mediaX at Stanford University

H-STAR
HUMAN SCIENCES AND TECHNOLOGIES ADVANCED RESEARCH INSTITUTE

Can Games Change Energy Behavior and Reduce Consumption?

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Seriosity, Inc.

The Opportunity

- **A 10% reduction** in energy use will lower the quantity of fossil fuels consumed by an amount roughly equal to a 25-fold increase in wind plus solar power, or a doubling of nuclear power (Sweeney, 2007).

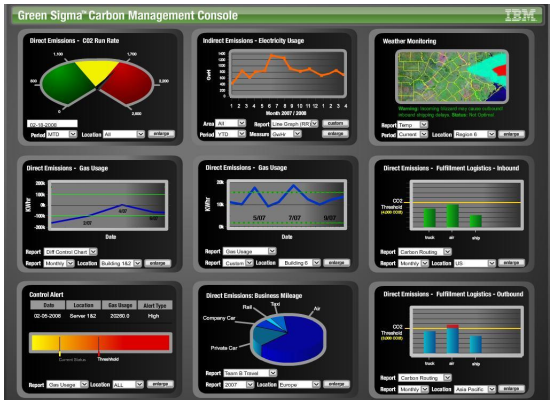
- This **opportunity** involves **behavior change**

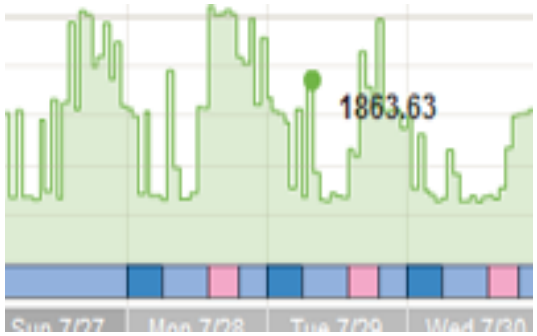
- The **engine** of behavior change is **information**

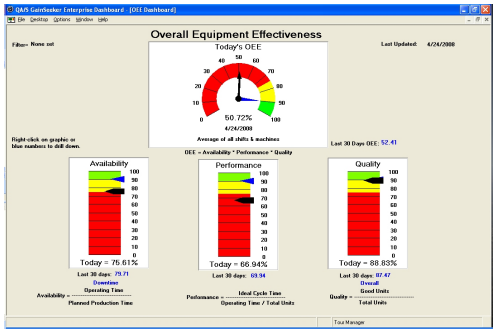
The Problem

- **Billions** spent **gathering** information
  - Smart sensors and infrastructure
  - Tons of information

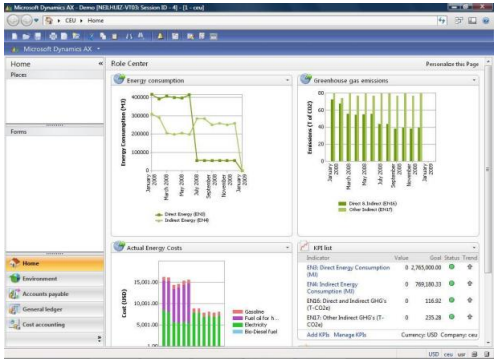
- But **energy** information is **dull**
  - Complex UI's
  - Problems are distant
  - Feedback separated from behavior
  - "What I get" not obvious (even $)


Green Sigma™ Carbon Management Console
IBM


1863,63


Overall Equipment Effectiveness
Today's OEE
50.72%
Availability
Today = 75.61%
Performance
Today = 66.94%
Quality
Today = 88.83%

Google PowerMeter: Energy User's Home
Electricity used Sep 30–Oct 1
House, Real-time
Day Week Month
electricity in kW
Previous day
Wednesday Sep 30
11 kW·h used
Approx. $658/year
Thursday Oct 1
6.3 kW·h used
Approx. $628/year
Compared to others
Your usage on Oct 1 6.3 kW·h
1-bedroom apartment
2-bedroom apartment
2-bedroom house
3-bedroom house
4-bedroom house
Compared to past usage
6% under Thursday's energy budget
6 kW·h used
11 kW·h budgeted
Manage Discuss Help


