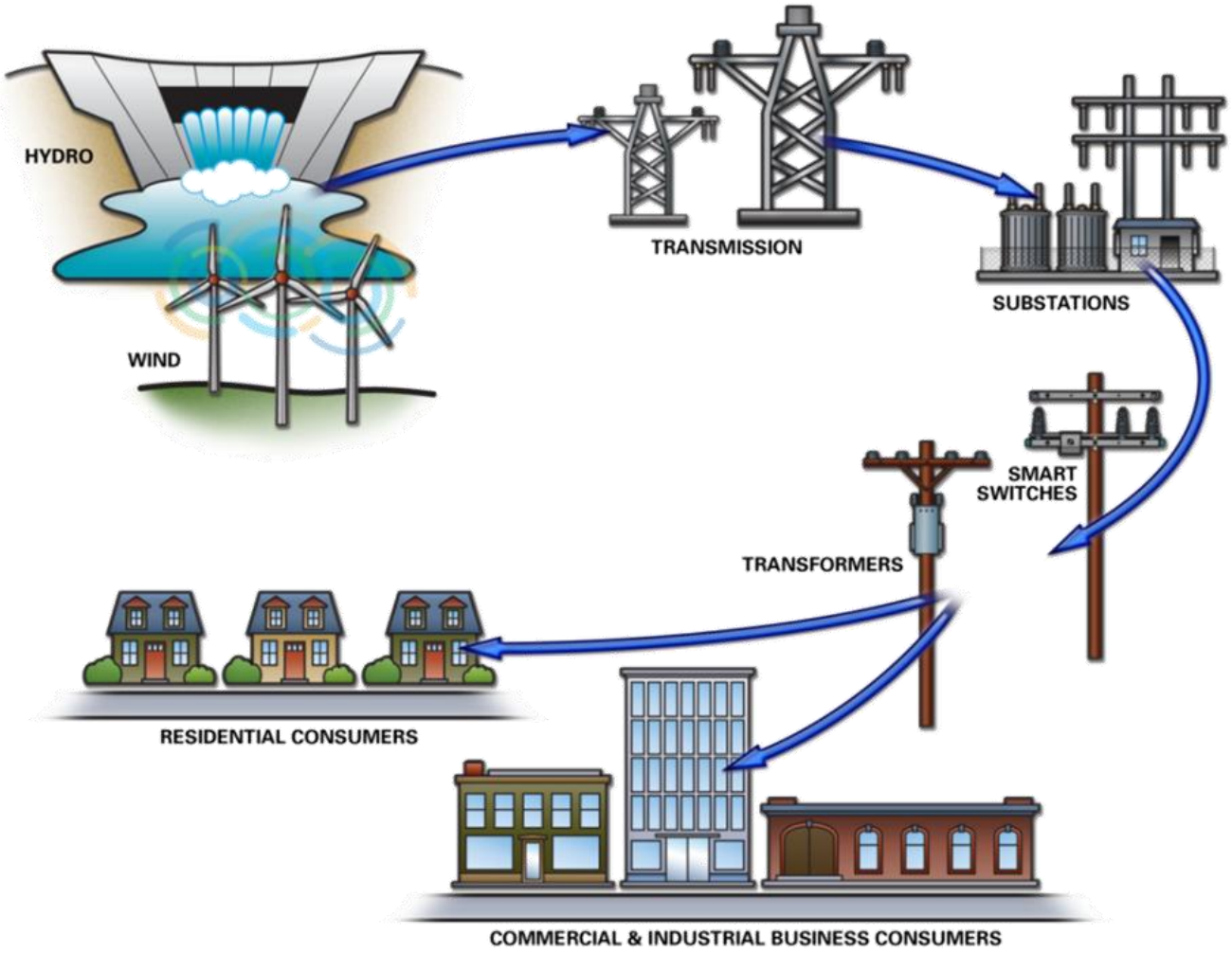
Photo courtesy of Bill Owens, City of Pullman

Avista's Smart Grid Projects

February 10, 2011

Olympia, WA

Energy for a Smart Future



Seven Characteristics of the Smart Grid

Characteristic	Today's Grid	Smart Grid
Enables active participation by consumers	Consumers are uninformed and non-participative with power system	Informed, involved, and active consumers - demand response and distributed energy resources.
Accommodates all generation and storage options	Dominated by central generation- many obstacles exist for distributed energy resources interconnection	Many distributed energy resources with plug-and-play convenience focus on renewables
Enables new products, services and markets	Limited wholesale markets, not well integrated - limited opportunities for consumers	Mature, well-integrated wholesale markets, growth of new electricity markets for consumers
Provides power quality for the digital economy	Focus on outages - slow response to power quality issues	Power quality is a priority with a variety of quality/price options - rapid resolution of issues
Optimizes assets & operates efficiently	Little integration of operational data with asset management - business process silos	Greatly expanded data acquisition of grid parameters - focus on prevention, minimizing impact to consumers
Anticipates and responds to system disturbances (self-heals)	Responds to prevent further damage- focus is on protecting assets following fault	Automatically detects and responds to problems - focus on prevention, minimizing impact to consumer
Operates resiliently against attack and natural disaster	Vulnerable to malicious acts of terror and natural disasters	Resilient to attack and natural disasters with rapid restoration capabilities

http://www.oe.energy.gov/SmartGridIntroduction.htm

Energy for a Smart Future

What are the potential benefits of a smart grid?

- Reduce waste and increase efficiency
- Decrease outages
- Empower customers
- Environmental benefits

Transformation

2008

Distribution Reliability

- Distribution Automation
- O&M Driven Asset Replacement
- Pro-active Pole Management

Energy Efficiency

- Conductor "Right Sizing"
- Transformer Replacement
- Feeder Balancing
- Capacitor Placement
- Monitoring

- Communications and Integration

American Recovery and Reinvestment Act – Smart Grid Investment Grant Opportunity

July 2009

Smart Circuit

Distribution Reliability

- Distribution Automation
  - Conservation Voltage Reduction
  - Integrated Volt-Var Compensation
  - Optimal Load Transfer
  - Automated Fault Detection and Isolation
  - Adaptive Fuse Schemes

