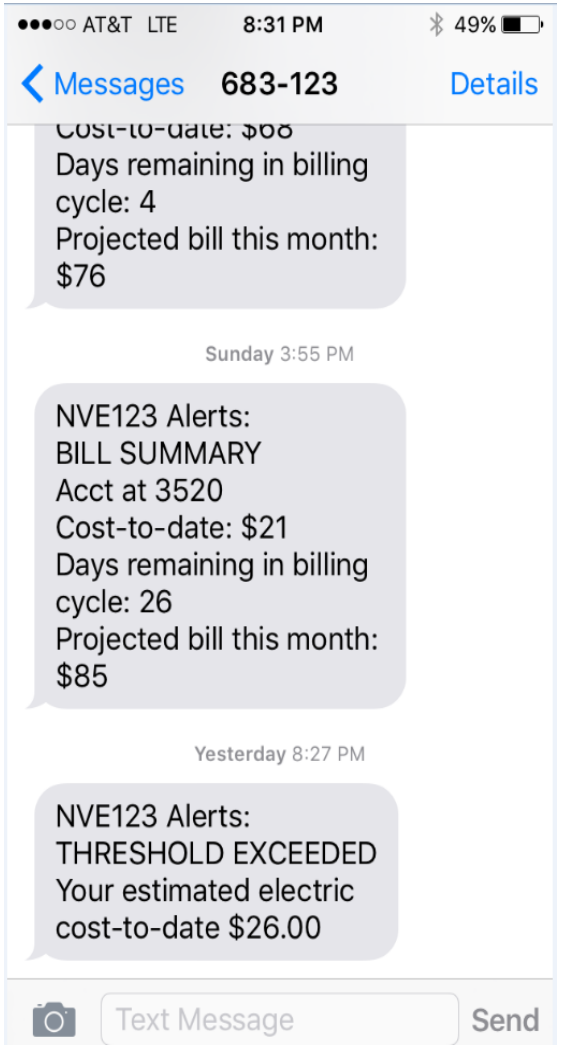
Electricity Used to Date
63
kWh

Cost to Date	$21
Days Remaining	26
Projected Monthly Bill	$85

My Weekly Trends

Previous 01/10 - 01/16	Current 01/17 - 01/23	Comparison
Temperature (low / high)		
30°/ 59°	33°/ 62°	↑3°/ ↑3°
Electric Usage (kWh)		
123	150	↑27
Cost		
$18	$21	↑$3