Microsoft Dynamics AX
Home
Role Center
Energy consumption
Greenhouse gas emissions
Actual Energy Costs
KPI list

OPOWER

Scenes
Devices
Schedules
Energy
Power
Messages
Location
Kitchen
Counter Light
Overhead Light
Dishwasher
Refrigerator
Stove Fan
Washer
Occupancy Sensor
Camera
Washer
Cycle:
Washing
Cost:
$0.55/wash
Temperature:
130°F
Energy Aware:
Green Index:
10
Stop

CHEZ LE POISSON
CAFE RESTAURANT

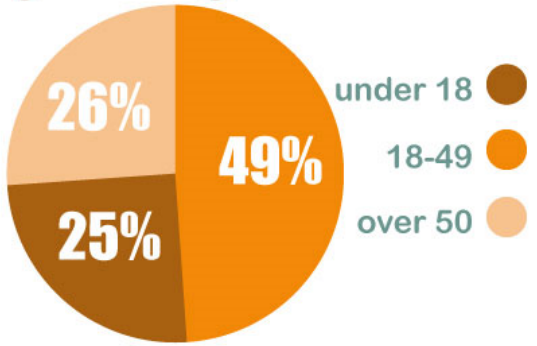
HIGHSCORE: 100690
SCORE: 0

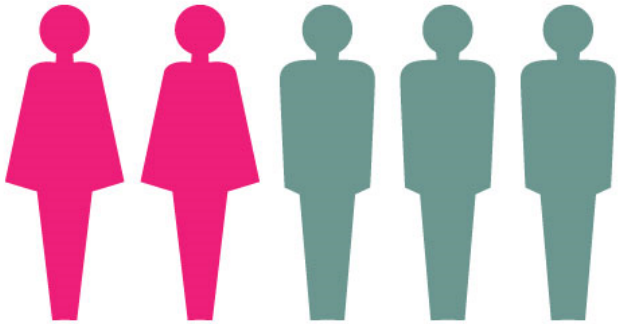
IF you like to gam- ble I tell you
4×
4×
IGN.COM

VIDEOGAME statistics

65% The percent of US households that play video games

gamer age distribution





2 out 5 gamers are **female**

32 YEARS OLD
the age of the average gamer

A new gamer generation

- *Marvel's The Avengers*
  - $207.4 million for opening weekend (3 days)

- *Call of Duty: Modern Warfare 3*
  - $400 million (6.5 million copies) in 24 hours
  - "biggest entertainment launch in history"

- *World of Warcraft*
  - 11 - 12 million subscribers paying $15/month
  - Over $10 billion in sales over 7 years

A new science of fun

- Previous games research has focused largely on media effects of violent and aggressive content

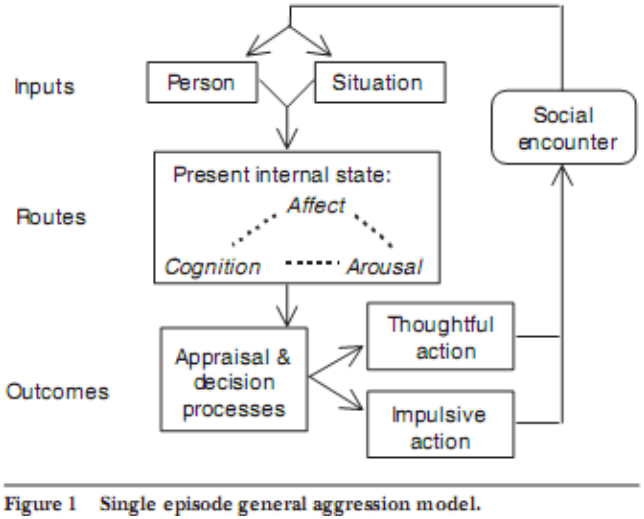
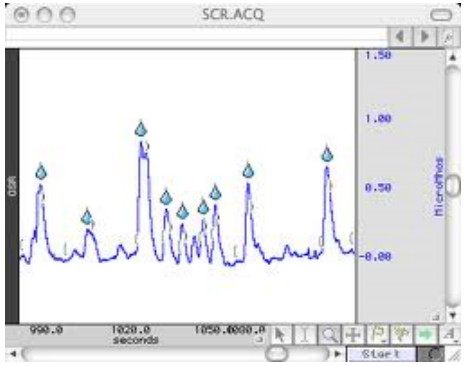
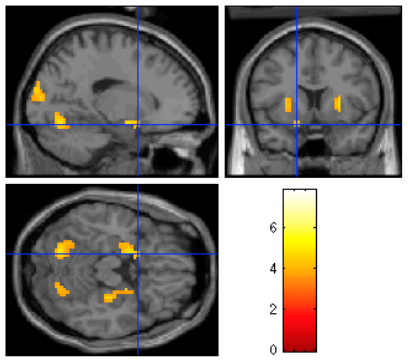