Energy Efficiency

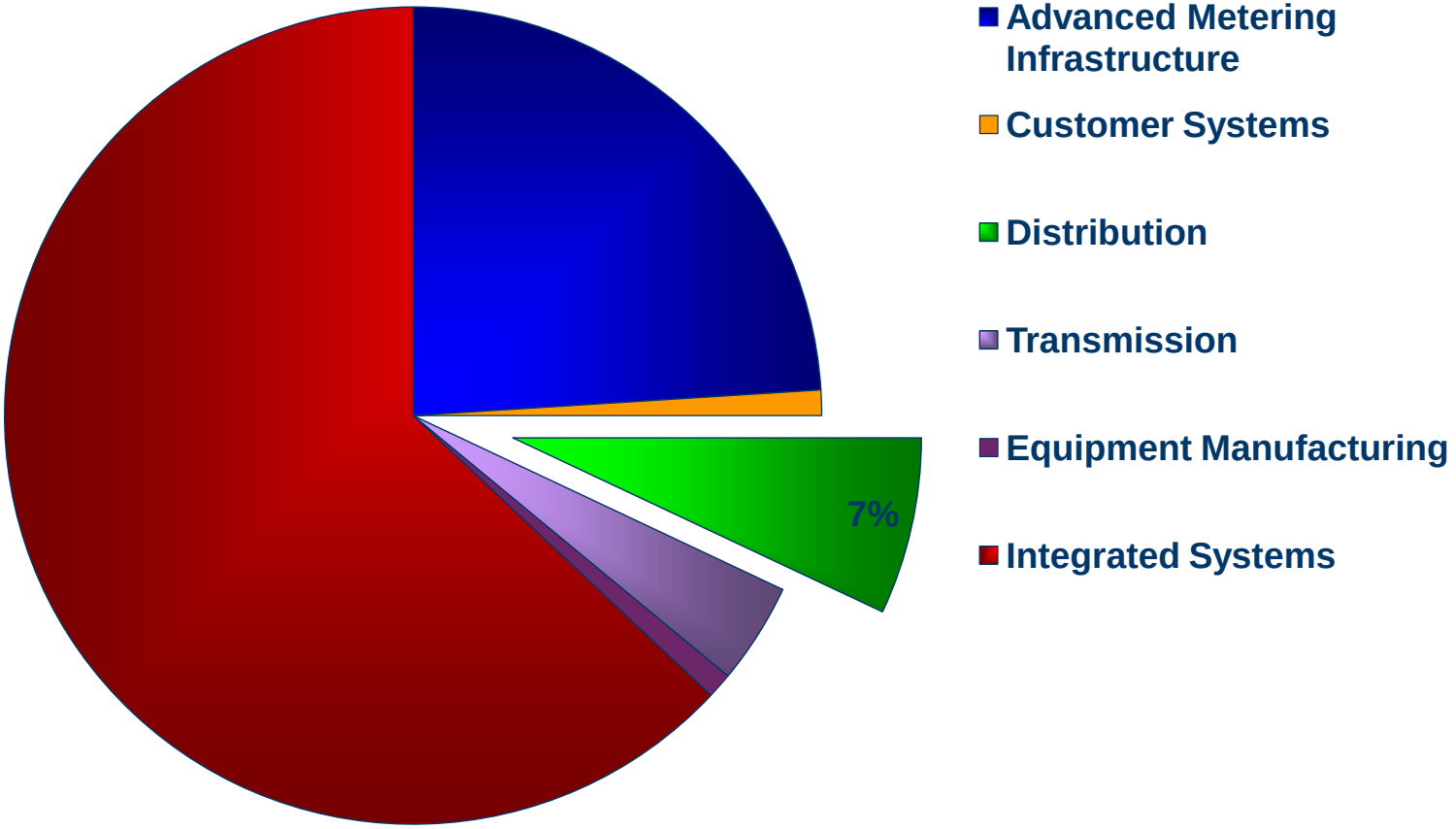
- Conductor Replacement
- Feeder Balancing
- Monitoring

- Communications and Integration

Spokane “Smart Circuit” Overview

Funding Overview

$3.4 Billion awarded in the following categories



Source: Edison Electric Institute Smart Grid Website http://eei-stimulus.groupsite.com/file_cabinet/49994?lpx=1

Goals of the Spokane Project

- Increased Reliability
- Reduce Energy Losses
- Integration of distributed energy resources
- Extend life of assets

Increased Reliability

Fault Detection Isolation & Restoration

- Distribution Supervisory Control and Data Acquisition (SCADA)
- Line Monitoring
- Communication System
- Remotely Operable Line Devices
- Remotely Operable Substation Devices

Outage Restoration Example


LOCKOUT CONDITION
Substation A
FAULT
Substation B
Substation C


UPSTREAM RESTORED
Substation A
FAULT
Substation B
Substation C


DOWNSTREAM RESTORED
Substation A
FAULT
Substation B
Substation C

Increased Efficiency

Active Power Flow Management

- Distribution SCADA
- Line Monitoring
- Communication System
- Remotely Operable Line Devices
- Remotely Operable Substation Devices

Increased Energy Efficiency

- Smaller Conductors → Larger Conductors
- Fixed Voltage Regulation → Dynamic Voltage Regulation
- Fixed Reactive Power Compensation → Dynamic Reactive Power Compensation

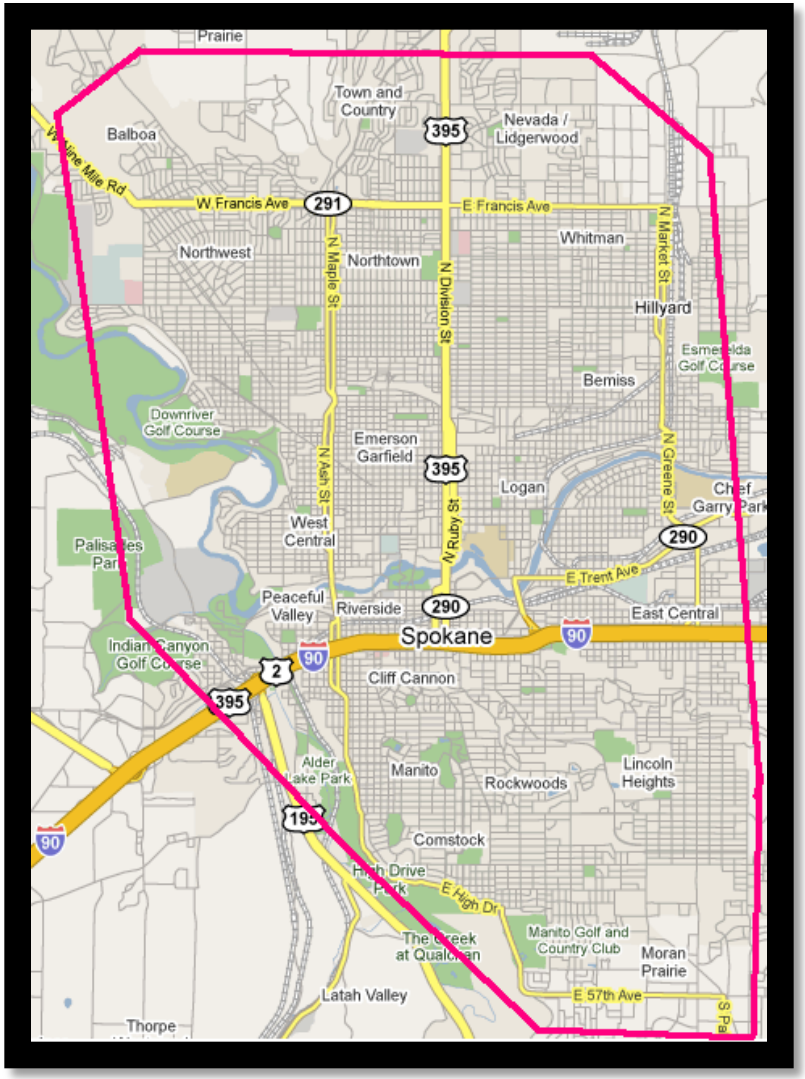
Distributed Resources & Asset Life

- System capable of handling a wide range of customer, and utility owned **resources**.

