



## **Behavioral environmental economics: Nudging for sustainable consumption and production**

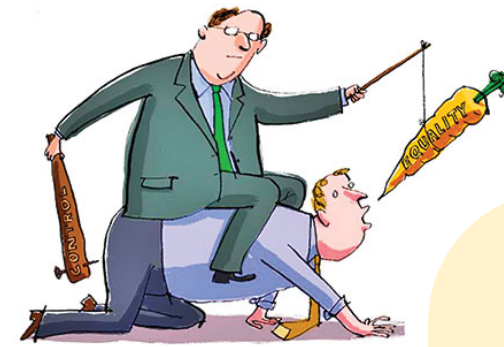


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# People respond to incentives



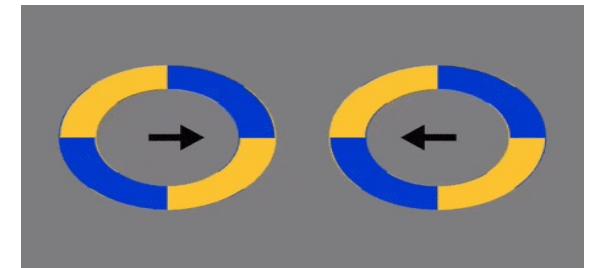
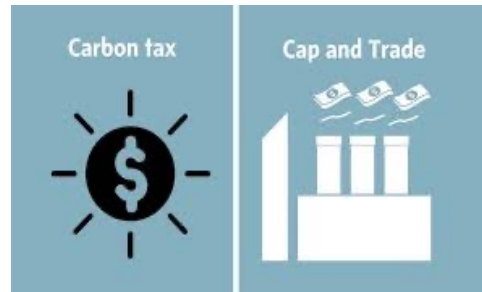
COMMAND-AND-CONTROL  
REGULATIONS, STANDARDS



PUT A PRICE ON POLLUTION  
SUBSIDIZE "GREEN" PURCHASES



BEHAVIORAL ECONOMICS  
"NUDGE"



"three-in-one"  
Carpooling law



"Hoy No Circula"  
(No Driving Day)



X-LARGE	LARGE	MEDIUM	SMALL
<b>\$190</b> single-family home (up from \$151)	<b>\$133</b> single-family home (up from \$101)	<b>\$39</b> single-family home (down from \$41)	<b>\$10 REFUND</b> single-family home (instead of \$0)
<b>\$65</b> replacement fee for lost/stolen bin	<b>\$60</b> replacement fee for lost/stolen bin	<b>\$55</b> replacement fee for lost/stolen bin	<b>\$50</b> replacement fee for lost/stolen bin



## Human beings in traditional economics



100% RATIONAL

100% FOCUSED ON  
MONEY AS AN  
INCENTIVE

**HOMO  
ECONOMICUS**



## Human beings in behavioral economics

“By exploring the consequences of *limited rationality*, *social preferences*, and *lack of self-control*, [Thaler] has shown how these human traits systematically affect individual decisions as well as market outcomes.”  
(Royal Swedish Academy wrote in awarding Thaler the prize.)





## Imperfect optimization

- Limited attention : most salient elements of the environment have dominant influence of the decision.
- Limited computational ability : too many choice options, mental accounting (is the tendency of humans to create mental labels for money, based on its origin)
- biased reasoning → rule of thumb (heuristics), overconfidence etc.



### Mental Accounting Examples



Grocery shopping while full



Grocery shopping while hungry



Projection bias



Present you: enjoying social media and coffee, not working on your assignment.



Future you: Stressed and panicking the night before your assignment is due,

Procrastination

**Bounded self-control :**  
a gap between intention and action



## Non-standard preference

- Reference-dependent preferences
- Loss -aversion
- Having interest in the outcomes of other people (Altruism, fairness, social norms)



“If you want people to do something,  
make it easy.”