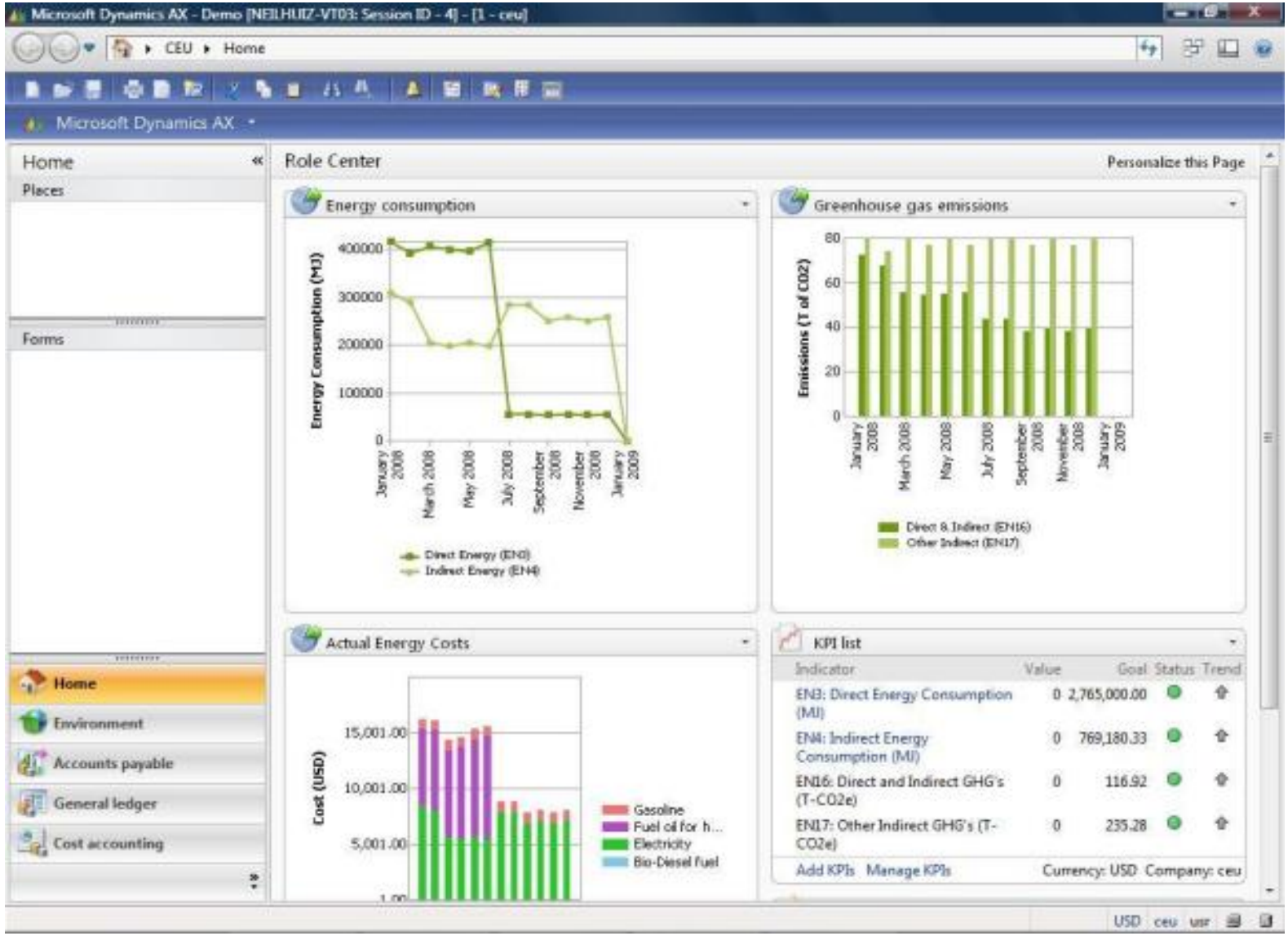
Figure 1 Single episode general aggression model.