- System capable of handling a wide range of customer loads and system **constraints.**

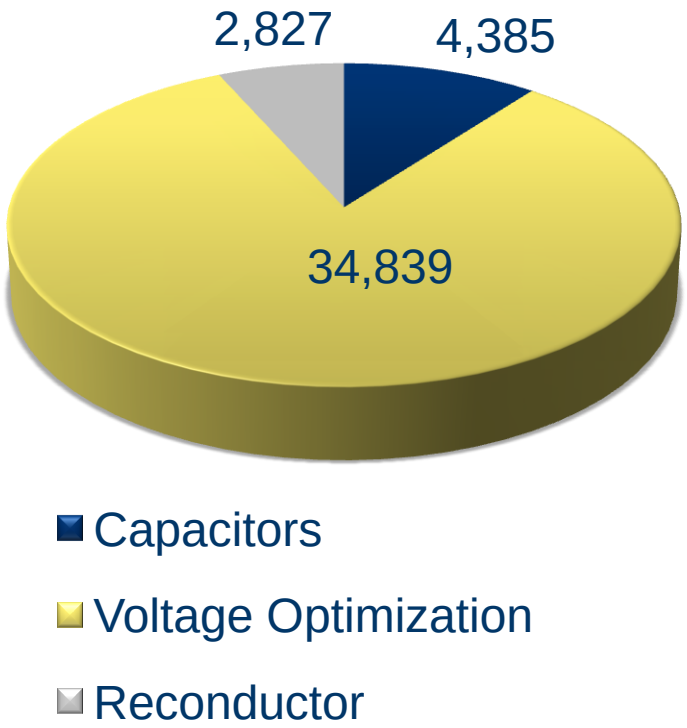
Project Scope

- 59 Circuits
- 14 Substations
- 110,000 electric customers



Benefits for Spokane Smart Circuit

Savings (MegaWattHour)

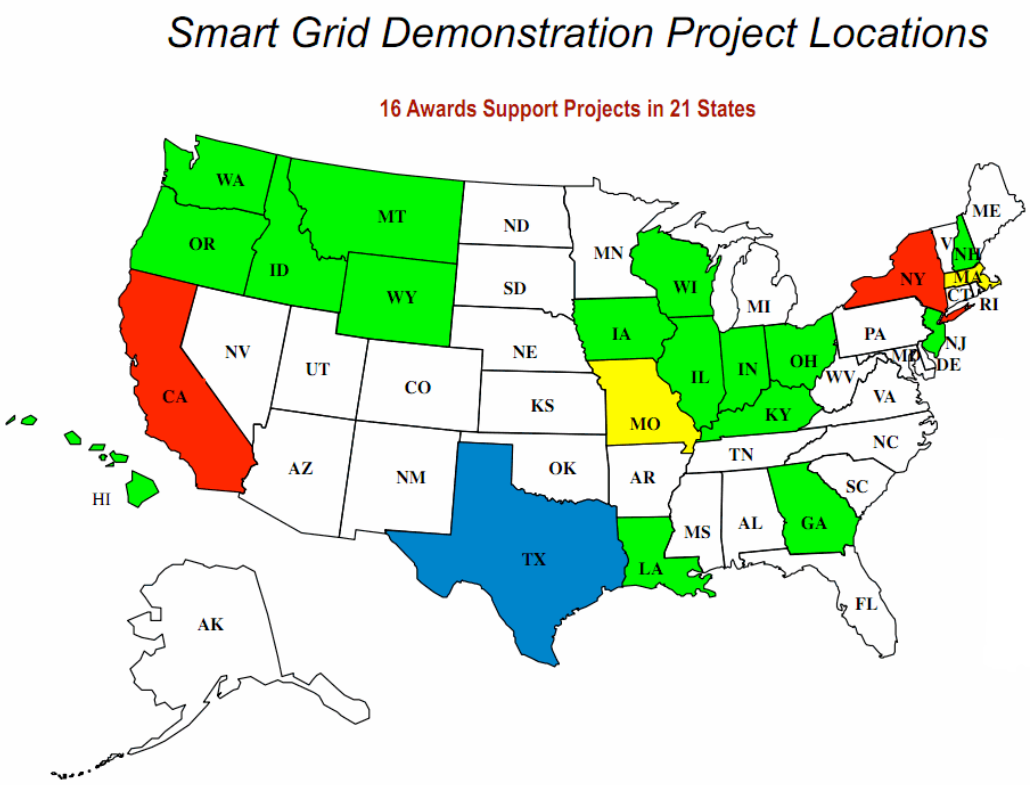


Carbon Reduction: 14,360 Tons a year.

- $50/Ton to Sequester
- $718,000/year.

Smart Grid Demonstration Project

ARRA Smart Grid Demonstrations



Pacific Northwest Demonstration Project

Pacific Northwest SMART GRID DEMONSTRATION PROJECT

What:

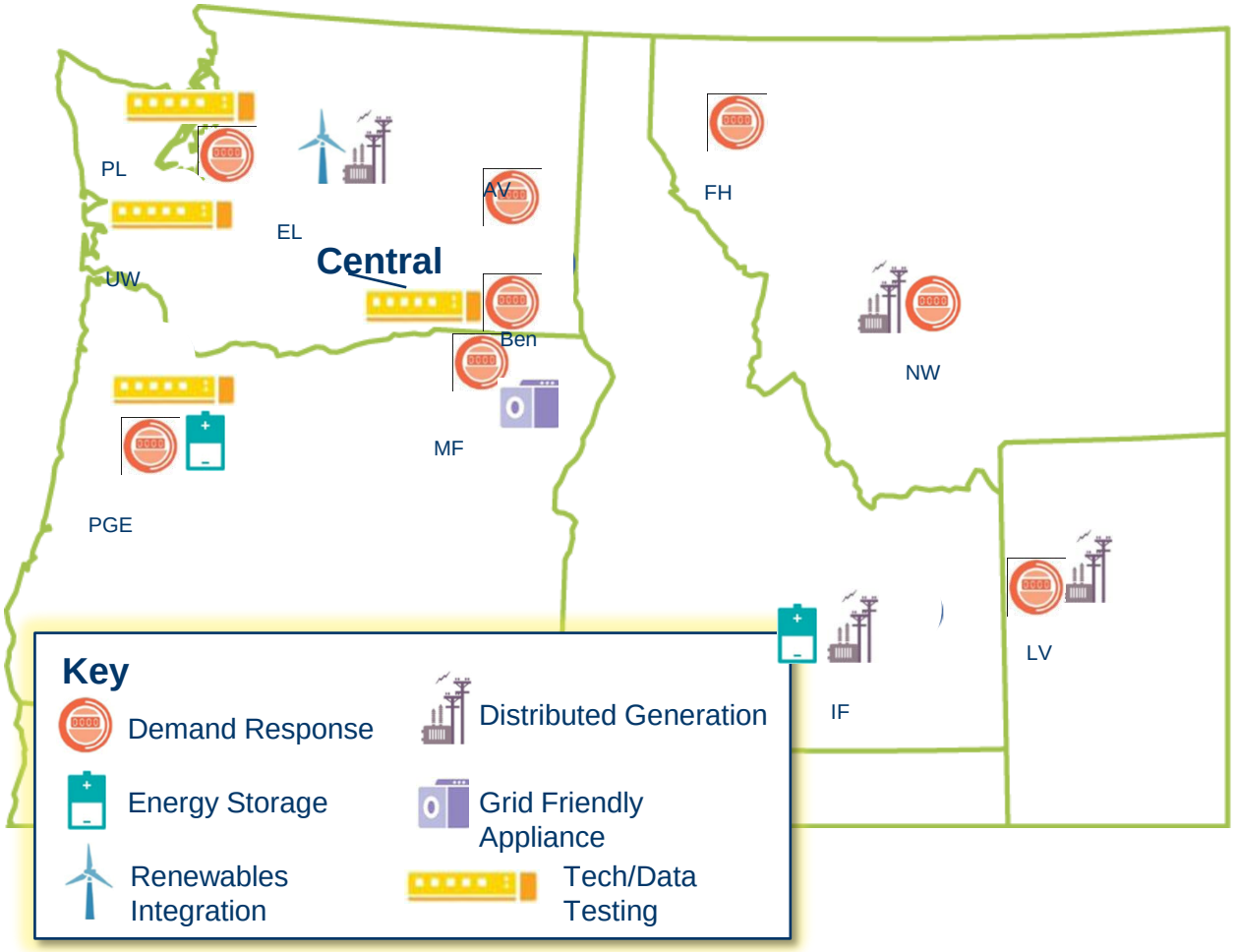
- $178M, ARRA-funded, 5-year demonstration
- 60,000 metered customers in 5 states

