Reducing GHG Emissions in Federal Agencies: Insights from social science on organizational change

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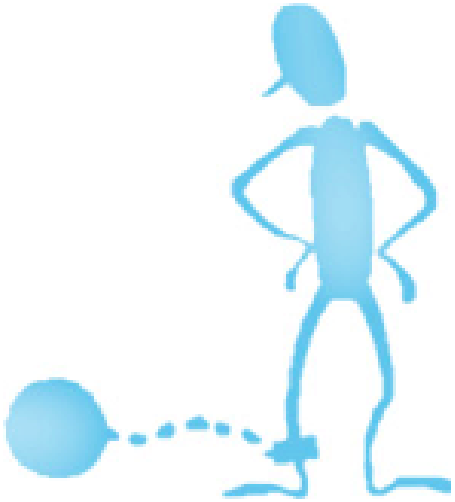

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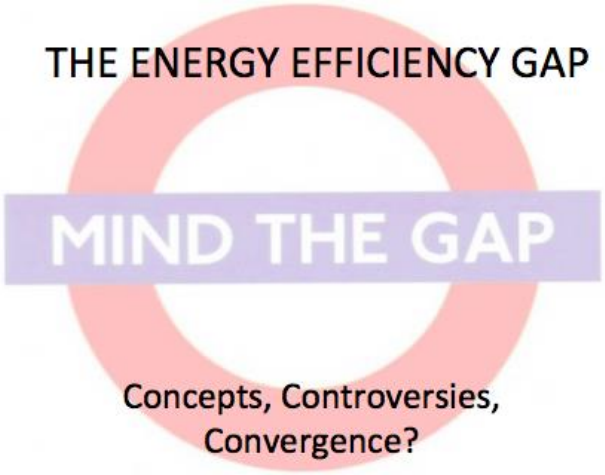
An Energy Efficiency Gap: Still after all these years

- The EE gap: the Δ between the socially optimal level of EE and the level actually realized
- It has attracted wide attention among energy policy analysts, as society has forgone apparently cost-effective investments in EE, even though the “levelized cost of EE” is lower than the retail price for energy.



Neoclassical Economists: Laser Focus on Market Failures

- Jaffe, Stavins, Palmer, etc, (Harvard, RFF, CEA, EIA,...) focus on market failures and caution against tackling non-market barriers
- Without market failure, there is no public policy basis for market interventions – “markets should be considered innocent until proven guilty”
- Perhaps the gap doesn’t really exist:
  - Uncertainty surrounds energy benefits, with technology purchases representing “irreversible investment” and higher discount rates
  - Ignored costs/inflated energy savings estimates by analysts

Jaffe, A., Stavins R.N., and Newell, R. (2004). Economics of Energy Efficiency. Encyclopedia of Energy, 2. 79-90.

Gillingham, Kenneth, R. Newell, and K. Palmer. (2009). Energy Efficiency Economics and Policy. Resources for the Future. http://www.rff.org/documents/rff-dp-09-13.pdf

Split Incentives & Asymmetric Information are Classic Market Failures

- With “principal-agent” markets, the agent has more information than the principal, and they have different incentives.
- Asymmetric information results in the adverse selection problem. Bad cars sell at the same price as good cars since it is impossible for a buyer to know the difference.
- Builders put bad appliances into spec buildings because they will not suffer the consequence. (a “moral hazard”).

George A. Akerlof, "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism," *The Quarterly Journal of Economics* 84, no. 3 (August 1970): 488-500.

George J. Stigler, "The Economics of Information," *The Journal of Political Economy* 69, no. 3 (June 1961): 213-225

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Federal agencies can tackle the issue of misplaced incentives:

- **Developing an incentivized program model that directs bill credits back to reimbursable customers** who identify, fund, and implement projects.