- A new wave of research is focusing on how games satisfy basic psychological needs

- How games peak arousal and attention to keep us engaged





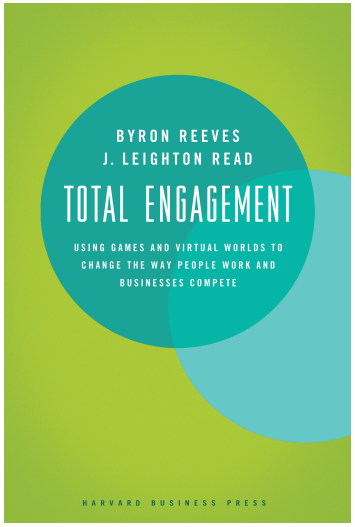

Microsoft Dynamics AX - Demo [NEILHUIZ-VT03: Session ID - 4] - [1 - ceu]
CEU ▸ Home
Microsoft Dynamics AX
Home
Places
Forms
Home
Environment
Accounts payable
General ledger
Cost accounting
Role Center
Personalize this Page
Energy consumption
Energy Consumption (MJ)
400000
300000
200000
100000
0
January 2008
March 2008
May 2008
July 2008
September 2008
November 2008
January 2009
Direct Energy (EN3)
Indirect Energy (EN4)
Greenhouse gas emissions
Emissions (T of CO2)
80
60
40
20
0
Direct & Indirect (EN16)
Other Indirect (EN17)
Actual Energy Costs
Cost (USD)
15,001.00
10,001.00
5,001.00
Gasoline
Fuel oil for h...
Electricity
Bio-Diesel fuel
KPI list
Indicator
Value
Goal
Status
Trend
EN3: Direct Energy Consumption (MJ)
0
2,765,000.00
EN4: Indirect Energy Consumption (MJ)
0
769,180.33
EN16: Direct and Indirect GHG's (T-CO2e)
0
116.92
EN17: Other Indirect GHG's (T-CO2e)
0
235.28
Add KPIs
Manage KPIs
Currency: USD
Company: ceu
USD
ceu
usr