Why:

- Quantify costs and benefits
- Develop communications protocol
- Develop standards
- Facilitate integration of wind and other renewables

Who:

Led by Battelle and partners including BPA, 11 utilities, 2 universities, and 5 vendors



AVISTA

NW Smart Grid Demonstration

NETL

Bonneville Power Administration

Battelle NW

3 Tier
Areva
IBM
Netezza
Quality Logic

Utility Partners

Avista
Benton PUD
City of Ellensburg
Flathead Electric
Idaho Falls Power
Lower Valley Energy
Milton-Freewater
Northwestern Energy
Peninsula Light
PGE
Seattle City Light

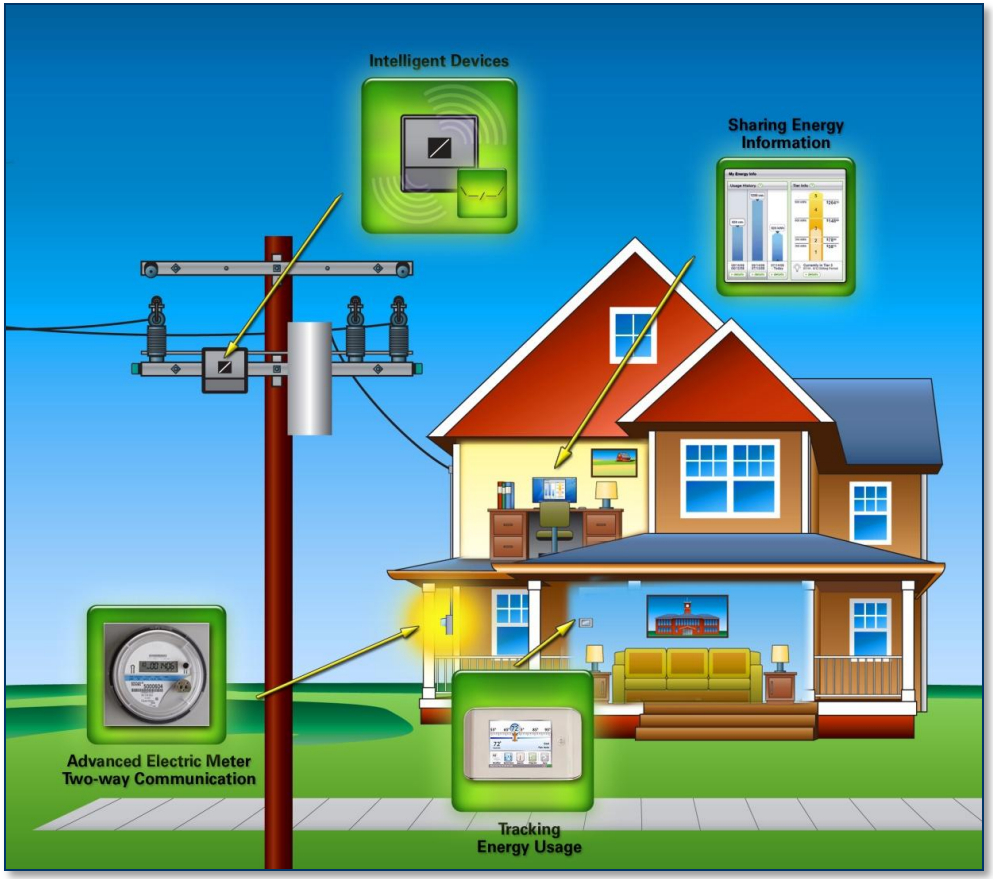
NW Smart Grid Demonstration

Project Impacts

- 3 Substations
- 13 Circuits
- 13000 Electric Customers
- 5000 Gas Customers

Pullman Smart Grid Demonstration Project

- Upgrade facilities and automate distribution system
- Install technologies and tools for customers to actively monitor and manage their energy usage



2010 Year in Review

Smart Grid Demonstration Project

- Project Funding
- Substation Design
- Distribution Design & Construction
- Communication Network Design
- Distribution Management System
- Communications
- Residential Meter Design

2011 Project Activities

Smart Grid Demonstration Project

- Substation Construction – device installation
- Distribution Construction – conductor upgrade, capacitor bank and recloser installation
- Communication Installation –radio mesh network deployed to allow meter communication
- Baseline system analysis of Pullman system
- Provide Advanced Meter residences a web based tool for data access

Smart Grid Demonstration Project

Benefits

- Distribution switches, capacitors and reclosers make the system more efficient
- A rapid communication system will shorten customer outages
- Management of the distribution grid improves reliability
- Automated outage detection and reporting to effectively locate outages
- Ongoing energy use information allows customers to monitor and manage energy

The Customer Experience

The Customer Experience

- Advanced Meter Infrastructure
- Customer Education and Energy Awareness (Web Portal)
- Customer Participation (Demand Response)
- Real Time Energy Use Feedback (In-home, real-time display)

Advanced Meter Infrastructure (AMI) Scope

Digital meters provided by our cost share partner, Itron, that operate via a secure wireless network, allowing two-way, real-time communication between the customers' meter and Avista.

- Installation begins March 2011 Scope Services – trucks will carry Avista logo
  - ~13,000 Electric
  - ~5,000 Gas
- Customer web tools Fall 2011

The Customer Experience
Scope

Web-Portal

- Display interval energy usage data
- Provide education and tools to understand and manage energy consumption
- Available to all Customers with Advanced Meters

Demand Response/Home Area Network

- Respond to Battelle's Transactive Signal
- Provide a Home-Area-Network & Smart Thermostat
- 1,500 Customers in Pullman

Real Time Energy Use Feedback

The Customer Experience
Web Portal Objectives

- Provide capability to display meter interval data
- Provide capability for customers to compare usage & costs in a variety of ways
- Provide capability for customers to set a budget and manage energy cost to that budget
- Provide customer education and generate interest in energy management
- Provide web-channel information to a mobile application.
- Develop an understanding of cause and effect results on customer behavior

RESIDENTIAL HOME | BUSINESS HOME | INSIDE AVISTA | CONTACT US | QUESTIONS? | SIGN-OUT

AVISTA

MY ACCOUNT | SERVICES & PRICING | ENERGY SAVINGS | YOUR SAFETY | OUR ENVIRONMENT | OUR COMMUNITY

Search GO

Home > My Account > My Account Details

- My Account
- Bill Assistance
- My Bill
- My Payments
- Moving?
- Update My Account
- Billing Options
- Payment Options
- Bill Inserts
- Housewarming Gift Certificate
- My Smart Meter

SERVICES FOR YOUR BUSINESS GO

My Account Details

Sign-Out

Welcome Leona

Account

Balance (as of 01/06/2011) $116.[illegible]CR View Current Bill

Last Payment Received 01/05/2011 $[illegible].00 View

No payment due at this time.

