

# The People Factor

What has the academic literature to tell us about the way that people respond to energy feedback?

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# Research literature on energy feedback

1970s – 1990: psychology-based, quite mechanistic interpretation of how people behave (stimulus-response)

1990s: shift to more social and educational approaches (user as learner and social animal)

Post-2000: growing interest in use of ICT for feedback and in using feedback for peak reduction as well as energy conservation

# What's the story? Theoretical approaches

Sociological: *energy use is largely invisible, energy systems are complex, and daily practices are significant.*

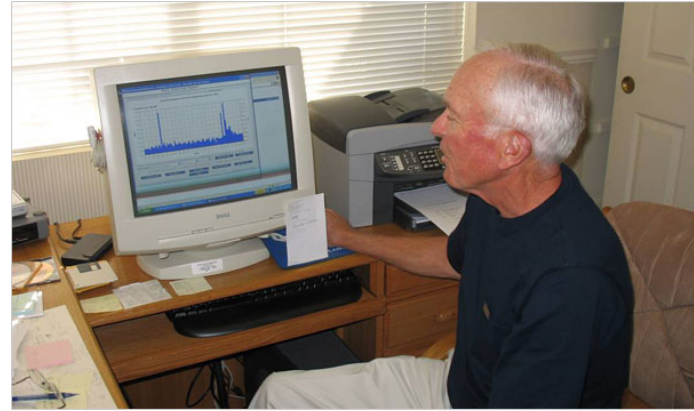
- What are comfort standards and expectations?
- How do people carry out daily routines and choose technologies?
- What is their practical know-how about these technologies and the options open to them?



# What's the story? Theoretical approaches

*Economic: energy is a commodity and consumers will adapt their usage in response to price signals*

- What is price elasticity?
- How much demand does it apply to? (eg 20-25% of UK el demand may be shiftable)
- What is the impact of realising that supply is limited, especially at certain times?
- What happens when we apply the image of the rational-economic consumer? (behavioural economics)



# What's the story? Theoretical approaches

Psychological: *energy use can be affected by stimulus – response mechanisms and by engaging attention*

Feedback is effective when

- based on actual consumption
- frequent, over prolonged period
- involves interaction and choice
- appliance-specific breakdown for electricity
- may involve historical or normative comparisons
- understandable, appealing

Combined approaches tend to work best (e.g. feedback + personal advice)

**ComEd**  
An Exelon Company

**Home electricity report**  
Account number: 1234567890  
Report period: 04/10/09 - 05/03/09

We are pleased to provide this personalized report to you as part of a pilot program. The purpose of the report is to:

- Provide information** This report is an educational tool to help you understand your home's electricity use in the context of other homes.
- Track progress** We will help you learn about how your home's usage changes over time and where you likely have opportunities to save.
- Share energy efficiency tips** On the back of the report, we provide ideas for saving energy, and more. You can find more tips at [www.ComEd.com/energyreport](http://www.ComEd.com/energyreport).

JOHN DOE

**Last Month Neighbor Comparison** | You used **48% more** than your efficient neighbors.

Category	Value
EFFICIENT NEIGHBORS	707 kWh
YOU	1,049
NEIGHBORS	1,000

**HOW YOU'RE DOING**

Great  Good  More than average

**WHO ARE YOUR "NEIGHBORS"?**

- EFFICIENT NEIGHBORS** (approximate 10 occupied, nearby homes that are similar in size to yours)
- ALL NEIGHBORS** (the most efficient 20 percent from the "All Neighbors" group)
- EFFICIENT NEIGHBORS** (the most efficient 20 percent from the "All Neighbors" group)

**Last 12 Months Neighbor Comparison** | You used **46% more** electricity than your neighbors. This costs you about **\$1,020 extra** per year.

Key:  
■ YOU  
■ ALL NEIGHBORS  
■ EFFICIENT NEIGHBORS

**Use fans to stay cool**

Fans help you stay cool while reducing your air conditioning costs. Portable fans and window fans keep air circulating, which allows you to raise the room temperature 3-4 degrees and stay just as comfortable. You will save about 5-10% on energy cost for every two degrees you raise the thermostat.

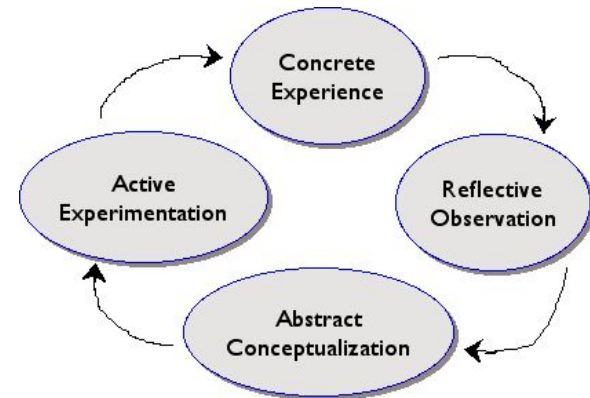
Incentive: We offer a \$20 rebate on a new fan - visit [comed.com](http://comed.com) for details.



# What's the story? Theoretical approaches

... and educational: *effective energy use is a skill that is learned through experience in specific situations.*

- if people can experiment with energy and see the consequences, they typically increase control and may form new habits.
- Effective feedback adds to what they already know about their 'energy system' and helps them discover what they can change, e.g. switching off, cutting 'default' usage by altering settings, investment in efficiency measures or home alterations.



# Summary of observed responses to feedback

- Broad range (many factors are involved)
- Experimental literature up to 2000 or so showed 5-15% for 'direct' (immediate) feedback; up to 10% for less immediate. Mostly opt-in experiments
- More recent, larger-scale trials of immediate feedback show average impact at a lower level, around 5%; 2-3% for paper-based feedback.
- Online feedback probably most effective when it complements other forms
- Scope for 'alerts' via mobile phones etc.
- Some evidence for combined impact of prepayment and feedback on overall consumption
- Combined impact of time-of-use pricing and feedback on peak consumption
- Evidence that impact can be durable, especially when feedback is continually used
- Smart metering not essential for improved feedback – but can help

# Overall conclusions to date

Good feedback necessary for effective engagement and demand management; not always sufficient

Several aspects to effective feedback: economics and psychology are not the only useful theoretical approaches

[Note that home automation/domotics may remove feedback from sight – not much evidence yet on effectiveness ... treat claims for energy saving with caution]

<http://www.ofgem.gov.uk/Sustainability/EDRP/Documents1/SD%20Ofgem%20literature%20review%20FINAL%20081210.pdf>

(for recent US review, see

[http://www.drsgcoalition.org/resources/other/ACEEE\\_AMI%20&%20Feedback%20Program%20Meta-Review\\_JUN%2010.pdf](http://www.drsgcoalition.org/resources/other/ACEEE_AMI%20&%20Feedback%20Program%20Meta-Review_JUN%2010.pdf) )

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