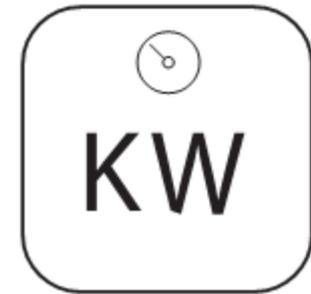


I PRO 323

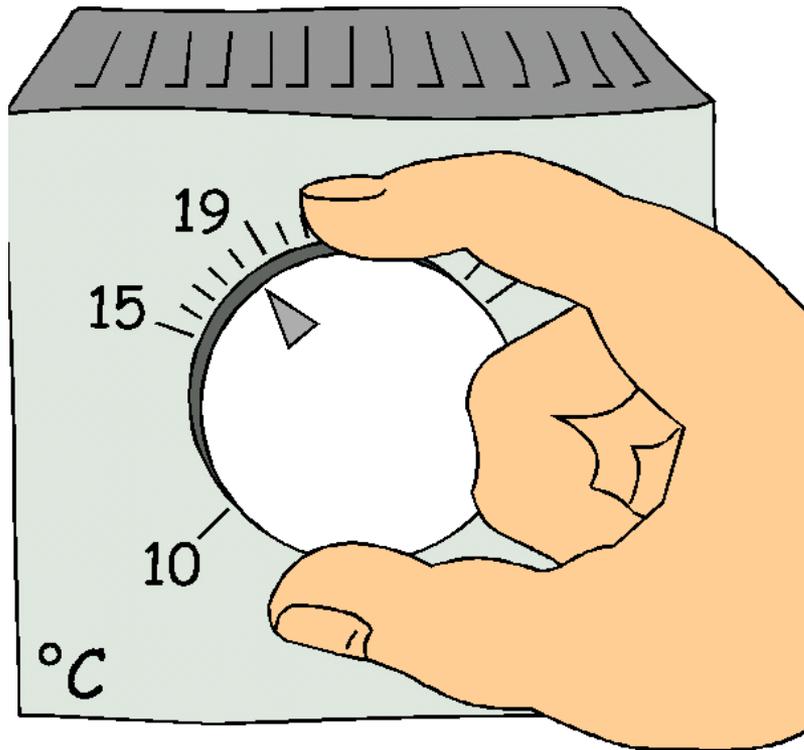
Home Energy Diet



**“Standby Power
uses as much as
10% of energy
consumed in the
average home”**

International Energy Agency Fact
Sheet, April 2007





Estimated 4% savings on A/C energy use for every 1 degree increase in the temperature setting.

Source: Kill Your Air Conditioner, Joe Klein, July 7, 2008

There is evidence of reductions of up to 30% of peak demand through programs involving time-sensitive pricing.

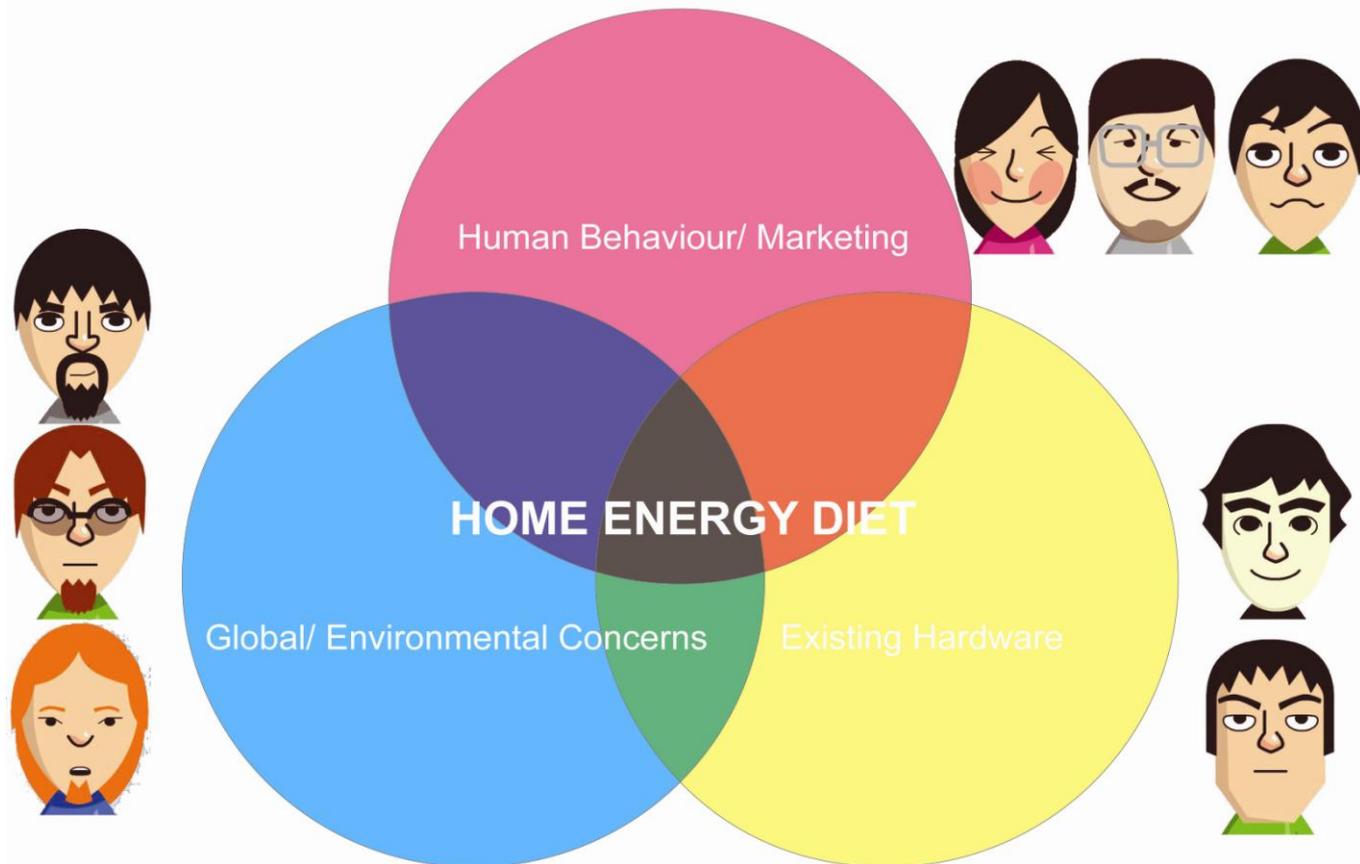
-Environmental Change Institute (Oxford University, 2006)