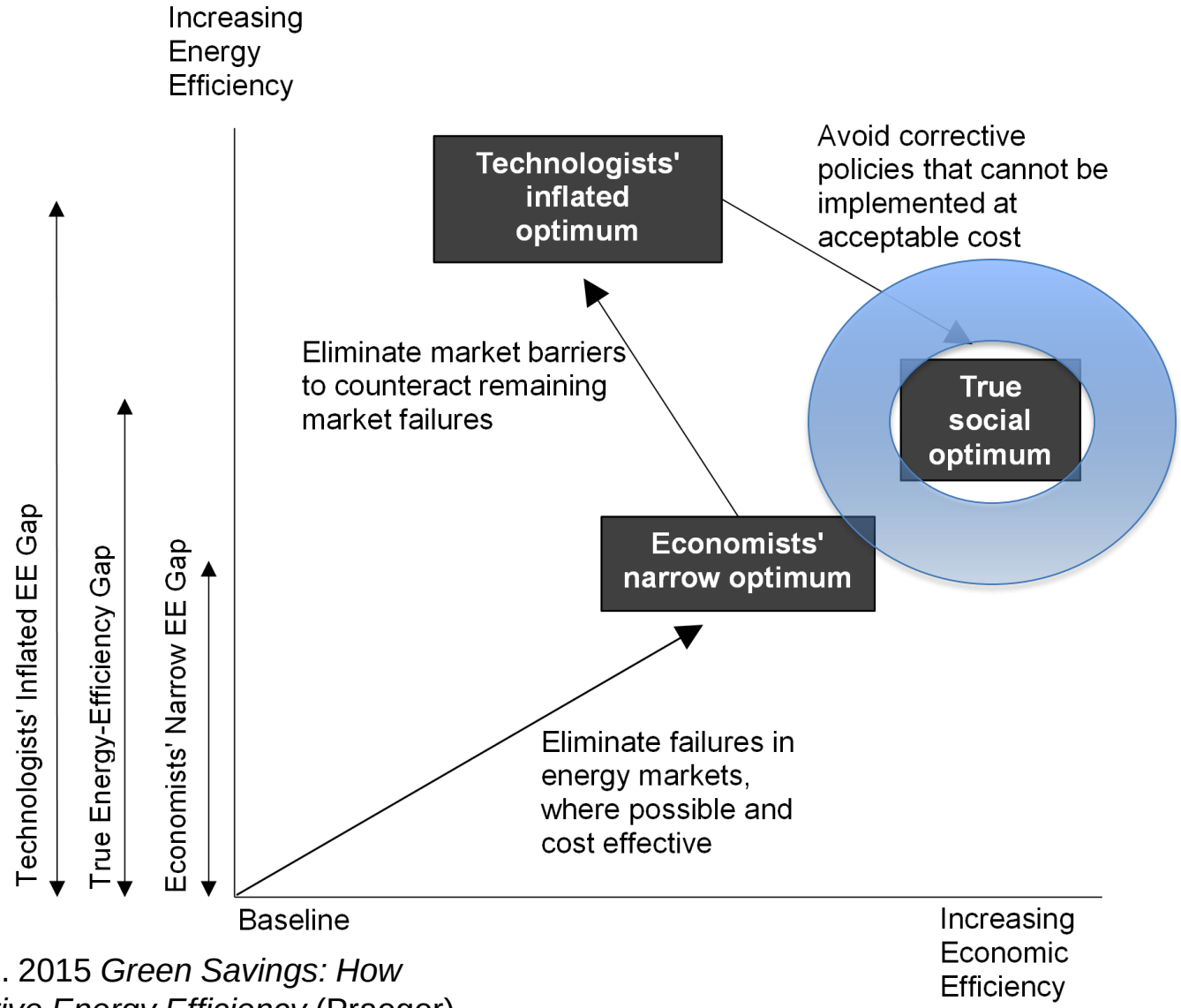
- **Real-time data from more than 1600 meters,** which enabled trend analysis, remote diagnosis, load-shedding, occupancy set-backs and **full-scale real-time pricing implementation.**

Should Policies/Programs Extend Beyond "Correcting" Markets Failures?

