



Samuel Neaman Institute  
for National Policy Research

עיקרי הנושאים שהוצגו בשנים  
האחרונות בכנסים בינלאומיים שונים  
שדנו בממשק שבין דפוסי התנהגות  
הנוגעים בצריכת אנרגיה והשפעתם על  
שינוי האקלים

Dr. Perry Lev-On, Dr. Miriam Lev-On,  
Prof. Ofira Ayalon

**היבטים פסיכולוגיים  
והתנהגותיים של  
חיסכון באנרגיה**

January 2, 2018

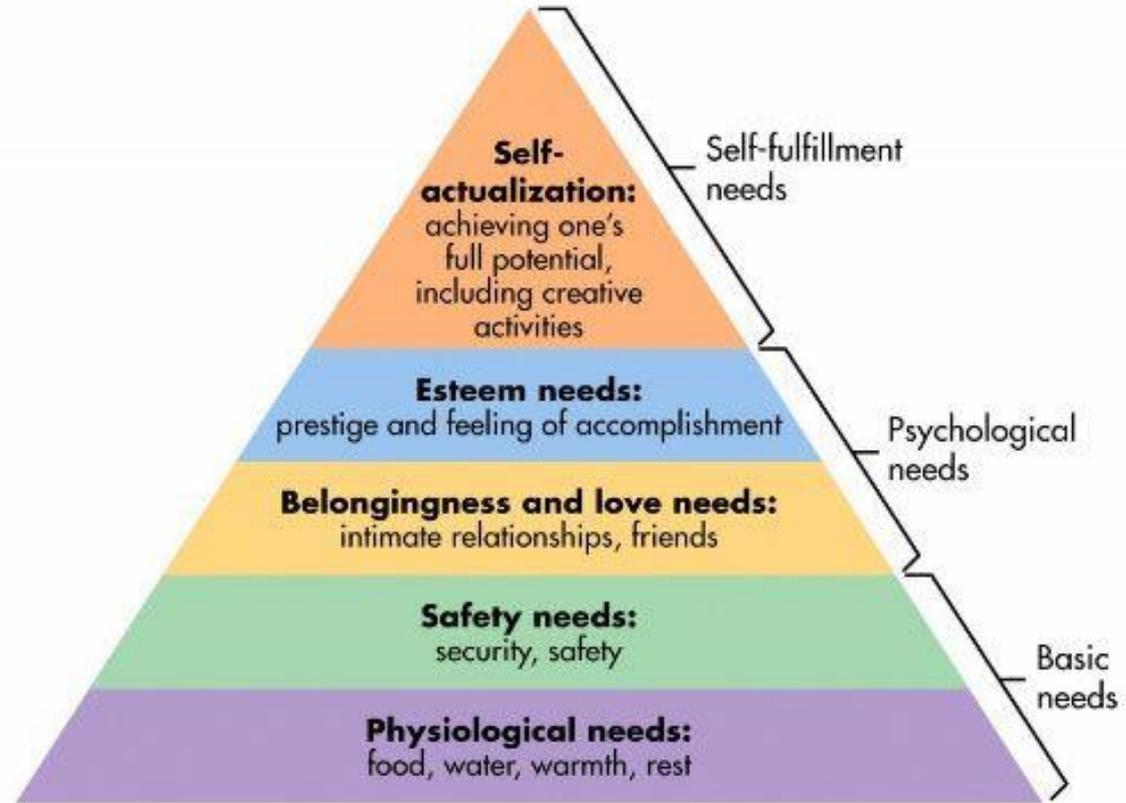


TECHNION  
Israel Institute  
of Technology

  
January 2018



# Key Perspective - Hierarchy of needs



- ▮ Maslow's hierarchy of needs is a motivational theory in psychology comprising a 'five tier model' of human needs, often depicted as hierarchical levels within a pyramid. These needs influence human behavior.