Purpose

- Use technology to alter consumer behavior in order to reduce energy consumption.

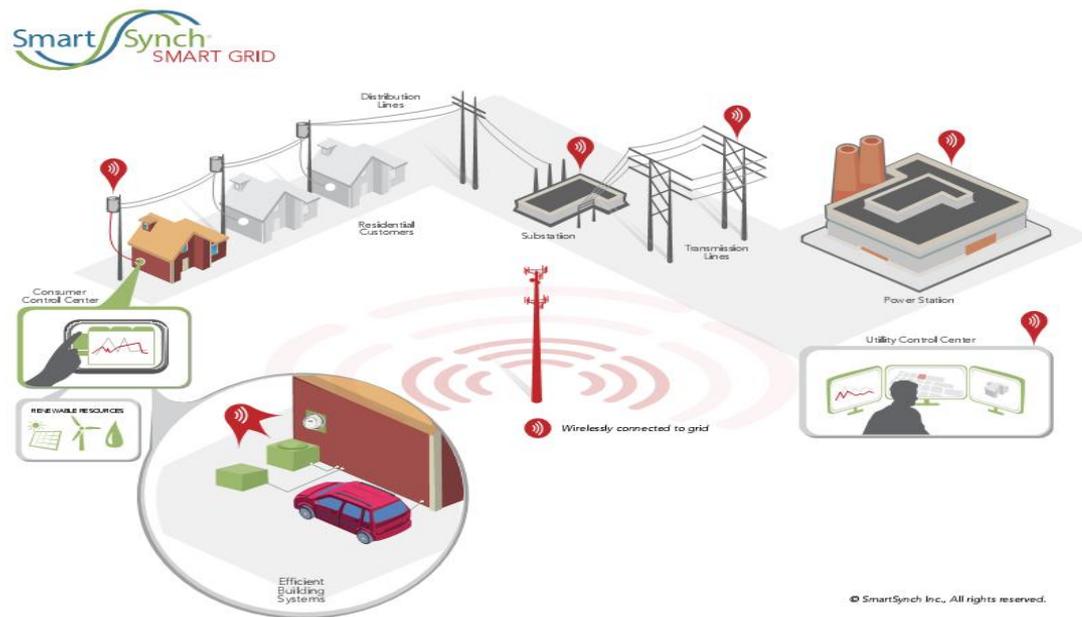
Team Structure

Team Structure & First Group Division



Initial Problem

- ComEd has been forced by recent legislation to reduce the amount of energy consumption in their region.



Goals

- Short Term
 - Conduct research into methods of altering home occupant's behavior in regards to energy consumption.
 - Technology exists that would allow individuals to lead far more energy efficient lives, especially in their home lives, but such technology has yet to be widely adopted in a residential setting

Goals

- Short Term
 - Develop a strong requirement specification for future IPROs to build upon
 - Current group was provided with a problem with no clear plan for obtaining a solution. For any real progress to be made a well formed plan must be constructed and passed on to the next group