Pay Now

NEED MORE INFOR[illegible]TION AB[illegible]T [illegible]UR ACCOUNT?

Payment and Billing [illegible]tions

Payment Options Select[illegible]		See All Options
Billing Options Selected	eBill	See All Options
Project Share Pledge	None	Make a Pledge

Update Your Service Information

Service Address	Spokane Valley, WA 99016	Moving?
Mailing Address	Same as Service	Change
Primary Phone Number		Change
Alternate Phone Number		Change

Account Preferences

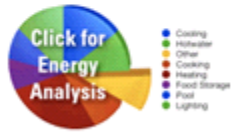
E-mail Preferences	To help Avista deliver information that is relevant and valuable to you via e-mail, please visit your E-mail Preferences page.

MY SMART METER

BILL ANALYZER

Identify the major causes of changes in energy usage.

HOME ENERGY ANALYZER



Analyze your annual energy costs and find ways to save.

AVISTA

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Search GO

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SERVICES FOR YOUR BUSINESS GO

Curtis A Kirkeby
Account #:

Service Details at:
Spokane, WA 99223

Your home is equipped with the innovative technology that will help you manage and better track your energy and save you money.

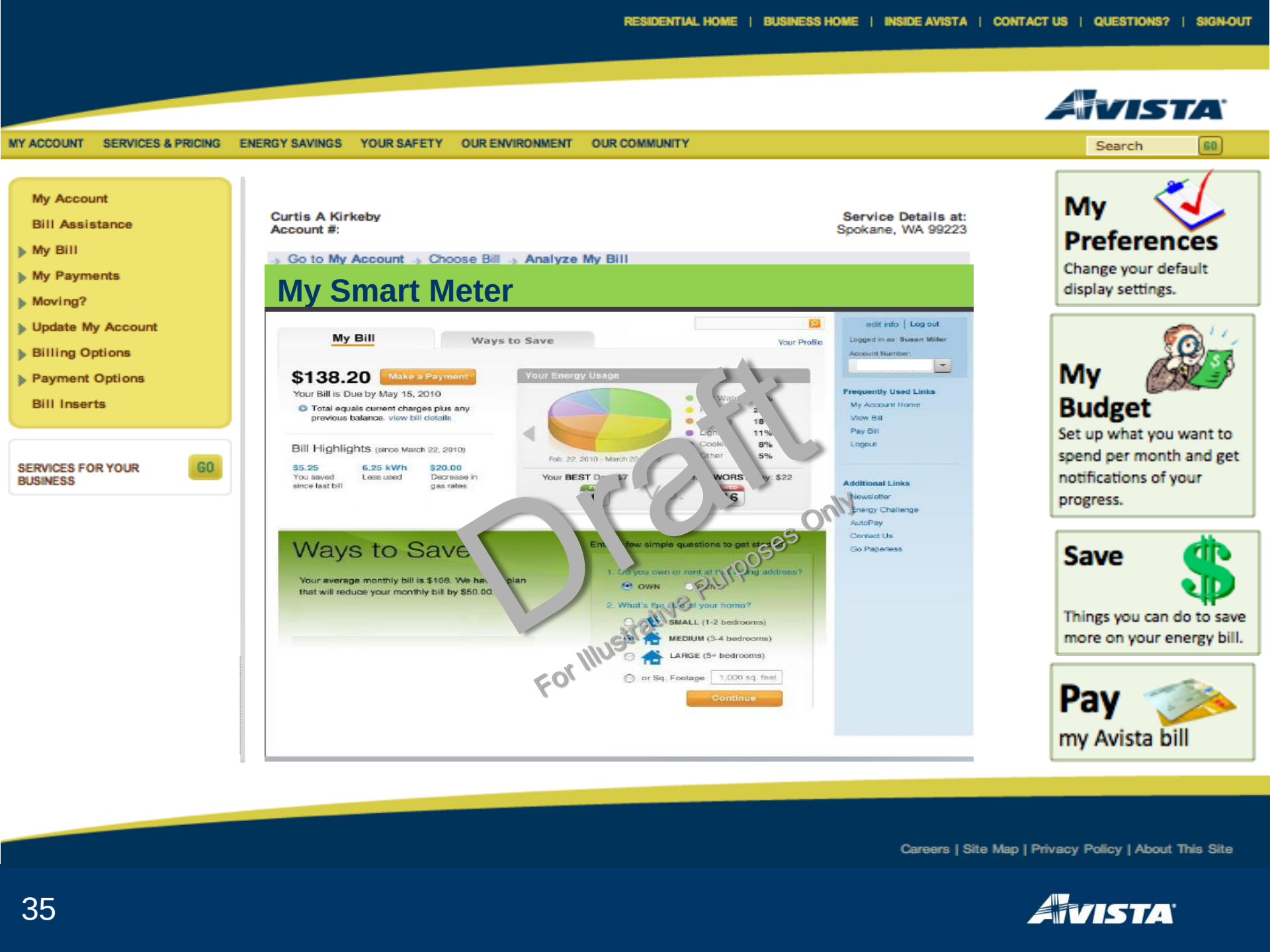
Getting started is easy.

Answer the 5 questions below.
Once complete, you will be directed to your Smart Meter.

- What year was your home built? 1970's
- How many people reside in your home? 4
- What is the size of your home? 2800 sqft.
- What is your homes main source of heating? Electric
- How do you heat your water? Electric