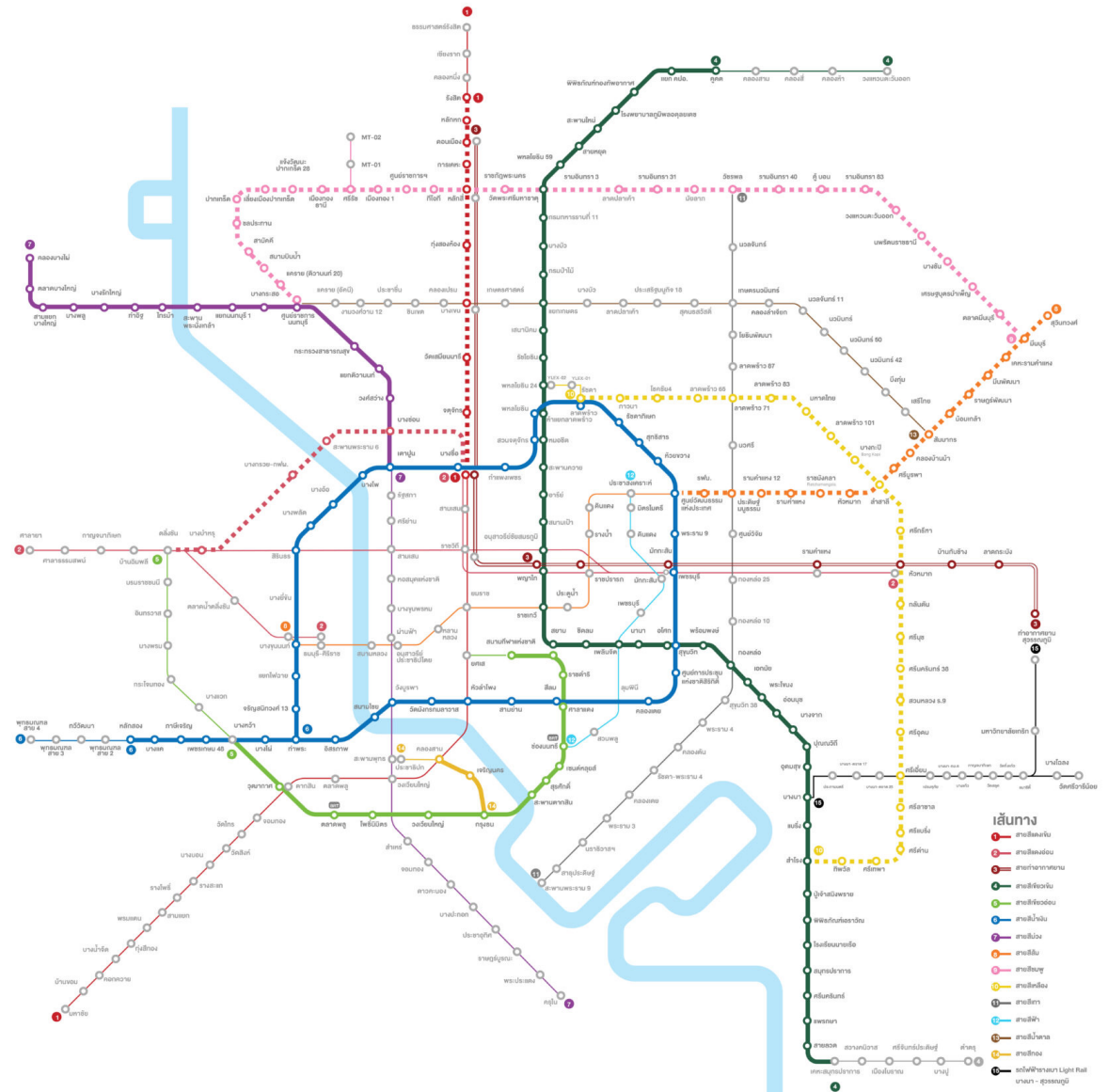
Richard H. Thaler

Prize in Economic Sciences, 2017



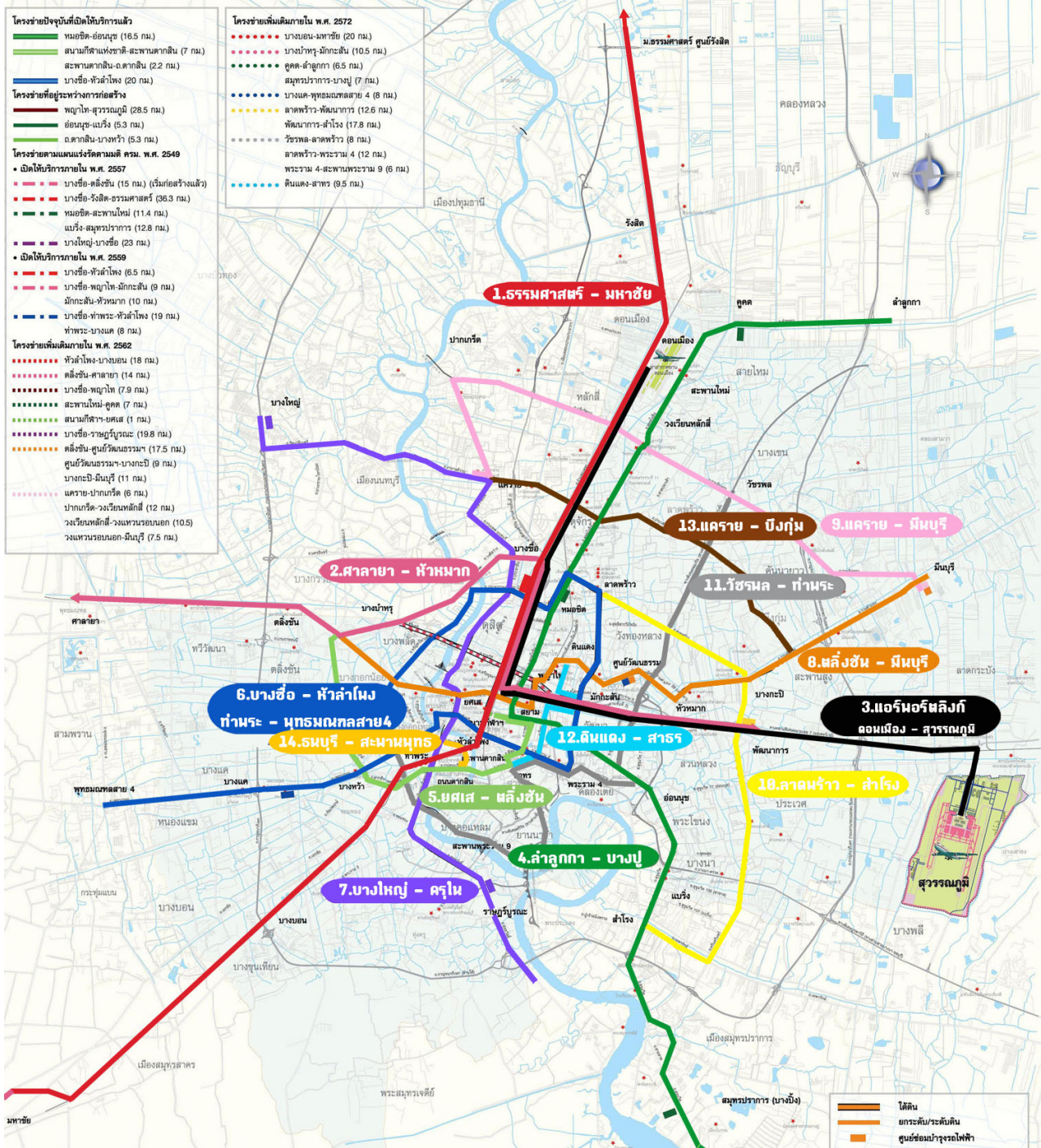
# โครงการระบบรถไฟฟ้าขนส่งมวลชน

## พื้นที่กรุงเทพมหานครและปริมณฑล



ที่มา: รถไฟฟ้าขนส่งมวลชน

- โครงการปัจจุบันที่เปิดให้บริการแล้ว**
- หนึ่งสาย - อ่อนนุช (16.5 กม.)
  - สถานีรถไฟฟ้าใต้ดิน - สะพานตากสิน (7 กม.)
  - สะพานตากสิน - ด.ตากสิน (2.2 กม.)
  - บางซื่อ - หัวลำโพง (20 กม.)
- โครงการที่อยู่ในระหว่างก่อสร้าง**
- พญาไท - สุพรรณบุรี (28.5 กม.)
  - อ่อนนุช - แบริ่ง (5.3 กม.)
  - ด.ตากสิน - บางหว้า (5.3 กม.)
- โครงการตามแผนแม่บทคมนาคม ค.ม. พ.ศ. 2549**
- เปิดให้บริการภายใน พ.ศ. 2557
    - บางซื่อ - คลิ่งชัน (15 กม.) (เริ่มก่อสร้างแล้ว)
    - บางซื่อ - วิจิตร-ธรรมศาสตร์ (36.3 กม.)
    - หนึ่งสาย - สะพานตากสิน (11.4 กม.)
    - แบริ่ง - สมุทรปราการ (12.8 กม.)
    - บางใหญ่ - บางซื่อ (23 กม.)
  - เปิดให้บริการภายใน พ.ศ. 2559
    - บางซื่อ - หัวลำโพง (6.5 กม.)
    - บางซื่อ - พญาไท - มิถิถะสัน (9 กม.)
    - มิถิถะสัน - หัวหมาก (10 กม.)
    - บางซื่อ - ท่าพระ - หัวลำโพง (19 กม.)