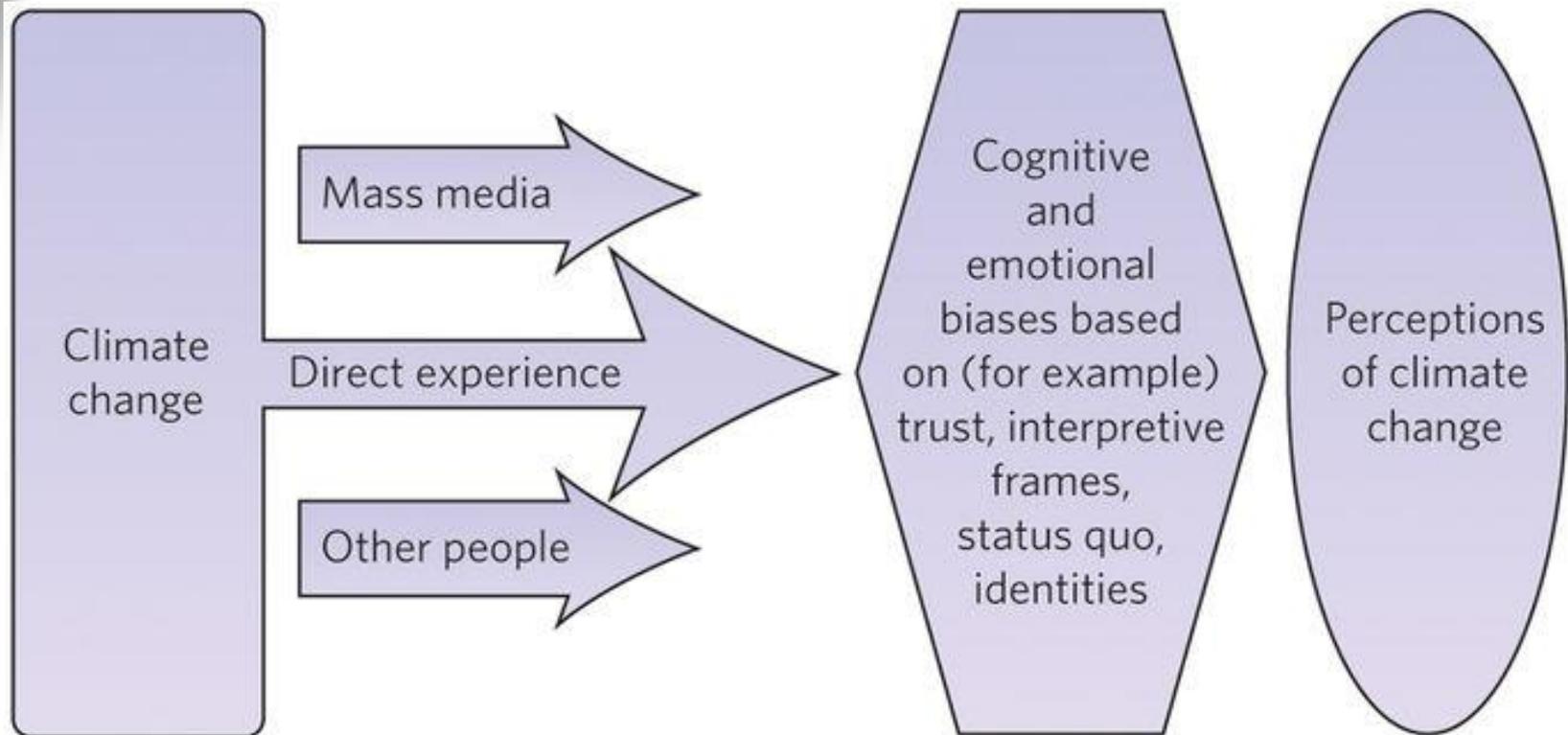


# Psychology and Climate Change

- ▮ Human behavior is integral not only to causing global climate change but also to responding and adapting to it.
- ▮ Psychological research can inform efforts to:
  - Address climate change;
  - Avoid misunderstandings about human behavior and motivations that can lead to ineffective or misguided policies.
- ▮ Key research areas:
  - Describing human perceptions of climate change;
  - Understanding and changing individuals, household and organizational behaviors that drive climate change; and
  - Examining human impacts on climate change and adaptation responses.



# Psychological research and global climate change



Source: Nature Climate Change 5, 640–646 (2015)  
doi:10.1038/nclimate2622

# Behavior, Energy & Climate Change (BECC)

- ▮ BECC is a set of conferences that have been convened annually over the past 11 years in collaboration of:
  - American Council for an Energy Efficient Economy (ACEEE)
  - Berkeley Energy and Climate Institute (BECI)
  - Precourt Energy Efficiency Center (PEEC), Stanford University.
- ▮ BECC is focused on understanding individual and organizational behavior and decision-making related to energy usage, greenhouse gas emissions, climate change, and sustainability.