Next

AVISTA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Search GO
My Account
Bill Assistance
My Bill
My Payments
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Update My Account
Billing Options
Payment Options
Bill Inserts
SERVICES FOR YOUR BUSINESS GO
Curtis A Kirkeby
Account #:
Service Details at:
Spokane, WA 99223
Go to My Account Choose Bill Analyze My Bill
My Smart Meter
My Bill
Ways to Save
Your Profile
$138.20
Make a Payment
Your Bill is Due by May 15, 2010
Total equals current charges plus any previous balance. view bill details
Bill Highlights (since March 22, 2010)
$5.25
You saved since last bill
6.25 kWh
Less used
$20.00
Decrease in gas rates
Your Energy Usage
Ways to Save
Your average monthly bill is $108. We have a plan that will reduce your monthly bill by $50.00
OWN
SMALL (1-2 bedrooms)
MEDIUM (3-4 bedrooms)
LARGE (5+ bedrooms)
or Sq. Footage
1,000 sq. feet
Continue
edit info | Log out
Frequently Used Links
My Account Home
View Bill
Pay Bill
Logout
Additional Links
Newsletter
Energy Challenge
AutoPay
Contact Us
Go Paperless
Draft
For Illustrative Purposes Only
My Preferences
Change your default display settings.
My Budget
Set up what you want to spend per month and get notifications of your progress.
Save
Things you can do to save more on your energy bill.
Pay
my Avista bill
Careers | Site Map | Privacy Policy | About This Site
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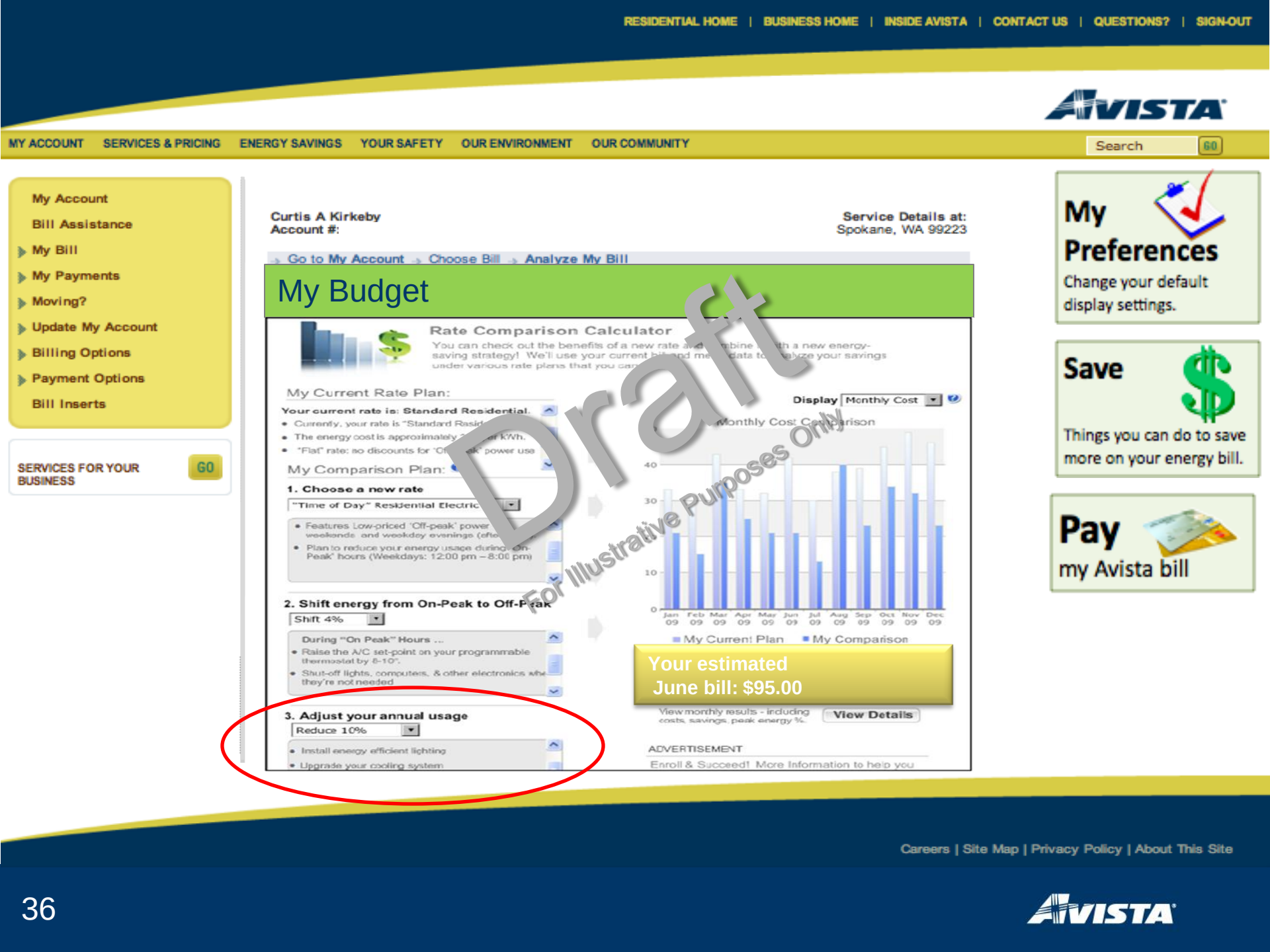
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SERVICES FOR YOUR BUSINESS GO
Curtis A Kirkeby
Account #:
Service Details at:
Spokane, WA 99223
Go to My Account Choose Bill Analyze My Bill
My Budget
Rate Comparison Calculator
My Current Rate Plan:
Your current rate is: Standard Residential
My Comparison Plan:
1. Choose a new rate
"Time of Day" Residential Electric
2. Shift energy from On-Peak to Off-Peak
Shift 4%
During "On Peak" Hours ...
3. Adjust your annual usage
Reduce 10%
Install energy efficient lighting
Upgrade your cooling system
Display Monthly Cost
Monthly Cost Comparison
My Current Plan
My Comparison
Your estimated June bill: $95.00
View monthly results - including costs, savings, peak energy %.
View Details
ADVERTISEMENT
Enroll & Succeed! More Information to help you
Draft
For Illustrative Purposes Only
My Preferences
Change your default display settings.
Save
Things you can do to save more on your energy bill.
Pay
my Avista bill
Careers | Site Map | Privacy Policy | About This Site
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My Account
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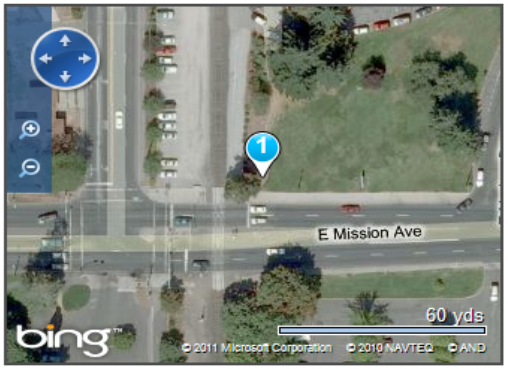
SERVICES FOR YOUR BUSINESS GO



Double-click on a home to compare

1411 E Mission Ave
Spokane, Washington 99202

Year Built: 1956 (default)
Bedrooms: -
Bathrooms: -
Sq Ft: 1500 (default)
Air conditioning: none (default)
Heating: central gas furnace (default)

56 W[illegible]m Score?

Estimated H[illegible] Scor[illegible]

You may be able to improve your score by telling us a bit more about your home.

HOME ENERGY ANALYZER

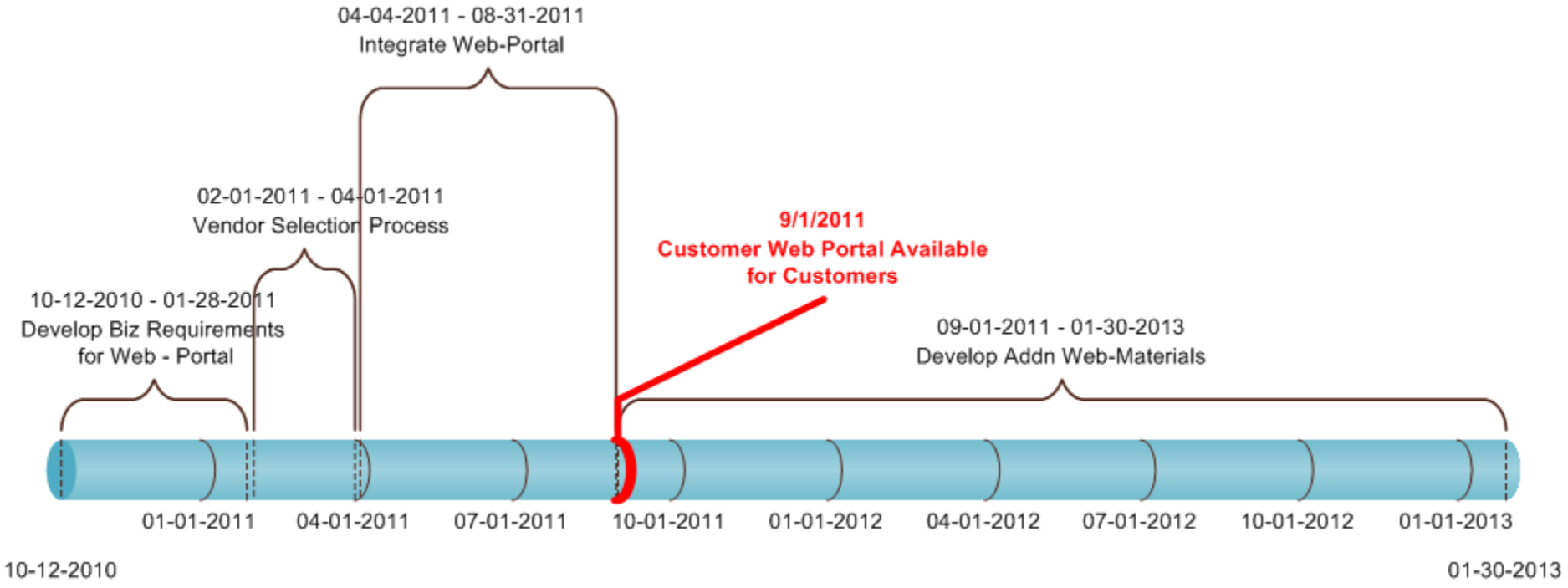
Analyze your annual energy costs and find ways to save.

