



Xcel Energy Colorado DSM Roundtable Discussion

May 15, 2013

1:00pm to 4:00pm

1800 Larimer, Room 03G01

Welcome and Introductions

Contact Info: Suzanne Doyle
Manager, DSM Regulatory Strategy & Planning
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Agenda

1:00 – 1:05 **Welcome, Introductions**

1:05 – 1:30 **Regulatory Update**

1:30 – 2:30 **DSM Program Highlights**

2:30 – 2:45 **Break**

2:45 – 3:45 **Product Development**

3:45 – 4:00 **Wrap-up/Open Discussion**

Regulatory Update

Presented by:
Suzanne Doyle

Compliance information is available
at Xcel Energy's DSM Website:

http://www.xcelenergy.com/About_Us/Rates_&_Regulations/Regulatory_Filings/CO_DSM

Recent Filings – Q1 2013

■ 2012 DSM Annual Status Report – Filed 4/1/2013

Electric DSM	Goal	Actual
Energy Savings	329.3 GWh	400.7 GWh
Demand Savings	79.3 MW	90.6 MW
Budget	\$77.3M	\$79.4M

Net Benefits: \$219.6M
Financial Incentive: \$22.7M
TRC: 2.38

Gas DSM	Goal	Actual
Energy Savings	435,054 Dth	431,496 Dth
Budget	\$13.2M	\$12.5M

Net Benefits: \$5.7M
Financial Incentive: \$1.1M
TRC: 1.18

60/90-Day Notices

■ *Past 60-day Notices:*

Program Notice Description	Notification Date	Comments Due	Date Implemented
2013 Cooling Efficiency	1/25/2013	02/25/2013	02/26/2013
Colorado Residential Insulation Rebate	1/2/2013	02/02/2013	02/02/2013
Community Energy Planning	12/19/2012	01/19/2013	01/20/2013
Residential Pool Pump	12/18/2012	01/18/2013	01/19/2013

60/90-Day Notices (Cont...)

■ *Current* 60 or 90-Day Notices:

Program Notice Description	Notification Date	Comments Due	Date Implemented
Process Efficiency Product Evaluation	04/17/2013	N/A	N/A
Low-Income Energy Savings Kits Product Evaluation	04/17/2013	N/A	N/A
High Efficiency Air Conditioning Product Evaluation	04/17/2013	N/A	N/A
Lighting Efficiency 2013	02/27/2013	03/29/2013	4/29/2013
Standard Offer – 90 Day notice (End product)	03/19/2013	4/19/2013	

Upcoming 60-Day Notices

■ Calculator Updates:

- Home Performance w/Energy Star
- Energy Efficient Showerheads
- Heating System Rebates
- Heating Efficiency
- Compressed Air Efficiency
- Motor & Drive Efficiency
- High Efficiency A/C

■ Other Notices:

- Data Center Efficiency (NTG clarification)
- Commercial Refrigeration Efficiency (New product)
- Cooling Efficiency (RTU early retirement)

Future DSM Filings (2013)

- **June 14, 2013: *DSM Strategic Issues* (2015 and beyond)**
 - **Major Topics:**
 - **Energy Efficiency Goals**
 - **Incentive Mechanism**
 - **Demand Response goals**

- **July 1, 2013: *2014 DSM Plan***
 - **Goal:**
 - **Electric – 384 GWh**
 - **Gas – Still Evaluating**
 - **New Measures - Product Development**

DSM Program Evaluations 2013

■ Residential:

- Home Performance (Process & Impact)

■ Business:

- CO Segment Efficiency (Process Only)
- CO Compressed Air (Process & Impact for Prescriptive)
 - Small number of Custom-Compressed Air participants to be interviewed (ie. < 15) for Process information

DSM Program Highlights

Presented By:

Kim Spickard & David Hueser

Portfolio Achievements Update, DSM Program Overview, Business Energy Efficiency Program Highlights

**Presented By:
Kim Spickard**

First Quarter 2013 DSM Achievements

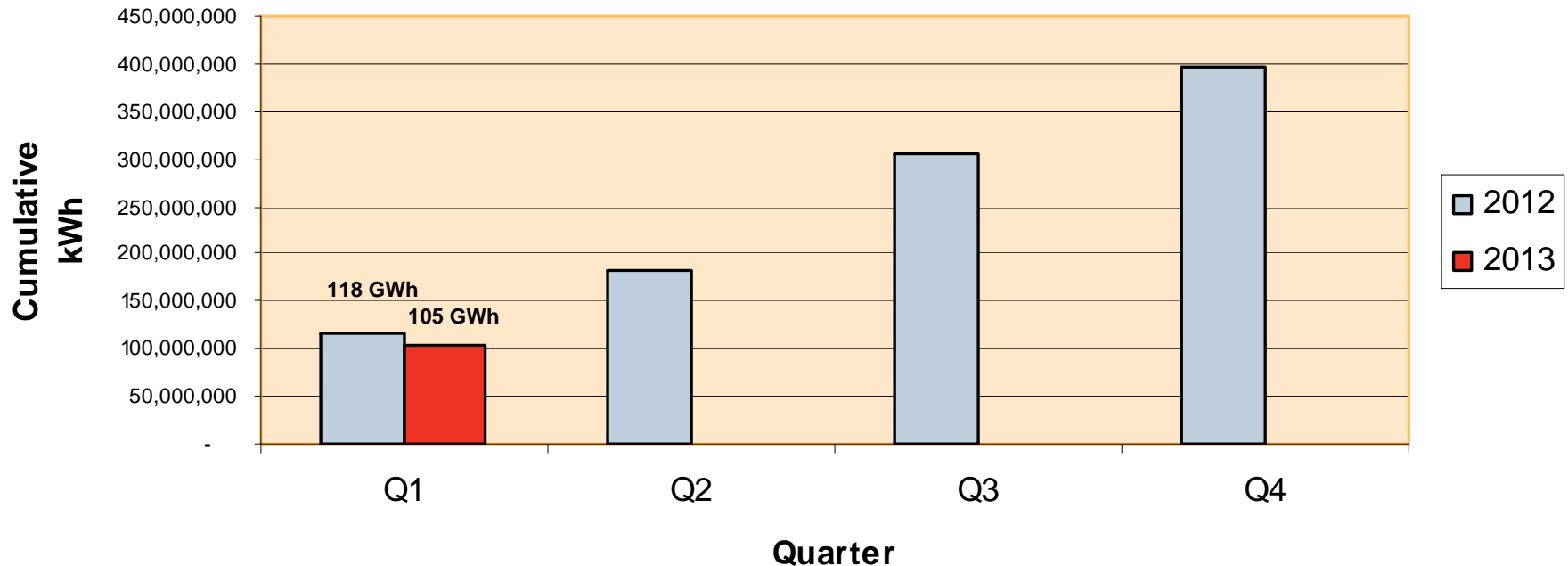
Total DSM Portfolio

- 2013 Electric Targets: 82.3 MW; 345.2 GWh; \$83M
- Q1 2013 Achievements: 17.2 MW; 104.7 GWh; \$14.8M

