MAPPING INCENTIVES TO CHANGE

HOW COMMUTIFI'S COMMUTER SCORE CAN INFLUENCE SUSTAINABLE COMMUTING

BY ANDY KEETON, ALLISON CROW, LYNN DANIELS, TIM KARFS, AND DAVID LEVY

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ABOUT US

ABOUT ROCKY MOUNTAIN INSTITUTE

Rocky Mountain Institute (RMI)—an independent nonprofit founded in 1982—transforms global energy use to create a clean, prosperous, and secure low-carbon future. It engages businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions that cost-effectively shift from fossil fuels to efficiency and renewables. RMI has offices in Basalt and Boulder, Colorado; New York City; Washington, D.C.; and Beijing.

TABLE OF CONTENTS

01 EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Commuting—particularly by single-occupancy personally owned vehicles (POVs)—is time-consuming and stressful for employees, expensive for cities and employers, and pollutes the environment. Although the challenges of commuting may be well-known, quantifying their impact and motivating commuters not to drive POVs are still difficult. Three main variables can help one to understand the social and economic costs of commuting.

Time. Long commutes can increase employee stress and contribute to adverse mental health outcomes, leading to an overall decrease in job satisfaction and lower employee retention. In fact, adding only 10 minutes to a one-way commute time has the same negative effect on job satisfaction as a 19% reduction in gross income.[1]

Cost. Infrastructure designed for POVs is expensive and risks becoming an underutilized asset in the new mobility future.[2] Faced with the choice to build more parking spaces to accommodate POV travel or support alternative commuting options, developers, cities, and companies typically default to constructing parking infrastructure because they lack information and time to develop infrastructure and programs that incentivize non-POV commuting.

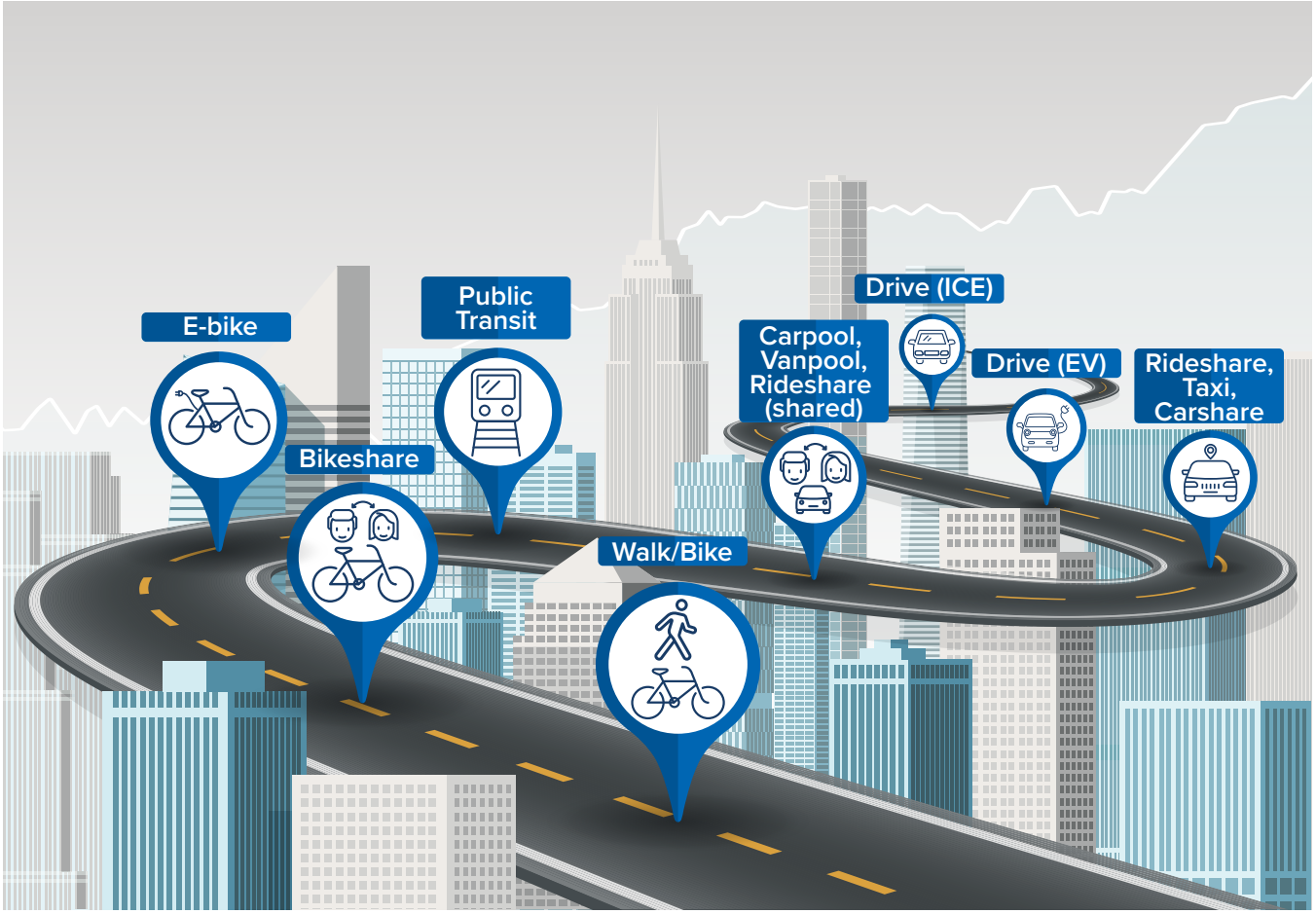
Emissions. Commuting was the source of approximately 15% of all US transportation-based greenhouse gas (GHG) emissions in 2016.[3] In order to decrease their overall environmental and social impact, socially and environmentally responsible companies are increasingly seeking to improve their employees' commutes. Of the Fortune 500 companies, 48% currently have climate action goals, and many provide employee commute benefits, like discounted transit passes, as a part of these goals.[4]

Successfully transitioning average American commuters from single-occupancy vehicles (SOVs) to shared, public, or active modes will have positive effects on society and reduce economic costs. In light of this, commuting solutions must be implemented to ensure employees are happy and healthy, while simultaneously saving cities and companies money and helping the planet.

As more companies, cities, and building owners push for commuting improvements, it is important to understand what types of change should be encouraged. Rocky Mountain Institute's Personal Mobility Spectrum (Figure 1) moves from the most negatively impactful modes of commuting (in terms of the combined time, cost, and emissions)—internal combustion engine (ICE) SOVs—to the least negatively impactful modes of commuting—walking and biking. Companies, cities, and others should encourage commuters to make decisions that prioritize the least negatively impactful modes on this spectrum. However, without extensive knowledge of the needs and behaviors of commuters and proper understanding about how people make decisions, programs that seek to encourage large-scale change by individuals often fail.

FIGURE 1

THE PERSONAL MOBILITY SPECTRUM



RMI's Personal Mobility Spectrum moves from the most negatively impactful (in terms of time, cost, and emissions) to the least negatively impactful mode of personal mobility. Individuals are more likely to make further improvements as they move along the spectrum from driving an internal combustion engine (ICE) vehicle to walking or biking.

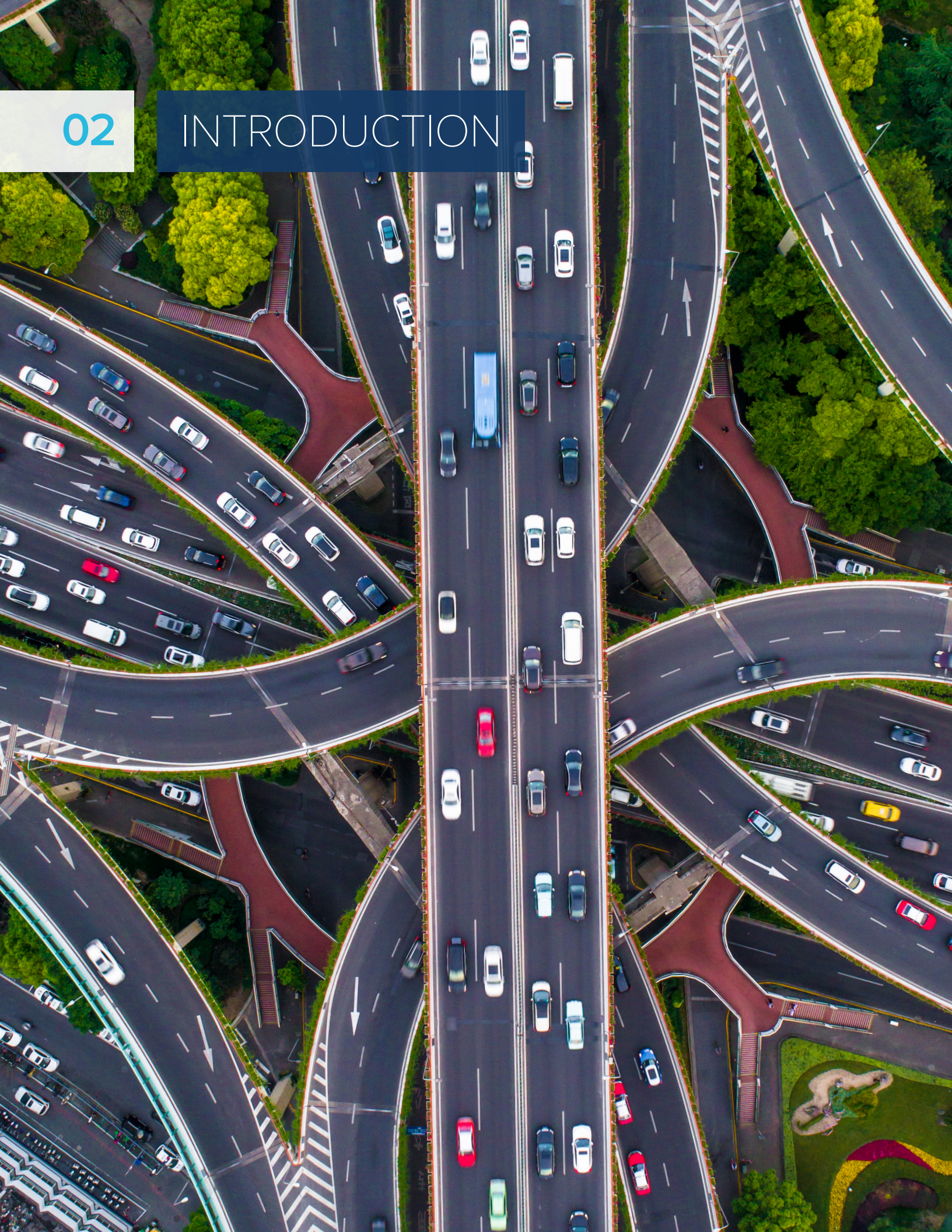
COMMUTIFI'S COMMUTER SCORE: AN AGENT FOR CHANGE

Commutifi's Commuter Score (patent pending) leverages mobility-focused behavioral economics insights from RMI in order to encourage improved commuting.[i] It is used to provide commuting managers,[ii] such as those from companies, cities, and campuses, with individualized and entity-wide time, cost, and carbon scores that quantify commuting problems and inform possible solutions. Using these initial scores, commuting managers can inspire personal and collective improvement through well-placed reference points and thoughtfully designed incentive and commuting benefits programs based in behavioral economic theory. When structured effectively, these programs can successfully push appropriate recommendations to commuters and help ensure that resources intended to improve commuting are mapped to real change. Following logged commuting changes, Commutifi's Commuter Score will update, providing commuting managers with a quantified understanding of the impact of the actions taken by commuters. Understanding the need for commuting behavior change is a first step, but understanding how to design an effective program is critical to measurable impact.