Gruul's Lair [70-70]
0.4%
15 fps 36.3 MiB
Name ToggleFu
Eradicate - 25/25/88
AtlasLoot Enhanced
100%
1:01 PM
Nightboy 9104/9104
70 Druid 7414/10.5k
Dyrendal 17.5k/17.5k
70 Warrior Night Elf 2/100
Lair Brute 17.5k (30%)
BUFFS & TRACKING
Devotion Aura VIII
Heroic Presence
Tree of Life
Tree of Life
Prayer of Fortitude III 56:31
Prayer of Spirit II 55:01
Gift of the Wild III 54:55
Arcane Brilliance II 54:01
Greater Blessing of Kings 26:01
Omen of Clarity 24:59
Greater Blessing of Wis... 24:11
DEBUFFS
5 Blessing of Demonstrati... 13:37
group1
Radaar 12.7k/12.7k
Kakuros 11.9k/12.0k
Marill 10.5k/10.5k
Miezu 16.5k/18.0k
Willemtell 10.7k/10.7k
group2
Mijat 8681/8681
Kiccpe 9319/9319
Chobanne 9121/9121
Asterion 9033/9033
Alinutza 8763/8763
group3
Unicul 6837/6837
Invirer 7857/7857
Hynelinekcz 8183/8183
Kry 8293/8293
Nightboy 9104/9104
group4
Cicamaca 17.8k/17.8k
Dyrendal 17.5k/17.5k
Tamika 12.4k/12.4k
Kaball 15.9k/15.9k
Dispelator
group5
Leviethan 7181/7439
Warshanus 10.4k/10.4k
Arhizek 17.7k/17.7k
Saintseraph 8711/8711
Kypucyka 10.6k/10.6k
Nightboy <Eradicate>
Knight-Captain Kaball
TENCH
5 Blessing of Demonstrati...
Bloodrage - Dyrendal
3.2 Lifebloom - Dyrendal
5.8 Rejuvenation - Dyrendal
11 Regrowth - Dyrendal
Warshanus <Fear Soul>
Name Threat %Max TPS
Alinutza 40.5k 100 600
Dyrendal 38.0k 94 588
Dispelator 38.0k 94 690
Kypucyka 35.7k 88 857
Miezu 32.4k 80 522
Asterion 31.9k 79 1145
Arhizek 28.0k 69 510
Willemtell 27.8k 69 482
Chobanne 27.3k 68 485
Nightboy 4973 12 0
I R S X
Gronn-Priest 101010
Saintseraph 27348
Kiccpe 26004
Nightboy 22532
Leviethan 17172
Mijat 15917
Miezu 12426
Unicul 11853
Arhizek 5995
Invirer 5196
Dyrendal 4999
Cicamaca 2686
Warshanus
Fear Soul
Level 70 Gnome Warlock (Player)
PvP
Alive
Healer
Mark
[Raid] [Tamika]: umh gona get full buffed:S?
Cenarion Expedition 16014 / 21000
Master Looter
Soulstones: 0
Normal
Cenarion Expedition: Revered - 16014/21000 (76.3%)

A new sense of work vs. play

- Increasing attention to **serious games**
  - IBM, State Farm, P&G, Microsoft, military, security, education, health

- **Games work** in **serious contexts**
  - Health, business productivity, learning



- Work and play are not opposites

The Idea

- Use successful **ingredients** from games:
  - Self representation; feedback; community connections, ranks and levels; teams; virtual economies; compelling narrative
- Make a **multiplayer game** that connects home smart meters with game play
  - Track energy use
  - Feedback displays in game
  - Links to social networks and mobile devices

Guiding concepts

- **Mix** real and virtual
  - House and real behavior as joystick for game play
- Build **professional** games introduced at **scale**
  - Dept. of Energy - ARPAe
  - Seriosity, Inc. & KUMA Games
- Fit current **game trends**
  - *Farmville*
  - Facebook
- **Stay true** to game sensibilities**!**
  - Even though the game goals are serious
  - Fun, multi-period, rewards, teams, feedback…