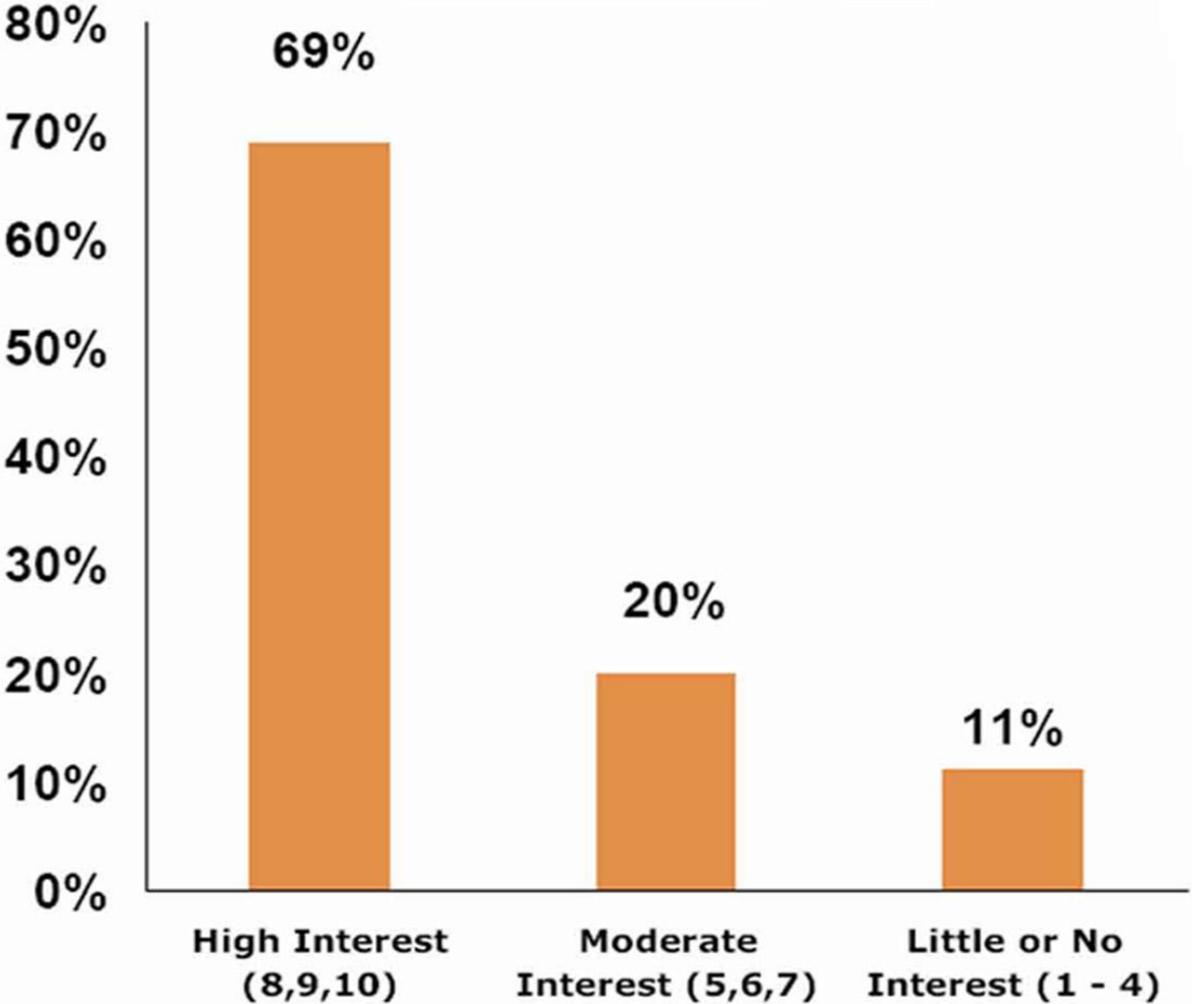
Goals

- Short Term
 - Develop a virtual prototype based on our specifications in order to better portray our end goals and possibly gain support/sponsorship.
 - At this stage we must be able to prove our products validity and market it as a feasible project.

