METERING INTERNATIONAL | SMARTENERGY CANADA

Inside the Smart Home

Ron Zimmer, President & CEO
Continental Automated Buildings Association (CABA)

February 2, 2010
Toronto, ON

CABA

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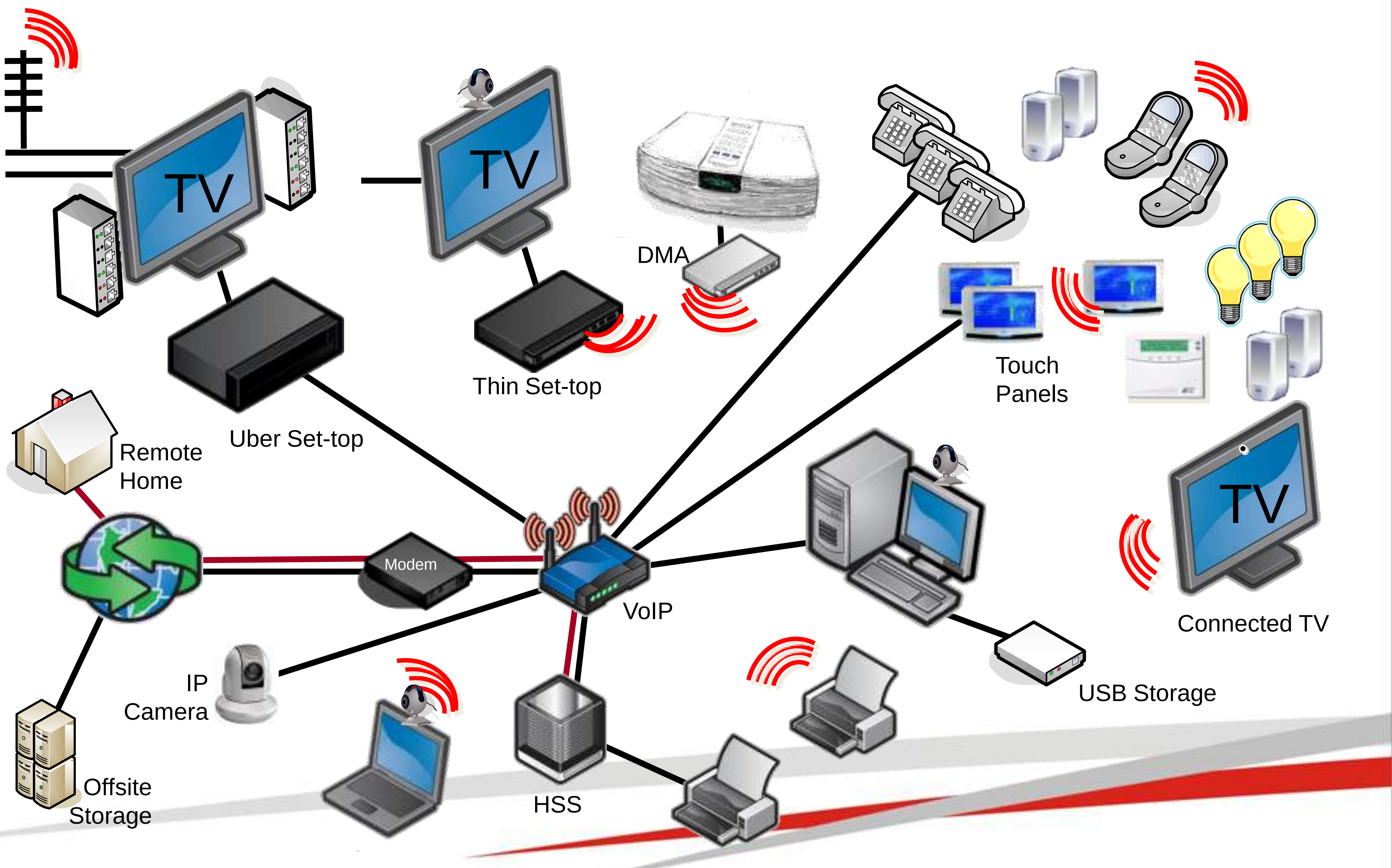
CABA Vision

"The knowledge-based forum for industry leaders who advance the use of technology and integrated systems in the global home and building industry."

How do we connect all of this stuff?



Realties of the Smart Home

- **Smart Home Vision of 10 years ago:**
  - Did not happen for the masses
  - Did happen for the "Rich and Affluent"
  - CAT5 wiring was just starting to sell, but not for the masses
  - Multi HVAC systems
  - Central touch pad (Home Controls)
  - Lighting, window treatments and cameras

Realties of the Smart Home continued

- **Smart home today for mass market is a connected home that has varied networks developing:**

  - Computer, gaming and TV

  - Wired and wireless

  - HVAC programmable thermostats

  - Security pack from companies like ADT, GE, Honeywell, etc.

  - Very basic web cam systems

Connected Home Research Council (CH-RC) Members

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BALL STATE UNIVERSITY
MOEN Buy it for looks. Buy it for life.
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TELUS the future is friendly
BLACK & DECKER Hardware & Home Improvement Group
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zensys Now a division of SIGMA

CABA’s Connected Home Research Council (CH-RC)

The Connected Home Research Council provides opportunities for research project collaboration conceived and executed by Research Council members. The resulting research reports, white papers and executive summaries are made available to Research Council members and industry stakeholders.

CABA's Connected Home
Research Council

State of the Connected Home Market Study:

Over the past 4 years we have completed 2 research studies in 2003 and 2005. Certain products have reached critical mass in the market place.We find ourselves in the early stages of the adoption curve but in the height of the Connected @ Home Hype.

Family
"Help me take care of my family"

Entertainment
"Entertain me"

Career
"Help me with my career"

CH-RC State of the Connected Home Market Study Research

- Study was completed in June of 2008
- Divided into three ecosystems (family, entertainment and career)
- Industry benchmark study 3rd study in eight years
- Found that a home with sensors and "smartness" never took hold for the masses due to:
  - Cost of system and components
  - Not being user-friendly

CH-RC State of the Connected Home Market Study Research continued

- Study determined that entertainment is “king”
  - TVs, gaming and computers connecting together in a “plug and play” environment

- The safe, secure and comfort areas are lagging behind in consumers minds because:
  - Price is higher than payback for investment
  - Too complicated for the non-tech person

Complimentary Executive Summary at:
http://www.caba.org/2008connectedhomestudy.