- "Government remedies are most suited to overcoming genuine market failures or government failures…. Other types of barriers may be best addressed and resolved by allowing market forces to work." (CCCSTI, 2009)
- But that would mean that investments in energy efficiency would fall short of the "social optimum"

Committee on Climate Change Science and Technology Integration. 2009. *Strategies for the Commercialization and Deployment of Greenhouse Gas Intensity-Reducing Technologies and Practices"* (U.S. Department of Energy) DOE/PI-0007, January.

Alternative View About Closing the Energy-Efficiency Gap

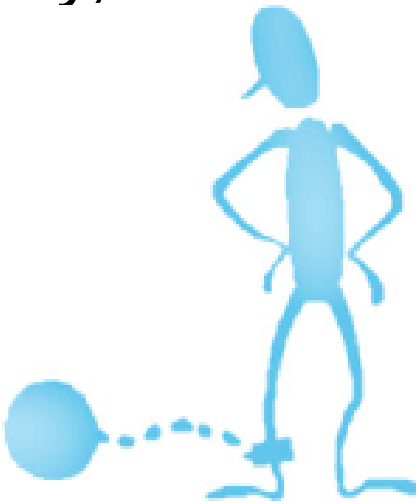


Brown, MA and Y Wang. 2015 *Green Savings: How Policies and Markets Drive Energy Efficiency* (Praeger)

Behavioral Psychology and Economics Wrinkles

Consumers typically do not choose or use technologies following principles of rational utility maximization based on full information about the consequences of their energy choices

- Imperfect information, bounded rationality, loss aversion, rational inattention
- Social potential, the role of values, intermediaries



Bounded Rationality

- Individuals and firms are also limited in their ability to use, store, retrieve, and analyze information
- Decision makers are only as rational as their limited computational capabilities and incomplete information permit them to be--"bounded rationality”
- Various heuristics and screening devices are used to simplify decision-making (e.g., brand, availability,…).
  - Copying is such a strong motivator that it is often seen as principle number 1 of behavioral economics.
  - Another way to reduce deliberation costs is to default to the status quo

Herbert A. Simon, "Rational Decision Making in Business Organizations," *The American Economic Review* 69, no. 4 (September 1979): 493–513.

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- Interpretation of the facility's "green" features is highlighted by **dynamic, interactive exhibits**
- **information packets and reminders via letters, emails, phone calls, and newsletters**
- launched **a multi-faceted communication, education, and awareness campaign**

- **formulating, justifying, validating, and defending funding requirements**
- **quarterly and yearly energy glances for leadership situational awareness**
- tireless efforts to **lobby upper management**

Loss Aversion

- People strongly prefer avoiding losses to acquiring gains
- Sunk costs often affect economic decisions: the price paid becomes a benchmark for value
- These “fallacies” lead to high discount rates & inertia
- They illustrate the limits of markets in the face of a massive global commons problem

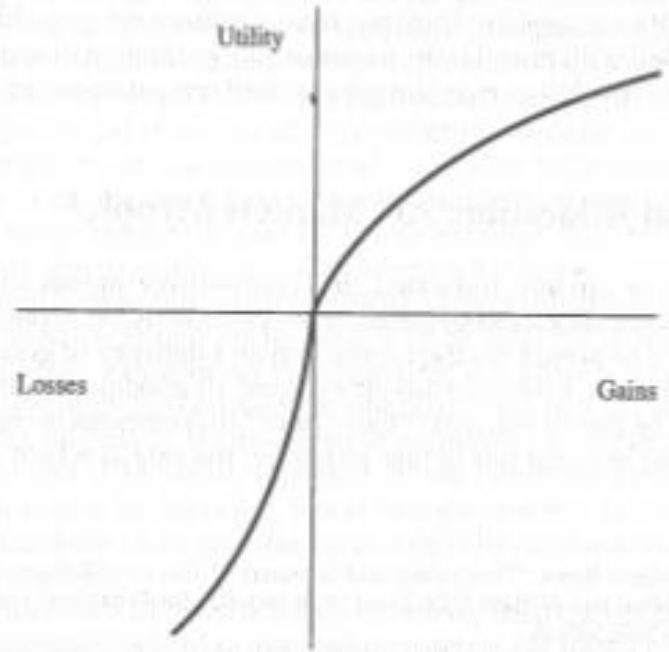


Figure 6.1 Utility Function Showing Loss Aversion

Greene, D. L. “Uncertainty, Loss Aversion and Markets for Energy Efficiency.” Energy Economics 33 (2011): 608–616.