- 2013 Gas Goals: 428,310 Dth; \$13.3M
- Q1 2013 Achievements: 91,046 Dth; \$1.7M

Q1 2013 actual electric energy savings (kWh) is 30% of 2013 goal, slightly behind 2012 pace

Colorado DSM Portfolio 2012/2013 Cumulative Electric Achievement, Quarterly Comparison



Direct Evaporative Pre-Cooling (DEPCACC)

- The Direct Evaporative Pre Cooling Measure was launched on February 26th.
- Cypress Ltd, has started marketing efforts and trade seminars.
- Cypress Ltd, has launched a website:
www.precoolandsave.com
- The website directs customers to Xcelenergy.com to download an application.
- Prescriptive rebates of \$100/ton for RTU's and Split Systems
- Air Cooled chillers will be custom until 2014

Lighting Efficiency

- **T-12 to T-8 Rebates discontinued**
- **Direct mail campaign to remind customers and vendors of the pending May 1 deadline for T12 to T8 rebates**
- **Several Prescriptive LED rebates reduced due to lower market pricing**
- **Tiered rebates for exterior LED fixtures**
- **Lighting Occupancy Sensor rebates lowered due to lower market pricing**

Lighting Optimization Rebates

- **Lamp removal in T8 systems**
 - T8 to T8
 - \$12/fixture
- **NEW: T12 to T8 1- to 2-lamp installation**
 - \$10 per fixture*
- **NEW: T12 to T8 3-lamp installation**
 - \$12 per fixture*

** Requires an electronic ballast and complete removal of lamps, ballasts, and sockets*

New Exterior Lighting Measures

- **LED wall packs for Exterior and Parking Garage installations** (do not require Energy Star qualification)
- **Energy Star Qualified LED Screw-In Downlights**
- **Bi-level Stairwell Fixtures with Integrated Sensors.**

Standard Offer

- **Program Being Discontinued**
 - **Directly competes with other, more cost-effective, products**
 - **Has failed to consistently meet MTRC**
 - **Has failed to make kW, kWh and participation goals**
- **Active preapproved projects have until 12/31/13 to submit all paperwork to be rebated under the Standard Offer Program**

Residential and Low-Income Program Highlights

**Presented By:
David Hueser**

Home Performance With ENERGY STAR®



Program updated in 2012 to improve performance and cost effectiveness; 2013 off to a good start

■ **Program updates**

- Three required measures, down from five
- Air sealing, attic insulation, efficient lighting required if recommended in audit, and not previously completed.
- Incorporated new Insulation requirements (air sealing, test in/out, CAZ check)
- Concierge pilot not rolled out in 2013

■ **2013 progress**

- 93 applications through Q1 2013, accounting for 85,595 net kWh (19% of goal) and 2,626 net Dth (22% of goal)



Photos: Coleman, Philips, Home Depot

Residential Water Heaters (E&G)



Program not cost-effective in 2012 on low natural gas prices and low savings per unit vs. 2012 goal

■ **Considerations for 2014 CO DSM Plan**

- Remove less-efficient gas measures
- Gas storage: focus solely on .67 EF and above
- Gas tankless: 0.82 EF Tankless units were cost effective in 2012. Keep in 2014.
- Electric heat pump: reduce program costs

■ **Technical changes**

- Avoided costs, administration, incremental costs

■ **2014 Customer and Contractor outreach**

- Scale down costs; maintain general awareness



Photo: GE

Low Income Non-Profit Energy Efficiency (NEEP)



Electric MTRC cost effective at 1.34, and gas MTRC .90 in 2012
Ample 2013 pipeline of identified energy savings

■ **Partner with Energy Outreach Colorado (EOC)**

- NEEP provides funds – supplemental to federal weatherization grants – for electric and gas equipment and process improvements
- EOC identifies non-profit organizations serving low-income individuals: shelters, safe houses, residential treatment centers.

■ **Technical assumptions**

- Custom Efficiency model analysis for each project
- Cumulative NEEP electric and gas cost & benefits tracked

■ **2013 Goals, Budgets**

- 1.8 GWh on \$930K electric budget
- 6,970 Dth on \$628K gas budget



Photo: Energy Outreach Colorado

DSM Product Development Update

Presented by:

Pat Goggin and Andre Gouin

DSM Website provides program idea submission forms at:

http://www.xcelenergy.com/About_Us/Rates_&_Regulations/Regulatory_Filings/CO_DSM

Product Development Team

- **10 Resources able to flex across 4 Platforms**
 - Energy Efficiency
 - Renewable Energy
 - Demand Response
 - Transportation
- Manager: Kevin Schwain, 612-330-5961
- Colorado Team Lead: Pat Goggin, 303-294-2370
- Pilot Lead: Andre Gouin, 303-294-2975

2012/13 Plan Settlement Development Update

Innovative Technology RFP Update

- Selected 3 to fill 2013 gap
 - Pool Pump Efficiency
1.9 GWh | residential segment | Launched
 - Cooling Efficiency – Evaporative Pre-cooling for Air-Cooled Condensers measure
2.5 GWh | business segment | Launched
 - Refrigeration Efficiency
Final technical assumptions approved
9.1 GWh | business segment | Ready to Post

Waste to Energy Projects

Purpose:

- To implement a program applicable to Eligible Energy Resources installed on customer premises.