Goals

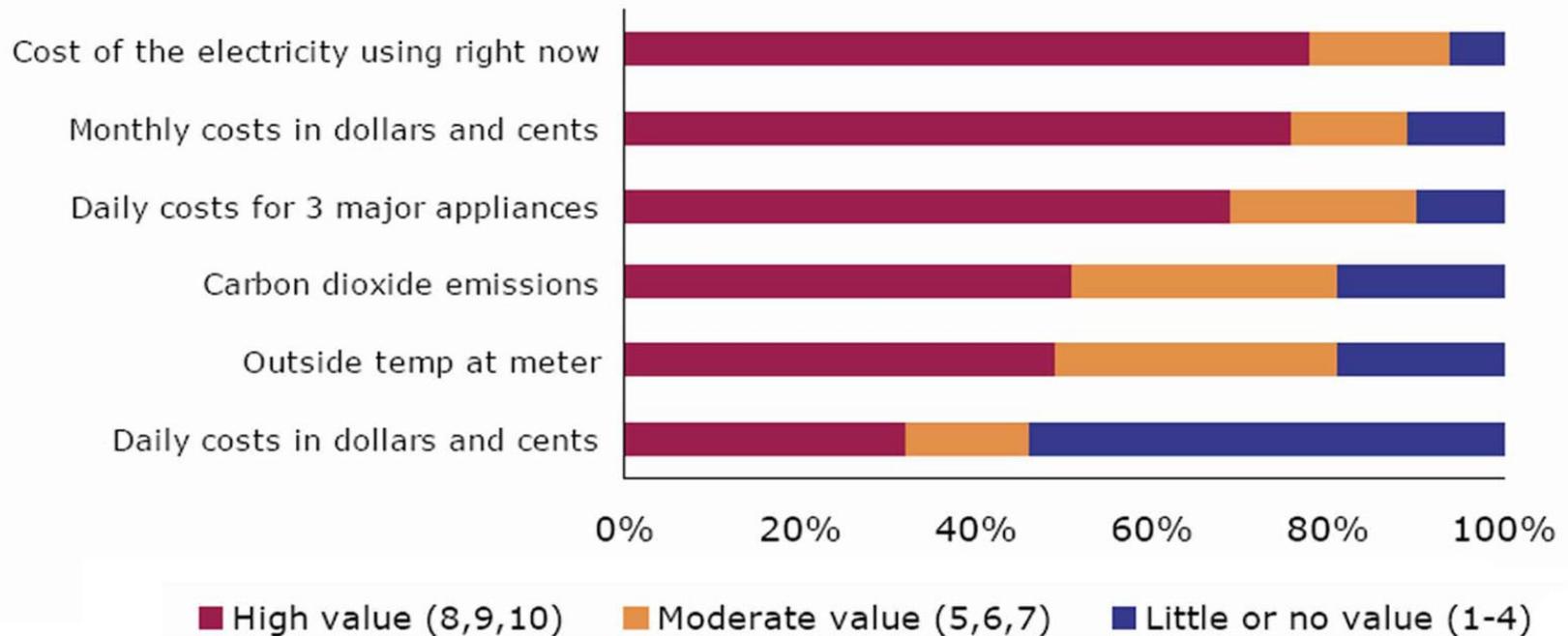
- Long Term
 - Produce a new energy monitoring/controlling system that will...
 - Be affordable
 - Convince home occupants to adopt more energy efficient practices
 - Provide home occupants with convenient functions in regard to their household systems

CUSTOMER INTEREST



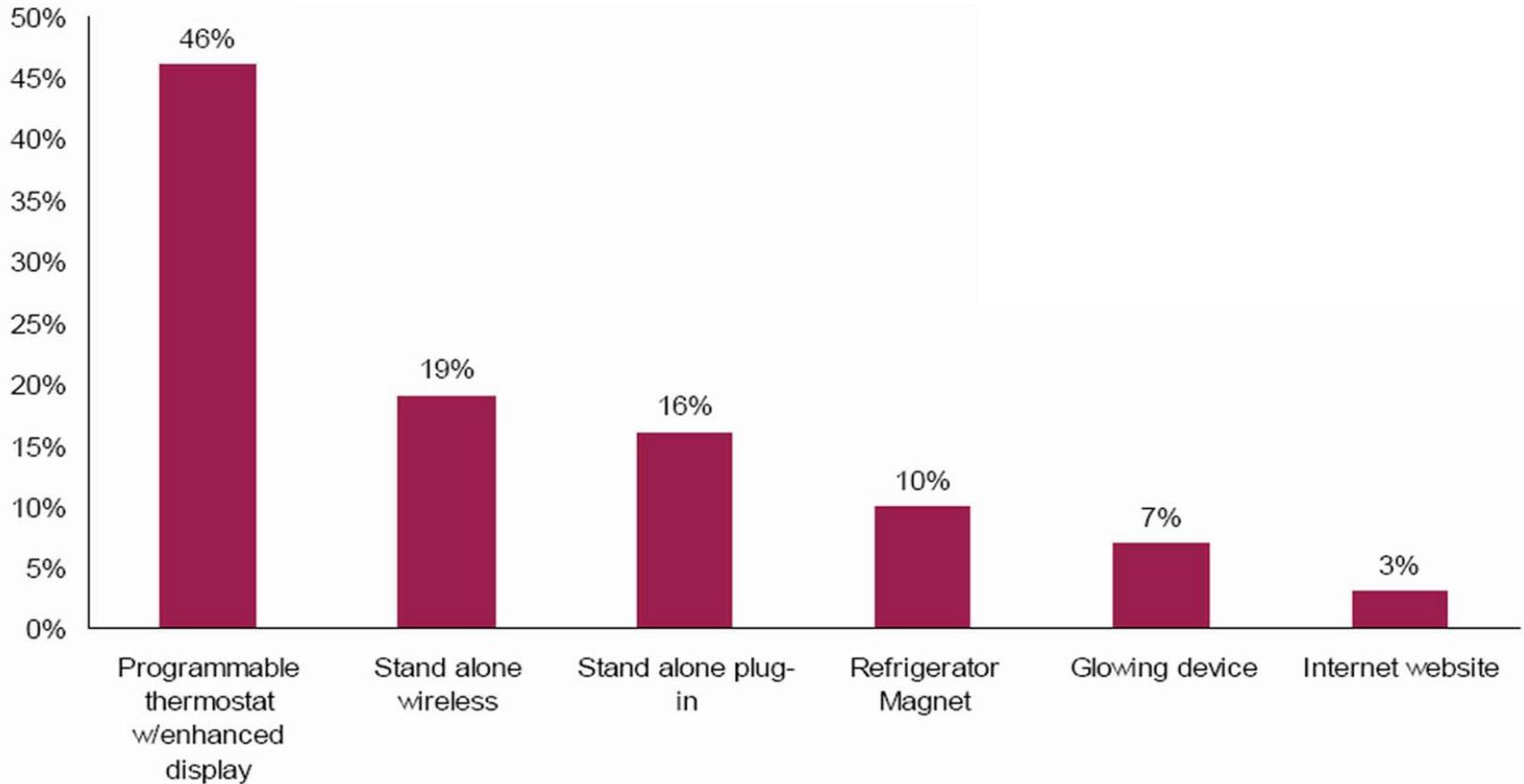
Source: Energy Insights National Residential Online Panel In-Home Display Survey, October, 2007