[i] See Appendix A for a detailed description of behavioral economics and its application to personal mobility.

[ii] The term "commuting manager" references a person in charge of understanding, planning, and/or improving commutes for companies, cities, campuses, or other entities.

02 INTRODUCTION



INTRODUCTION

Commuting represents more than 20% of vehicle miles travelled in the United States, and due to the predictable and consistent nature of SOV travelling, it presents a compelling opportunity to motivate long-term behavior change. But many commuting managers analyze transportation behavior using traditional economics, considering only time and cost; this approach is flawed because it assumes individuals will act rationally and provides no insights as to *why* individuals choose to travel the way they do. Behavioral economics helps to explain the reason behind individual choices and how best to nudge individuals toward desired behaviors while maintaining individuals' freedom of choice. A carefully designed commuting benefits program, coupled with strategically placed reference points corresponding to achievable yet significant commuting goals, can induce commuter behavior change. Commutifi's Commuter Score attempts to drive this change by providing commuting managers with a quantifiable view of their commuting problem through individual and entity-wide commuting scores. These scores can be used to design effective incentive and commuting benefits programs, inform commuters about recommendations for commuting change, and quantify the impact of implemented programs. Behavioral economics then becomes a low-cost, high-impact framework for accelerating the adoption of new commuting alternatives.

This report will discuss why a scoring system is valuable and how it can be used to drive positive change. The discussion emphasizes:

1. reference point theory and why a purposefully chosen reference point is needed to drive change;
2. why scoring can help establish reference points and encourage personal improvement;
3. how scoring is currently being used in the mobility space;
4. how a scoring system and behavioral economics can be used to inform incentive and commuting benefits programs that create real change; and
5. a seven-step process that commuting managers can use to drive commuting change, including three sample use cases.

SETTING REFERENCE POINTS: THE FIRST STEP TOWARD POSITIVE COMMUTING CHANGE

Behavioral Economics in Action - Reference Points:

Have you ever bought peanuts from a vendor outside of a baseball game? As you're walking to the stadium, you see a vendor selling a bag of peanuts for $5. Since you know that the same bag will cost $7 inside the stadium, you happily accept the deal. However, had you been walking to a grocery store where a bag of peanuts costs $3, and a vendor offered you the same deal, you would have quickly dismissed the vendor and continued on your way. The vendor was offering you the same bag of peanuts for the same price, so why the difference in your willingness to accept the deal? Your reference point changed from the $7 bag of peanuts in the stadium to the $3 bag in the grocery store.

Findings from behavioral economics suggest that an individual's evaluation of an outcome is impacted by comparisons with a reference point.[5] In order to drive positive change in commuting habits, commuting managers must set reference points that provide individuals with an understanding of how well they are doing versus how well they should or could be doing. Ultimately, individuals will not embrace alternatives unless they believe that the alternative will be an improvement over the status quo, and reference points provide the necessary information to determine whether the outcome should be categorized as an improvement or not.

Research also suggests that a well-placed reference point can influence behavior and create positive change.[6] Artificial reference points can ensure all participating individuals compare themselves on the same scale and strive for the same goals. These reference points should represent goals that are challenging but achievable. If a goal is considered impossible, individuals tend to simply check out. In contrast, if it is too easy, people may not achieve their greatest potential because they will choose not to improve further once they have achieved the initial success, a phenomenon referred to in behavioral economics as "satisficing." Setting a relevant and purposeful reference point can help commuting managers organize large, diverse groups of commuters and encourage changes that correspond to the group's goals. Further discussion of this topic, which includes a suggested method of setting effective reference points, can be found in the following sections.

SCORING: A FRAMEWORK FOR ESTABLISHING RELEVANT REFERENCE POINTS

Behavioral Economics in Action - Scoring:

Do you remember taking the SAT or ACT? From a young age, scores are used to compare diverse individuals across a common spectrum and encourage positive change. Though there exists much debate over the effectiveness of these scoring systems, the SAT and ACT are good examples of what Commutifi's tool seeks to provide—a standardized scoring system that enables managers to set their own reference points corresponding to their desired goals. For instance, any student interested in attending Harvard University knows from an online search that they need to score at least a 1470 on the SAT or 33 on the ACT to be considered for admission. However flawed that system may be in determining potential academic success in college, it does push motivated students to score highly and increase their chances of admission.

A commuting scoring system provides commuting managers with a standardized approach to compare individual and entity-wide scores with an established reference point (corresponding to the group goal). This system can provide managers with a single number that encompasses all of the complexity of commuting and can help them create goals and corresponding programs that seamlessly encompass all aspects of commuting, which can lead to greater participation and better results. Setting a goal for the group to collectively decrease parking by 20% may be easy to understand in theory. However, it does not encourage positive change across the entire spectrum of commuters (e.g., a carpooler may not feel inclined

to switch to biking or public transit) nor encourage widespread participation (as only 20% of individuals need to participate). In contrast, a program that seeks to increase the average score by 20 is inclusive for all commuters and encourages everyone to participate (at least minimally) to achieve the goal. Furthermore, a score-based program can easily be tracked because commuting managers need only look at one number—the entity's average score—to determine the progress.

Commutifi's Commuter Score provides commuting managers with a standardized scoring system to better understand their group's current commuting patterns, which helps with setting appropriate goals. This system can be used to develop and monitor incentive and commuting benefits programs that encourage achievable and positive change (more on this concept and how it can best be handled in later sections). Unfortunately, there is little extensive research about the best scoring methods and ranges, as well as the best practices for setting reference points. Therefore, it may take some time through intentional experimentation for Commutifi to optimize its scoring system and for commuting managers to determine the most effective reference points. If stakeholders are willing to discuss their methods, sharing commuter-program findings through workshops or reports may be a quick and efficient means to achieve these goals, thus expediting the learning process.

SCORING IN THE MOBILITY SPACE: HOW SERVICES ENCOURAGE CHANGE THROUGH SCORING

Traditional transportation planning focuses on time and cost as the main indicators of personal mobility mode choice—the least expensive, quickest option wins. However, a variety of other factors also influence mobility decisions. Sangho Choo and Patricia L. Mokhtarian determined that an individual's attitude, personality, and lifestyle are critical factors that determine the type of personal vehicle one owns.[7] Similarly, these personal factors are important when individuals choose their commute mode. Research has found that car dependence and the choice to use a POV for personal transportation is intrinsically linked to qualitative and societal factors, like personal mobility freedom, social norms, and social status.[8]

TransitScreen, Walk Score, and the INRIX Global Traffic Scorecard (INRIX) create scores that influence positive mobility change by providing comprehensive information on a location's current mobility environment. All three have developed unique scoring systems that distill complex information about available mobility infrastructure (such as walking and biking accessibility, public transit routes and availability, and SOV-induced congestion) into easy-to-understand scores. Through these scoring services, building owners, city officials, and other transportation planners can better understand which aspects of their transportation infrastructure need improvement. They can then use this information to design future programs to improve personal mobility through enhancements to public and private infrastructure.

TransitScreen and Walk Score provide information about a specific location's access to various personal mobility options and the ease of moving around that location. In addition, TransitScreen provides real-time transit and traffic information. INRIX analyzes the impact—both time and cost—of congestion on car commuters. These location-specific services do not provide information about individual commuter behavior nor the detailed environmental impact scores that could benefit environmentally conscious actors. Other tools that calculate an individual's transportation emissions are readily available online,[9] but they can be challenging to use on an entity-wide scale.

Furthermore, these three scores—TransitScreen, Walk Score, and INRIX—do not address many of the root causes of personal mobility decisions. In other words, it may be helpful to know that a community has a Walk Score of 94 or an office building has a TransitScreen MobilityScore of 72, but it still does not mean that people are going to walk or take transit to and from work. Nevertheless, these scores can be helpful, especially when effectively incorporated with other services and programs. However, there remains a large opportunity to drive greater impact by leveraging behavioral economics.

COMMUTIFI'S COMMUTER SCORE

Testing Commutifi's Commuter Score:

To test Commutifi's Commuter Score, RMI investigated several edge cases and case studies. The goal of the edge case review was to ensure that individuals received higher scores as they moved along the Personal Mobility Spectrum (see Figure 1) and, therefore, would not be incentivized to move backward along the spectrum, even in extreme cases (e.g., someone who decides to walk three miles should not be encouraged to take public transit instead). One case study looked at a hypothetical two-mile commute at peak commute time using four different modes: biking, walking, transit, and rideshare. These four commutes returned scores of 99, 81, 82, and 70, respectively, which generally follows the mobility spectrum. RMI employees from across the commuting spectrum also took Commutifi's survey to test the sensitivity of the scoring and help understand how little changes affect scores. Example scores ranged from an eight for a 26-mile, 70-minute SOV commute to a 100 for a 0.3-mile walk and 1.5-mile bike commute. Additional sensitivity was tested between bike commuters to investigate how short distance changes affect the score, and only minimal change was observed. These studies confirmed the score accurately ranks commutes according to their time, cost, and carbon impact.