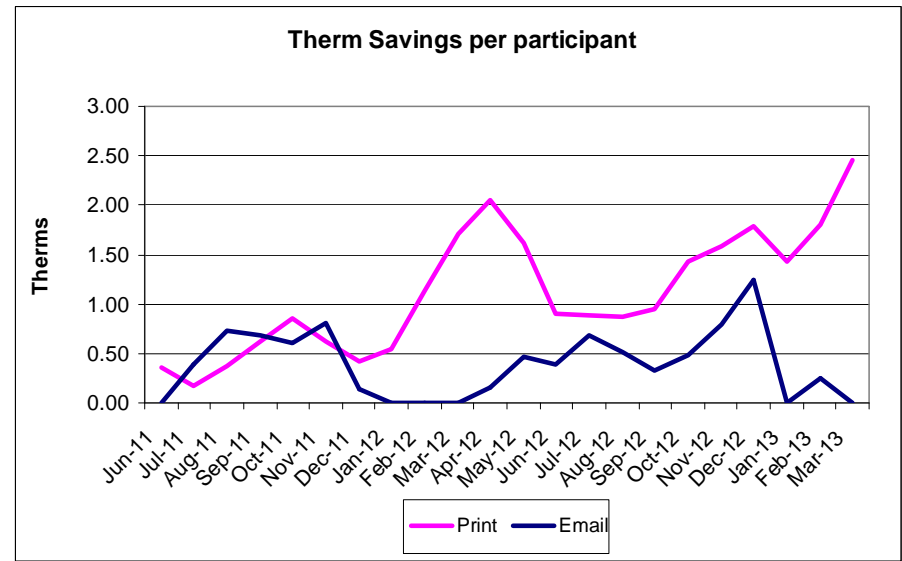
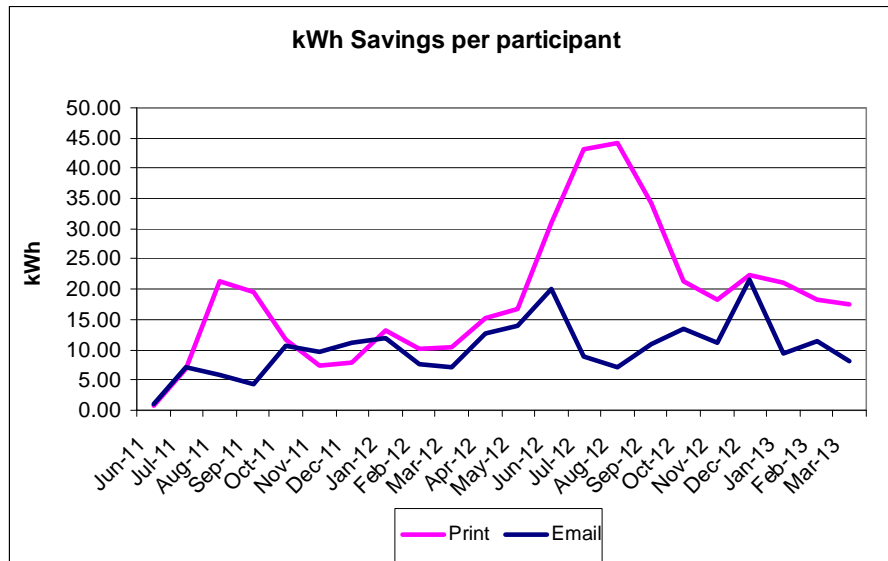
2013 Activities:

- Program is most appropriately addressed in RES Plan
- Filed Advice Letter April 1st 2013
 - Net Metering tariff revised to clarify eligibility
 - Propose programs for eligible energy resources in 2014 RES Plan

Pilot & Study Update

Energy Feedback Pilot

- ❑ Successfully expanded to an additional 50k participants in January
- ❑ Continue to see strong savings from original pilot group
- ❑ Preliminary expansion savings available in second quarter 2013



2013 Cumulative Savings

2.4 GWh

19,600 DTh

IHSD Pilot – 1st year savings evaluation

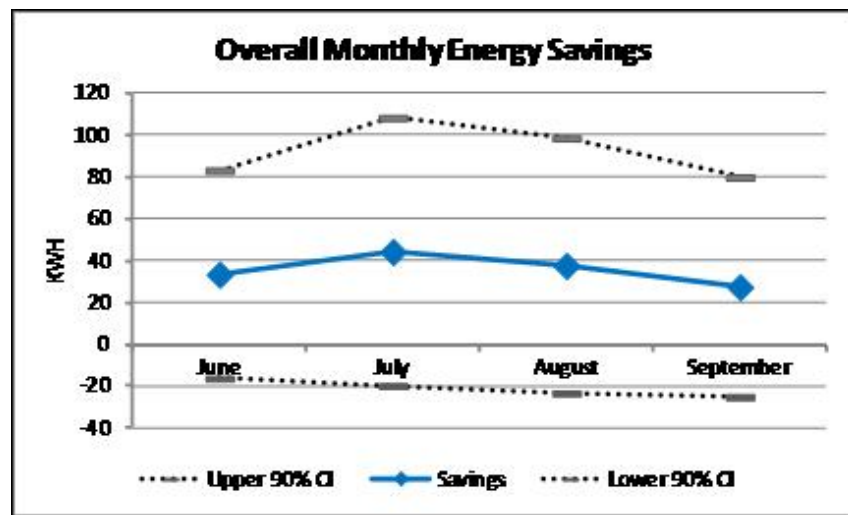
Background

The In-Home Smart Device Pilot is designed to test how residential customers respond to various control strategies and energy consumption information delivered to their homes through in-home energy management devices. Participants are expected to lower their energy consumption when provided with the tools to monitor and track their energy usage. The goals of the pilot include:

- Determining the impact on residential energy consumption**
- Determining the persistence of these savings over a two year pilot**
- Determining if a deemed savings amount can be determined**

Xcel In-Home Smart Device Pilot – preliminary evaluation of 1st year energy savings

While it appears that there may be energy savings resulting from the presence of devices, the differences are not statistically significant



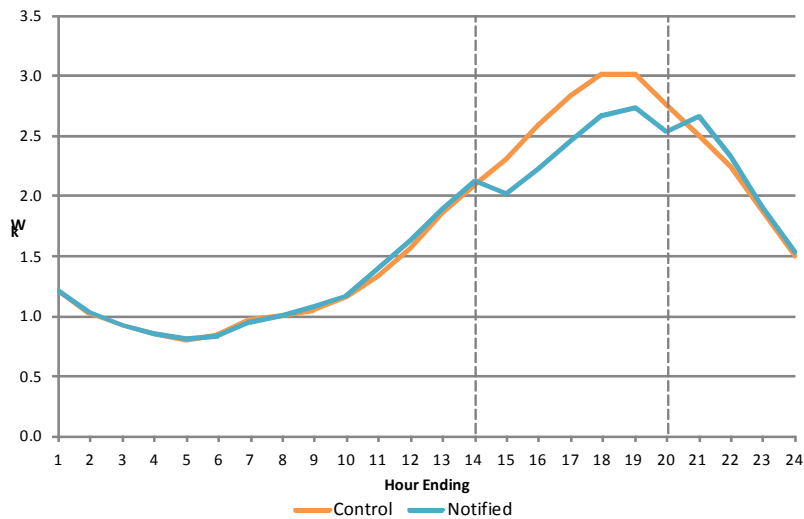
	Adjusted Control Group Billing Energy	Estimated Savings	Percent Savings	Significant Savings?
June	924	33	3.6%	No
July	1,269	44	3.5%	No
August	1,157	38	3.2%	No
September	959	27	2.9%	No

This analysis of the In-Home Smart Device (IHSD) pilot covers impacts for the period June 1, 2012 through September 30, 2012. It includes analysis of the customers with IHSDs outside of Boulder (in Centennial and Westminster, collectively referred to as “Denver”) and those 33 customers with IHSDs in Boulder that are not participants in the pricing Pilot, but are on the standard residential rate.