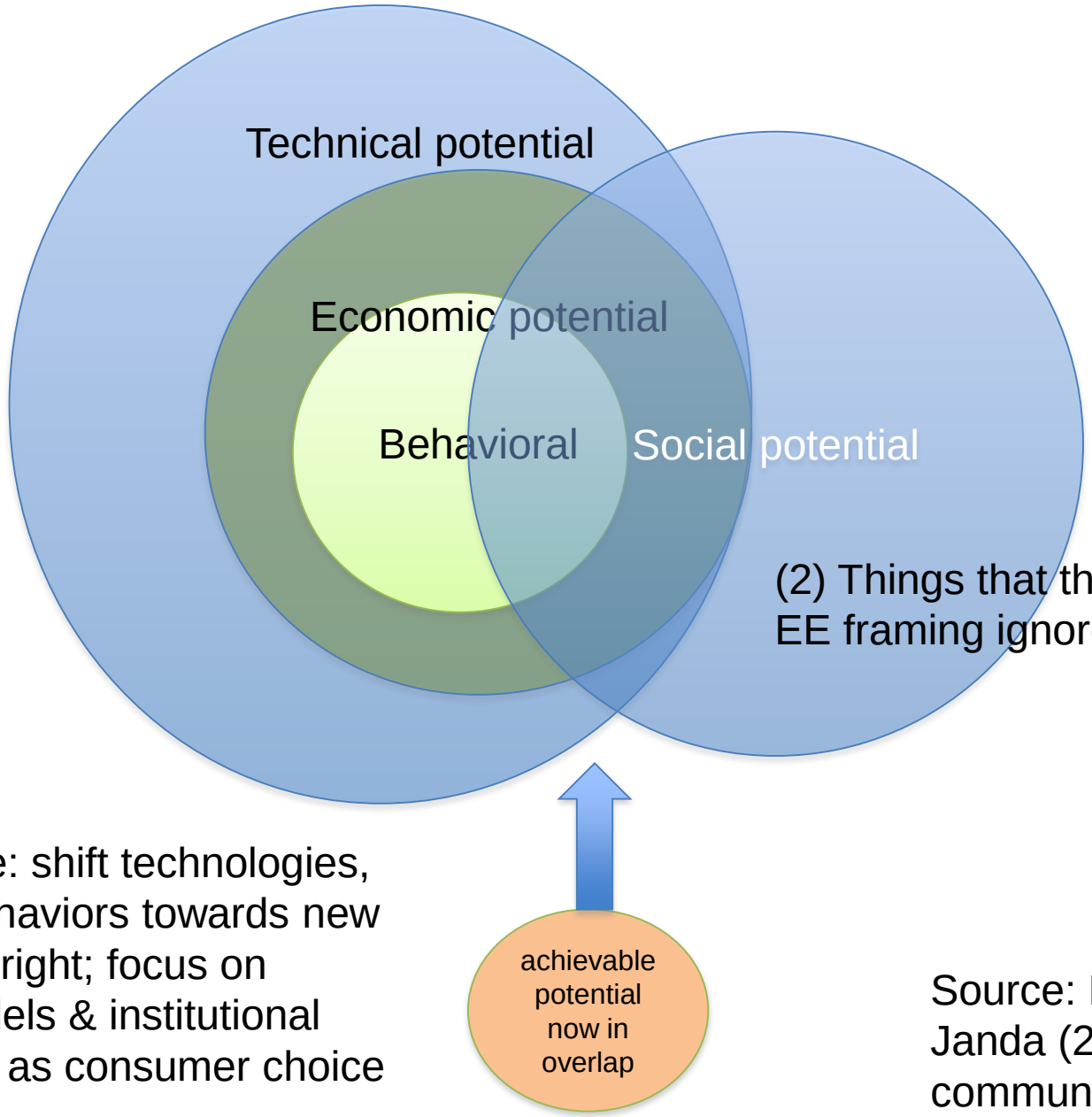
Kahneman, Daniel, Jack L. Knetsch, and Richard H. Thaler. 1991. Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias. *The Journal of Economic Perspectives*, 5 (1): 193-206.