INFORMATION THE CUSTOMER WOULD FIND VALUABLE



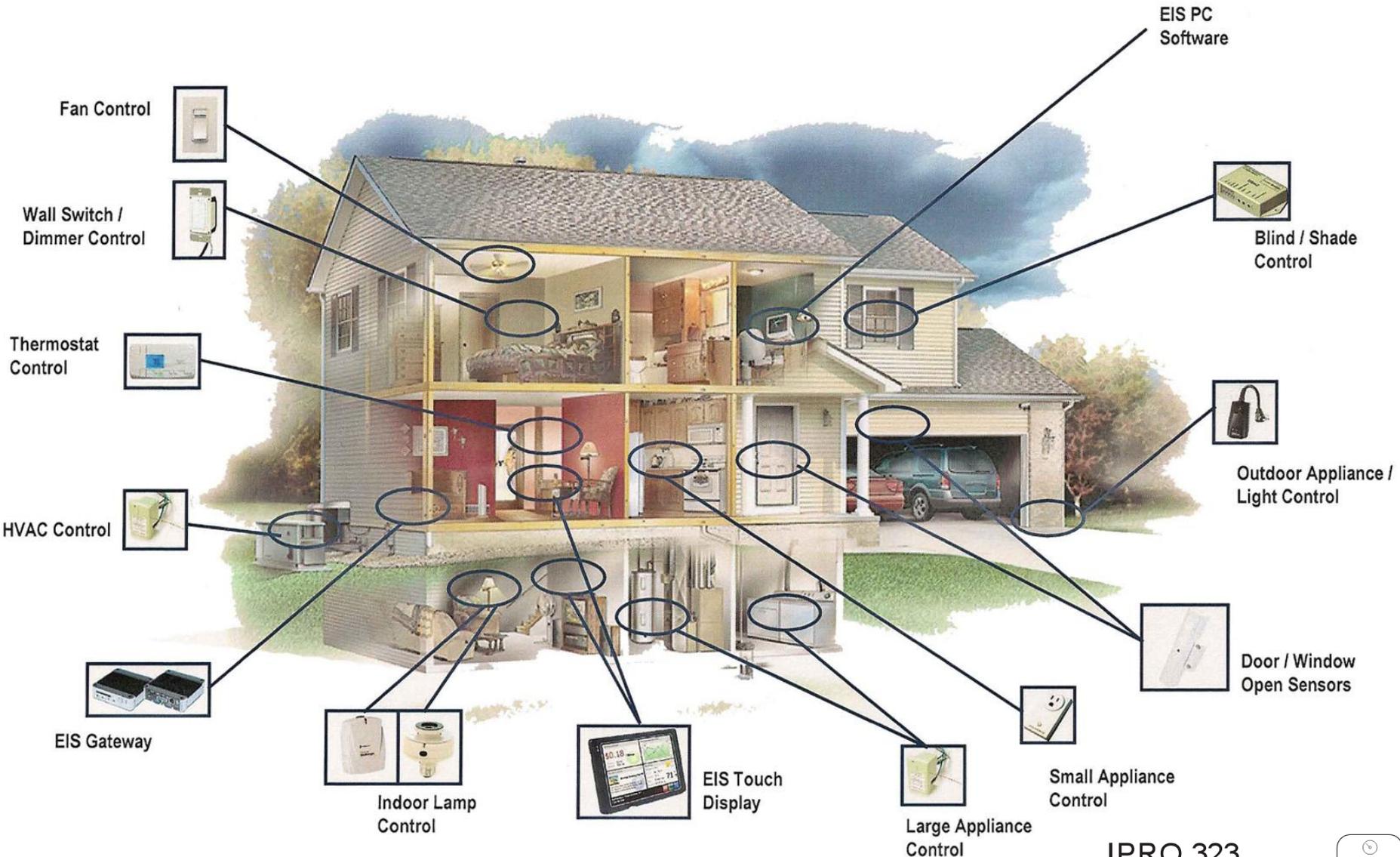
Source: Energy Insights National Residential Online Panel In-Home Display Survey, October, 2007

Preferred type of In-Home Display



Source: Energy Insights National Residential Online Panel In-Home Display Survey, October, 2007