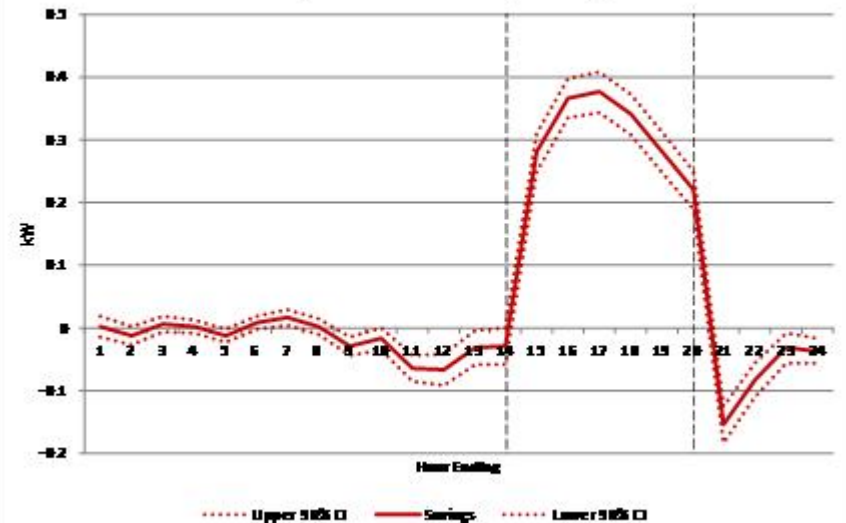
Xcel In-Home Smart Device Pilot - preliminary evaluation of 1st year demand savings

The load reductions were statistically significant on all but the last event day, which was the one mild day with a high of only 77 degrees.

Average Hot Event Day



Average Hot Event Day Savings



	Adjusted Control Group Average kW	Estimated Average kW Reduction	Percent Reduction	Event Day High Temperature	Significant Savings?
July 13, 2012	2.85	0.37	13.0%	96	Yes
July 20, 2012	3.40	0.29	8.7%	101	Yes
July 23, 2012	2.93	0.29	9.9%	100	Yes
August 1, 2012	2.01	0.15	7.6%	94	Yes
August 8, 2012	2.68	0.52	19.2%	96	Yes
September 14, 2012	0.98	0.02	1.9%	77	No
Average of hot events	2.75	0.31	11.3%		Yes

Xcel In-Home Smart Device Pilot - lessons Learned in 2012

Installation

These types of installations are complex, require Customers to be available for the appointment and pose unique challenges for the Company such as electrical permits, and legacy electrical issues. Selection and installation of devices should not be driven by utilities but rather by Customers purchasing certified devices from retailers with rebates offered for these devices.

Control events

50% of devices are not controllable. Customer participation in these events may increase with a financial incentive or penalty. Without this Customers can easily opt out or disable their systems.

Customer Outreach

The 2012 Customer survey was a key driver in developing the 2013 outreach plan.

The primary vehicle for outreach activities was email, however direct interaction with Customers for e.g. calls to/from call center reps remains the most effective method of outreach.

IHSD Programming Thermostat - <http://youtu.be/NI1ARJCLtkk>

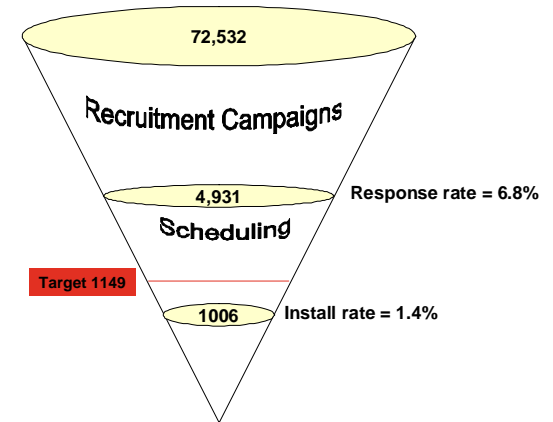
IHSD Reconnecting Devices - http://youtu.be/JgiwhJF_fq8

IHSD Control Events - <http://youtu.be/Q23qEaelzz4>

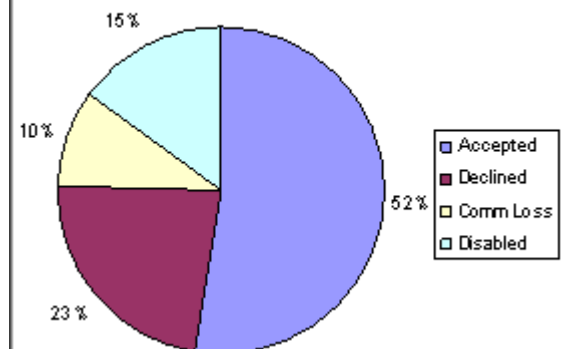
IHSD General Usage - <http://youtu.be/tzKmPbvexBM>

IHSD Website - <http://youtu.be/l46C0-WTCp8>

Customer Adoption



Control Event Performance



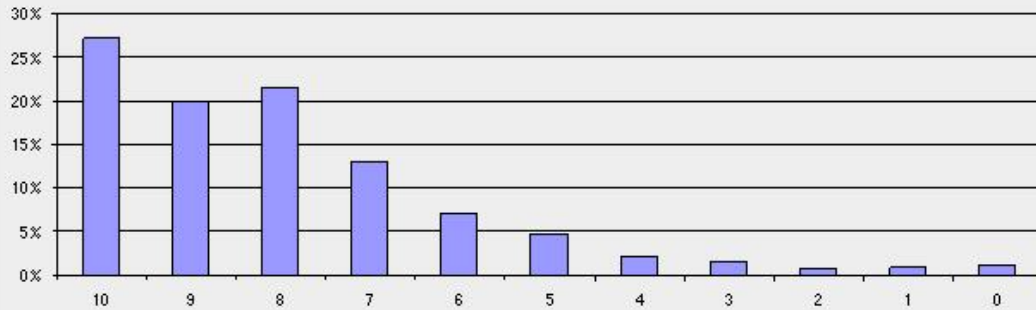
Xcel In-Home Smart Device Pilot – summary of 2012 customer survey

Customer Survey Results

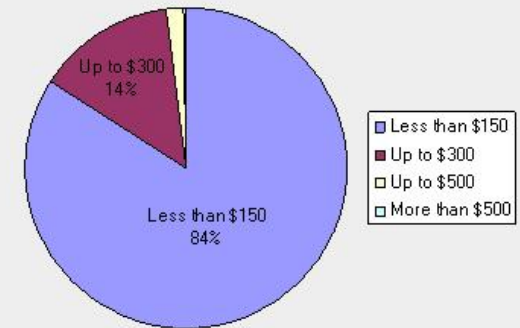
- Nearly 90 percent of participants were satisfied with the In Home Device pilot program
- 89% responded that they are satisfied with their 'In-Home' devices
- although customer satisfaction with the devices and the IHD program were high, only 43 percent of participants would likely purchase an IHD system on their own

Survey results

How satisfied are you with the In Home Device pilot program so far?