Social Potential

- Optimizing financial metrics is not the only motive for consumers and organizations
- Green technologies may be adopted, for instance, to improve productivity (re-lamping, industrial motors/variable speed drives), comfort (window retrofits), status (fleets of EVs), or security and safety (smart grid, solar)
- Need to align EE with social desires as well as institutional missions, rather than just trying to inform & motivate: “If only they knew, if only they cared,…”
- Rational inattention and capital rationing underscore the challenge of “driving” EE

Moezzi, M. & Janda, K. B. From "if only" to "social potential" in schemes to reduce building energy use. *Energy Research and Social Science* **1**, 30-40.

(1) EE business as usual seeks to get each circle to fill in the one above it until the technical potential envelope is full



(2) Things that the standard EE framing ignores

(3) New game: shift technologies, costs, and behaviors towards new norms on the right; focus on business models & institutional action as well as consumer choice

Source: Modified from Janda (2015). Personal communication.

Key Organizational Concepts

- Need to understand group think, social norms, team mental models, role of leaders, peer educators, and policy/program diffusion
  - What enabled the Japanese Ministry of the Environment to introduce voluntary “Cool Biz” programs?
    - Reduced summer FFC by raising thermostats, shunning business suits, extending holidays, and shifting to a workday that starts earlier
  - How did they diffuse to South Korea and the UN?

Deline, M. B. 2015. Energizing organizational research: Advancing the energy field with group concepts and theories. *Energy Research & Social Science* **8**, 207-221.

Kwon, M. Y. *Cool Biz Campaign Effective*, <http://www.koreatimes.co.kr/www/news/nation/2009/08/113_50191.html> (2009).

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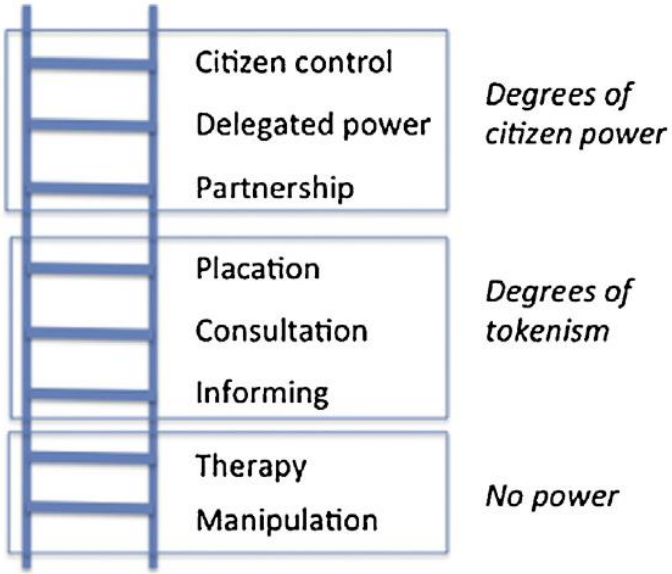
- focused **on instituting energy culture practices such as mock bills, energy feedback, and awards**
- the facility manager executed a program that included **no-heat, no-cool weeks during the shoulder seasons**, and **coordinated with building managers** to open doors and windows at appropriate times to maximize natural cooling and heating
- **green teams to change tenant behaviors**

Tap into the Creativity of People

- Move from “demand-side management” to “citizen engagement”
- Build communities of practice
  - Social media can assist
- Going beyond providers, users, and regulators
  - Top down, bottom up, don’t forget the “middle out” intermediaries



Ladder of Citizen Participation

Arnstein, S.R. 1969. “A Ladder of Citizen Participation.” JAIP, 35: 216-24.