    - ท่าพระ - บางแค (8 กม.)
- โครงการเพิ่มเติมภายใน พ.ศ. 2562**
- หัวลำโพง - บางเขน (18 กม.)
  - คลิ่งชัน - ศาลายา (14 กม.)
  - บางซื่อ - พญาไท (7.9 กม.)
  - สะพานตากสิน - ดุสิต (7 กม.)
  - สถานีรถไฟฟ้า - หินส (1 กม.)
  - บางซื่อ - หัวลำโพง - สุพรรณบุรี (19.8 กม.)
  - คลิ่งชัน - ศูนย์วัฒนธรรมฯ - บางเขน (17.5 กม.)
  - ศูนย์วัฒนธรรมฯ - บางเขน (9 กม.)
  - บางแค - บี.บี.ซี (11 กม.)
  - แคราย - ปากเกร็ด (6 กม.)
  - ปากเกร็ด - วงเวียนใหญ่ - มินบุรี (12 กม.)
  - วงเวียนใหญ่ - วงเวียนมรณบท (10.5 กม.)
  - วงเวียนมรณบท - มินบุรี (7.5 กม.)



ได้ดิน  
 ยกระดับระดับดิน  
 ศูนย์ซ่อมบำรุงรถไฟฟ้า

# NUDGE



“The important thing about nudges? They're not mandates. Nudges don't attempt to make it impossible to do the wrong thing, but rather they make it easier to do the right thing.”

How a particular choice is presented – the ‘choice architecture’ – can have a significant effect on the choice made.

For example, where a good is placed on a shelf can affect the likelihood that it will be chosen.



