• Modernization of the grid
  – Smart Grid Vision Board
  – Smart Grid Infrastructure
    ▪ Smart Meters
    ▪ Systems Integration and Big Data
    ▪ Communications Infrastructure
    ▪ Security
  – Customer Programs and Services
  – Distribution Automation

• Emerging technologies
  – Grid Modernization – What’s Next?
The NV Energy Smart Grid Vision

**System Monitoring**
- Voltage Regulation
- Outage Detection

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

**Systems**
- Distribution Management System (DMS)
- Regional Network Interface (RNI)
- Meter Data Management System (MDMS)
- Supervisory Control and Data Acquisition (SCADA)
- Web Portal/Mobile
- Mobile Workforce Management (MWM)
- Customer Preference Center
- Big Data Analytics

**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

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

**Distribution Automation**
- Intelligent Switching
- Capacitor Control
- Fault Isolation

**Demand Management**
- Demand Response
- Home area Network (HAN)
- Distributed Generation
## Modernization of the Grid

### Smart Grid Infrastructure

### Smart Grid

**Foundational Infrastructure**

<table>
<thead>
<tr>
<th>Electric</th>
<th>1.23 million</th>
<th>15-minute intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas</td>
<td>157 thousand</td>
<td>60-minute intervals</td>
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<tr>
<td><strong>$139 million DOE</strong></td>
<td>Smart grid investment grant</td>
<td></td>
</tr>
<tr>
<td><strong>$186 million</strong></td>
<td>In general rate base 2014</td>
<td></td>
</tr>
<tr>
<td><strong>$20 million NET</strong></td>
<td>Steady state annual benefits</td>
<td></td>
</tr>
<tr>
<td><strong>3.5 million</strong></td>
<td>Remote connect/disconnect</td>
<td></td>
</tr>
</tbody>
</table>

**Table:**
- **Cyber Secure:** Encrypted network
- **900 MHz:** FCC licensed frequency
- **Dedicated:** AMI and DA spectrums
- **Fiber:** Secure backhaul

**Graph:**
- Modernization of the Grid
- Smart Grid Infrastructure
- Electric and Gas readings
- Investment grants and benefits
- Communication infrastructure and spectrum usage
Modernization of the Grid
Systems Infrastructure

Smart Grid
Systems Infrastructure

New Systems Integration
- Distribution Management System (DMS)
- Regional Network Interface (RNI)
- Meter Data Management System (MDMS)
- Supervisory Control and Data Acquisition (SCADA)
- Web Portal/Mobile
- Mobile Workforce Management (MWM)
- Customer Preference Center
- Demand Response Management System (DRMS)

Big Data Platform
Service Oriented Architecture (SOA)
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

- Smart Metering
- Event Management
- Outage Notification
- Demand Response
- Distribution Automation
- Voltage Regulation

Advanced Meter Infrastructure (AMI)

Distribution Automation (DA)
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
  - 1.4 million total hits in 2015 (web and mobile)
• Demand response – programs that allow NVE to control customer’s loads to assist in meeting the electric peak load without adding generation

• NVE’s Program is one of the largest 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
Modernization of the Grid
New Customer Solutions

- Energy Efficiency Optimization Service
- HVAC Fault Detection Service
- Remote Control

Enhanced data analysis identifies new savings opportunities
Modernization of the Grid
Distribution Automation

Distribution Automation - Remotely monitors and controls basic switches, capacitors, relays, reclosers, and other devices that control a large and complex array of power lines, substations, and other components of the system:

- 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 – What’s Next?

• **Distribution**
  - Distributed generation integration and impact to the grid
  - Study the benefits of smart inverters
  - Volt/Var optimization pilot program
  - Fault location, isolation, and service restoration
  - Remote controlled switching
  - Integrated mobile dispatch

• **Customer service offerings**
  - Continue to develop emerging technologies and interfaces with customers offering a suite of products and services to help customers track and manage energy consumption

• **Use of Emerging Technologies**
  - Use of storage technologies
    - Batteries - Technology assessment as related to grid integration
  - Electric Vehicles (EV)
    - Infrastructure needed to promote EV use across Nevada - The “Electric Highway” is a catalyst
    - Potential use as a demand side resource either through demand response or acting as a storage device