How much would you be willing to pay for an In Home Device system?

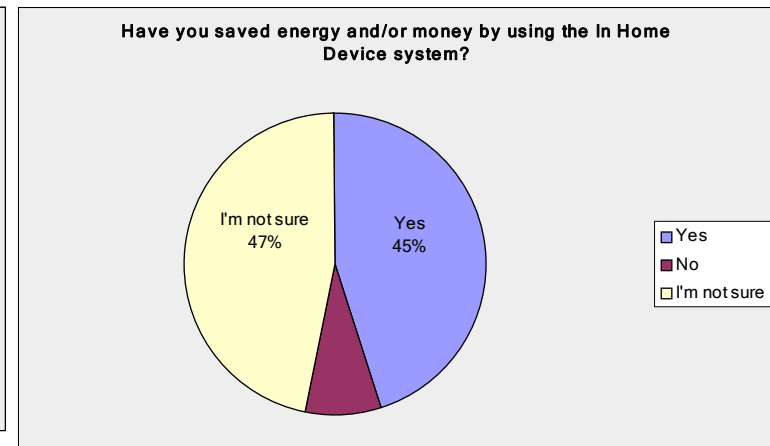
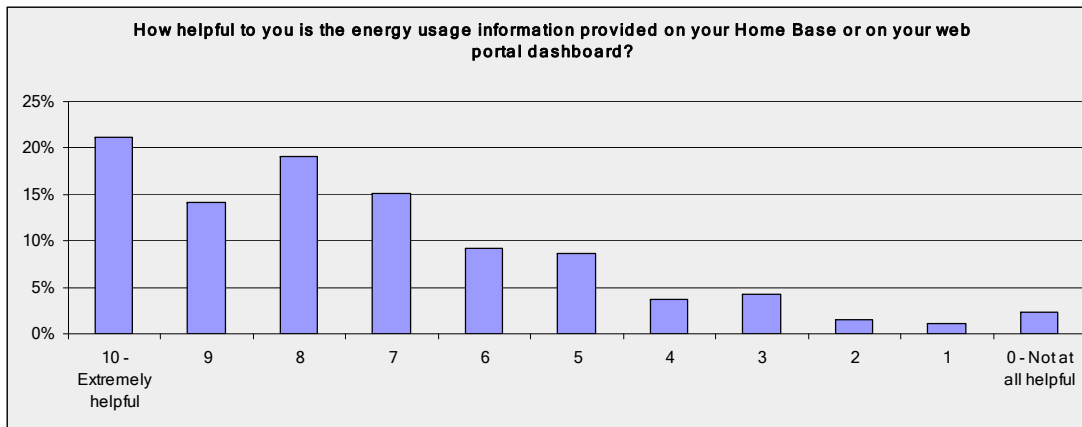


Xcel In-Home Smart Device Pilot – summary of 2012 customer survey

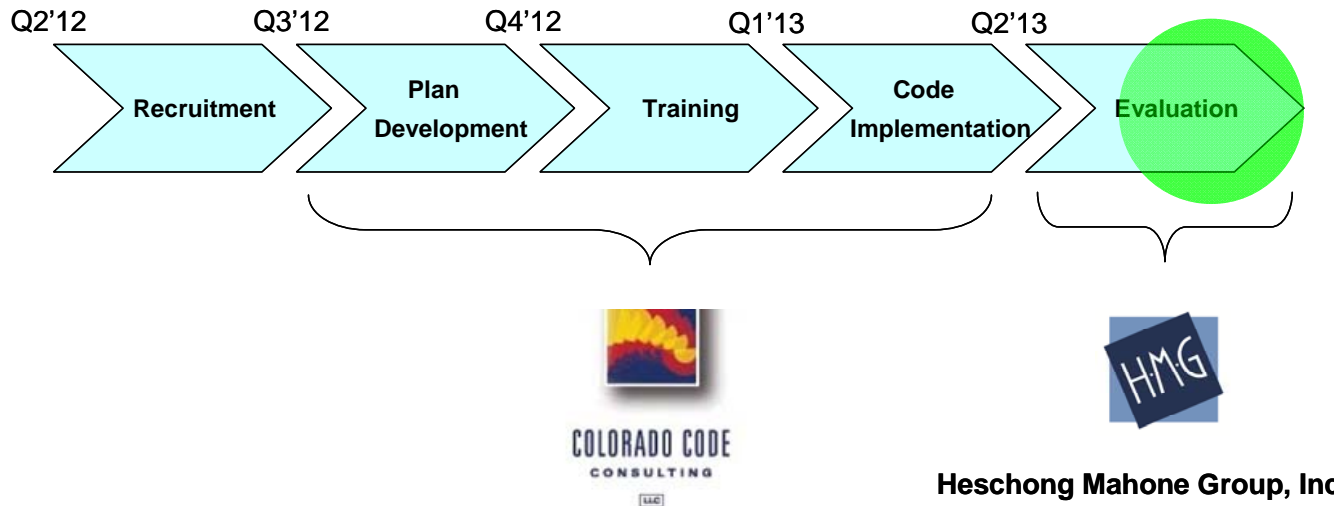
Customer Survey Results

- Customers generally found the energy usage information provided on the Home Base or web portal helpful (80%)
- 45% of Customers believe they have saved energy and/or money

Survey results



Building Code Support Pilot



Status:

- Training completed in 3 participating jurisdictions
- Impact potential, methodology evaluation close to completion
- Readout of findings at the next Roundtable