# Make it easy

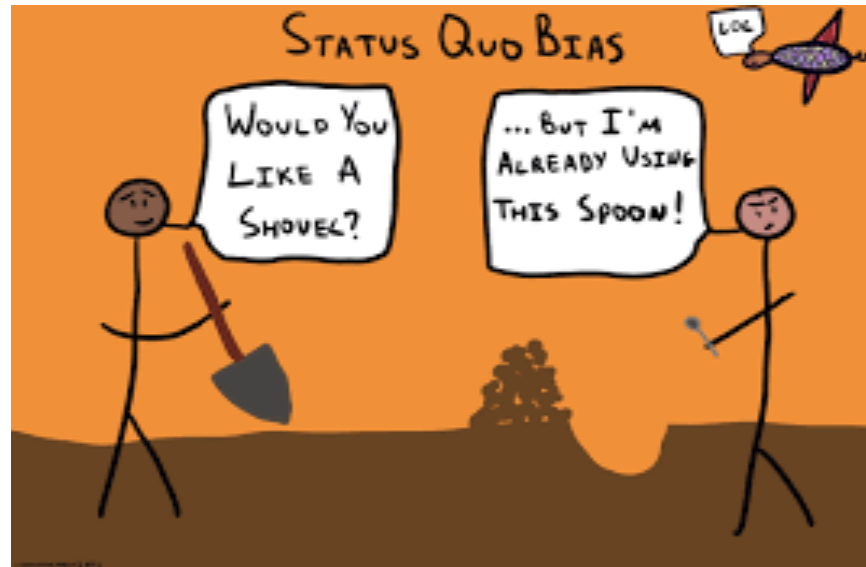


#242013656



# Default effect

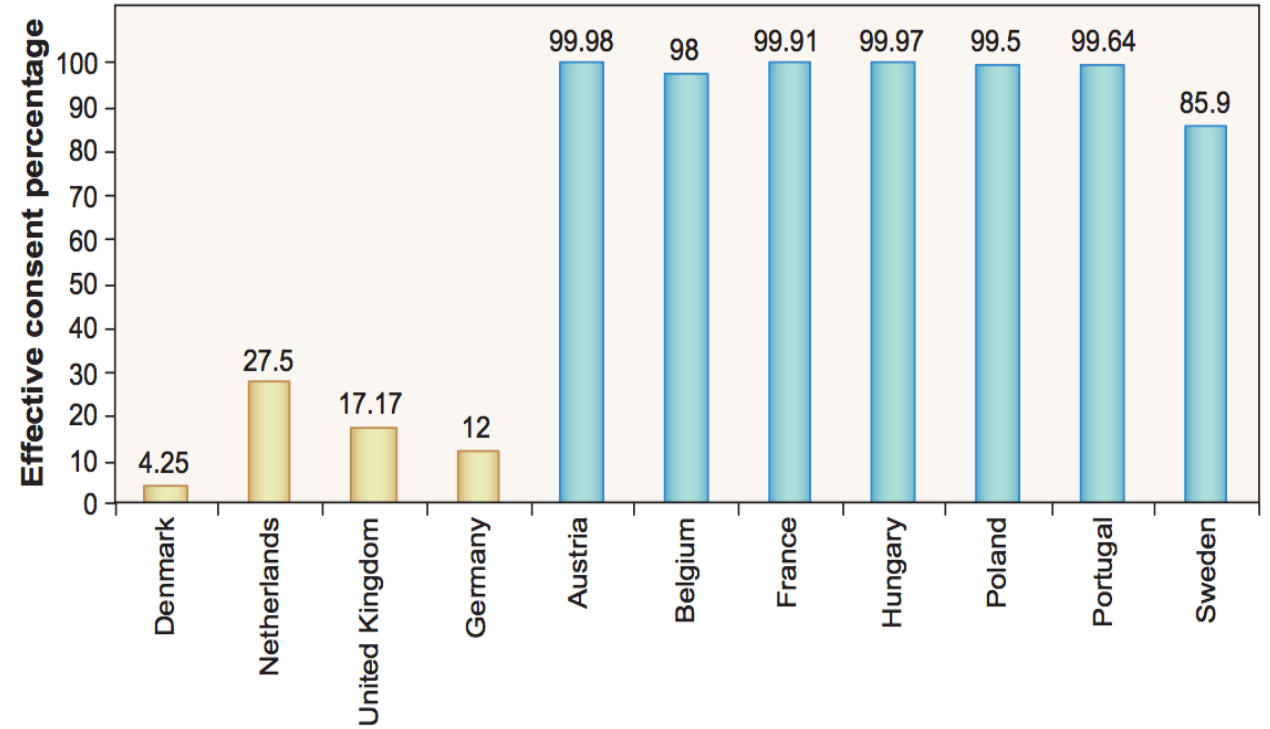
The default choice is often what people stick with. This is due to something called the **status quo bias**