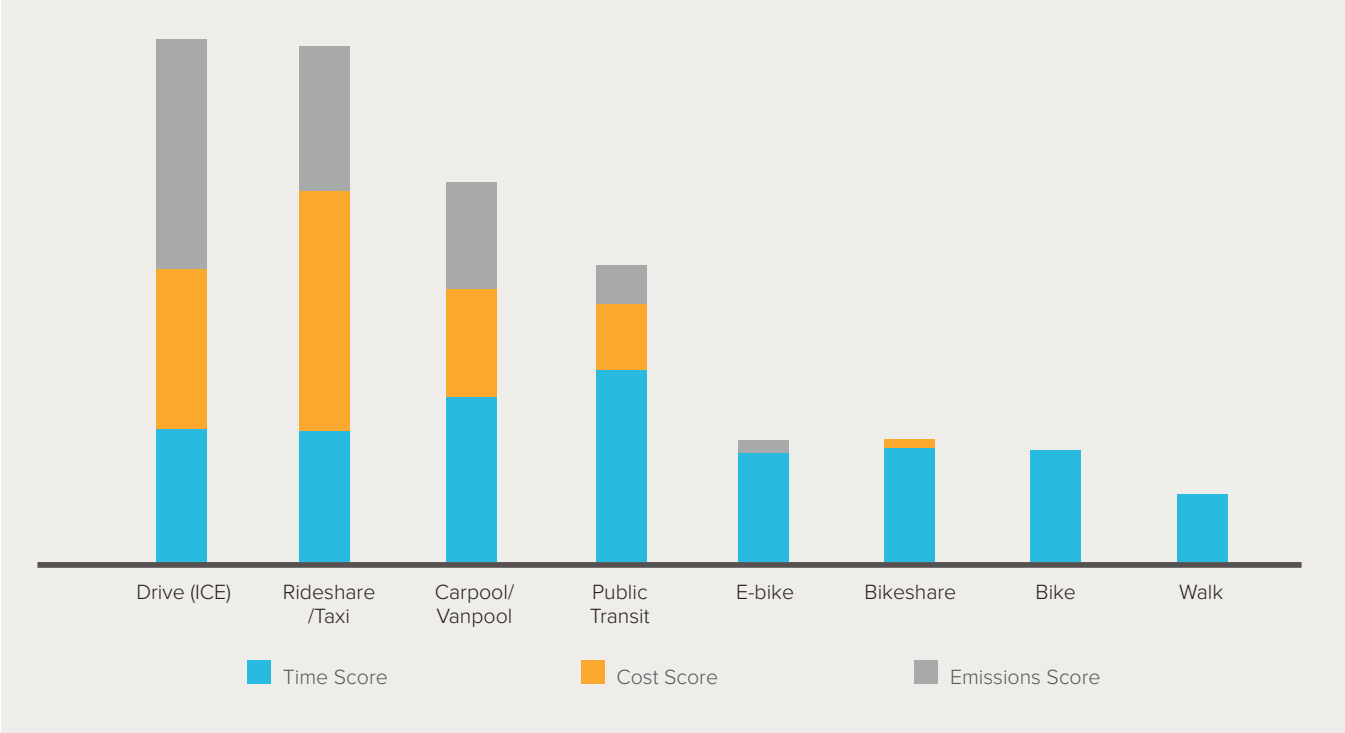
Commutifi's Commuter Score seeks to fill in the aforementioned gaps in the mobility scoring marketplace by:

1. quantifying the overall commuting problem through scoring;
2. providing a framework for commuting managers to develop behavioral economics-inspired incentive and commuting benefits programs;
3. pushing recommendations to commuters; and
4. quantifying the effects of programs over time.

Commutifi's Commuter Score provides individuals with a 0–100 score (with 100 being the best) based on their commuting habits according to three factors—time, cost, and carbon emissions—then assigns bonus and penalty points based on how much a commute negatively affects health (both physical and mental), vitality, and stress. The score incorporates these three factors, along with the bonuses and penalties, to provide a more holistic understanding of commuting modes that corresponds to their customers' values. Figure 2 shows the relative impact of different commute modes based on time, cost, and emissions. It shows that when these three factors are all accounted for and weighted equally, driving an ICE vehicle is the most negatively impactful. In contrast, walking and biking are the least negatively impactful forms of commuting.

FIGURE 2

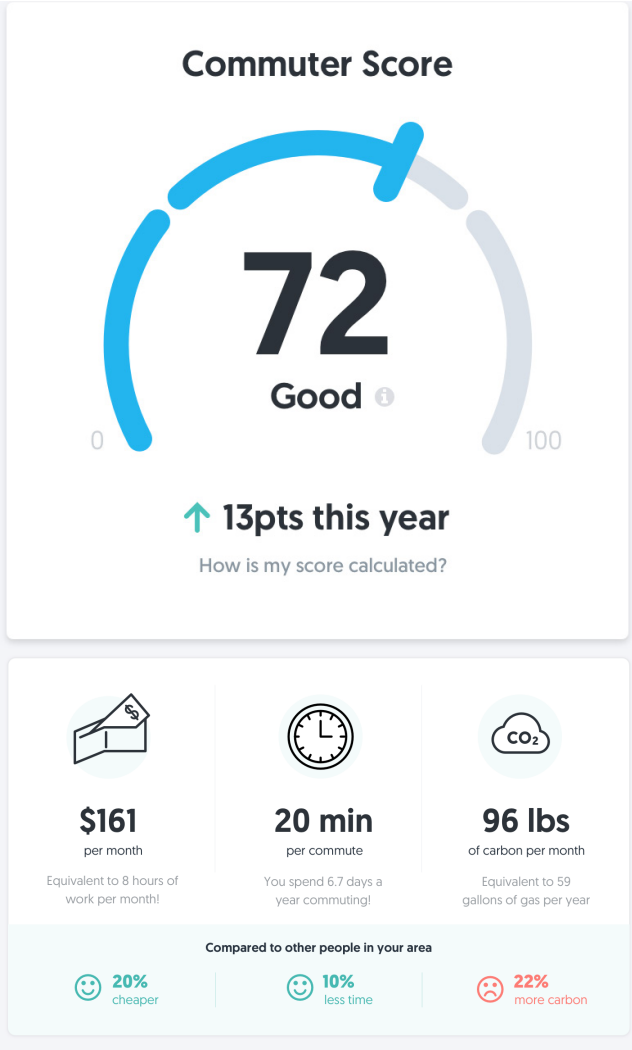
RELATIVE IMPACT OF COMMUTING BY MODE



Each factor—time, cost, and emissions—was calculated from US average commute time and distance from the 2017 National Household Travel Survey and corresponding per mile measurements.[10] The calculations were normalized so that the largest time, cost, or emissions value is set to one. The three factors are stacked on top of each other and placed in order of total relative impact from driving an internal combustion engine (ICE) vehicle to walking.

The Commutifi Commuter Score is calculated based on information from a user survey. RMI reviewed the survey, and ideas and themes from RMI's work on behavioral economics were incorporated throughout.[iii] Although the tool does not fully address key behavioral concepts like personality, lifestyle, and attitude, questions focusing on external factors affecting commute choices begin to answer the why question. Behavioral economics thinking was applied to the survey to increase clarity, but current limitations due to biases inherent in surveying may still exist and lead to somewhat inaccurate scores.[11] However, Commutifi, on request, offers real-time integration with personal vehicles, mobility services like Uber and Lyft, bikeshare, scootershare, and company shuttles, vanpools, and carpools. This real-time integration coupled with increased behavior-focused calculations offer the opportunity for Commutifi to overcome these limitations in the future.

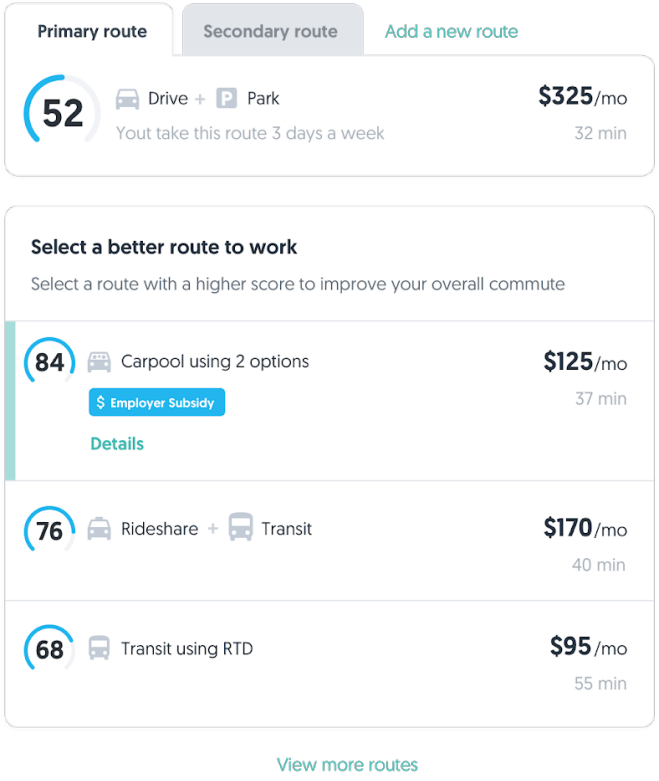
Tailored calculations ensure that scores change based on when, where, and how an individual commutes, and the tool's capability to update when new infrastructure or programs become available allows for the scores to be dynamic and change over time. All scores are displayed in an individualized dashboard that includes recommendations for personal score improvements and that updates regularly when new mobility options or incentives (like e-scooters, vanpools, or transit pass discounts) are offered by commuting managers or become available on the market. The tool offers commuting managers the ability to distill insights from large amounts of diverse information and can help them design, implement, quantify, and track customized incentive and commuting benefits programs.

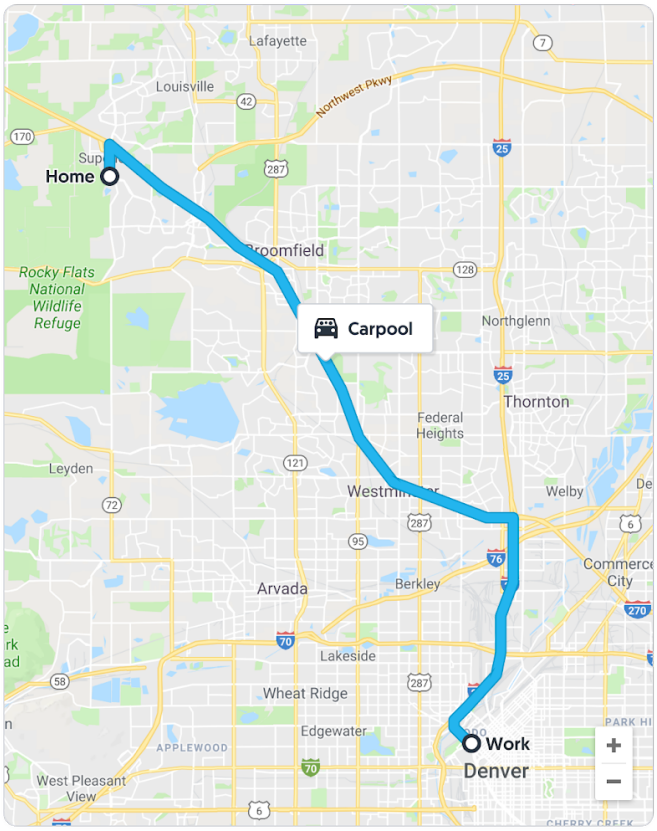


[iii] The survey reviewed by RMI and discussed in this paper is the version that was active at July 16, 2018. Note that previous and future versions may alter scoring and other findings, and recommendations discussed throughout this paper may be less effective when other versions of the survey are used.