EV Demand Response Pilot

Purpose

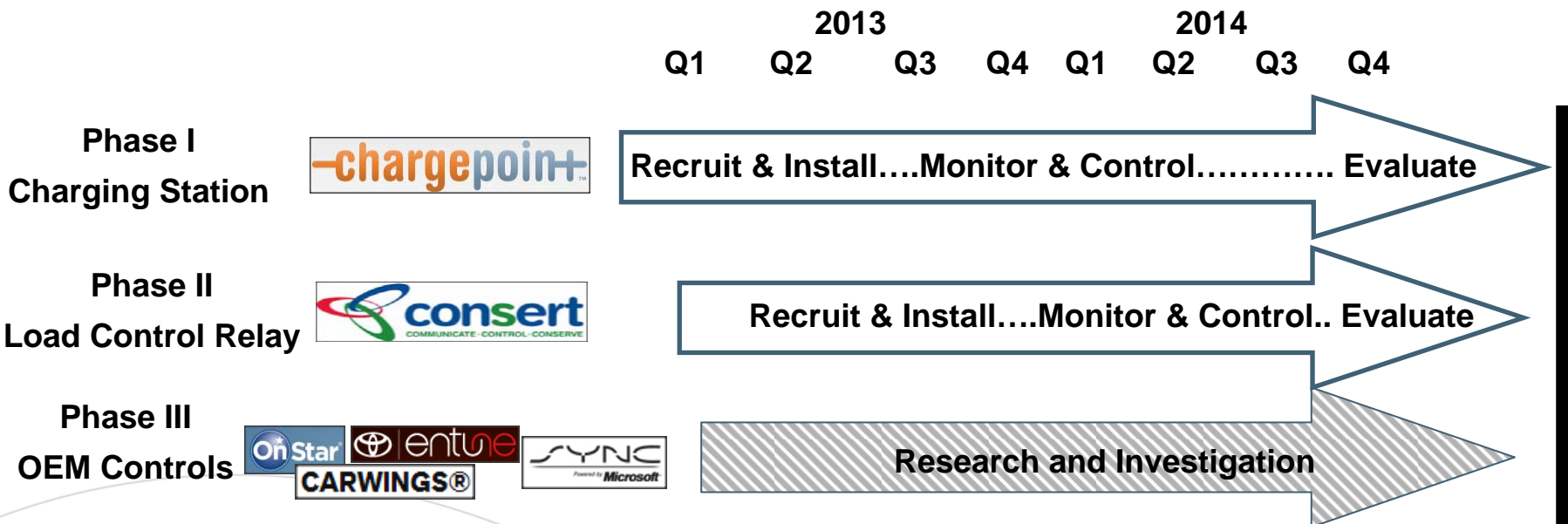
Determine demand response opportunity available through control of electric vehicle charging stations and better understand:

- ☐ Customer's willingness to allow interruption of charging
- ☐ Available load coincidence with peak demand



Status

Pilot is progressing with phased approach, control events will begin this summer



Impact Evaluation of the Whole House Energy Efficiency and Comfort Study

Presented by:
Jim Bradford, President
Mesa Point Energy

Project Description

Whole House Energy Efficiency Study (WHEC)

- An analysis of energy savings (kWh & therms), cost effectiveness and pay back
- Involved Implementation of a comprehensive package of energy savings technologies in 10 Front Range homes
- Provides the opportunity to acquire data from homes that have undergone a comprehensive energy efficiency retrofit
- Projects were installed in the fourth quarter of 2010

Project Homes

Test Home	Town	Square footage	Year built
1	Denver	2,214	1984
2	Centennial	1,755	1982
3	Westminster	2,000	1973
4	Boulder	1,315	1968
5	Highlands Ranch	1,800	2000
6	Arvada	2,500	1999
7	Westminster	1,600	1979
8	Arvada	1,680	1942
9	Denver	2,400	1960
10	Lakewood	4,000	1995

WHEC Project Scope of Work

Measure	Type	Home 1	Home 2	Home 3	Home 4	Home 5	Home 6	Home 7	Home 8	Home 9	Home 10
Insulation	Attic and Walls	x	x	x	x	x	x	x	x	x	x
	Air Sealing	x	x	x	x	x	x	x	x	x	x
Duct Sealing	Standard	x	x	x	x	x	x	x	x	x	x
Ventilation	"Poor Man's" HRV	x	x	x	x	x	x	x	x	x	x
Lighting	CFL 100%	x	x	x	x	x	x	x	x	x	x
Heating System	ES 95% 2stage Gas	x	x		x	x	x	x	x	x	x
	GSHP			x							
Air Conditioning	Central A/C 14 SEER	x	x		x	x	x				
	Air Source Heat Pump									x	x
	Evap - Coolerado							x	x		
Water Heating	Gas Tankless			x	x			x			x
	SolarWH w Elec Tank					x	x				
	Sealed Combustion	x	x								
	ASHP Water Heater								x	x	
Windows	High Efficiency Windows				x						

Evaluation Methodology

1. Utility bill based analysis

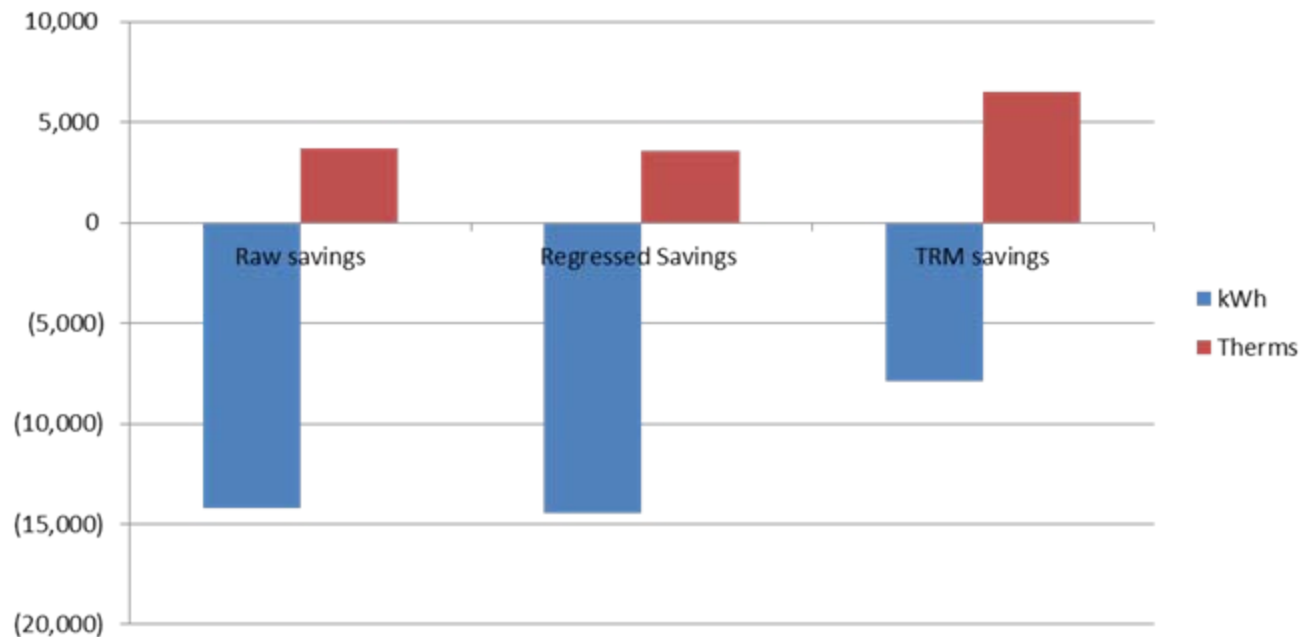
- Raw data analysis provided for comparison
- Weather corrected data analysis