# BECC Broad Goals

- ‡ Identify lessons about **behavior and decision making** that advance energy and climate solutions.
- ‡ Help **integrate research insights throughout the value chains** of energy-using goods and services.
- ‡ Expand **support for social science research** as applied to the biggest contributors to today's energy challenges.
- ‡ **Facilitate knowledge accumulation**, exchange, and collaboration across analytical approaches.

<https://beccconference.org/about-becc/>





# Overview of Some Topics Discussed

- Energy Conservation Decisions,
- Shaking up the transportation system,
- Engaging low income and multi-family residential buildings,
- Innovative communication strategies to engage various audiences,
- Experiments and innovative approaches to behavioral change,
- Using information to affect transportation choices
- 'Keep the Change': The Persistence of New Energy Behaviors
- Lessons learned from past behavioral change initiatives



# Titles of Topics and Papers Presented (1)



## Engaging Responses and Reactions

- How Consumers Make Decisions about Time-of-Use Electricity Pricing Plans
- 'Getting to Know You': Predicting Customers Responses to Utility Programs
- 'Stretch It Out': Heterogeneity in Estimated Demand Elasticities under Residential Time-Based Rates

## Framing & Segmentation

- Moral Foundations and Environmental Decision-Making
- Using Neuroscience to Predict Nationwide Energy Decisions
- Promoting Pro-Social and Pro-Environmental Behavior through Values-Affirmation
- Financial Scarcity Shapes Conservation Choices and Motivations



# Titles of Topics and Papers (2)

## Marketing

- Marketing
- Coordinating on National ENERGY STAR® Promotions to Improve Regional Success
- Changing the Conversation on Energy: How Framing Can Impact Behavior
- Can VR be Used to Educate People on Energy Efficiency?

## Water, Waste and Consumption

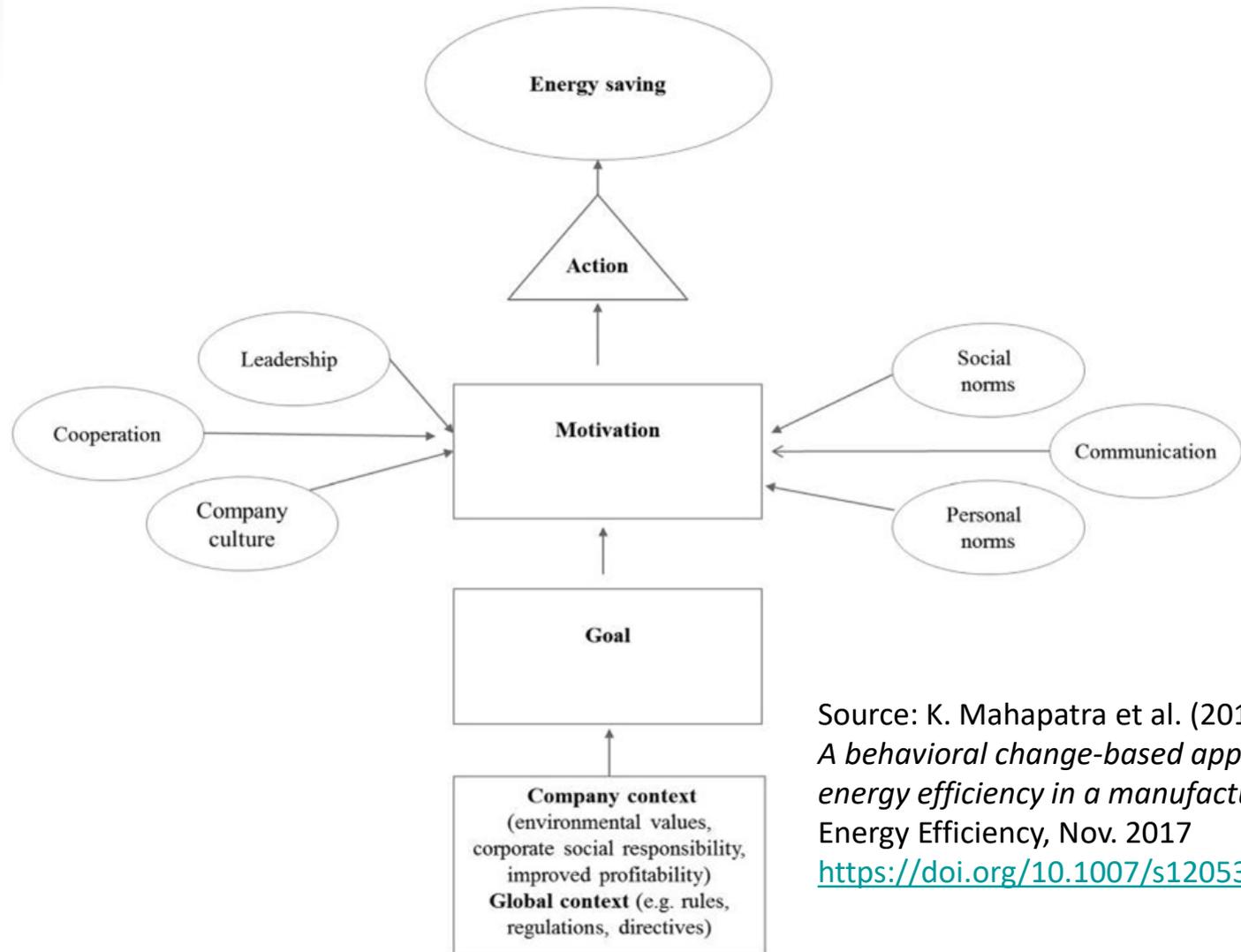
- Water, Waste and Consumption
- Can water teach Electricity about Designing Behavioral Efficiency Programs?
- Trash Talk and Action: Improving Waste Diversion through Organizational Change
- Effect of Social Norms on Residential Water Conservation – Christine Jaeger, California State University, San Marcos
- Water and Energy—Meet Sustainability