As with the survey, RMI helped integrate ideas from behavioral economics into both the scoring and user dashboard to most effectively encourage individuals to improve their habits and increase their score. One key aspect integrated into the scoring is the idea of ratio bias, which states that people are more receptive to absolute numbers than percentages or ratios. For example, this suggests that the US commuting score national average should be set to a lower value on the 0–100 scale, as people are more likely to feel motivated to improve their score if it correlates to a larger absolute change. The user dashboard was developed to limit choice overload—a phenomenon where individuals simply avoid making a choice because they feel overwhelmed by the quantity or complexity of the choices available to them—and subsequently increase likelihood that individuals will choose to improve their habits.

Integrating behavioral economics concepts into Commutifi's Commuter Score tool increases the likelihood that individuals will choose to improve their score, but these improvements will be maximized by purposely designed incentive programs. Programs should be designed in tandem with Commutifi's Commuter Score and informed by behavioral economics. The next section describes specific aspects of behavioral economics that should be considered when designing an incentive program. It is followed by a section outlining a recommended seven-step process that commuting managers can follow to develop effective programs. The section includes three example use cases that dive more specifically into the process.





03 STEPS AND USE CASES FOR DEVELOPING EFFECTIVE PROGRAMS

STEPS AND USE CASES FOR DEVELOPING EFFECTIVE PROGRAMS

DEVELOPING AN EFFECTIVE INCENTIVE AND COMMUTING BENEFITS PROGRAM: USING COMMUTIFI'S COMMUTER SCORE AND BEHAVIORAL ECONOMICS TO ENCOURAGE CHANGE

Best Practices in Brief

- Choice Architecture: set appropriate reference points that correspond to goals and incentivize both small and large changes through tiered payout structures.
- Round Number Clustering: utilize people's natural instincts to cluster near round numbers by structuring payouts to increase every five or 10 points.
- Time (Temporal) Discounting: distribute payments and/or nonmonetary rewards to participants early in the program to increase participation.
- Social Norms: encourage participation throughout the program through public precommitments.
- Status Quo Bias: ensure available amenities provide individuals with a three-times increase in value over current commuting choices.

Incentive and commuting benefits programs should be designed according to behavioral economic theory to achieve the greatest chance of success. These decision-making theories can inform programs that utilize services like Commutifi's Commuter Score to effect change and save money and time. The following discussion unpacks a number of theories core to behavioral economics, including choice architecture, round number clustering, time (temporal) discounting, social norms, and status quo bias. Each of these theories can be applied to the mobility space to encourage better commuting habits. For each theory, we present what the theory is and how it should be applied using Commutifi's Commuter Score. More detailed information about these and other concepts from behavioral economics and their application to mobility are discussed in Appendix A and outlined in Appendix B.

CHOICE ARCHITECTURE

Choice architecture is the practice of influencing choice by changing the manner in which options are presented to people.

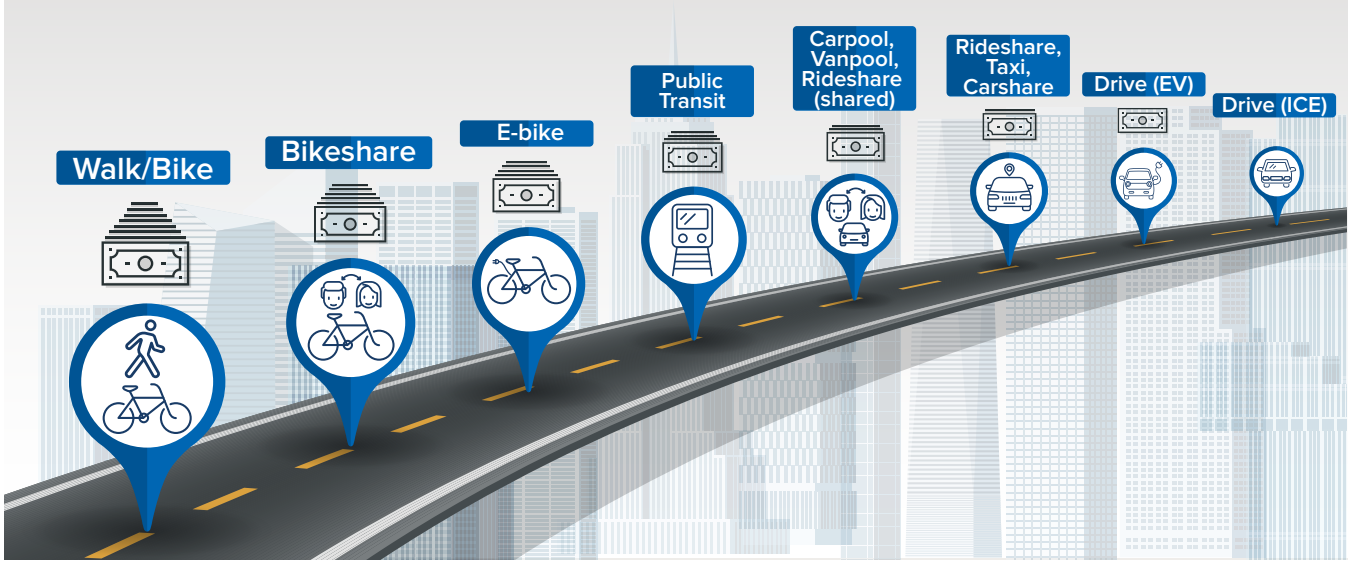
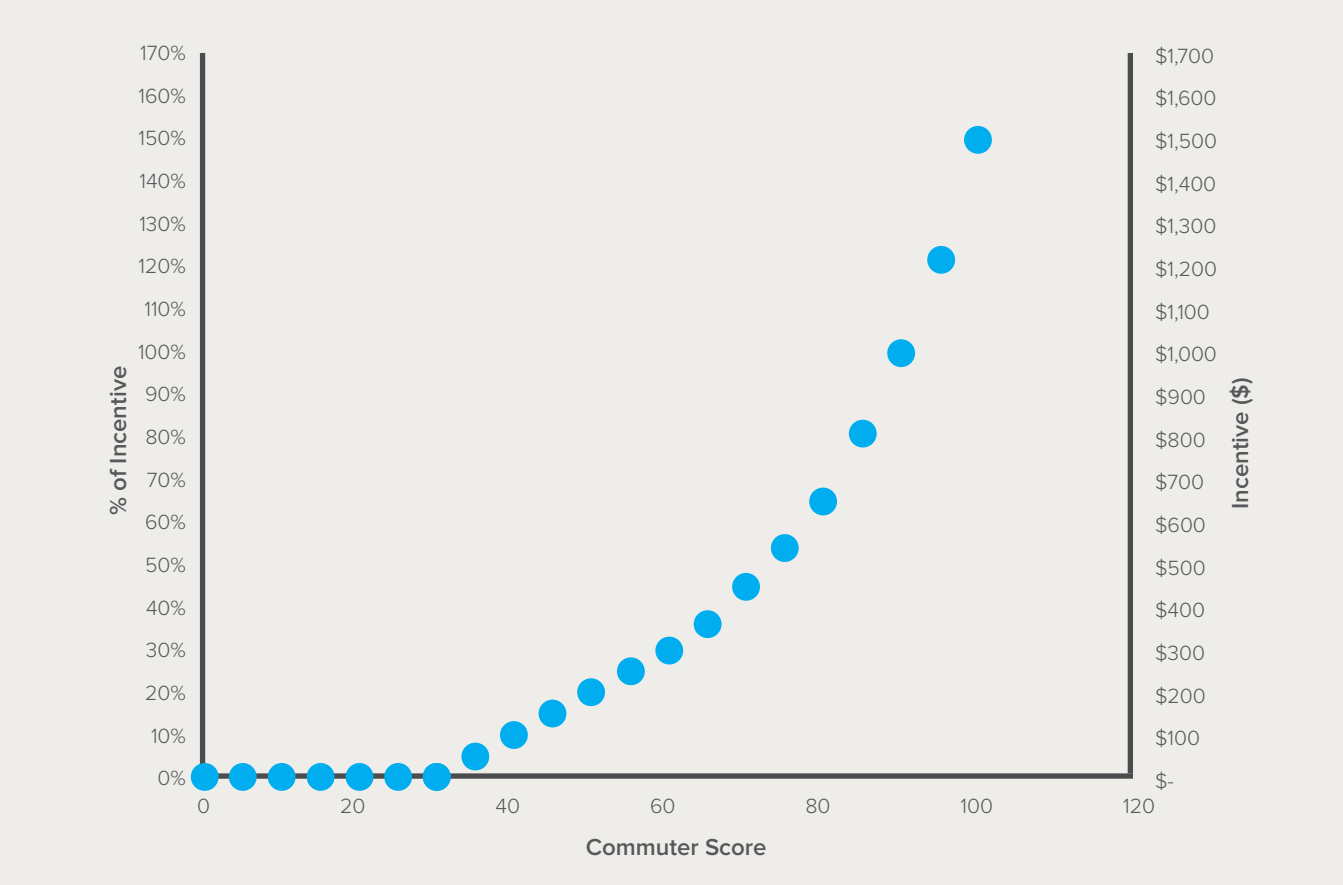


Figure 3 shows a recommended incentive payout structure. It utilizes a linear-to-exponential scale that influences commuting choice by paying individuals specified amounts that incentivize small improvements for those scoring in the lower half of commuters (scores less than 50) and large improvements for those scoring in the top quartile—and especially those scoring above 80. This limits the chances of individuals satisficing at certain points, as further improvements lead to increasing gains. The proposed structure further incentivizes individuals who score above 90 to continue to improve their score by distributing "bonus" incentives—above the stated maximum.