**OPT-OUT**  
**OPT-IN**



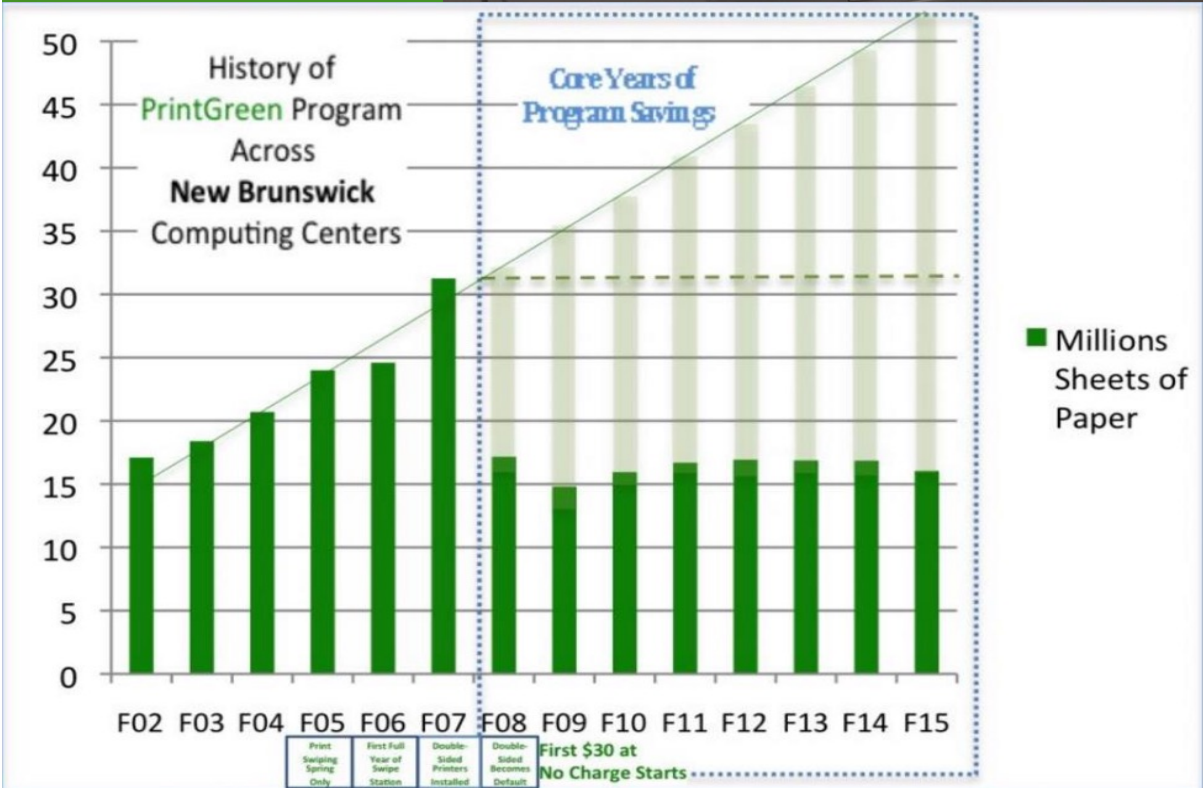
# Default effect



Effective consent rates, by country. Explicit consent (opt-in, gold) and presumed consent (opt-out, blue).



# Default effect



switch to green

with Adani Electricity's Green Tariff



## Green electricity default

“When Swiss energy companies made green electricity the default choice, huge numbers of consumers were happy to stick with it – even though it cost them more.”

# Default effect

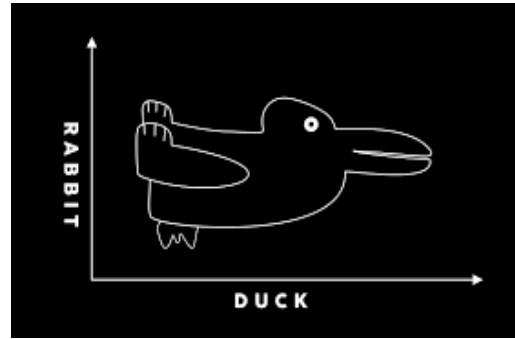


**"No Plastic Bag"**

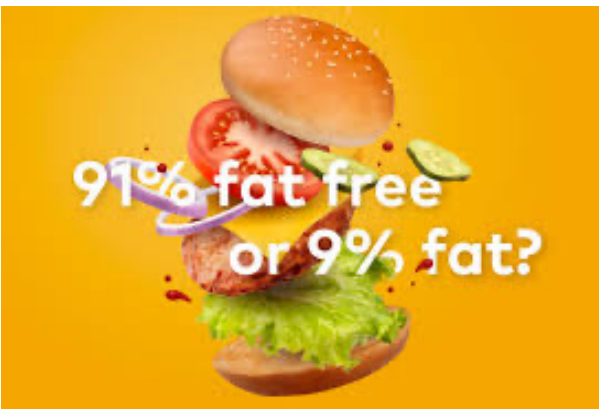


**Toiletries**

# Framing effect



- The framing effect is a cognitive bias where people decide on options based on whether the options are presented with positive or negative connotations

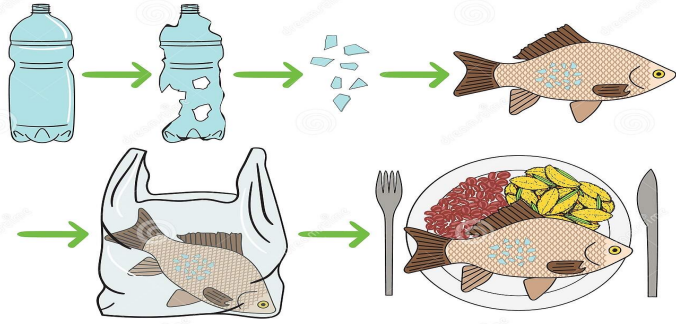


survival frame : 90% of patients are still alive  
mortality frame : 10% of patients are dead