Snapshot by Email



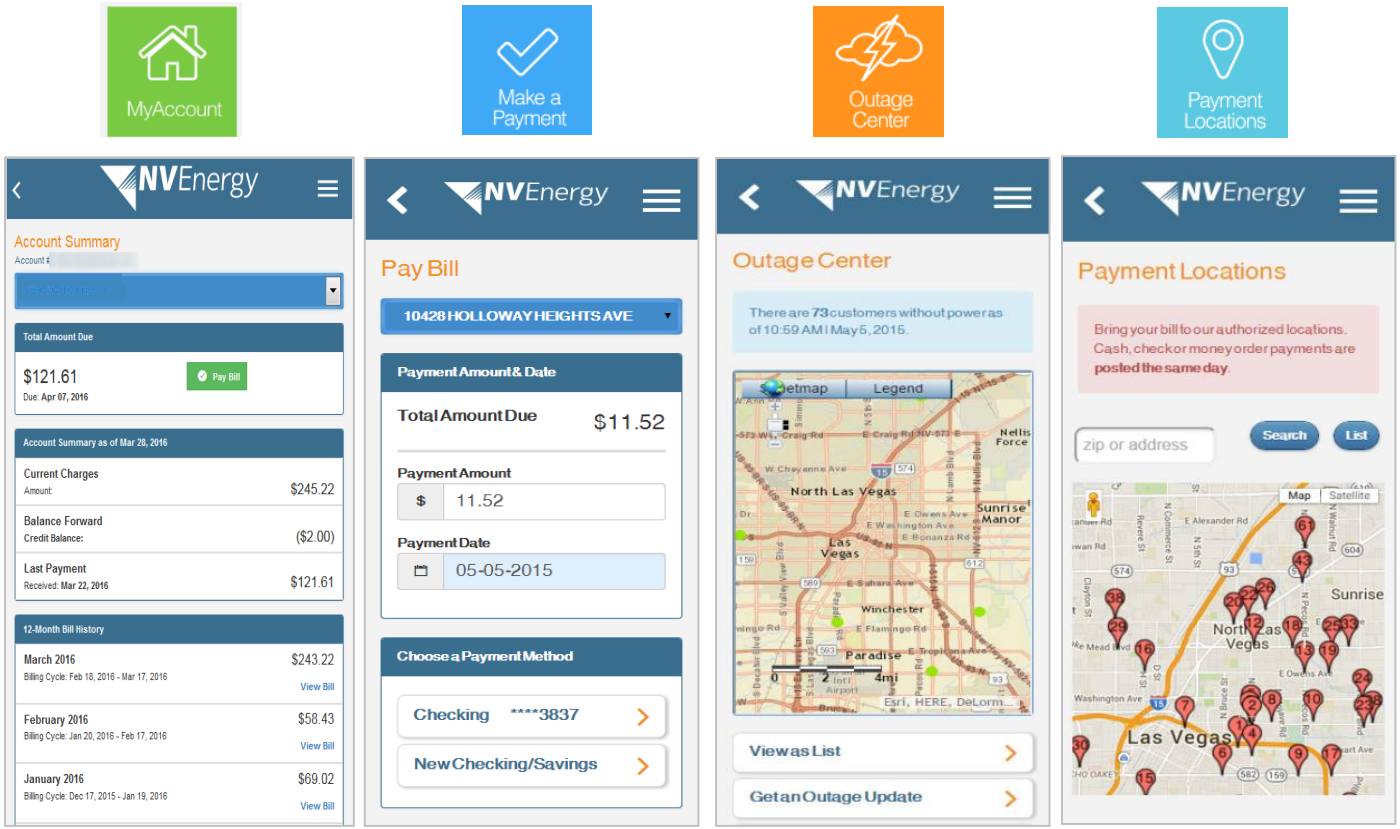
Snapshot by Text

Modernization of the Grid
Outage Communications

Customer Programs – Outage Reporting

Outage reporting through multiple channels – Utilizing the Customer Preference Center customers have the ability to choose their preferred method to report outages:

Available Now – NV Energy Mobile App



*NV Energy Mobile App – available in **iTunes** or **Google Play***

Modernization of the Grid
Transmission and Generation

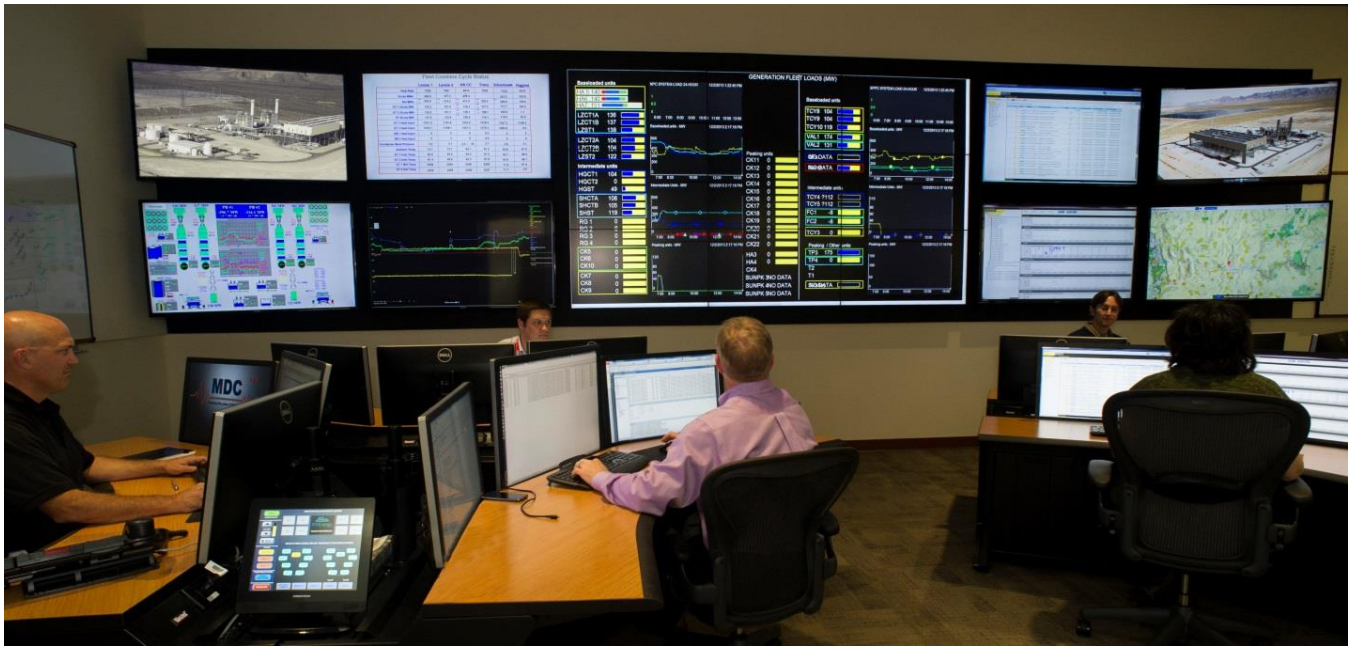
- Participation in the California Independent System Operator's Energy Imbalance Market ("EIM")
  - NV Energy's participation is voluntary
  - NV Energy received PUCN approval in 2014 and went live in December 2015 resulting in cost savings as soon as the first full month of participation was completed
  - Primary Benefits of EIM Membership for Nevada:
    - Members can avoid having to build new resources to follow imbalance in generation and load due to the fact that existing resources can be shared between balancing areas
    - Increases the cost effectiveness of intermittent renewable resources such as wind and solar because any excess generation can be delivered and used over a larger area

Modernization of the Grid
Monitoring and Diagnostic Center ("MDC")

- MDC
  - NV Energy maintains an MDC that tracks over 100,000 data points at its power plants
  - The data helps to predict failures in advance so outages can be avoided or properly scoped
  - NV Energy spent roughly $5 million to build the state of the art facility
  - The MDC saved over $5 million in preventable maintenance in the first two years of operation
  - Advanced Pattern Recognition Software – GE SmartSignal is the model used to monitor and identify degradation through pattern recognition and failures

Modernization of the Grid Generation - MDC

MDC



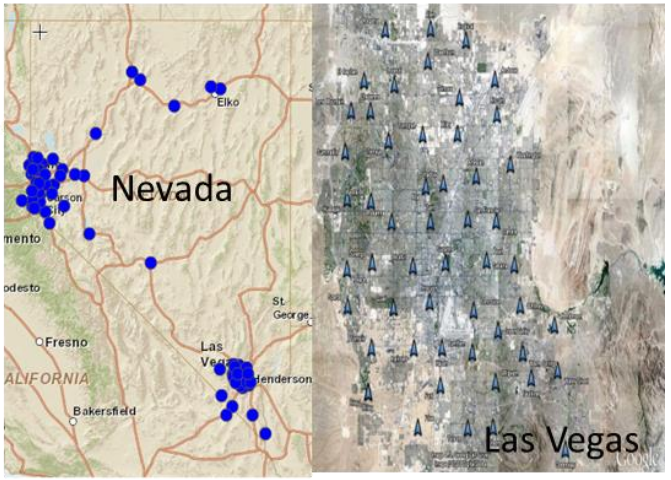
- Benefits
  - Optimal dispatch and scheduling of resources based on performance data
  - Forced outage avoidance
  - Maintenance scheduling / optimization
  - Centralized fleet-wide process engineering competency