Because these incentives are presented as bonuses, individuals may be more inclined to make more impactful lifestyle choices. Providing this information to all new members of the group (e.g., new tenants

FIGURE 3

EXAMPLE INCENTIVE PROGRAM PAY STRUCTURE



The left axis indicates the percentage of the planned incentive that an individual would earn and the right axis indicates a corresponding dollar amount in an example program with a $1,000 per person annual budget. The incentives follow a linear-to-exponential scale starting at a score of 35. Commuting managers should determine individual commuter scores and round down to the nearest payout.

or new hires) can help influence important choices, like where to rent an apartment. For example, the knowledge that scoring a 100 on the Commuter Score will earn an additional $1,500 per year (as is the case in the example shown in Figure 3) may incentivize a new hire to spend more on rent to live close enough to work to achieve that score.

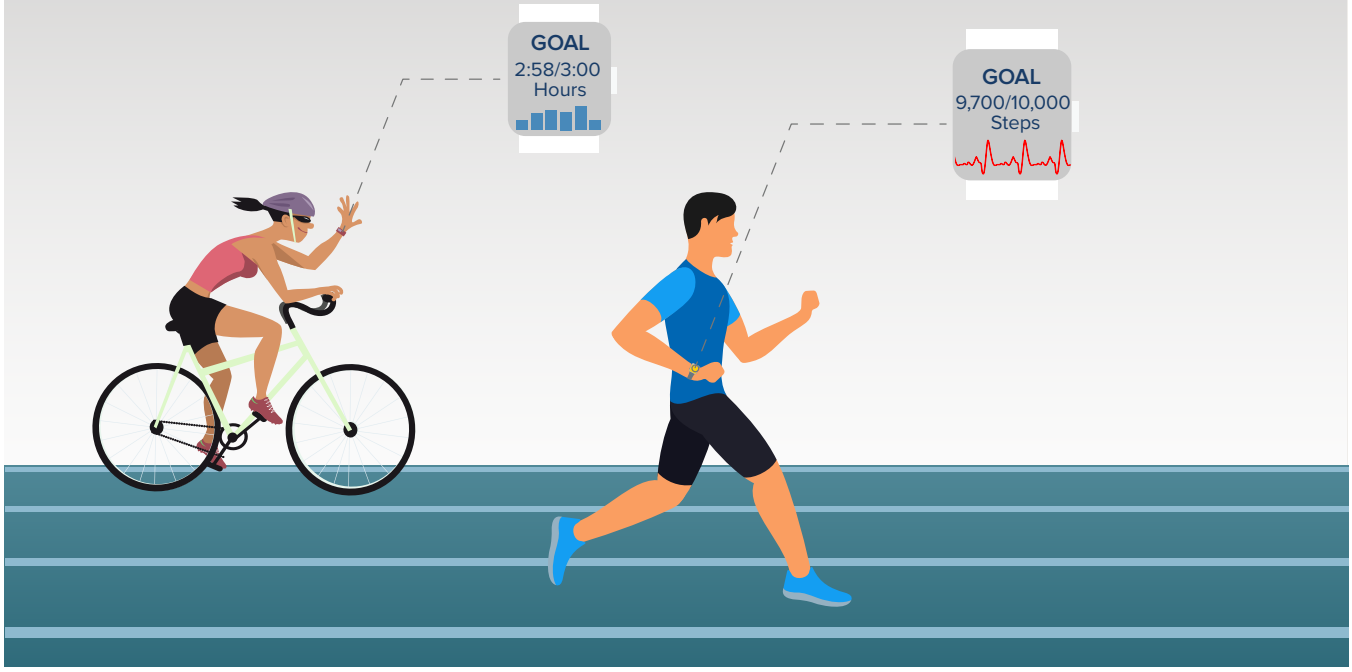
A similar approach can be applied to nonmonetary rewards by dividing each reward into pieces and distributing the pieces according to the same percentage scale. This would work with any reward that is easily broken up, like paid time off, food, or other gifts. Rewards that are harder to divide (for example, the ability to choose your office desk) cannot follow the exact percentage scale described in Figure 3. However, if the value of the reward can be assessed relative to other rewards, a similar approach can be used where higher-value rewards are given to those with better scores and lower-value rewards are given to those with lower scores.

ROUND NUMBER CLUSTERING

Round numbers have particularly strong motivational consequences because people are psychologically drawn to, and more satisfied by, round number performance scores (e.g., 0s, 5s, 10s).

The recommended payout structure (Figure 3) is based on the behavioral economics theory that individuals naturally cluster their scores around round numbers (those ending in 0 or 5), a phenomenon that has been observed in everything from batters in baseball to students taking the SAT.[12] It utilizes five-point thresholds (i.e., all scores from 65 to 69 will receive the incentive corresponding to a score of 65), so individuals will be further incentivized beyond their natural instincts to score near a round number. For instance, someone scoring a 73 would feel motivated to improve their score by two to get to 75.

Round numbers have particularly strong motivational consequences because people are psychologically drawn to, and more satisfied by, round number performance scores (e.g., 0s, 5s, 10s).

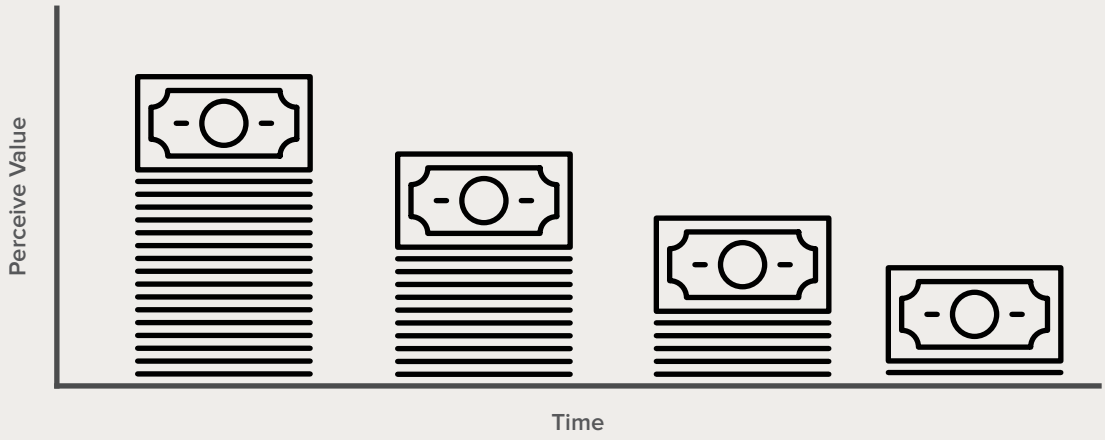


TIME (TEMPORAL) DISCOUNTING

Present rewards are weighted more heavily than future ones; once rewards are considered too distant, their persuasion and perceived value are reduced.

Time (temporal) discounting is the theory that describes the phenomenon wherein individuals weight rewards received now more heavily than future ones.[13] The theory suggests that a series of smaller incentives that are distributed more frequently is better than one large incentive distributed at the end of a period. Therefore, to incentivize change, payouts should be provided in real time as individuals improve their commuting habits. For example, individuals who receive $50 each month will be happier, and more willing to continue to participate in a program, than those who receive $600 at the end of the year. As the time between payments increases, the participation rate decreases. Increasing payment frequency does lead to more administrative burden, but Commutifi's enterprise dashboard can assist commuting managers by providing regular updates on the payouts that individuals have earned as frequently as desired (daily, monthly, seasonally, etc.).

With **time (temporal) discounting**, present rewards are weighted more heavily than future ones; once rewards are considered too distant, their persuasion and perceived value are reduced.

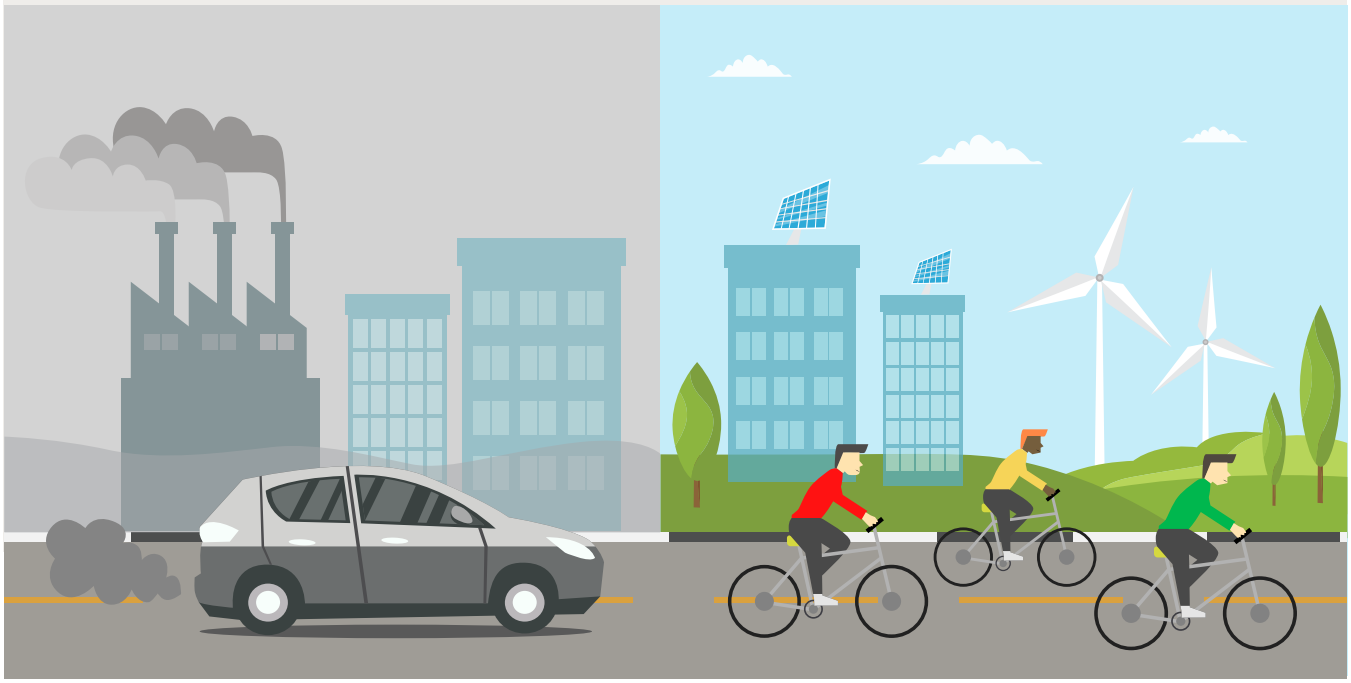


SOCIAL NORMS

Social norms signal appropriate behavior and help individuals understand expectations and rules within a group of people.