# Practical Example: A behavioral based approach at Volvo Construction Equipment

- ▮ Analysis of a case study (Mahapatra et. al., 2017) of Volvo Construction Equipment AB in Braås, Sweden (VCE Braås), that led to reduced relative idle electricity use by more than 10% during 2013– 2016 by implementing a strategy of changing everyday behavior of production workers
- ▮ A schematic diagram of the theoretical framework of factors affecting the performance of a behavior-based energy efficiency project is presented below.
  - The framework shows that energy saving is the result of employees' actions, which is triggered by their motivation.
  - The motivation to act is influenced by factors such as: goals, personal and social norms, company culture, leadership, communication, and cooperation among the employees.

# A theoretical framework of factors affecting the performance of a behavior-based energy efficiency project



Source: K. Mahapatra et al. (2017),  
*A behavioral change-based approach to energy efficiency in a manufacturing plant*,  
Energy Efficiency, Nov. 2017  
<https://doi.org/10.1007/s12053-017-9581-9>



## Example (continued)

- ‡ In 2013, the Volvo CE Global Director of Manufacturing Engineering and Environmental Care introduced a plan to improve energy efficiency in all production sites of the company
- ‡ The focus has been to reduce electricity use as it constituted about 50% of the total final energy use of Volvo CE, and in some production sites, the share was up to 75%.
- ‡ The strategy targeted changing everyday practices of the production workers **such as turning off of machines or lights when not in operation.**





The energy efficiency plan was conceived to be realized by the following four steps:

- ▮ Reduction of idle electricity use during the off-production weekends (Saturday–Sunday).
- ▮ Reduction of idle electricity use during the off-production hours during weekdays (night time).
- ▮ Reduction of the number and/or duration of production shifts, but keeping the production level constant.
- ▮ Reducing energy use during production hours.

### **Project Result:**

The relative idle electricity use of VCE Braås has been reduced by an average of 10%, which the management estimates to be equivalent to about 86,000/year (assuming 1 = 9 SEK).





## **Conclusions:**

The VCE Braås energy efficiency project shows that it is indeed possible to improve energy use in manufacturing industries through a change in habitual behavior of the production workers, without providing any overt economic argument or incentive.





Samuel Neaman Institute  
for National Policy Research

# New Frontier of Energy Research



Source:  
Wired.com

## Thanks for your attention



TECHNION  
Israel Institute  
of Technology