$$\text{Savings} = (\text{Baseline use} - \text{Post install Use})$$

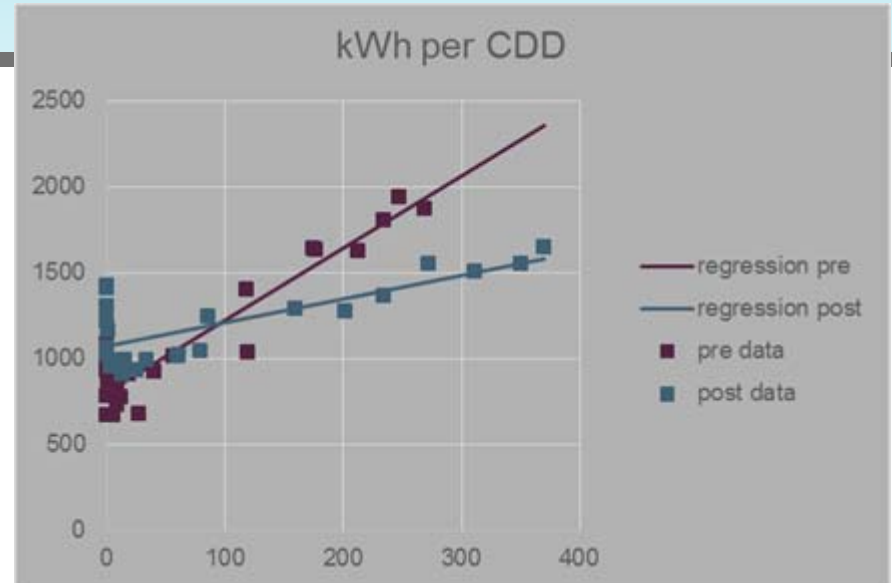
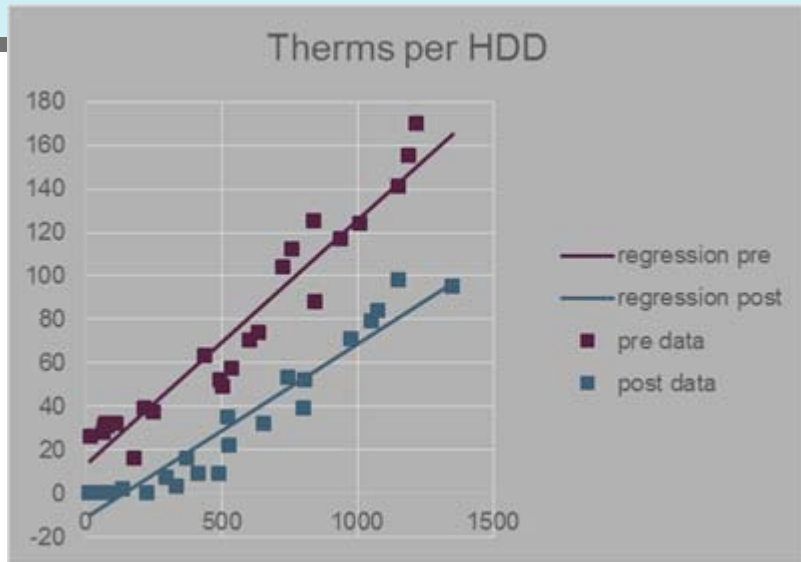
2. *Technical Reference Manual* savings estimation

Comparing TRM and bill-based findings

	kWh	Therms	CO ₂ electric	CO ₂ natural gas	CO ₂ (lbs) total
Raw savings	(14,224)	3,682	(22,773)	43,074	20,301
Regressed Savings	(14,438)	3,595	(23,115)	42,064	18,948
TRM savings	(7,911)	6,499	(12,666)	76,041	63,375



Example – House 5



		slope	intercept	R square
Therms per HDD	pre	0.11	13.27	0.96
	post	0.08	-10.97	0.96
kWh per CDD	pre	4.20	801.20	0.95
	post	1.36	1071.98	0.75

House 5 example

Retrofit characteristics

- **Standard measures:** insulation, duct sealing, 95% furnace, 15 SEER AC replacing 10 SEER unit, CFLs, Poor Man's HRV
- **Added measures:** Solar DHW with natural gas backup
- **In this case, actual building performance was not well predicted by TRM**

House 5 example, continued

Annualized Usage and Weather by Year						
Cal Year	Therms	HDD	Therm Cost	kWh	CDD	kWh Cost
2009	979	6,772	\$760.02	12,220	715	\$1,147.81
2010	784	6,182	\$600.73	13,888	1,026	\$1,603.68
2011	443	6,587	\$407.33	14,334	1,002	\$1,584.84
2012	285	5,494	\$311.39	14,336	1,288	\$1,572.64
TMY pre	887	6,480	\$738.34	12,926	788	\$1,385.32
TMY post	384	6,306	\$319.90	13,937	788	\$1,493.68
Savings	503		\$ 418.44	(1,011)		\$ (108.36)

Summary results

House	kWh Savings	\$ kWh Savings	Therm Savings	\$ Therm Savings	Total \$ savings	project cost	Simple Payback (years)
1	651.62	\$70	166.56	\$144	\$215	\$18,500	86
2	583.87	\$66	287.60	\$215	\$281	\$18,500	66
3	(2,269.96)	-\$266	731.31	\$881	\$615	\$40,500	66
4	(393.86)	-\$48	195.22	\$193	\$145	\$29,000	200
5	(1,011.08)	-\$108	502.72	\$418	\$310	\$27,000	87
6	-	\$0	-	\$0	\$0	\$27,000	Not in sample: PV was added
7	(1,563.94)	-\$181	188.15	\$159	-\$22	\$23,500	no payback
8	(1,549.44)	-\$180	386.33	\$367	\$187	\$24,000	128
9	(7,877.83)	-\$908	548.34	\$472	-\$436	\$20,300	no payback
10	(1,007.46)	-\$114	588.97	\$471	\$357	\$19,800	55
Sum	(14,438.07)	-\$1,669	3,595.20	\$3,323	\$1,653	\$248,100	150
EEBC Admin costs						\$61,297	
Admin as % total						25%	
					GT	\$309,397	187

Homes and main measure overview

House	Baseline AC	Post-install	TRM / Analysis approximates Billing?	Remarks
TH1	Yes	14 SEER	Yes	
TH2	Yes	14 SEER	Yes	
TH3	Yes/Disconn	GSHP	Yes	Adding AC causes large increase in electric use
TH4	Window	14 SEER	Yes	Replacement of window AC with central AC may have increased conditioned space area
TH5	Yes (10 SEER)	14 SEER	No	Unexplained increase in electric use likely due to occupant usage or baseline issues.
TH6	Yes	14 SEER	Yes	Savings not considered
TH7	WHEC, Humid	Coolerado	No	Evaporative to Coolerado cooling doesn't change cooling efficiency. Rebound, change in occupant usage
TH8	Yes, 12 SEER	Coolerado, ASHP DHW	No	ASHP HP increases electric use.
TH9	WHEC	ASHP	Yes	Change from evaporative to AC increases energy use, rebound
TH10	Yes, 10 SEER	ASHP	Yes	ASHP HP increases electric use. This property likely using ASHP as leading heat source