Peer influence can nudge individuals to join and stay in a commuting incentive program. Programs should require individuals to make commitments and be accountable. To ensure that social norms are formed, respected members of the group (e.g., CEOs and other managers) should participate. This will encourage individuals to join and stay with the program, as people tend to act in a manner they deem suitable in their environment. This is the main reason why "precommitting to a goal is one of the most frequently applied behavioral devices to achieve positive change."[14] Similarly, displaying peers' scores to individuals can help encourage further commuting improvements. This tactic has been used successfully by utilities to encourage homeowners to use less energy, and a similar program should encourage change in the commuting realm as well.[15] These nudge tactics work most effectively in organizations with a strong collaborative culture, so they are not right for every situation.

Social norms signal appropriate behavior and help individuals understand expectations and rules within a group of people.



STATUS QUO BIAS

People show a strong preference for things the way they are and are reluctant to embrace, or are skeptical of, change.

Generally, people strongly resist changing their habits, so incentive programs and alternative commuting options need to overcome this bias. The endowment effect (a separate but related behavioral economics phenomenon) further states that individuals tend to overvalue their own goods (or in this case, mode of commuting) by a factor of three.[16] Therefore, alternative commuting options must present value propositions that overcome this effect and encourage change from the status quo. If valuable alternatives do not exist, people will not change their habits, no matter how well the incentive is structured. So prior to—or in conjunction with—establishing an incentive program, commuting managers should develop commuting benefits programs that provide the valuable alternative options that will incentivize change. These options should encourage commuting mode change along the Personal Mobility Spectrum in Figure 1.

Thanks to **status quo bias**, people show a strong preference for things the way they are and are reluctant to embrace, or are skeptical of, change.

Examples of commuting benefits that can encourage members of the group to adopt new commuting modes are displayed in Table 1. Once an enticing set of alternative commuting options exists, a well-structured incentive program will help pave the way for a happier, cleaner, and more efficient commute.

TABLE 1

COMMUTING BENEFITS PROGRAMS THAT DRIVE CHANGE

COMMUTE MODE	COMMUTING BENEFITS THAT ENCOURAGE ADOPTION
DRIVE (ICE)[iv]	• Available/nearby/assigned parking • Free/discounted parking
DRIVE (EV)	• Accessible/nearby charging • Free charging • Prioritized parking locations for EVs • Free/discounted parking for EVs
RIDESHARE/TAXI/CARSHARE	• Designated pickup/drop-off locations for rideshare • Available carshare parking/access to carshare vehicles • Subsidized rideshare/taxi/carshare
CARPOOL/VANPOOL/RIDESHARE (SHARED)	• Free/discounted parking for carpool/vanpool • Better parking locations for carpool/vanpool • Guaranteed ride home program for people who take carpool/vanpool • Subsidized rideshare for those taking shared services as a backup (such as Lyft Line or Uber Pool) • Company-led pairing or sign-ups
PUBLIC TRANSIT	• Free/discounted transit pass • Nearby transit stops or shuttles from nearest stop • Flexible work hours • Guaranteed ride home program • Live transit schedules (like TransitScreen) • Subsidized rideshare as a backup • First-/last-mile programs and subsidies

Table 1 is continued on next page

[iv] These amenities encourage regression to driving, so money should first be distributed to amenities related to other modes.

TABLE 1, CONTINUED

COMMUTING BENEFITS PROGRAMS THAT DRIVE CHANGE

COMMUTE MODE	COMMUTING BENEFITS THAT ENCOURAGE ADOPTION
E-BIKE	• Designated parking for e-bike users • Showers/changing rooms/lockers at office • E-bike charging infrastructure • Flexible work hours • Subsidies to purchase e-bikes • Guaranteed ride home program for bad weather/emergencies • Subsidized rideshare as a backup
BIKESHARE	• Nearby bikeshare hub • Free/discounted bikeshare memberships • Showers/changing rooms/lockers at office • Flexible work hours • Guaranteed ride home program for bad weather/emergencies • Subsidized rideshare as a backup
WALK/BIKE	• Ample and accessible bike racks/bike parking • Flexible work hours • Nearby biking and walking infrastructure (i.e., bike lanes, bike paths, walking paths) • Centrally located office space • Guaranteed ride home program for bad weather/emergencies • Subsidized rideshare as a backup

A SEVEN-STEP PROCESS FOR DEVELOPING AN EFFECTIVE COMMUTING PROGRAM

Commuting managers seeking to create or improve their own programs can use Commutifi's Commuter Score to quantify and address problems and evaluate solutions. To do this, commuting managers should follow this seven-step process:

Step 1: Quantify the commuting problem with Commutifi's Commuter Score

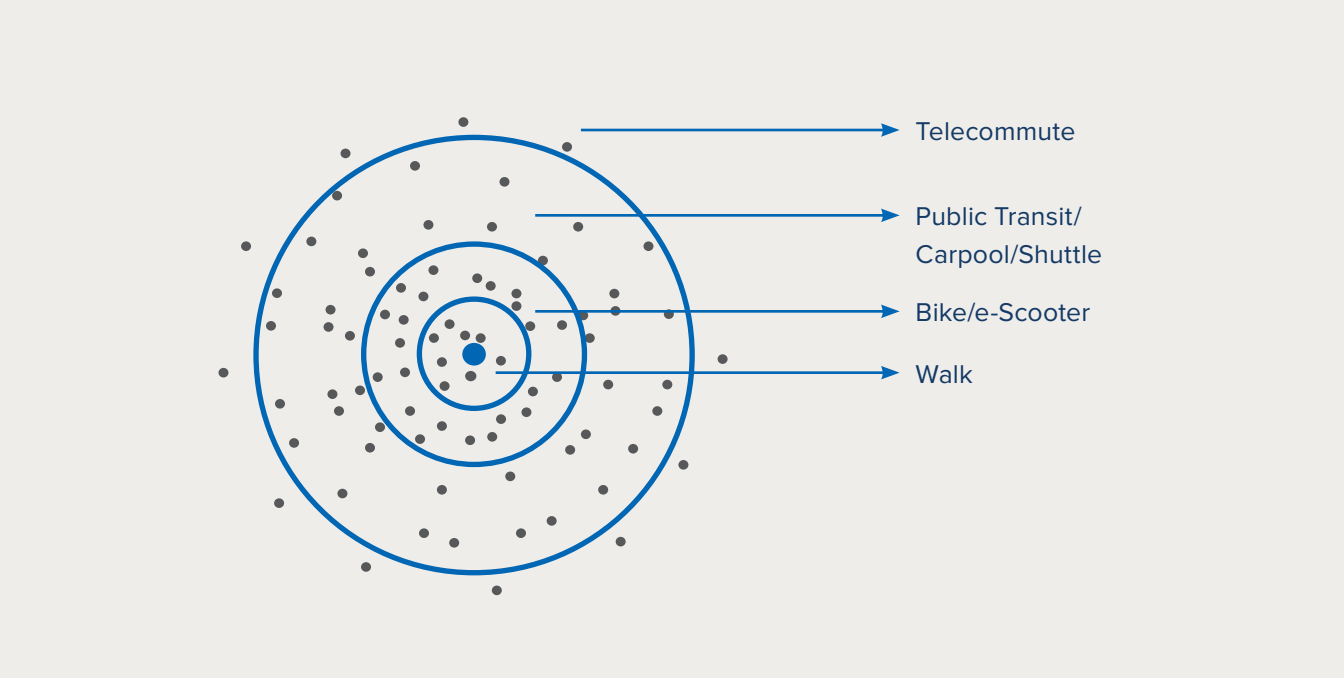
Commuting managers can use Commutifi's Commuter Score to quantify their commuting problem and gather data about their group.

Step 2: Visualize the data and form commuter groups

Key data that need to be understood to establish an effective program include: individual and collective commuting mode split, distance, time, cost, and emissions; personal commute choice attributes (i.e., why do people choose to commute the way they do?); heuristics for personal commute choice (i.e., what specific criteria are important when individuals decide how to commute?); and, availability and utilization of commuting benefits. These data are gathered in Commutifi's Commuter Score survey and can be visualized to better understand commuting trends and form groups. Figure 4 shows one method of grouping individuals and visualizing data.

FIGURE 4

COMMUTER VISUALIZATION AND GROUPING



Each dot represents a commuter's starting location. Rings are used to group commuters by commute distance, which is an important factor in determining available modes. Programs should look to promote and support options optimized for commuters in each ring.

Step 3: Establish objectives and potential budgets
Commuting managers will need to determine their entity's objectives for encouraging commuting change, as well as the budget available for the program. Objectives will be specific to each entity and can focus on saving cost, time, or emissions, as well as on improving employee retention, reducing congestion, or freeing up parking spots. The budget may not come from previously available funds, and commuting managers should consider establishing a budget based on the value of existing assets, like parking spaces.

Step 4: Prioritize and identify target groups
Each commuting group will require different programs to encourage SOV abandonment, and certain groups are more likely to adopt alternative commuting options than others. Therefore, prior to developing a commuting program, commuting managers must identify which group(s) are most likely to make commuting changes that align with the entity's objectives. Commuting managers can use the data collected in Step 1 and visualized in Step 2, along with their specific objectives, to prioritize and identify these groups.

Step 5: Pilot commuting programs and benefits
The specific program will vary based on budget, objectives, and commuter data. Programs designed with behavioral economics in mind will have a greater likelihood of success. However, all programs should be piloted prior to full adoption, as the specific details will likely be improved with iterations.

Step 6: Evaluate effectiveness of pilot through re-scoring using Commutifi's Commuter Score
Commutifi's Commuter Score can be used to evaluate the effectiveness of an incentive or commuting benefits program by providing updated scores whenever users update their commute details. This can illuminate how well the program is going by quantifying the change (e.g., the average score of the target group may increase from 73 to 94, indicating that the program was successful in effecting positive commuting change within that group).

Step 7: If necessary, repeat the process until a suitable program and/or set of commuting benefits is established
Commuting managers will likely need to go through multiple iterations of their incentive or commuting benefits programs to determine the most effective program. Subtle tweaks in the program's structure may have profound effects and can save commuters, cities, and companies time and money. Additionally, new mobility platforms are emerging and evolving, so staying flexible and prepared for changes will ensure a successful program.