Smart Home Overview



Source: ComEd presentation

IPRO 323
Home Energy Diet





DESIGN CRITERIA

		DESIGN CRITERIA													PRICE \$	NOTES				
		ENERGY CONSUMPTION			RENEWABLE ENERGY	MONEY SPENDING	PRE-PAYMENT OPTION	COMPARE DATA TO PAST	COMPARE DATA TO OTHERS	INTEGRATES WEATHER DATA	REAL-TIME DATA	READABILITY E - easy, M - medium, H - hard	HARDWARE	SOFTWARE / INTERNET			MONITORING ALL APPLIANCES IS POSSIBLE	COLOR INDICATORS OR ALERTS	PROGRAMMABLE	WIRELESS
PRODUCT	ELECTRICITY	GAS	WATER	CO2 EMISSIONS																
	LANGIS + GYR GRID METERS	X								X	H	X	X						X	Also used by utility company. Data transmitted to computer.
	SMART POWER STRIP											X	X			X				35 Motion detector.
PLUGS	PLOGG	X								X		X	X		X					95 Useful for other products to monitor individual outlets. ZigBee
	PRI PLUG-IT	X			X	X				X		X	X		X					Under development.
	HOME JOULE	X				X			X		E	X	X		X					Doubles as a night light.
	KILL-A-WATT	X				X				X	M	X	X		X				X	45 Portable, can be used at any appliance.
	ORION WATER METER MONIT.			X							M	X	X		X					25 Transmits data to receiver.
MONITORS	AMBIENT ORB	O	O	O	O	O				O	E	X	X	X	X	X	X			150 Can track changes in stock market, horoscopes, weather, as well as energy use
	PACIFIC POWER MONITORING				X							X	X		X					Full-service solar power company.
	CENT-A-METER	X			X						E	X	X		X				X	150 Working on patent to include water and gas consumption
	COMVERGE POWERPORTAL	X									E	X	X		X					ZigBee Compatible.
	EWGECO	X	X	X	X	X					E	X	X	X	X					- Portable, can be used at any appliance. More data sent to website.
	POWERCOST MONITOR	X	X	X	X	X					E	X	X		O					135 Highest amount of sales. >70,000 units sold.
	PRI WIRELESS FREEDOM	X	X	X	X	X					M	X	X		X					ZigBee Compatible.
	PRI CUSTOM INTERFACE	X	X	X	X	X					M	X	X		X					ZigBee Compatible.
	THE ENERGY DETECTIVE	X	X	X	X	X					M	X	X		X					140 Ugliest device seen so far.
	ENERGATE	X	X	X	X	X					E	X	X		X					Product has strong emphasis on temp/humidity control.
	AZTECH IN-HOME DISPLAY	X	X	X	X	X					E	X	X		X					ZigBee Compatible.
	ECOMETER	X	X	X	X	X					E	X	X		X					Under development.
	THE WATTBUG	X	X	X	X	X						X	X		X					Contest winner, product not available. Strong user response.
	PRI ADVANCED	X	X	X	X	X						X	X		X					Only trial versions are out now.
	SAN VISION ENERGY TECHNOLOGY INC. -MEA	X	X	X	X	X					E	X	X		X					Still under development. Needs smart meter connection.
	GREENBOX	X	X	X	X	X						X	X		X					Still under development.
	CRESTRON	X	X	X	X	X						X	X		X					Full building automation, not focused on energy reduction.
	ECHOLON	X	X	X	X	X						O	X		X					Still under development. Systems in use in their HQ.
BUILDING DASHBOARD	X	X	X	X	X					E	X	X		X					Full building control system.	
AGILEWAVES	X	X	X	X	X						X	X		X					Full building control system. Developed by former NASA engineers.	

X -Product has criteria.
O -Product could have criteria.



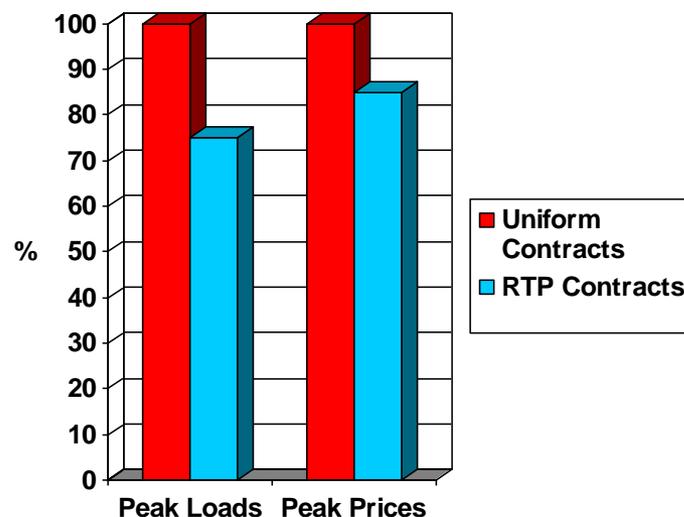
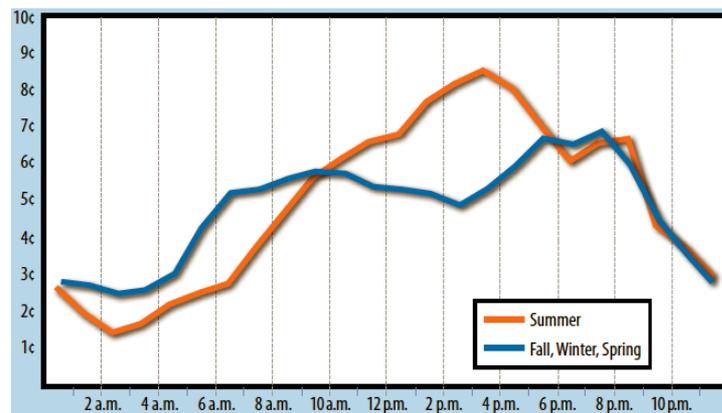
DESIGN CRITERIA