Measure overview

Measure	Type	Remark
Insulation	Attic and Walls	Pre and post conditions unclear. Economics a strong function of site conditions
	Air Sealing	By blower door testing. Resulted in approximately 30% reduction in ACH
Duct Sealing	Standard	Difficult to quantify savings, field conditions unclear
Heating System	ES 95% 2stage Gas	Reasonable measure in most cases. Baseline efficiency not fully documented
	GSHP	Economics difficult compared to high efficiency furnace
Air Conditioning	Central A/C 14 SEER	Scope included the addition of cooling, making economics difficult
	Air Source Heat Pump	Economics may be difficult compared to high efficiency furnace
	Evap - Coolerado	Replacement of conventional evaporative cooling does not provide energy benefit
Water Heating	Gas Tankless	A popular measure
	SolarWH w backup	Economics of measure not clear
	Sealed Combustion	Economics may be difficult considering higher price
	ASHP Water Heater	May be difficult to compete against natural gas DHW heat. Operation not clear
Lighting	CFL 100%	Scope unclear and likely variable
Windows	High Efficiency Windows	Inclusion of incremental costs only would improve
Ventilation	"Poor Man's" HRV	Savings value hard to quantify and unclear

Improve economics

- **Payment of incremental cost (or other reduced incentive) may improve payback 4x or more**
- **More selective measures and buildings may improve payback 2x or more**
- **Gas prices did not increase as may have been anticipated during program design. Actual price per therm went down 10-20%**
- **Comfort improvements have high value to homeowner, but can't be quantified**

Lessons learned

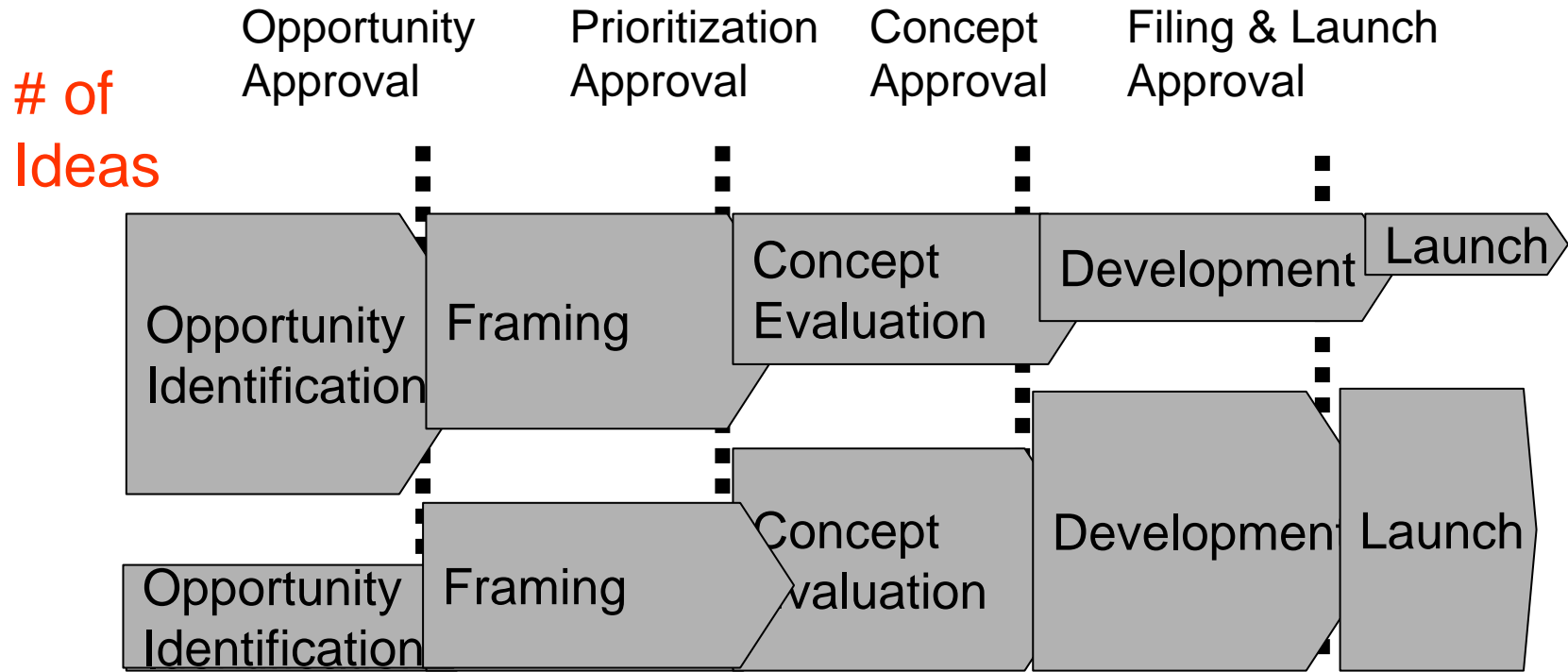
- **Program design, engineering and execution are critical to success**
- **Measure selection is important**
- **Advanced measures and systems don't automatically create favorable economics**
- **Setting baseline, refining EM&V and program tracking are all important**
- **Future energy prices can affect project performance**

Questions?

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Ongoing Development Update

Product Development Process



Level of Effort per Idea

2014 New Products

Product	Measure
Residential Heating	ECM Fan Motors
Compressed Air	Cycling Dryer
	Dewpoint Demand Controls
	Mist Eliminators
Business Lighting	LED Troffers
	Parking Garage LEDs
Recommissioning	Building Tune-up

DSM Roundtable Ideation Submissions – 1st Quarter

■ Photocells for LED Wall Packs

- No incremental savings - Existing Tech Assumptions assume no night operation**

■ Heat Pump Water Heaters – Residential

- Already a measure in Water Heating Product**

■ Mid-Market Prescriptive Retrocommissioning Program

- Already under development (Building Tune Up)**
- 3rd Party Admin costs reduce cost effectiveness**

DSM Roundtable Ideation Submissions – 1st Quarter

■ Multi-Family Program

- Already under development

■ Small Business Direct Install

- Duplicates Small Business Lighting Product

Product Development Opportunity Identification Form is not an open RFP for 3rd Party Implementation proposals.

New Ideas?

■ CO Roundtable Ideas

- Submit complete Roundtable Idea Form at least 90 days prior to a CO Roundtable Meeting in order for an analysis to be presented at that meeting.
- Incomplete Idea Forms will be returned to submitter for completion
- 90 Day window starts when form is complete

■ Roundtable Idea Form:

- <http://www.xcelenergy.com/staticfiles/xcel/Regulatory/Regulatory%20PDFs/CO-DSM/Opportunity-Identification-Form.xls>

Wrap-up / Open Discussion

Upcoming Roundtable Schedule:

August 21, 2013

November 13, 2013