Your Annual Energy Usage Co[illegible]†

This House	1 Yr:[illegible], Bed:-, Bath[illegible] Sq Ft:1500	$3,604	56
Averages In 99202	Yr:-, Avg.[illegible] Ft:-	$2,479	62
18606 E Baldwin Ave, Spokane Valley, WA, 99016-9508	2 Yr:1980-1984 Bed:3, Bath:2, Sq Ft:1200-1399 View this home	$2,782	61
Find a House	Enter new address to compare Or double-click on the map	Compare	

† Energy estimates are based on publically available data for each home and typical usage data for households in your area.

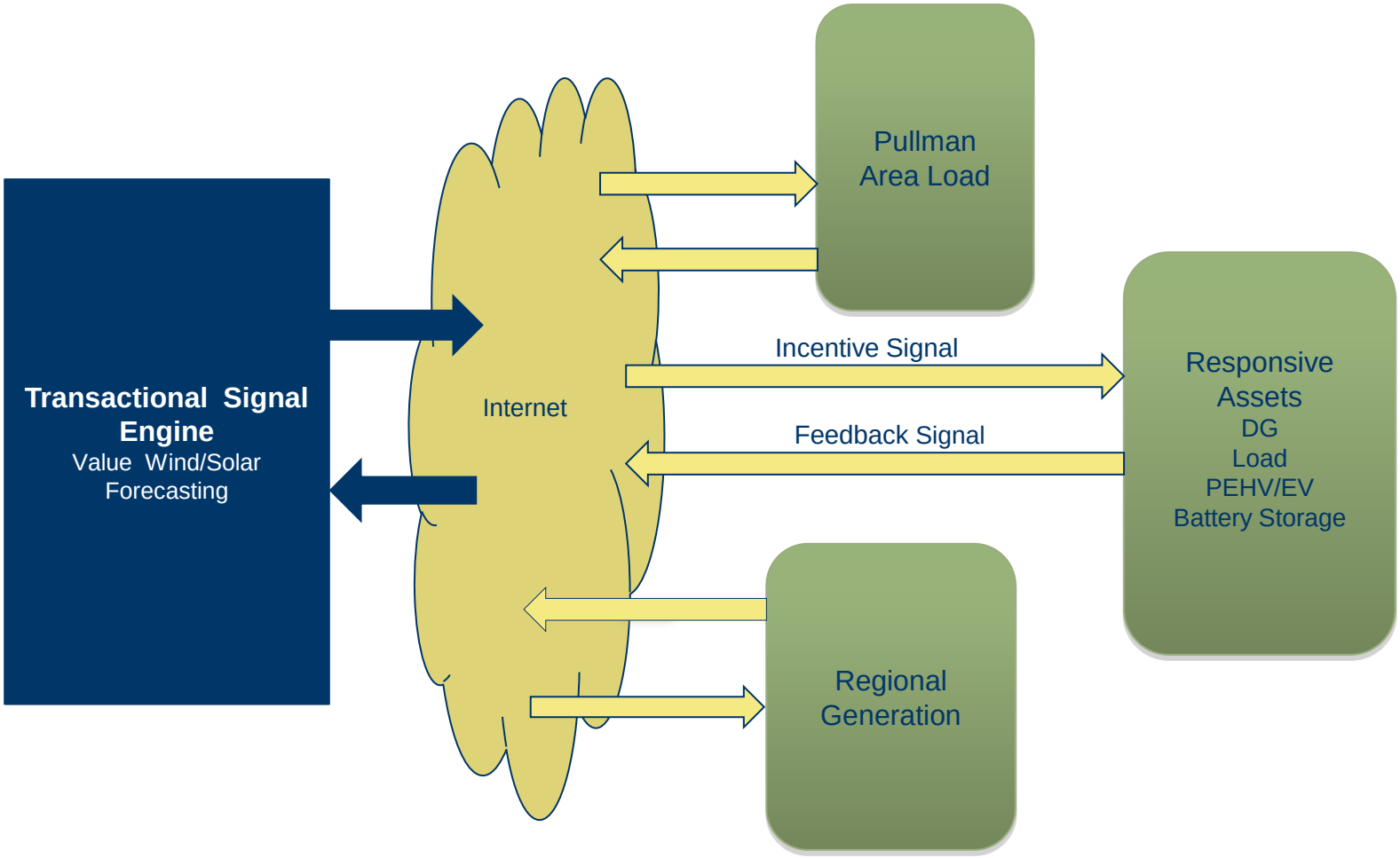
The Customer Experience
Web Portal Timeline



The Customer Experience
Demand Response

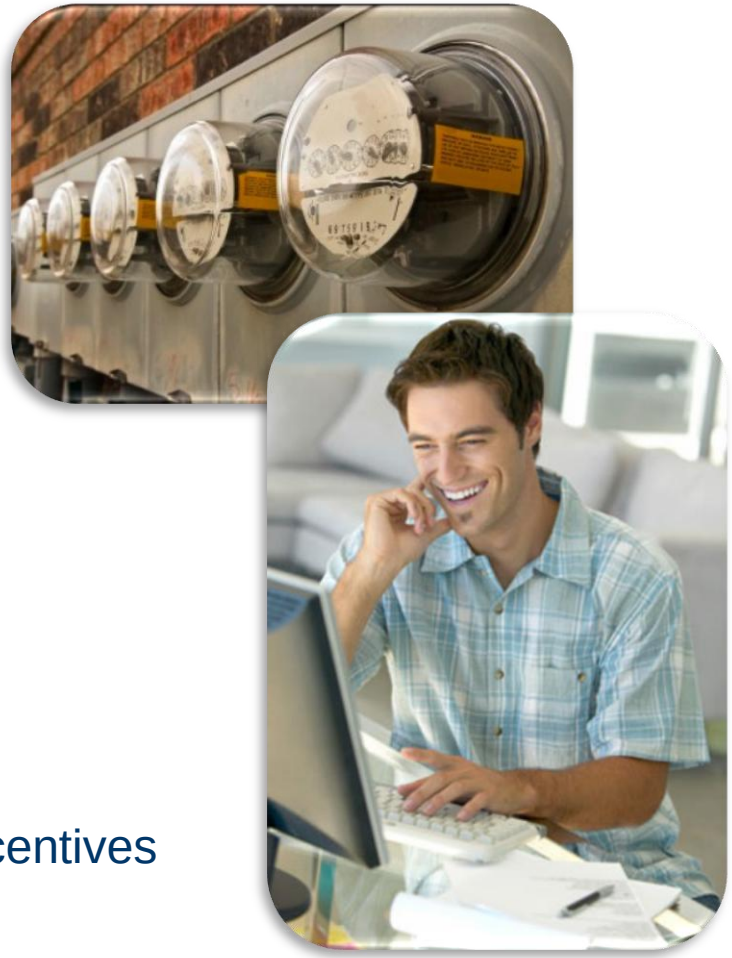
- Growing national interest in reducing the peak demand for electricity at critical times by eliminating some electricity use or shifting it to non-peak times.
- Strategy—‘demand response’(DR). Eliminates need to run or build more expensive, fossil-burning peaking generation plants.
- Pacific Northwest Regional Demonstration Project explores this on a regional scale
- Led by Battelle and its partners, including Avista