Janda, K. B. Building Communities and Social Potential: Between and Beyond Organisations and Individuals in Commercial Properties. *Energy Policy* **67**, 48-55

The Expansion of "Intermediaries" in Energy Markets

- Intermediaries have always existed:
  - Chambers of commerce
  - Professional and industry/manufacturers associations
  - NGOs, communities of faith
  - Homeowner associations
  - Bankers, insurers,…
  - Builders, architects,…
  - ESCOs, contractors,…
- They are expanding with privatization and technology diversification, they are expanding
- At the same time, the power of regulatory authorities is expanding (CPP, etc.)

Moss, T. 2009, Intermediaries and the governance of sociotechnical networks in transition. *Environment and planning. A* **41**, 1480-1495

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- **Every facility is now installing energy and water savings measures and reducing its utility costs through an ESPC.**
- **streamlining ESPC contractor selections, energy conservation measure selections, and the notice of intent to award contracts.**

Note: the need for ESPC oversight or augmentation to prevent cream skimming.

Going Forward

- Promising program/policy thrusts:
  - the potential of strategic polycentric governance (up + down + middle out)
  - bundled policies with strong citizen engagement
- Need for more analysis:
  - The research identifies useful general principles for designing effective interventions.
  - Because of a limited research base and the great variety among organizations and value chains, much less guidance is available for larger social scales, where opportunities for FFC may be even greater

Gilligan, J. M., Vandenbergh, M. P., Cohen, M. A. & Wiseman, A. E. Accounting for Institutional Plasticity in Climate Policy Analysis. *Nature Climate Change* (2016 forthcoming).

Victor, D. & Keohane, R. O. Cooperation and Discord on Climate Policy: Contributions from Political Science. *Nature Climate Change* (2016 forthcoming).

For More Information

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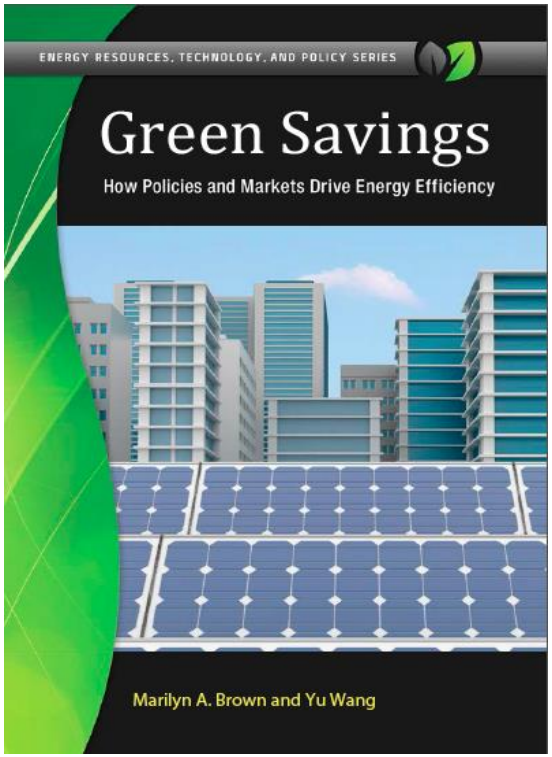

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Moral Licensing vs Spillover

- Some studies suggest that engagement in one type of FFC-reducing behavior can inhibit subsequent similar behavior, a phenomenon known as moral licensing. Yet, other studies have found positive “spillover” effects on subsequent behavior
- Previous pro-environmental actions are likely to strengthen environmental self-identity, and people are motivated to act in line with how they see themselves, encouraging consistent pro-environmental actions

Tiefenbeck, V., Staake, T., Roth, K. & Sachs, O. For better or for worse? Empirical evidence of moral licensing in a behavioral energy conservation campaign. *Energy Policy* **57**, 160-171 (2013).

Lanzini, P. & Thøgersen, J. Behavioural spillover in the environmental domain: An intervention study. *Journal of Environmental Psychology* **40**, 381-390 (2014).