THREE TANGIBLE USE CASES

The following are three use cases—a business district, a company in a transit district, and a building complex outside of a transit district—that demonstrate how commuting managers can use the steps described in the preceding section to establish effective commuting programs.

BUSINESS DISTRICT - A BUSY, GROWING DOWNTOWN AREA THAT CATERS TO SHOPPERS, TOURISTS, AND TECH COMPANIES ALIKE

Business District at a Glance:

- Commuters daily: 9,000
- SOV commutes daily: 3,850
- Resident commuters (< five miles) using SOVs: 1,000 = 11%
- Current commuting benefits: free public transit pass, enhanced bike lanes/paths

Commutifi's Commuter Score: 70 (average); 7–100 (range)

Shoppers and tourists have become increasingly agitated with the parking situation in this growing downtown business district. City officials, merchants, and restaurant owners have noticed the direct impact this has had on spending downtown—it seems that potential customers have decided to forgo the pain of finding a parking space during the week and have thus decided to simply avoid the area entirely. City officials believe the solution is to decrease the number of POV commuters to the district each day in order to ensure there is available parking for customers. To develop and establish an effective commuting benefits program, commuting managers from the city do the following:

Visualize the data and form commuter groups

- Two commuting groups—nearby commuters (those that live within five miles of the city) and distance commuters
- 1,000 (11%) resident commuters commute by POV

Establish objectives and potential budgets

- Objectives: (1) Enhance commuter and customer access to downtown by reducing SOV commutes into the area; (2) Reduce the need to construct additional parking spaces; (3) Free up parking spaces in the shopping district during peak hours
- Budget: $300,000 annually—the city justified this budget because 2,700 parking spaces are required to keep up with demand; at $20,000 per parking space, this would require an investment of around $54 million

Prioritize and identify target groups

Target group: nearby commuters who currently commute by POV

Since the objectives focus on reducing congestion and parking demand, the goal focuses only on reducing the number of car commuters. Those living close to the city have relatively greater ability to commute by walking, biking, or taking public transit without significantly impacting their commute times, so they are an easier target group than the longer-distance commuters. Therefore, the focus of the program will be on developing commuting benefits—in addition to those already provided—that encourage non-POV commuting within this group.

Pilot commuting programs and benefits

Commuting benefits program: guaranteed free ride home (and to work) program for walk, bike, and transit commuters

This program provides all individuals the opportunity to try commuting with another mode without the fear of becoming "stranded." The city implements this program for three months and monitors the impact it has on parking availability and economic vitality in the downtown business district.

COMPANY IN A TRANSIT DISTRICT - A COMPANY WITH ACCESS TO PLENTY OF COMMUTING OPTIONS BUT LACKING PARKING AVAILABILITY

Company at a Glance:

- Commuters daily: 100
- Available parking: 40 spots
- Commutes < five miles: 60%
- Commutes < two miles: 30%
- Current commuting benefits: free public transit pass, free bikeshare, carshare, carpool spots, locker rooms, secure bike parking, close proximity to public transit hub and bike paths

Commutifi's Commuter Score: 79 (average); 13–100 (range)

This company is about to move its office to a new building right next door to a transit hub. However, this new office has less parking available, so the commuting manager at the company has to figure out how to decrease the number of distributed parking passes from 60 to 40. Plenty of commuting benefits and alternative commuting options are readily available, but a well-established nudge will still be required to get people out of their cars.

Visualize the data and form commuter groups

- Distance-based groups: 30% under two miles, 60% under five miles, 40% over five miles
- Employees currently parking less than half the week: 15 under five miles, seven over 25 miles

Establish objectives and potential budgets

- Objective: reduce POV commuters to accommodate the lack of parking
- Budget: 60 employees will not be provided a parking spot—at $65 per parking space per month, this leaves the company with an additional $3,900 each month

Prioritize and identify target groups

Target group: nearby employees who currently park fewer than two days each week

The commuting manager needs to reduce the number of parking permits issued. Since individuals who park less than half the week still require the same permit as those who park daily, the former is the easier target group. These individuals already commute by alternative modes, so they do not need to be convinced that the other mode is viable. However, they may need a small nudge to get them to completely give up their permits. This nudge will be less substantial for those who live nearby, so the commuting incentive program should focus on this group.

Pilot commuting programs and benefits

Commuting incentive program: parking cash-out program ($65/month for employees who forgo a parking permit)

This program provides a financial incentive for individuals to forgo a parking permit. It offers enough value ($65 per month) to convince employees living nearby to use a non-POV commute mode. Employees can opt to take the money in their paycheck or have it directly applied to alternative modes, like bikeshare or rideshare. The exact value and distribution of the cash-out needs to be tested, so the company engages in an initial six-month pilot program to test it.

BUILDING COMPLEX OUTSIDE OF A TRANSIT DISTRICT - A NEW COMMERCIAL COMPLEX IN THE TECHNOLOGY-INDUSTRY CENTER OF A LARGE CITY, ABOUT A MILE AWAY FROM THE NEAREST TRANSIT STATION

Company at a Glance:

- Commuters daily: 2,000
- Available parking: 1,000 spots
- Commutes by SOV: 70%
- Current commuting benefits: proximity to public transit (one mile from nearest rail station)

Commutifi's Commuter Score: 63 (average); 2–100 (range)

A property developer is developing the plans for a commercial building complex in the technology-industry center of a large city and wants to construct less parking lot space, and repurpose the land for leasable commercial space. However, it is important that employee commutes stay manageable. Otherwise, companies will not lease the space because long and troublesome employee commutes are known to lead to high turnover rates.[17] The developer is, therefore, looking for alternative options and programs it can provide tenants to help mitigate any potential commuting problems.

Visualize the data and form commuter groups

- Current commute mode groups: 70% by SOV, 20% by transit, 5% by carpool, 5% by active modes
- Living proximity to rail station: 10% within .5 miles, 30% between 0.5-1.5 miles
- 25% living within 1.5 miles of transit station currently commute by SOV

Establish objectives and potential budgets

- Objective: replace six acres of parking lot space with more profitable commercial space
- Budget: six acres of parking space will be replaced by commercial space—at a profit margin of $1 million per acre,[18] this leaves the property developer with $6 million to apply toward the program budget

Prioritize and identify target groups

Target group: employees who live within 1.5 miles of a transit station and currently commute by SOV

The property developer wants to decrease the number of employees who commute by SOV without negatively impacting individual commute time and cost. Therefore, commuters without easy access to alternative commuting options at home are not the best, most cost-efficient group to target. Instead, the property developer needs to focus on commuting benefits programs that help individuals who live near other options—most notably, a transit station.

Pilot commuting programs and benefits

Commuting benefits program: first-/last-mile options, including a shuttle, bikeshare, and e-scooters

The program will focus on providing first-/last-mile options to get commuters to and from the nearby transit station. This seeks to allay concerns that commuters might have about the mile-long walk that adds both time and stress to the commute. Various forms of micro-transit are offered for this service, including shuttles, bikeshare, and e-scooters. The property developer will provide these services for free to tenants of the building complex, and will test out their effectiveness with a year-long pilot.

04 CONCLUSION

CONCLUSION

Concepts from the field of behavioral economics have been integrated into Commutifi's Commuter Score to improve its survey, scoring, and user dashboard, and increase the likelihood that recommendations are accepted and lead to long-term sustained commuting behavior change. Similar concepts can be further utilized by commuting managers to design programs that encourage significant and lasting commuting behavior change. Coupled with Commutifi's Commuter Score, reference points can be used by commuting managers to set commute goals that drive mode choice from SOVs to shared and active modes. Incentive programs, like the one recommended in Figure 3, can help improve individual commutes and save companies, cities, and building owners both time and money.

Though behavioral economic theory is well understood in general, its applications to mobility are sparse. As such, Commutifi's Commuter Score will undergo multiple iterations before finding the most effective scoring system. Nevertheless, Commutifi's tool is an exciting early implementation of behavioral economics for the purpose of positively shifting commuting behavior.

Commuting managers interested in encouraging positive commuting behavior change can use Commutifi's Commuter Score to quantify their current commuting situation, provide personalized recommendations to commuters, and track the precise impact of incentive and commuting benefits programs on commuting habits. Commuting managers will need to be patient as they determine the best methods to select reference points and encourage change through incentive and commuting benefits programs. Though grounded in behavioral economic theory and designed to encourage positive change, the specific structure of the incentive program proposed in Figure 3 and the use cases developed in the preceding section have not yet been tested in the field. Commuting managers who wish to use these structures should be open to adapting them to fit the needs of their organizations and the people who participate in their programs.

Pioneers in this space will continue to develop understanding of how behavioral economics can apply to personal mobility. Open discussion through workshops and partnerships can accelerate this understanding and drive change toward a clean and prosperous low-carbon mobility future.

05 APPENDIX A: BEHAVIORAL ECONOMICS AND NEW MOBILITY

APPENDIX A: BEHAVIORAL ECONOMICS AND NEW MOBILITY

Behavioral economics (BE) is the study of how emotion, attitude, and bias affect the purchasing and saving habits of individuals and organizations. BE is a product of decades-long research into the sometimes elusive reasons behind personal decision-making. In mobility, new technologies are making it easier for people to use low-carbon alternatives to gasoline-powered single-occupancy vehicles. These new technologies—collectively referred to as "new mobility," including services like Uber, Lyft, carsharing, dockless bike-share, electric scooters, and micro-transit—are providing people with more options. But despite ever-increasing numbers of mobility options as well as renewed investment in pilots focused on infrastructure improvements, first-/last-mile connections to and from transit, and streamlining transit coverage areas, driving POVs remains the dominant mode of travel for many people in the United States. In fact, US mode split did not change from 2000 to 2016, and trends suggest that overall vehicle miles travelled is increasing.[19] As dense populations exacerbate traffic congestion, air pollution, and the strain on public infrastructure, leaders need to embrace strategies that prompt positive behavior change.

RMI has identified BE as a useful low-cost tool to facilitate adoption of low-carbon mobility. BE is based on the concept of bounded rationality: human decisions are limited by thinking capacity, available information, and time.[20] In contrast to traditional economic theory, which assumes people make rational choices based on a careful review of logic and data, BE argues that people are irrational actors who make decisions based on emotion and subjective factors. Despite one's best intentions, culture and upbringing weigh heavily in deliberations regarding new mobility.