The Regional Transactive Signal



The Customer Experience
Demand Response Objectives

- Improve prediction and aggregation of energy consumption
- Establish and test the communication of and response to regionally communicated incentive signals
- Measure, analyze and report participant response to and comfort during DR events
- Measure, analyze and report multiple aspects of customers' satisfaction with the program
- Determine, document and report reasons customers leave the program by conducting program drop-out surveys
- Validate the need for and type of customer incentives



The Customer Experience
Enrollment

- Inform and educate customer pool about opportunity
- Potential tactics being explored:
  - Targeted direct mail to eligible participants
  - Doorhangers to eligible participants
  - Outbound calling to eligible participants
- *Avista intends to test education/recruitment materials in advance with customers to ensure clarity and understanding*

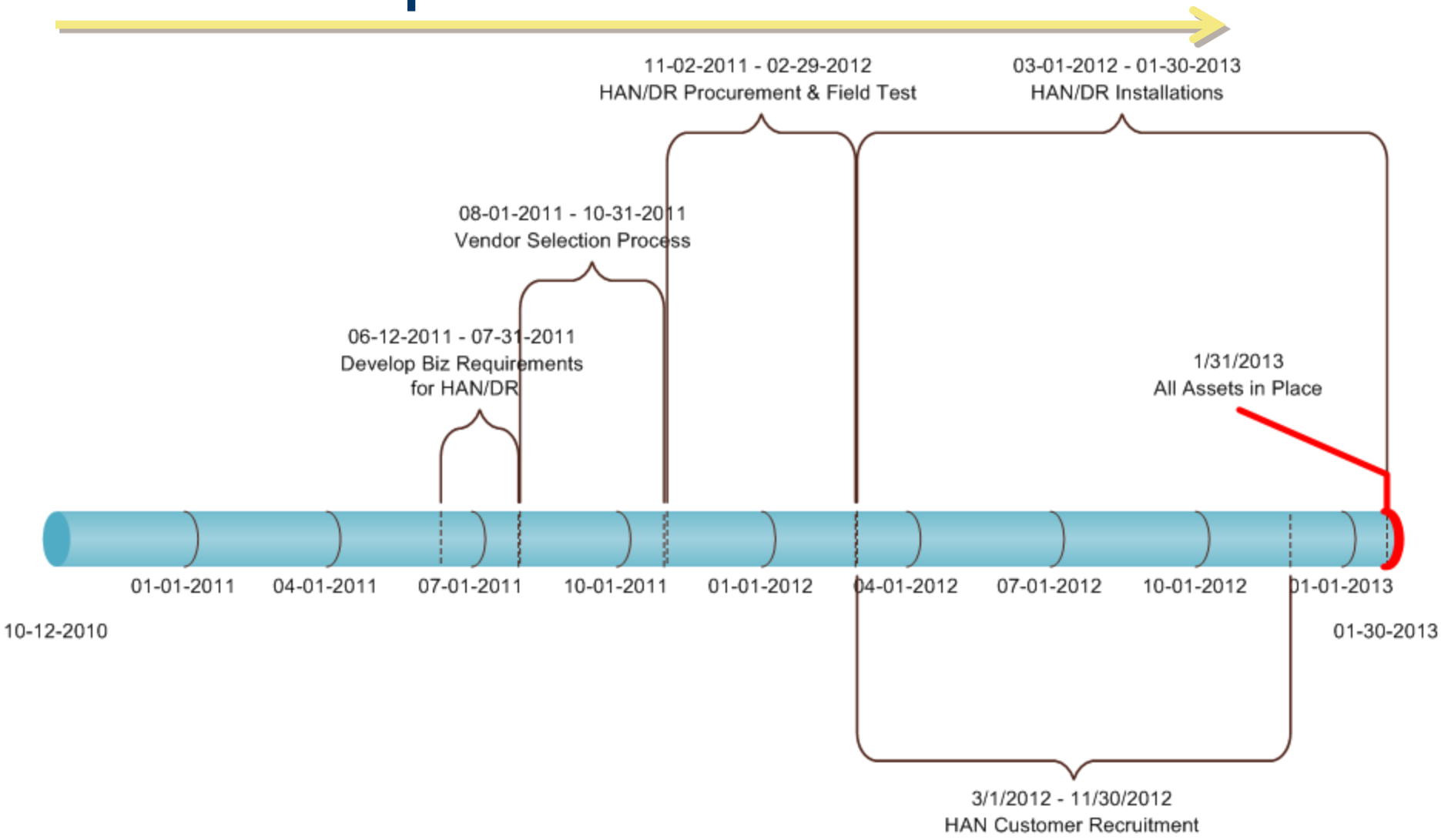
The Customer Experience
Demand Response Focus Groups

Conducted two customer focus groups in the summer of 2010

Purpose: gage customer response to preliminary demand response program design; assess interest level to participate in the demonstration; and collect customer suggestions for communicating about the demonstration

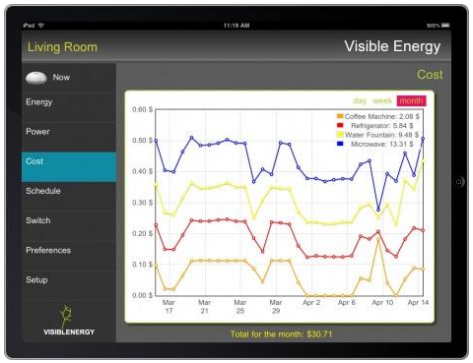
Results: Response to preliminary design was positive; 15 of 16 said they are interested in participating in the demonstration; several good suggestions received for how best to communicate about the demonstration

The Customer Experience
Demand Response Timeline



The Customer Experience
In-Home Real-Time Usage Presentation

- Direct communication with the meter
- Energy usage available in real time
- Provide for customer understanding of energy impact for devices within the home
- Allow customer to view energy usage on many devices?



Stakeholder Communications

Commission

- Monthly WUTC updates

Community

- Pullman City Council presentations
- Community presentations

Customers

- Advanced meter pre-installation letter to all Pullman and Albion customers
- AvistaUtilities.com
- Outbound calls
- Door hangers, FAQs, brochures
- Informed Customer Service Reps