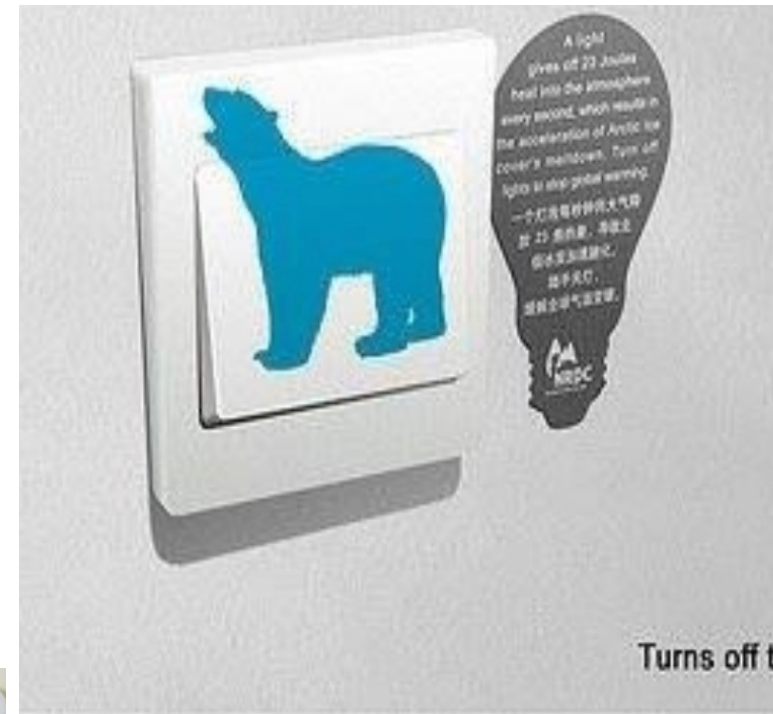
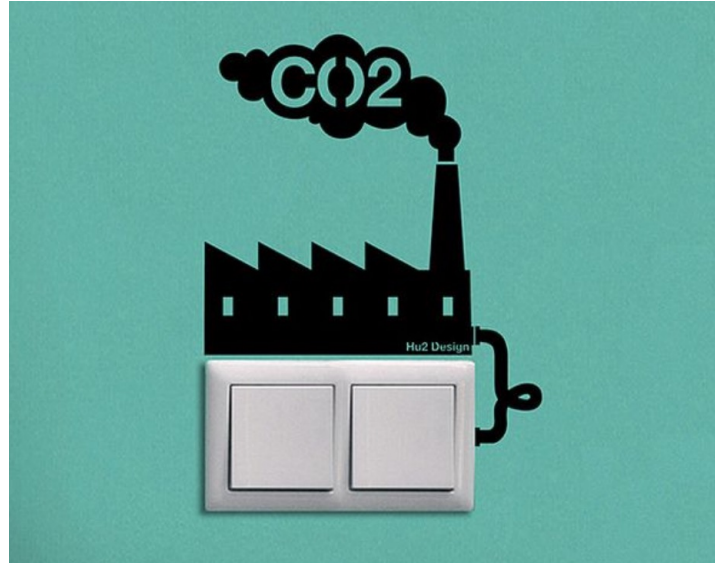


You are currently losing \$20 per month by using inefficient light bulb. VS You could save \$20 per month by changing light bulb.

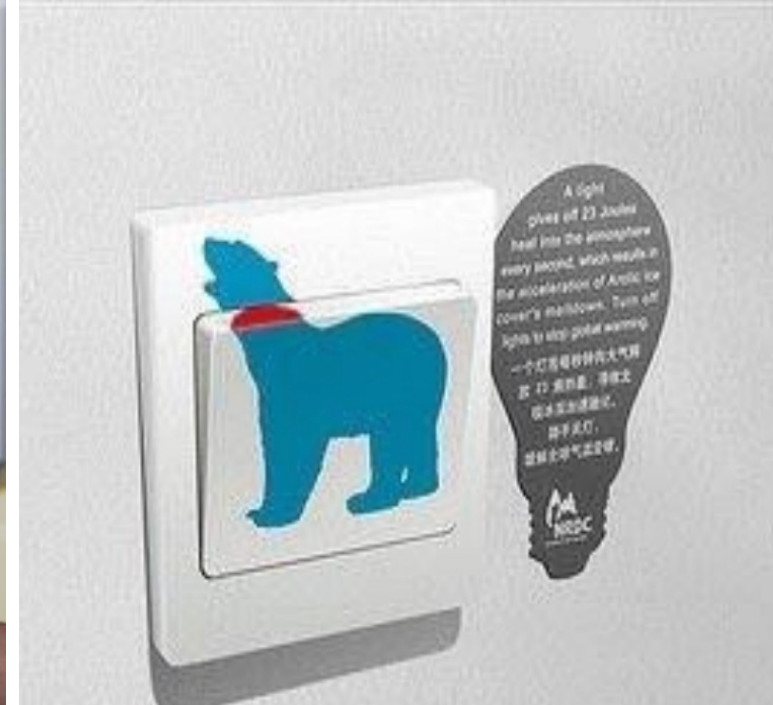
# Saliience












1/4 OF FISH  
CONTAINED  
PLASTIC



Turns off t



© dreamstime.com ID 186257119 © Gmv1314

 USED PAPER	→	 BECOMES	→	 GUITAR
 USED PLASTIC	→	 BECOMES	→	 NEW JACKET
 DRINK CANS	→	 BECOMES	→	 PAIR OF SCISSORS



# Tax Salience

people are more likely to change their behaviour in response to highly visible and highly salient taxes.



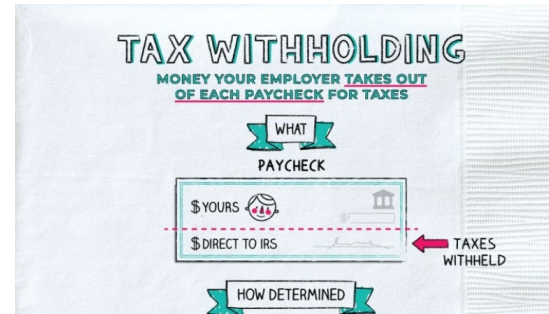
← Original tag

← Experimental tag to make sales tax salient

- posting tax-inclusive price tags reduces demand by 8 percent.
- increases in taxes included in posted prices reduce alcohol consumption more than increases in taxes applied at the register.