The Realities

Appeal of Connected Home Concept	U.S. 2008			U.S. 2005			Canada 2008		
	Total Online HHs	Primary Market	Mass Market	Total Online HHs	Primary Market	Mass Market	Total Online HHs	Primary Market	Mass Market
	A	B	C	D	E	F	G	H	I
Appeal (Q14B)									
Definitely/somewhat appealing (6-7)	**23%** G	**51%** HC	**2%** I	**22%** G	**51%** HF	1%	14%	**44%** I	0%
Might or might not be appealing (3-5)	**61%** D	48%	**71%** FB	57%	48%	**63%** E	**64%** D	**56%** BE	**68%** H
Definitely not/somewhat not appealing (1-2)	16%	0%	**28%** B	**21%** A	1%	**36%** CE	**22%** A	0%	**32%** H
Base	*(n=1,849)*	*(n=1,378)*	*(n=471)*	*(n=1,834)*	*(n=921)*	*(n=913)*	*(n=649)*	*(n=455)*	*(n=194)*

Note: Remember the consumer adoption curve. Innovators and early adaptors will purchase technology that others will not, until it becomes more mature and consumer friendly.

Family Ecosystem

Computer Behavior – Home Network	U.S. 2008 Total Online HH A	U.S. 2008 Primary Market B	U.S. 2008 Mass Market C	U.S. 2005 Total Online HH D	U.S. 2005 Primary Market E	U.S. 2005 Mass Market F	Canada 2008 Total Online HH G	Canada 2008 Primary Market H	Canada 2008 Mass Market I
Have Home Network									
Yes	**43%** D	**53%** EC	**35%** F	28%	**40%** F	19%	**40%** D	**54%** EI	**33%** F
Base	*(n=1,761)*	*(n=1,324)*	*(n=437)*	*(n=1,768)*	*(n=899)*	*(n=869)*	*(n=620)*	*(n=429)*	*(n=181)*
Wireless Home Network (Wi-Fi)									
Wireless (Wi-Fi)	**74%** DG	**75%** E	**72%** F	51%	**56%** F	43%	**63%** D	**68%** E	58%
Base	*(n=841)*	*(n=702)*	*(n=139)*	*(n=484)*	*(n=339)*	*(n=145)*	*(n=266)*	*(n=219)*	*(n=47)*
Laptop in Home Network									
Laptop in home network	**68%** D	69%	**67%** F	60%	**68%** F	48%	66%	63%	**69%** F
Base	*(n=880)*	*(n=727)*	*(n=153)*	*(n=520)*	*(n=358)*	*(n=162)*	*(n=288)*	*(n=234)*	*(n=54)*

Family Ecosystem continued

Interest in Family Ecosystem Application Areas % Very Interested; Top-2 Box	U.S. 2008			U.S. 2005			Canada 2008		
	Total Online HH	Primary Market	Mass Market	Total Online HH	Primary Market	Mass Market	Total Online HH	Primary Market	Mass Market
	A	B	C	D	E	F	G	H	I
Using technology to help you automate or control basic home systems like lighting, heating, ventilation and air conditioning (HVAC) in general*	13%	**28%** C	2%	**13%** G	**28%** F	2%	9%	**26%** I	2%
Using technology to streamline routine tasks like preparing meals, arranging family members' schedules and paying bills in general	15%	**29%** C	4%	14%	**26%** F	4%	12%	**25%** I	7%
Using technology for home security in general	15%	**29%** C	4%	–	–	–	11%	**27%** I	3%
Base	*(n=1,849)*	*(n=1,378)*	*(n=471)*	*(n=1,834)*	*(n=921)*	*(n=913)*	*(n=649)*	*(n=455)*	*(n=194)*

Lack of interest because of issue around:

- Set up - 51%,
- People in the mass market are technology challenged
- People are overwhelmed by dealing with technology at work and home

Family Ecosystem Continued

Maximum Total Addressable Market (TAM) for Family Mini-Concepts

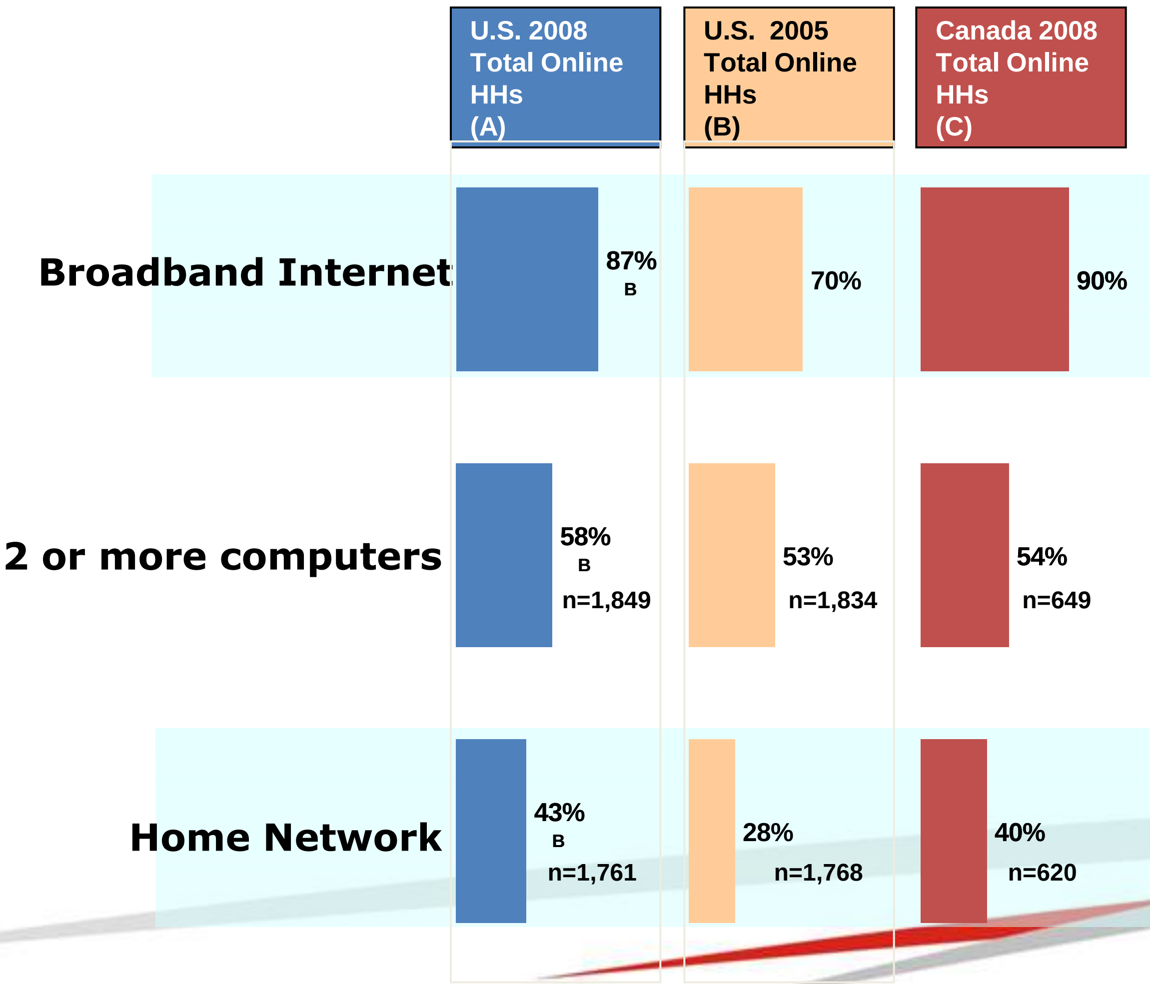
	U.S. 2008 Total Online HHs (n=319)	Canada 2008 Total Online HHs (n=143)
Energy-saving power strip	42%	36%
Programmable thermostat	39%	35%
Home zone sensors	37%	31%
Professional home network installation	36%	33%
Remotely administered home network repair services	35%	32%
Home network phone & on-site support	32%	28%
Remotely accessible door lock	32%	28%
Wireless appliance monitor	31%	28%
Remote A/V equipment & home lighting control	30%	22%
Service combines contact list for home & cell phones	25%	25%