	PRODUCT	DESIGN CRITERIA												PRICE \$	NOTES									
		ELECTRICITY	GAS	WATER	CO2 EMISSIONS	RENEWABLE ENERGY	MONEY SPENDING	PRE-PAYMENT OPTION	COMPARE DATA TO PAST	COMPARE DATA TO OTHERS	INTEGRATES WEATHER DATA	REAL-TIME DATA	READABILITY E - easy, M - medium, H - hard			HARDWARE	SOFTWARE / INTERNET	MONITORING ALL APPLIANCES IS POSSIBLE	COLOR INDICATORS OR ALERTS	PROGRAMMABLE	WIRELESS	THERMOSTAT	CONNECTED TO UTILITY COMPANY	
	LANGIS + GYR GRID METERS	X										X	H	X							X		Also used by utility company. Data transmitted to computer.	
	SMART POWER STRIP													X				X					35 Motion detector.	
PLUGS	PLOGG	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		95 Useful for other products to monitor individual outlets. ZigBee	
	PRI PLUG-IT	X			X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		Under development.	
	HOME JOULE	X											E										Doubles as a night light.	
	KILL-A-WATT	X											M										45 Portable, can be used at any appliance.	
	ORION WATER METER MONIT.			X										M	X									25 Transmits data to receiver.
MONITORS	AMBIENT ORB	O	O	O	O	O							E	X				X	X	X	X		150 Can track changes in stock market, horoscopes, weather, as well as energy use	
	PACIFIC POWER MONITORING				X										X	X	X	X	X	X	X			Full-service solar power company.
	CENT-A-METER	X			X								E										150 Working on patent to include water and gas consumption	
	COMVERGE POWERPORTAL	X											E										ZigBee Compatible.	
	EWGECO	X											E										- Portable, can be used at any appliance. More data sent to website.	
	POWERCOST MONITOR	X											E					O						135 Highest amount of sales. >70,000 units sold.
	PRI WIRELESS FREEDOM	X											M											ZigBee Compatible.
	PRI CUSTOM INTERFACE	X											M											ZigBee Compatible.
	THE ENERGY DETECTIVE	X											M											140 Ugliest device seen so far.
	ENERGATE	X											E						X	X	X	X		Product has strong emphasis on temp/humidity control.
	AZTECH IN-HOME DISPLAY	X											E											ZigBee Compatible.
	ECOMETER	X											E											Under development.
	THE WATTBUG	X																						Contest winner, product not available. Strong user response.
	PRI ADVANCED	X																						Only trial versions are out now.
	SAN VISION ENERGY TECHNOLOGY INC. -MEA	X											E											Still under development. Needs smart meter connection.
	GREENBOX	X																						Still under development.
CRESTRON	X													X									Full building automation, not focused on energy reduction.	
ECHOLON	X													O									Still under development. Systems in use in their HQ.	
BUILDING DASHBOARD	X											E											Full building control system.	
AGILEWAVES	X																				O		Full building control system. Developed by former NASA engineers.	