Having electricity bills paid by automatically debiting from a bank account decreases the salience of these charges, and is shown to have a positive effect on people's demand for electricity

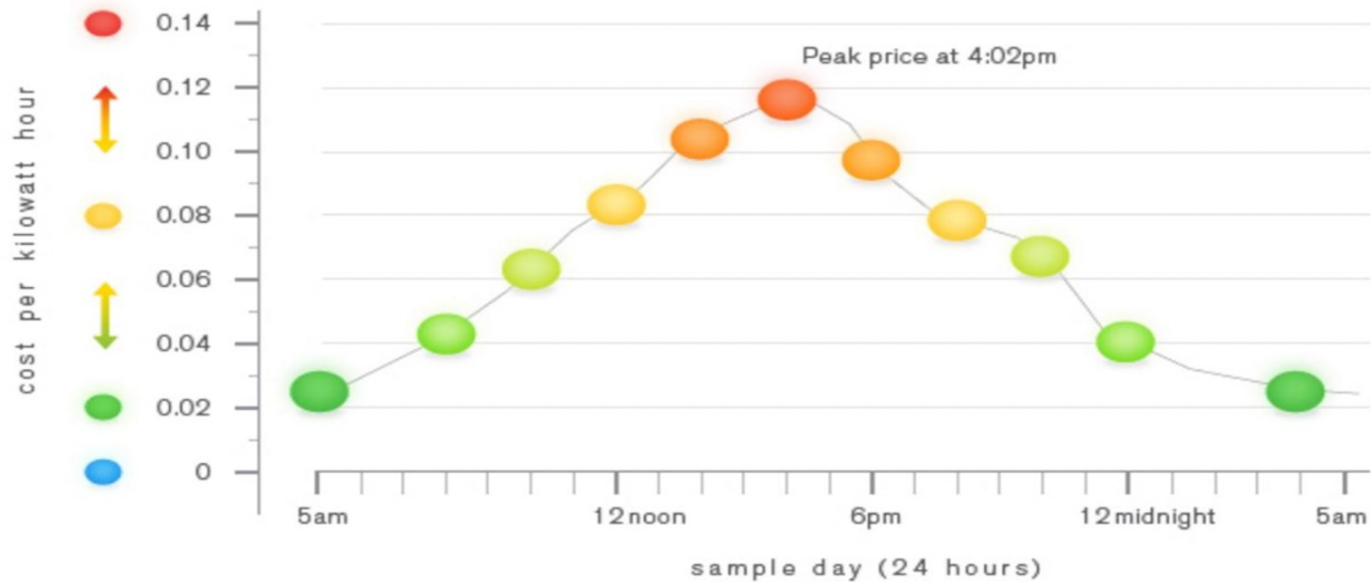


Income tax withholding and auto-filing tax returns reducing the salience of the income tax and increasing the effectiveness of the income tax system.



Gallagher and Mudhlegger (2008) : Sales tax waivers are associated a seven-fold greater increase in hybrid sales than income tax credits

## Energy Price Signaling



# Saliency

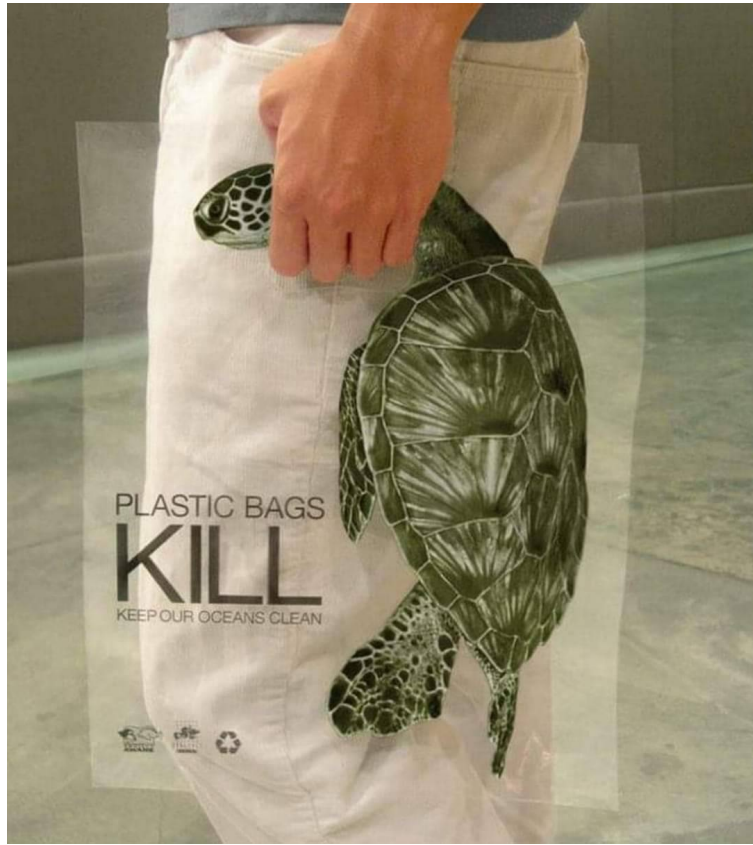
- energy is invisible it is difficult to tell when you are using a lot of energy and why.
- energy company in Southern California gave people a ball called the Ambient Orb that glowed red when homeowners were using a lot of energy, and green when they were using very little.
- Within a few weeks, users had reduced their peak energy consumption by 40 percent.



Source: Aztech.

Two of the different displays possible are shown. The top LED bar glows a different colour depending on the current electricity usage period.





# **SOCIAL NORMS**

**Social comparison has the ability to influence behavior**

# The Home Energy Report of tomorrow, today



## Bold, modern designs

Variable layouts ensure that no two reports are the same. There is a near-endless ability to design fresh layouts for each “moment that matters,” each customer attribute and each experience.

1

The Efficiency Zone compares a customer’s energy use to a target zone, rather than to similar efficient homes

*[New behavioral technique]*

**UtilityCo**

**Home Energy Report**  
March 1, 2020  
Account 1234567890

Service address:  
12345 Main Street  
San Francisco, CA 94111

**Your energy use at a glance**

Fair Good Great

This benchmark is an easy indicator that lets you know how you're doing each period.