If I buy or rent it, I want to watch it anywhere

Slide Courtesy of Entertainment Technology Center @ USC

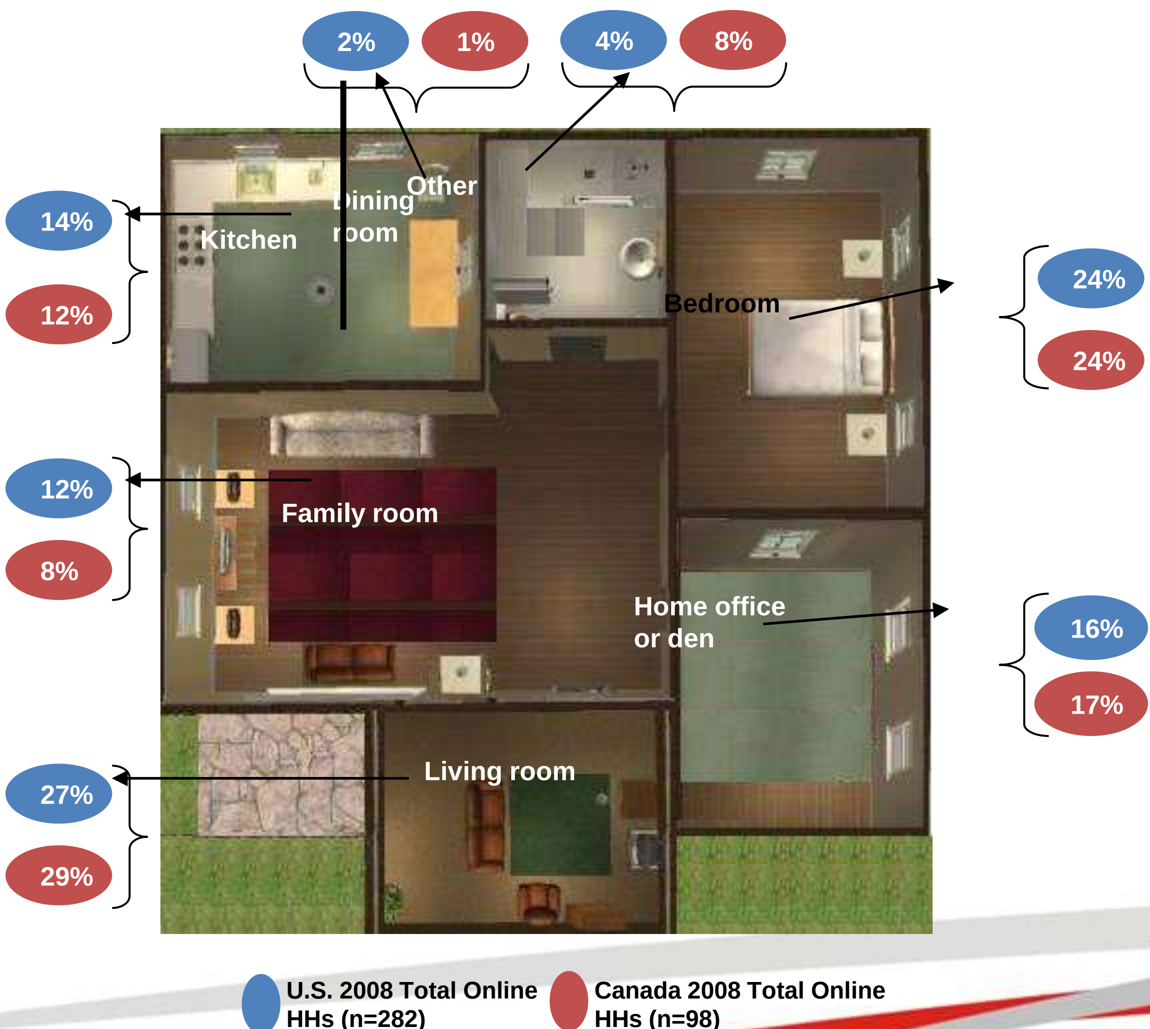
Entertainment Ecosystem

Connected Home Foundational Technologies



Entertainment Ecosystem Interest in Audio Entertainment

Interest in Listening to Internet Radio at Home by Room



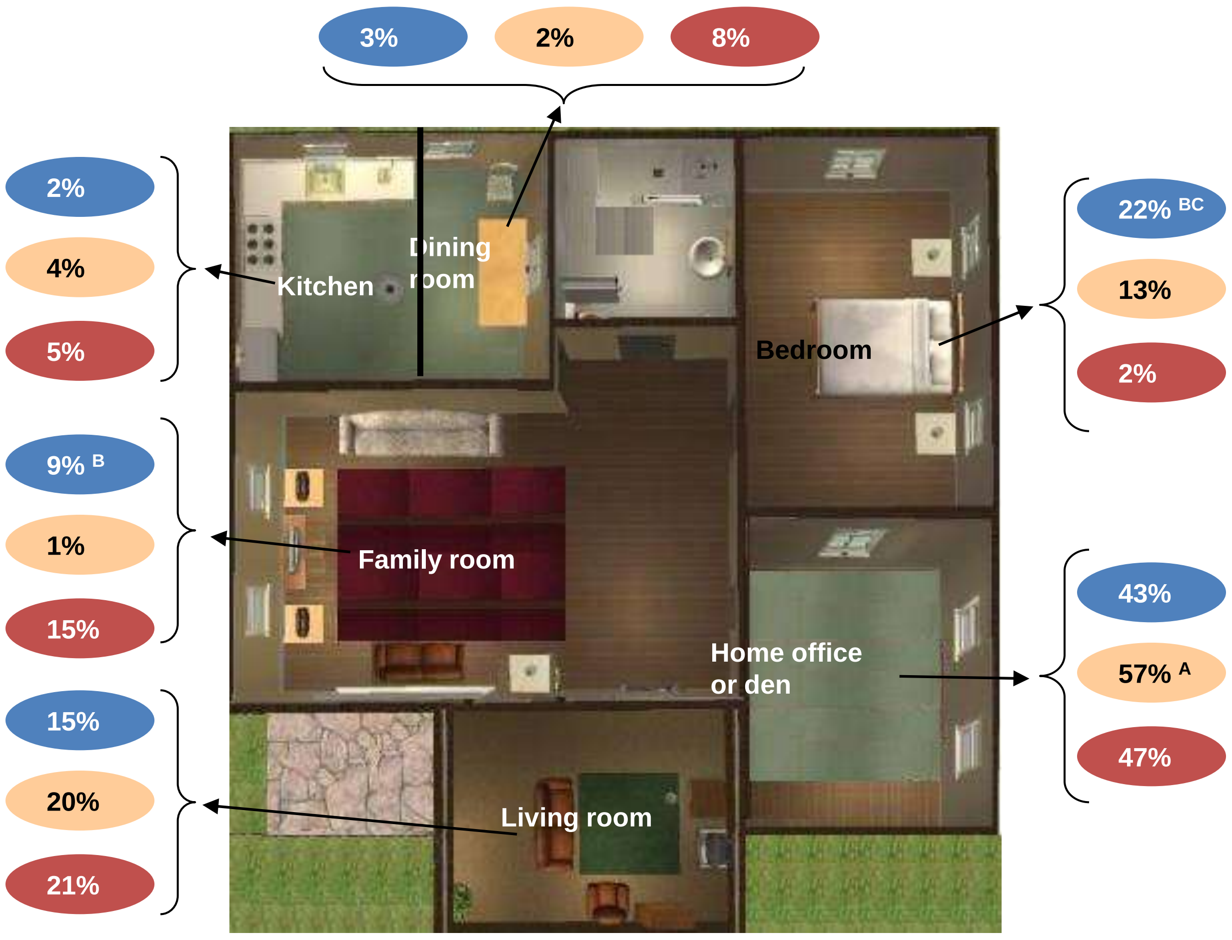
What Ecosystem is most interested in Smart Home/Connected Home?

- Answer the Career Ecosystem
- This is a Ecosystem of people who work from home at least part time or telecommute
- They use technology differently and are more likely to be using technology in a early web 3.0 environment to solve problems

	U.S. 2008 Total Online HHs (n=618; A)	U.S. 2005 Total Online HHs (n=604; B)	Canada 2008 Total Online HHs (n=215; C)
Works at Home Outside Regular Business Hours	52% B	43%	47%
Self Employed	15%	14%	15%

Career Ecosystem-Work at Home

When working from home, in which room of the house do you typically work?



U.S. 2008 Total Online HHs (n=346; A)

U.S. 2005 Total Online HHs (n=310; B)

Canada 2008 Total Online HHs (n=97; C)

QC48. Letters denote statistically significant differences among segments.

CABA's Connected Home
Research Council

Energy Efficiency Study

GOING GREEN

- Status of project
- Builder and developers knowledge
- Current Steering committee

Steering Committee Members:

Direct Energy (Project Lead)