Modernization of the Grid
Communications Infrastructure

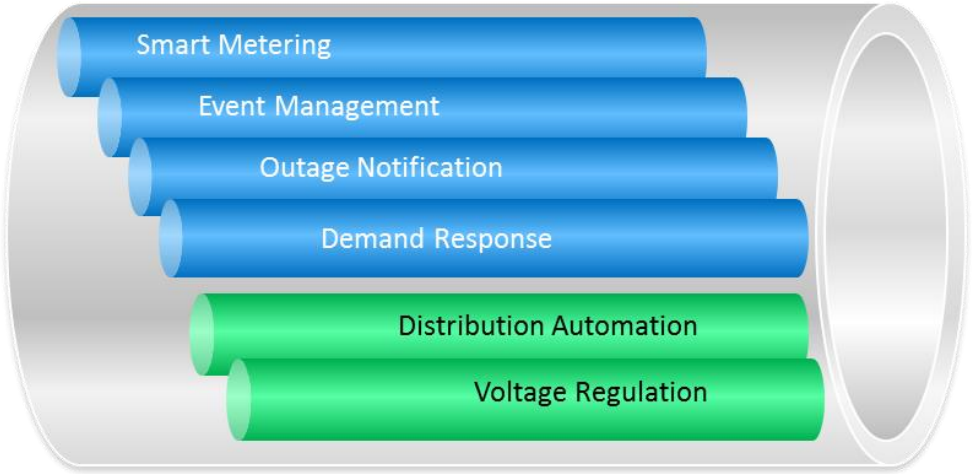
Smart Grid

Communications Infrastructure

- Communications Infrastructure Statewide
- Cyber Secure Base Stations
- 900 MHz licensed Radio frequency
- Dedicated AMI and DA spectrums
- Fiber and Microwave backhaul



Multiple Prioritized Channels



PCS N1-N4 — **Advanced Meter Infrastructure (AMI)**

PCS N19/25 — **Distribution Automation (DA)**

Modernization of the Grid Distribution

- Distribution Operations objectives
  - Safety: Ensure highest level of employee and public safety through understanding and application of technology
  - Reliability: Minimize customer outages and improve communication
  - Efficiency: Efficient operation of distribution system
  - Performance: Improve system performance based on technological advancements

Modernization of the Grid
Distribution - continued

- Programs currently in place:
  - NV Energize
  - Distribution Line Capacitor Automation
  - Substation Automation and Restoration Schemes
  - Distribution Automation – Intelliteam Switches
  - Substation Gas Detection
  - Substation Transformer Bushing Monitoring
  - Distributed Generation Monitoring (Primary)

Grid Modernization
Energy Efficiency and Demand Response

- Customer Energy Management Solutions
  - New program designs integrate energy efficiency and demand response to provide enhanced services to customers well beyond traditional rebate programs
- A new portfolio of programs leverage the smart grid infrastructure to allow customers to take advantage of new data driven solutions for enhanced energy management
- “Big data analysis” is applied on both sides of the meter to:
  - Optimize how customers use major energy systems
  - Allow NV Energy to actively manage its peak demand via peak shaping technology

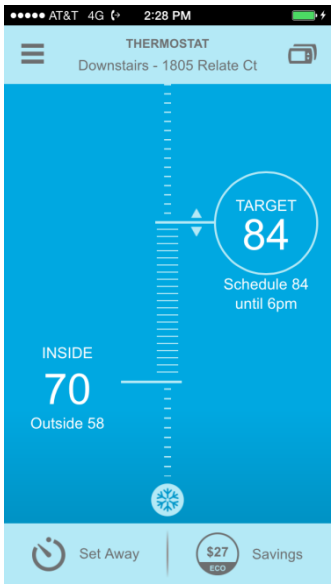
Grid Modernization
New Customer Solutions