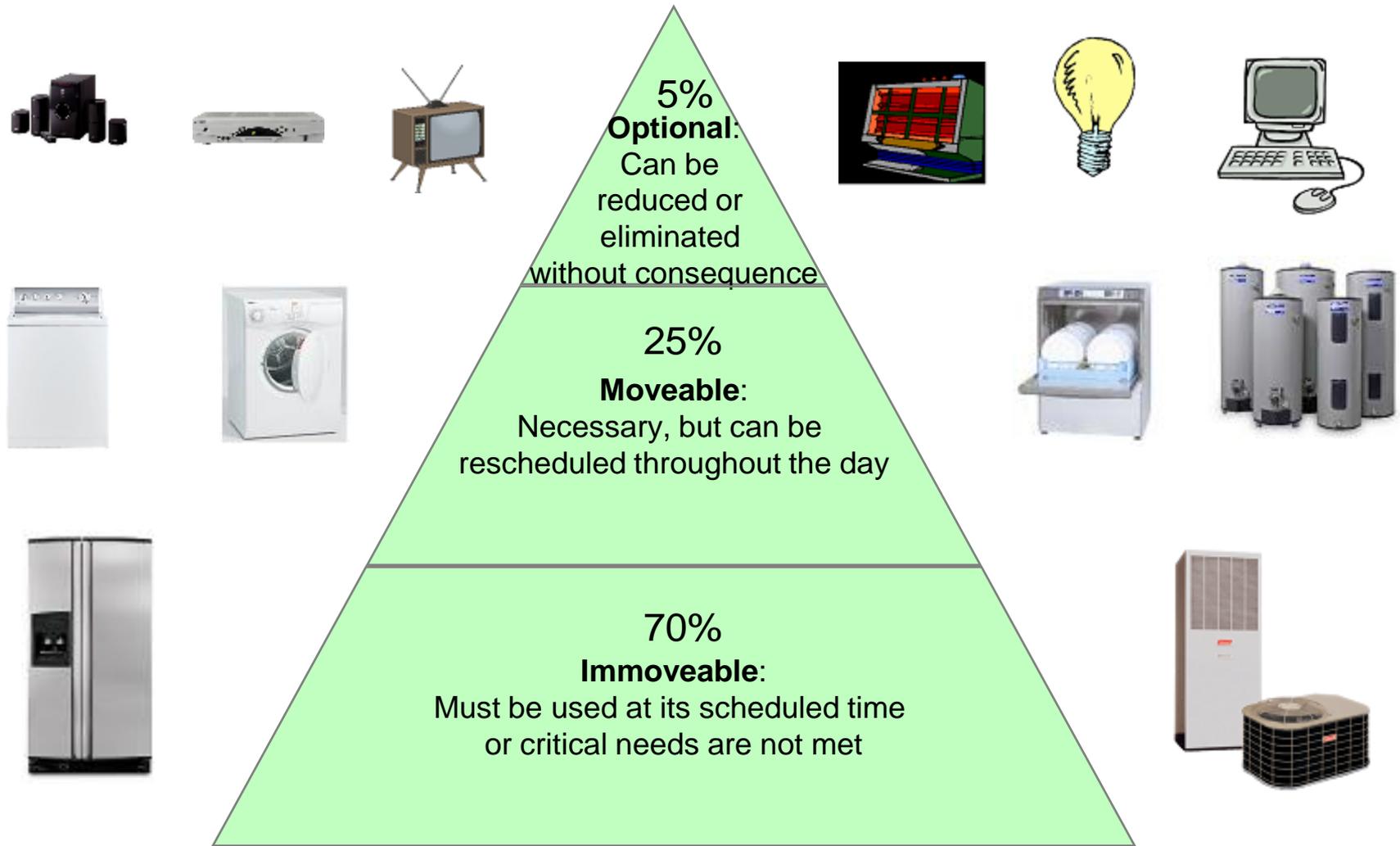
X -Product has criteria.
O -Product could have criteria.

Real Time Pricing (RTP) Contracts

- Cost of electricity varies by time of day
- Bills issued at the end of each month compare RTP costs to what the consumer would have paid with a uniform rate
- Encourages consumers to use electricity during low cost hours
- Tendency of consumer to shift power usage depends on:
 1. Monthly power budget of household
 2. The difference between peak-hour rates and low-cost rates
 3. Amount of moveable power usage



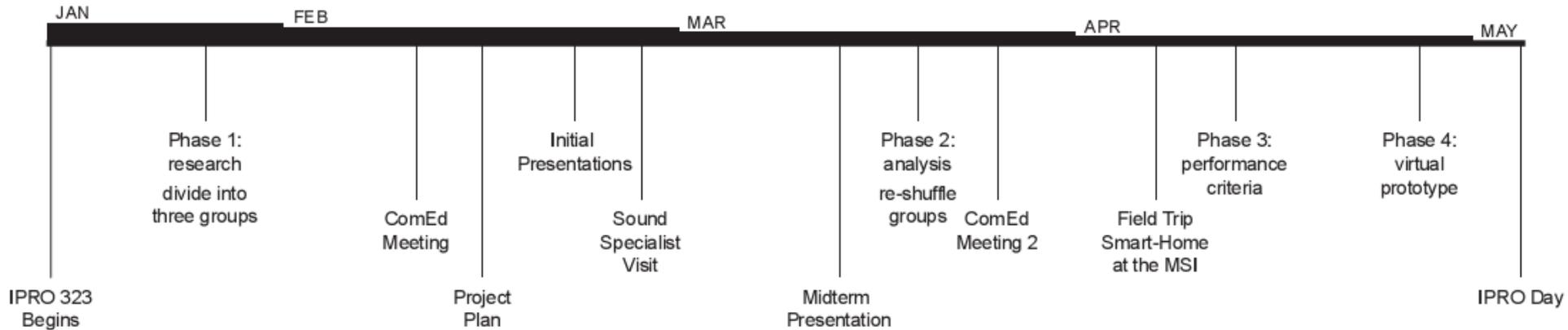
The Electricity Pyramid



I PRO 323 Home Energy Diet



Spring 2009
Timeline



Questions