Honeywell

TRANE

Procter & Gamble

APC
Legendary Reliability

NYSERDA

LEVITON

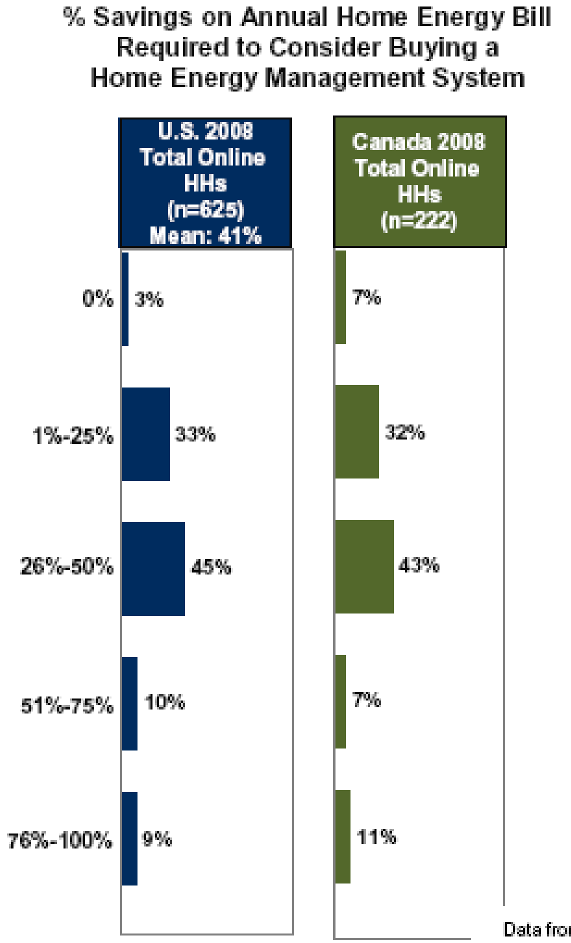
Panasonic ideas for life

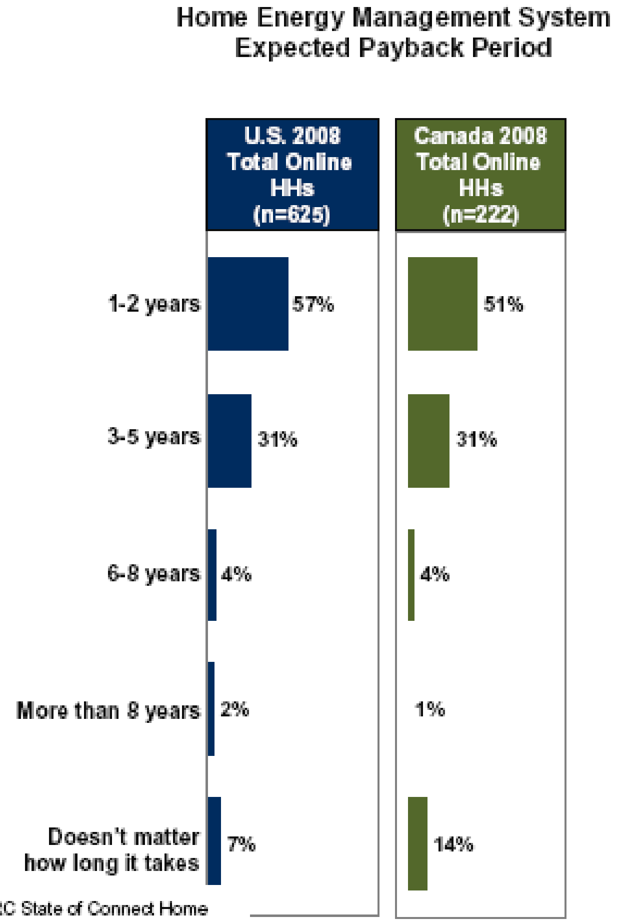
CH-RC- Successful Projects

1. Digital Youth Study
2. Laundry Time
3. Digital Kitchen
4. Senior Living
5. Interactive Television & Advertising Study (IPTV)
6. Microbusiness & Small Business Managed
7. Services Needs Assessment Study
8. Going Green – Energy Efficiency
9. State of the Connected Home Market Study
10. It's Just Magic!
11. Connected Home User Interface
12. Video Convergence
13. Connected Home Roadmap
14. Is Home Control Heating Up?

FREE report: http://www.caba.org/connectedhome/homecontrol

HOME ENERGY MANAGEMENT ADOPTION SURVEY





Data from 2009 CHRC State of Connect Home

SITUATION OVERVIEW

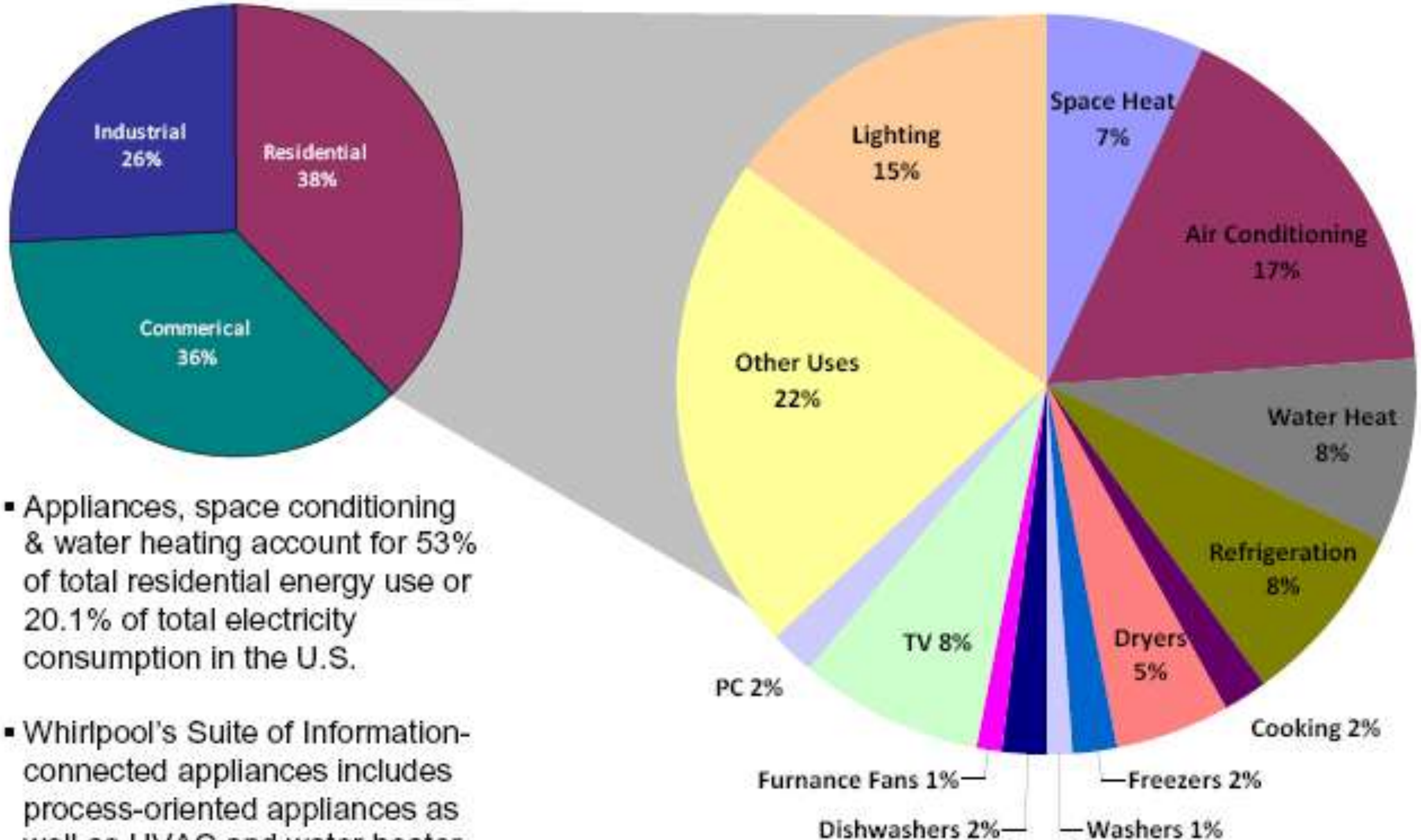
THE PROBLEM

- We have to reduce energy use while meeting or exceeding consumer expectations.
- We have to use the energy we do produce more efficiently / effectively.
- Smart appliances are NOT waiting for technology; they are waiting for aligned economic drivers so that manufacturers incorporate connectivity into their products