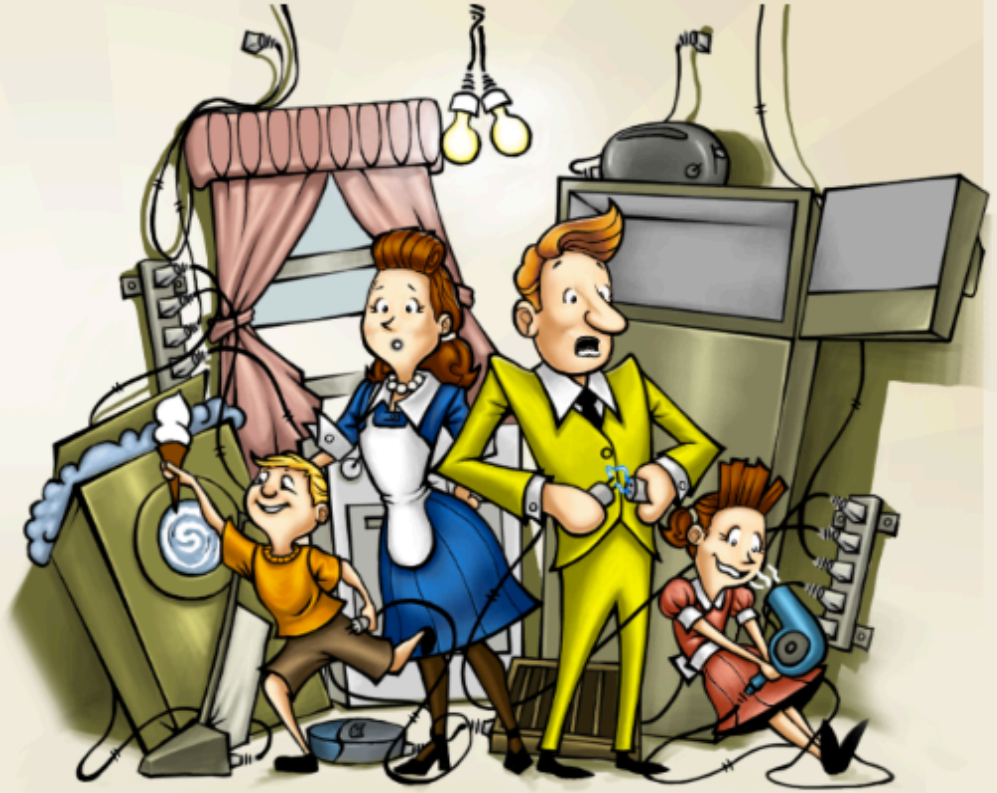
Username: Password: Login Connect

Power House

An energy-saving game that creates real results!

- Play "Power House" with your friends. It's an addictive "green" Sim with action, info and trivia!
- See your actual home energy use with Google Powermeter and then use real world savings to win contests and prizes!
- Earn Carbon offset points by playing games & use your points in the real world to plant trees, preserve rain forest, and support sustainable living!

Click **Play Now** to unlock your Power House!



A social game promoting energy conserving behaviors

PLAY NOW

STANFORD UNIVERSITY

seriosity

KUMA REALITY GAMES

seriosity

Saving the planet, one game at a time

Score 0
What is this?

Play Game
Highest Game Score 0
How do I play?

Upgrade my House
Upgrade Bucks 0
What is this?

Challenge a Friend
What is this?

Launch R-LEA Challenges
R-LEA Bonus Points 0
What is this?

Launch Market Place
Carbon Offsets 0
What is this?