**Let's take a look at your energy use** February 1–29, 2020

**Efficiency Zone: Up to 285 units**

You	393 units
Similar homes	502 units

The **Efficiency Zone** is a goal we set that you can work toward. It represents the 20% of homes in your comparison group that used the least energy this period.

**You used 23% less energy than similar homes.**

Your energy use was not in the Efficiency Zone.

**How do we define similar homes?**

To make this comparison, we use your home profile to find 100 similar homes based on:

- Size** similar square footage: 1,200 sq. ft.
- Location** near your home: within 4 miles
- Heating source** similar fuel type: gas

Don't miss out on saving \$40 each year! Turn over for tips that can help you save.

2

The Energy Use Benchmark indicates a customer’s relative level of efficiency in a simple way

*[New behavioral technique]*

3

More space is dedicated to graphs and insights, calling attention to information in new and modern ways

4

Color is used more strategically and in ways that are highly accessible to customers

5

Moments of Pride increase motivation by congratulating customers for taking action

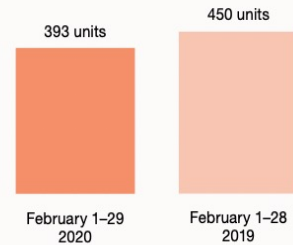
[New behavioral technique]

6

A new layout uses columns to categorize groups of related information and guide the narrative

This period, you used **15%** less energy than during the same time last year

Compare energy use, year to year



What could have caused your energy use to decrease? Changes in your household this period, like less appliance use or fewer people at home, may have lowered your energy use.

These tips were selected for you based on your **house information** and **time of year**



Run ceiling fans in reverse during the winter to circulate warm air.



Use a moisture sensor on your dryer to avoid over-drying.



Save up to \$22/year



Save up to \$18/year



Finish the Home Energy Assessment in 5 minutes or less

Having some details in your home profile is a good start, but having a complete picture of how your home uses energy will go a lot further. Just by completing a quick survey, you can start getting more personalized tips in each report.

To complete the survey, scan the QR code, or visit [utility.com/homeprofile](http://utility.com/homeprofile).



7

Personalized context on how customers are faring compared to previous months and rationale for any deltas

8

Iconography emphasizes information that matters, like our library of personalized recommendations

9

QR codes are used to spur easy action on related programs, such as Home Energy Assessments

We're here to help 1-888-999-0000 efficient@utilityco.com UtilityCo.com/HomeEnergyReport

Save more with special rebates and energy-efficient products you can buy at: [utilityco.com/energysavingsproducts](http://utilityco.com/energysavingsproducts)

Savings are estimated for typical premises in the UtilityCo service area and your actual savings may vary. UtilityCo cannot guarantee the amount of money or energy you may save by implementing the recommended actions. This report is printed on 10% post-consumer recycled paper using water-based inks. © 2010-2020 Oracle. All rights reserved.

UtilityCo

ORACLE Utilities

# Nudging to Reduce Food Waste

## Examples:



Kallbekken and Salen (2013) reducing plate size and providing social cues– reduce the amount of food waste in hotel restaurants by around 20%.



In a randomized control trial, [Shearer et al. \(2017\)](#) found that placing a sticker on general waste bins reminding people to recycle their food waste (“No food waste please. Remember to use your food recycling caddy”) increased the amount of recycled food waste by 20%.

# Tree ordination : The Thai way of protecting the forest



## Examples of green nudges

Type of nudge	Energy efficiency	Water conservation	Sustainable mobility	Sustainable food consumption	Waste and resource efficiency
<b>Cognition-based tools</b>					
Changes in the default policy	Green power as a default	Bed linen of hotel guests is changed only at the guest's request	Air conditioner does not automatically start with the car engine	'Take me home' default (May we pack your leftovers for you?)	Automatic double-sided printing
Use of feedback mechanisms	Smart meters and real-time displays	Consumption indicator for the shower	Fuel consumption feedback through smartphone app	Provide information about the ecological footprint of the product	Reference to waste generation/recycling per capita
Changes to the physical environment	Easier turn-off of stand-by appliances when leaving the home	Placement of stickers encouraging savings next to faucets	Make sustainable transportation options more prevalent (e.g. more bike-stands than car parking spaces)	Change of choice architecture for food displays	Changes in the location and appearance of recycling bins
Framing of information	Framing energy efficiency attributes (e.g. labels)	Framing information in water bills	Booking-system nudge	Framing product information and making labels more salient	Concise slogans or friendly images
<b>Interaction-based tools</b>					
Use of social norms	Home energy reports (HERs)	Slogans like "The majority of guests reuse their towels"	Team challenges at work for sustainable mobility behavior	Presentation of best-practice examples	Feedback about neighbor's recycling rates
<b>Incentive-based tools</b>					
Reward and penalty schemes	Energy saving accounts	Financial reward if a predefined water reduction target is achieved	Price reduction Tax reduction	Grants for the purchase of sustainable products (points, vouchers)	Announcement of a desired savings value and higher price for excess waste quantities
Simplification			Free trials for public transportation <b>Carpool nudge</b>	Offer smaller plates and no trays in university canteens	
Goal setting and commitment devices	Request to set a direct target (e.g. 10% less electricity)	Request to set a direct target (e.g. 20% less water)	Defining a fuel savings target	Incentive schemes prompting consumers to opt for packaging-free products	Highlighting the benefits that sustainable practice brings