SOLUTIONS

- Lowering residential energy use
  - Energy efficient appliances
  - Coordinating Communities of "Information-Connected" appliances
    - Shift energy to off-peak times
    - Manage loads to lower energy consumption when the grid is under stress
- Establish widespread connectivity
  - Increase incentives for consumers to purchase connected appliances
  - Establish connectivity incentives between utilities and manufacturers
  - Cause governments to incent connectivity for benefit of all

WHY ARE APPLIANCES RELEVANT?



- Appliances, space conditioning & water heating account for 53% of total residential energy use or 20.1% of total electricity consumption in the U.S.
- Whirlpool's Suite of Information-connected appliances includes process-oriented appliances as well as HVAC and water heater.

Source: ERPI Assessment of Achievable Potential from Energy Efficiency and Demand Response Programs in the US (2010-2030)

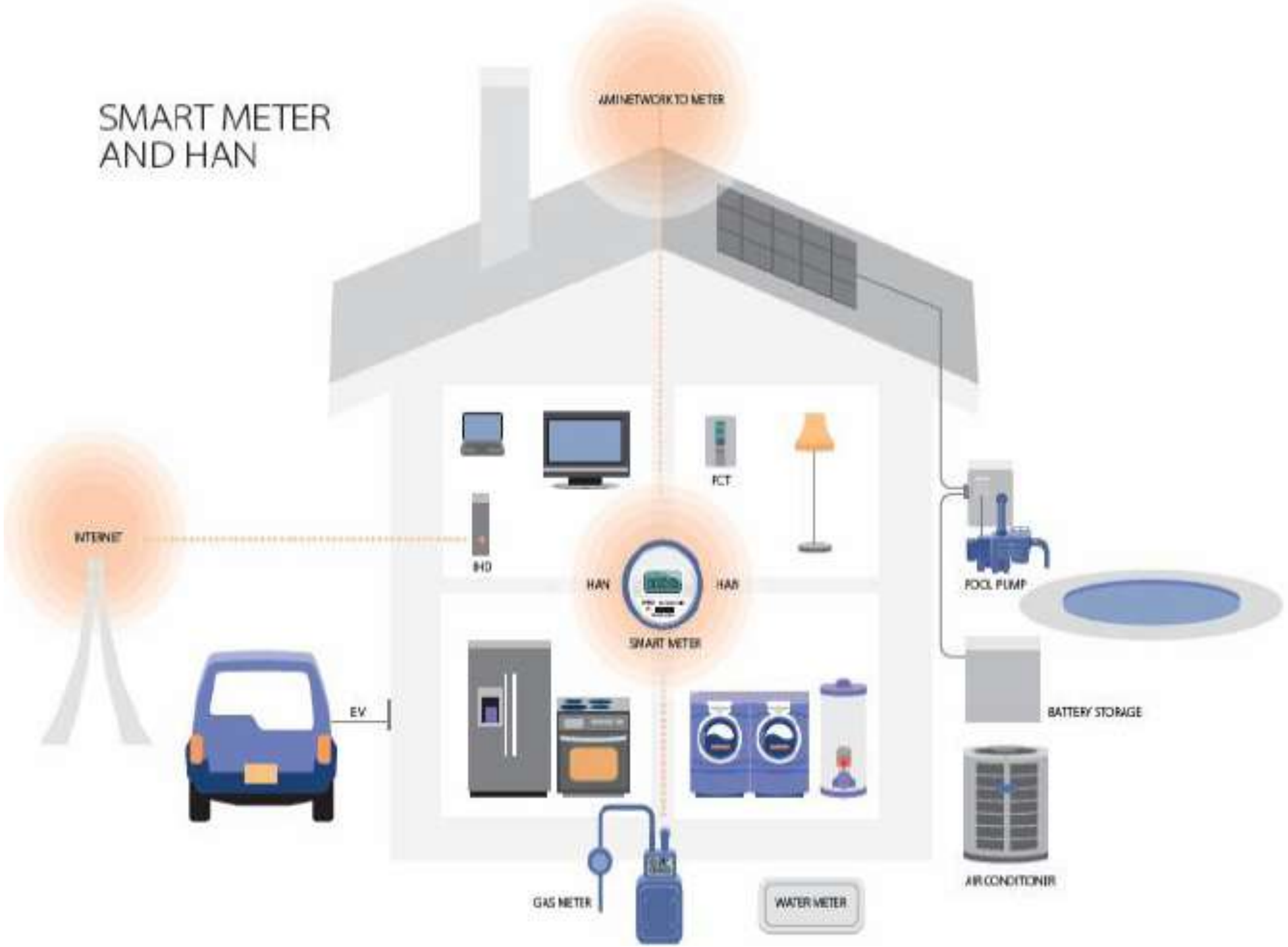
2008 TOTAL US RESIDENTIAL ELECTRICITY CONSUMPTION: 1,403 TWh

ENVIRONMENTAL IMPACT – REDUCTION IN CO_2 EMISSIONS

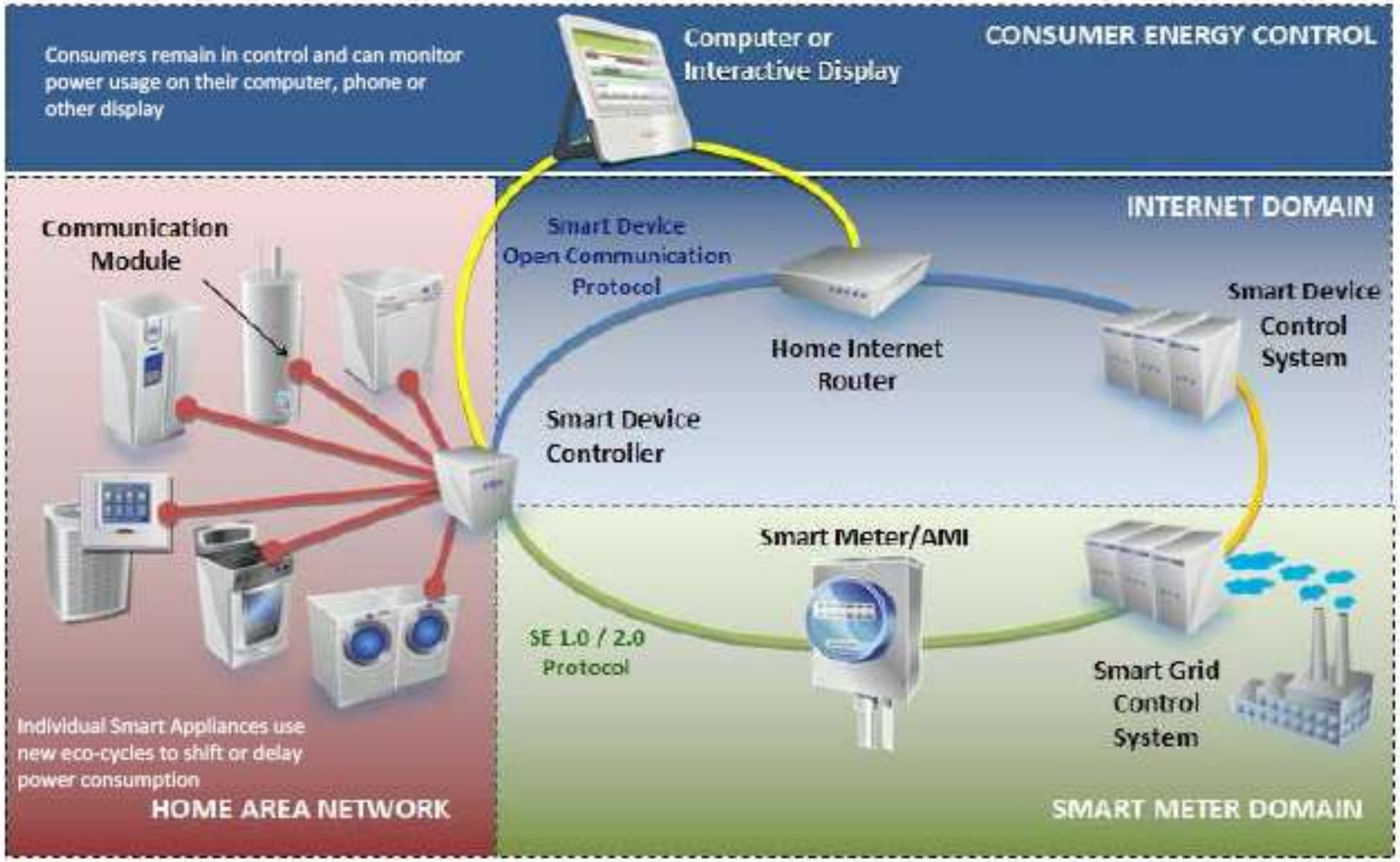
Appliance Category		Percent of Peak Demand Move to Off Peak Hrs	Annual Reduction in CO_2 Emitted[1]	Equivalent # of Car Years of Emission[2]
	DISHWASHER	80%	49.5 Mil Lb	4,200
	REFRIGERATOR	95%	6.8 Mil Lb	560
	ELECTRIC DRYER	80%	52.1 Mil Lb	4,300

[1] Reduction in emissions from off-peak consumption: 209lb CO_2 / MWHr – eGrid 2007 Summary, Dec 2008
[2] Annual emissions of a personal car: 5.46 metric tons CO_2 / vehicle / yr: US EPA; Feb 2009

SMART METER AND HAN



WHIRLPOOL SMART DEVICE NETWORK ARCHITECTURE



Smart Devices are linked to each other in an intelligent HAN that manages power usage and information

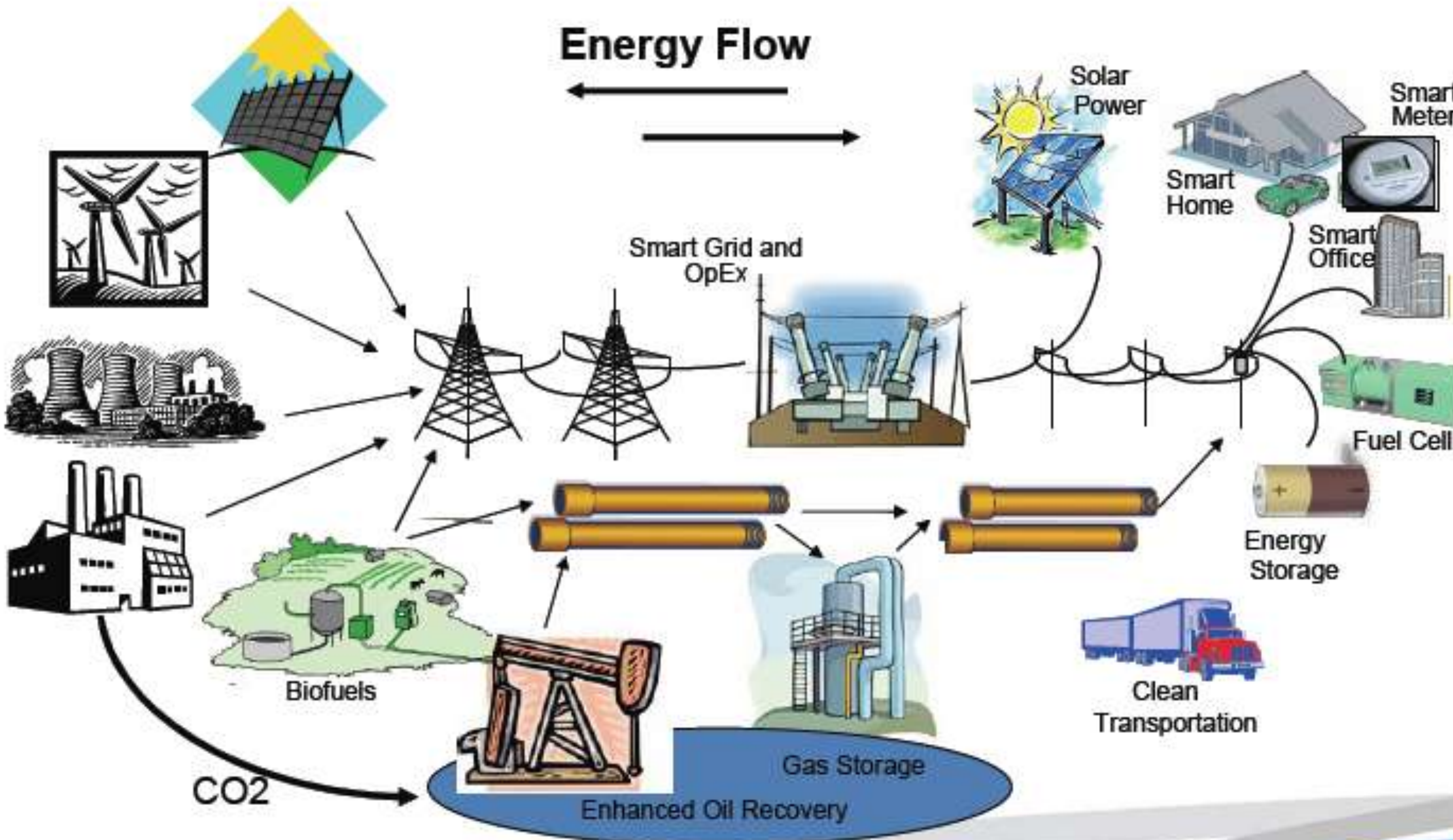
Two paths to the home: the Internet and/or the Advanced Metering Infrastructure