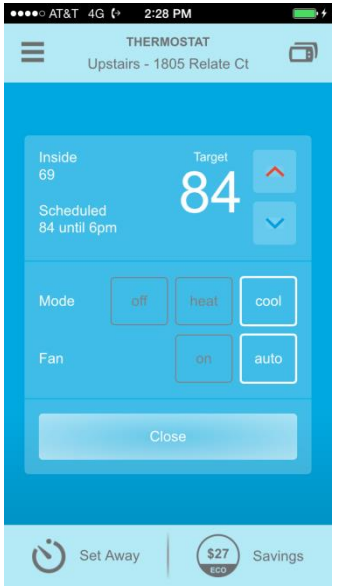
Energy Efficiency Optimization Service

HVAC Fault Detection Service

Remote Control

Enhanced data analysis identifies new savings opportunities

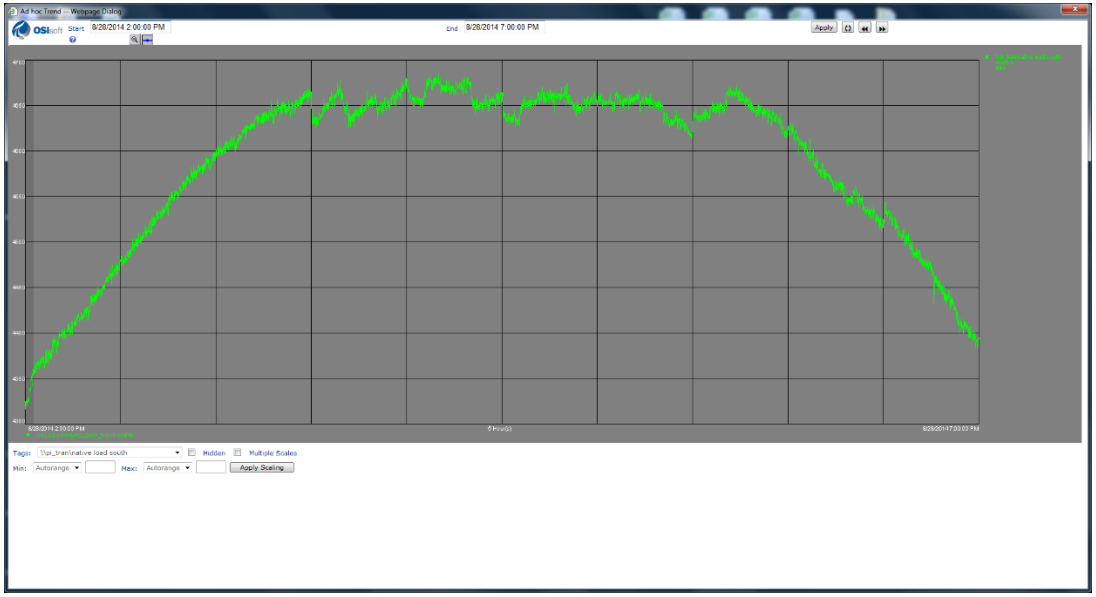




Grid Modernization
Advanced Peak Demand Management

- DRMS – advanced platform integrated to other enterprise systems allows NV Energy to forecast and optimize the “dispatch” of customer loads to reduce and shape the electric peak load. New approaches minimize customer impact, and most customers do not notice events.

- NV Energy has deployed the most advanced integrated energy efficiency and demand response platform in the country allowing flexible and locational dispatch to support both system wide and distribution level demand management (~240 MW of demand response statewide).

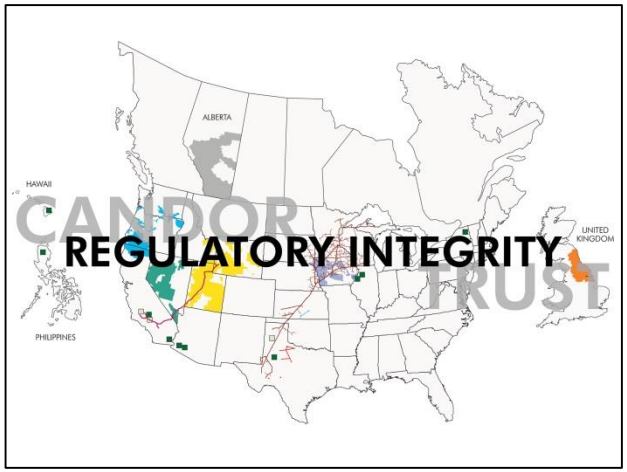


Demand response event optimization flatlines the electric peak producing significant avoided cost savings.

Grid Modernization
Role of Demand Response

- Demand response – programs that allow NVE to minimally manage customer loads to assist in meeting peak load without adding generation

- One of the largest home thermostat/Home Energy Management programs in the country
  - Controls over 244 MW of load, thus avoiding the need to construct new generation to serve the load
    - 201 MW at Nevada Power
    - 35 MW Irrigation load at Sierra Pacific
    - 8.4 MW other load at Sierra Pacific



Questions?

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