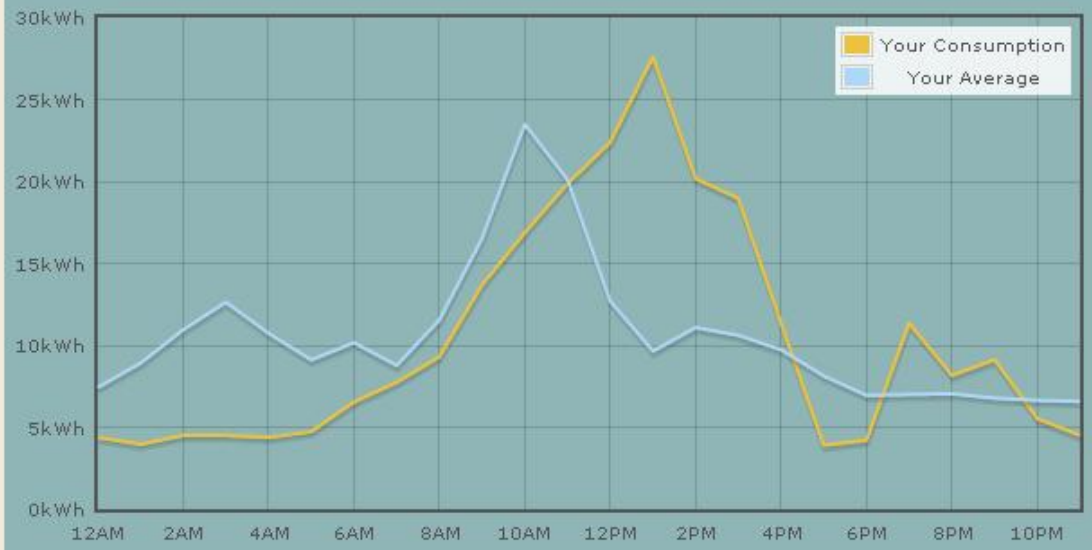
ACHIEVEMENTS 0/100

What's Happening in the Game Show

What's Happening in your Game

View: Home Energy Use Game Tachometer Table View SMART METERING ON

Your Home's Real World Energy Consumption



Wednesday, May 4, 2011 (Yesterday)

You used 15.70% less electricity yesterday than your daily average. That earns you a 1000 kW bonus in the Game's Electricity Monitor! See your Game Tachometer for details.

Real-Life Energy Action Challenges Show

MarketPlace Show

Welcome to the Dashboard
energytest2@test.com
View/Edit Profile Details

Score 0
What is this?

STANFORD UNIVERSITY

seriosity

KUMA REALITY GAMES

Saving the planet, one game at a time

Play Game
Highest Game Score 0
How do I play?

Upgrade my House
Upgrade Bucks 0
What is this?

Challenge a Friend
What is this?

Launch R-LEA Challenges
R-LEA Bonus Points 0
What is this?

Launch Market Place
Carbon Offsets 0
What is this?

ACHIEVEMENTS 0/100

What's Happening in the Game Show

What's Happening in your Game

View: Home Energy Use | Game Tachometer | Table View

SMART METERING ON

Game Bonus Calculation

Saving electricity in your REAL home helps you in the Game! The more energy you save at home, the bigger your red line number in the game tachometer making the game more fun to play and easier to earn higher scores.

Real-Life Home Energy Use

Average Daily Usage: 43.179 kWh
Yesterday's Usage: 36.380 kWh
Equal Percentage Savings: 15.70%

Earns Game Bonus

Today's Red Line Bonus: +1000 Wh

Bonus Allocation

*Start Value: 8000 Wh (8 kWh)
negative savings: 0 Wh
0 to 5% savings: 250 Wh
5% to 10% savings: 500 Wh
10% to 15% savings: 1000 Wh
15% to 20% savings: 1500 Wh
20% or better savings: 2000 Wh

Real-Life Energy Action Challenges Show

MarketPlace Show

Day 1 11:55
User Name
Peter Powerhouse
Points
193
Utility Consumption
1293.22
Total Score
187
F
120
100
80
60
40
20
0
-20
-40
43
254
140
67
133
440
-0.15

Day 1 23:59
User Name
jjcummings
Points
874
Utility Consumption
7661.16
Total Score
843
Day 1 Complete!
You completed day 1 in the life of the family!
Score: 874
120
-0.30

How many hours a day would you need to cut down on your heating or cooling to produce a 10% - 15% energy savings each year?
8 hours
12 hours
18 hours
LEVEL 1: Real Life Energy Action Challenge

Launch R-LEA Challenges

R-LEA Bonus Points 500

What is this?

MarketPlace (Coming Soon)

Carbon Offsets 70

What is this?

ACHIEVEMENTS 7/100

Rea

Mar

Dashboard
Games
Forum
Neighborhood
Leaderboards
Friends
Help
Logout
Connect
Neighborhood
Neighborhood View
Tabular Comparison
Competitions
Got Friends?
Neighborhood is a visual representation of your friends. Click on a username to see additional information. Play the games and use your upgrade bucks to earn even higher scores. Invite your friends to play on the Friends page and you will see them here after they sign up.
Show Total Score
Show Highest Game Score

Initial Results

- **85% of players report they would likely continue playing**

- **Getting measureable change in real energy behavior**

Next Steps:

- Enhance social elements of the game (Facebook Connect)
- Approach household energy behavior through family "gatekeeper"
- Compare household energy consumption of players to **that of non-players**
- **"The medicine works"**
  - Can we tease out **what particular ingredients** contribute the most?
  - Gameplay, informational surveys, challenges

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Thank You!

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