BRE Innovation Park – Innovation in Systems

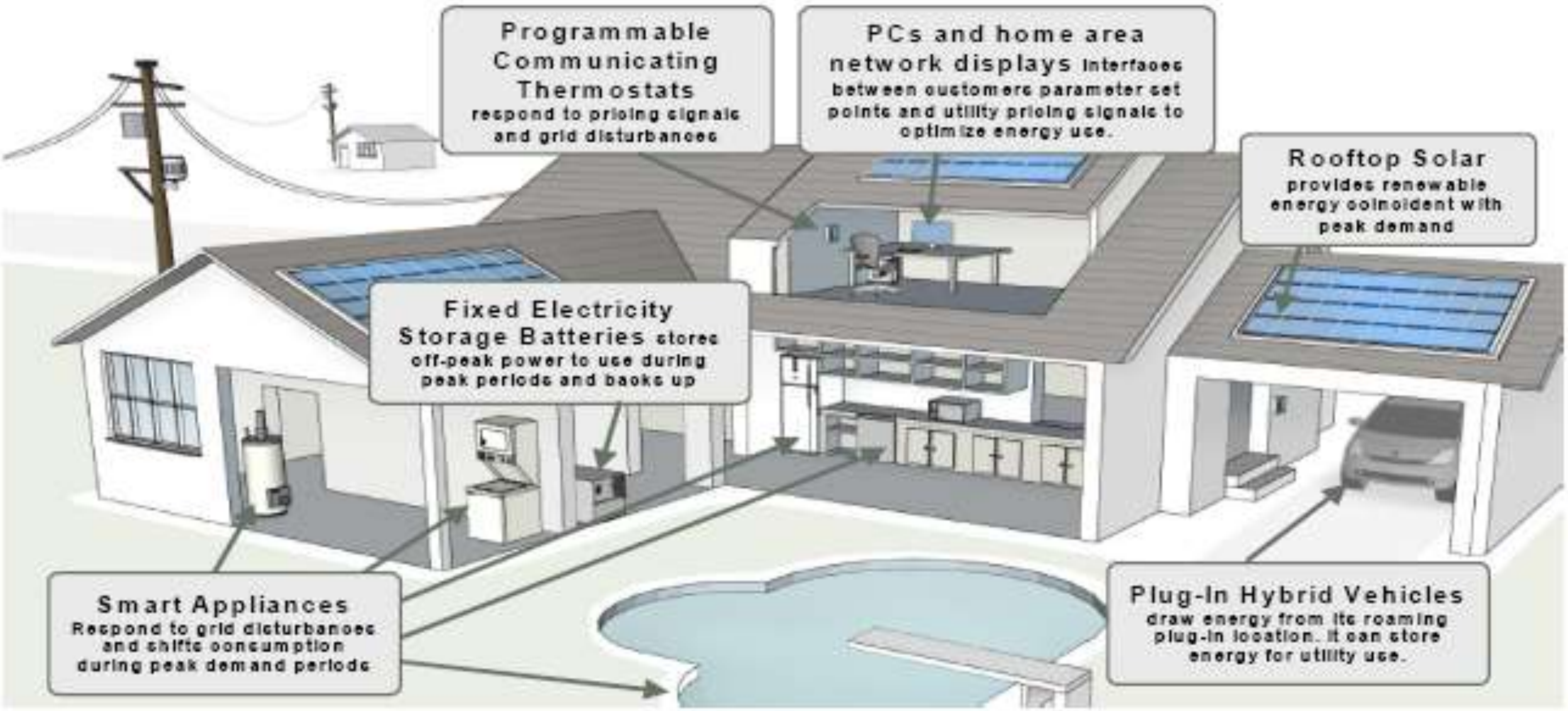
Smarter Metering & Smarter Grids

Benefits for Consumers	Benefits for Network Managers	Benefits for Suppliers
• Information portal • Taking ownership of usage trends • Pro-active advice from suppliers • Optimise tariffs • Self-service • Budget visibility • New home services • Ease of supplier switching • Carbon footprint tracking	• Theft detection • Technical losses identification & reduction • Distributed/micro- generation integration • Advanced mobile workforce • Advanced outage management • Asset maintenance & optimisation • Quality of Service reporting • Network planning	• No more 'Estimates' • Improved customer relations and lower cost to serve • Innovative tariffs – DR/DP – custom pricing • Improved customer enrolment • New services • Improved energy sourcing operations (including Settlements) • Enhanced Self- Service • New generation prepayment

The Utility World Tomorrow



The Smart Home



*EIA Annual Energy Outlook 2009 Reference Case Presentation

BRIGHT GREEN
BUILDINGS

Convergence of Green and Intelligent Buildings
Complimentary Research Report:
www.caba.org/brightgreen

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