Digitization and increased levels of connectivity are reshaping the mobility sector. Electrified fully autonomous vehicles (AVs) promise exciting benefits for reducing emissions and improving vehicle safety.[21] But acceptance of new technologies such as shared AVs will ultimately depend on people's positive or negative experience with not owning a car more than on how much money or time it saves them. Realizing highly disruptive scenarios—for example, most people abandoning car ownership in favor of driverless Mobility as a Service—will require overcoming biases and misconceptions that reinforce car ownership. By understanding the social and psychological components of human decision-making, interested parties can design interventions that nudge people toward sustainable travel modes. In the following, we introduce some key BE principles, and their possible applications to mobility decision-making.

HEURISTICS: MENTAL SHORTCUTS THAT SIMPLIFY DECISION-MAKING

BE suggests that people's limited capacity to process large amounts of information can lead us to use mental shortcuts, or heuristics.[22] Mental shortcuts substitute complex questions for easier ones that can be answered with minimal mental effort. But, these shortcuts often lead to suboptimal outcomes.

BE identifies several heuristics that influence how people evaluate alternatives and make decisions. One heuristic that plays a significant role in mobility decision-making is the availability heuristic, a shortcut that people use when making decisions whereby the likelihood of an event is based on how easily an example can be recalled. For example, a single poor experience, such as an unusually long wait for the bus, may lead an individual to believe that "buses *always* run late."

With no true way to know if buses always run late, this person may draw on an easily recalled example to conclude that they do. By making this broad assumption, the person will not have to think again about whether or not to take the bus: *buses run late, and therefore they are not a good option*. In this case, BE principles suggest that reducing stress associated with waiting times can improve perceptions of punctuality. Smartphone applications that show the real-time, exact location of a bus can be an effective way to address this problem by reassuring riders that the bus is on its way.

STATUS QUO BIAS: PEOPLE SHOW A STRONG PREFERENCE FOR THINGS THE WAY THEY ARE, AND ARE RELUCTANT TO EMBRACE, OR ARE SKEPTICAL OF, CHANGE

BE provides numerous examples of the effects of inertia—a strong desire for consistency—on human decision-making and how this biases decision-making toward doing nothing or making no changes, often resulting in suboptimal outcomes. One of the most prevalent biases in human decision-making is the status quo bias. Status quo bias describes a behavioral mindset in which people prefer things to stay the same by doing nothing, or by sticking with previously made decisions.[23] This inertia may exist even when transition costs are small or the importance of a decision is high.

Status quo bias is pervasive in mobility decision-making, as an overwhelming number of people choose SOVs even when better transportation services may be available. Despite the benefits of alternatives such as carpooling, public transit, and walking or biking, the human preference for the status quo ties individuals to that with which they are most familiar. An innate preference for simplicity, which conserves precious mental bandwidth, can lead to overvaluation of current possessions or circumstances, which in turn reinforces the status quo.

BE principles suggest that status quo preferences can be reoriented by framing alternatives in a manner that amplifies their benefits and normalcy. These attributes may be contrasted against unfavorable characteristics or by-products of the status quo. For example, the financial benefits of carpooling or the health benefits

of biking can be highlighted and contrasted favorably to the expense and negative environmental impacts of driving cars. Still, the mere awareness of new benefits is not always enough to change behavior since benefits offered by the status quo are typically given more weight. This is evident in commuting habits today, as the proliferation of transportation alternatives has not substantially changed preference for SOVs. Those advocating behavior change must commit to sustained communication of benefits. Since people look to others for cues on how to act, reshaping social norms can be highly effective in accelerating behavior change.

SOCIAL PROOF: PEOPLE REFERENCE THE BEHAVIOR OF OTHERS TO GUIDE THEIR OWN BEHAVIOR[24]

The concept of social proof suggests people generally desire to be like everyone else, and look to others for cues on how to behave, dress, or respond to certain stimuli. These cues guide individual conduct in particular social groups and contexts, such as at work, among friends, and in public settings. Following cues and adhering to unwritten rules, or social norms, is useful because it maximizes opportunities for inclusion, and minimizes the risk of ostracism. A frequently cited example of social proof is the use of laugh tracks in sitcoms, which have been shown to induce laughter.[25] The laugh track signals that others find something funny, so people laugh to reinforce their belonging among those exposed to the same stimulus. The desire to fit in can be leveraged at key points in the decision-making process, and enhance behavior change tactics employed through choice architecture.

CHOICE ARCHITECTURE: THE PRACTICE OF INFLUENCING DECISIONS BY MANIPULATING THE WAY IN WHICH OPTIONS ARE PRESENTED

How and when different options are presented is a prime example of BE in action. BE finds that choices can be worded, or framed, in a way that highlights the positive or negative aspects of the same decision,

leading to changes in their relative attractiveness.[26] Choice architecture is the practice of influencing decisions by changing the way in which options are presented. For example, beef advertised as 95% fat-free has proven to be more desirable to consumers than the same product advertised as having 5% fat.[27]

Another key aspect of choice architecture is the setting of defaults. Default options are preset courses of action that take effect if no action is taken by the decision maker.[28] Setting defaults is a particularly powerful device for leading people to desired outcomes. The decision maker is prompted to the best outcome without having to weigh the costs and benefits of the other options that require deliberate action to take effect. Defaults also strongly imply either what the best option is or the option that most people take. Once again, the decision maker often accepts this guidance, as it is both easier than thinking through the problem oneself, and aligns choices with those (presumably) taken by one's peers.

One of the most successful examples of default applications has been with 401(k) participation. 401(k)s are defined-contribution retirement plans that employees can use to have part of their pre-tax pay

put into an interest-bearing account that will be held tax-free until the money is actually withdrawn, which is usually at retirement.[29] There are several important decisions associated with 401(k) participation, such as whether or not to enroll at all, how much to set aside, and which investments to make. Since it is easier to do nothing than to research and weigh the benefits of each individual decision, historically, many people have simply chosen not to enroll. To improve participation, some employers have changed the way 401(k) participation is presented to employees by setting enrollment as the default choice. With the default set to enrollment, employees must take deliberate action to opt out or decline to enroll. This simple adjustment has had a significant impact on 401(k) participation for employers presenting enrollment as the default choice: according to one of the largest investment companies, Vanguard, employees presented with plans with the default set to enrollment had a 90% participation rate in 2016 compared to a 63% participation rate for employees hired under plans without the feature.[30]

Companies may use similar techniques when issuing parking benefits to nudge employees toward less resource-intensive options. If an employee is shown three options, with the default being a carpool-only space, they may be more likely to choose it because they may assume most other employees carpool to work and make that selection. At a minimum, it sets a different status quo and helps to establish a cultural norm within the organization that carpooling is a valued choice. In this case, both parties stand to benefit, as the employer and employee will save on parking costs.

LOSS AVERSION: PEOPLE TRY TO AVOID LOSSES MORE THAN THEY TRY TO ACHIEVE GAINS

Another finding of BE is that the pain associated with losses is twice as powerful as the pleasure associated with gains.[31] This is consequential in decision-making because people tend to overvalue what they own and the prospect of dispossession causes them to favor the status quo. More importantly, since losses are painful, people are more likely to take risks in order to avoid a loss than to gain benefits (even if the gains outweigh the losses) or even maintain the status quo. The concept of loss aversion can explain why penalties are sometimes more effective than rewards in triggering behavior change.[32]

Employers interested in steering employees toward public transportation can leverage loss aversion simply by increasing parking prices. Even for an employee who is unfamiliar with public transit, the pain of parking price increases may loom larger than the risk associated with trying a new commute mode. In addition, if paired with an incentive to use public transit, the employee will have two very compelling reasons to change behavior: a financial penalty for maintaining the status quo and an emotional incentive to avoid that penalty by using public transit.

BE recognizes that people often overvalue their material possessions. It is assumed that this also applies to habits. However, it is less clear if this determination should actually be applied to habits, and specifically driving habits. Can affinity for material goods be equated to a preference for driving? Are people reluctant to give up their cars simply because they would view that as a loss, or does personal transportation play such a large role in life that it cannot be evaluated in such a narrow manner? More research is needed to understand how loss aversion can influence mobility decision-making, if at all.

CONCLUSION

US cities, states, and businesses know that shifting people's preferences will be critical to unlocking the shared benefits of new mobility. As GHG emissions from personal mobility continue to rise, it is more important now than ever to transition away from gasoline-powered SOV travel toward more sustainable modes.

Traditional transportation-planning approaches conclude that simply providing more options and reducing the time and cost of those alternative options will be enough to create this change. However, it is increasingly clear that this approach is not working. BE can be incorporated into many aspects of transportation policy, including program and product design, to accelerate adoption of less carbon-intensive alternatives. To be successful, we must first understand how people make decisions, what shapes current preferences, and what keeps them from trying potentially better services. BE offers a new set of tools to diagnose barriers and identify innovative pathways to new mobility adoption. Still, more research is needed to understand how BE can be applied in the mobility space. By continuing to develop our understanding of BE principles, we can more quickly realize the shared benefits of an electric and autonomous new mobility future.

06

APPENDIX B : SUMMARY OF BEHAVIORAL ECONOMICS PRINCIPLES AND TACTICS

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Summary of key behavioral economics principles, their mobility context, and suggested behavioral engagement tactics.

CONCEPT	DEFINITION	MOBILITY CONTEXT	SUGGESTED TACTICS
STATUS QUO BIAS	People prefer things to stay the same by doing nothing (inertia), or to stick with a decision already made.	Despite the proliferation of new mobility services, SOVs remain the preferred choice among most commuters.	• Choice architecture that emphasizes benefits of the alternatives (positive framing). • Introduce new social norms through observability/peer influence. • Increase access to and trialability of alternatives. • Leverage fear of missing out (FoMo).
AVAILABILITY HEURISTIC	Judgments measuring the likelihood or frequency of an event are based on how easily an example or instance can be recalled.	A poor experience, e.g., a long bus wait, leads an individual to believe that "buses *always* run late."	• Increasing levels of connectivity and access to real-time information can dispel negative perceptions through positive framing.[33] • Sustained marketing initiatives that highlight success and satisfaction of alternatives.
CHOICE ARCHITECTURE	The practice of influencing choice by changing the manner in which options are presented to people.	Mobility choices should be presented in a manner that amplifies benefits of preferred alternatives, while contrasting these attributes against unfavorable characteristics or possible outcomes of the status quo.	• Emphasize benefits over risks or losses (e.g., on-time 95% vs late 5%). • Present a decoy choice (e.g., a personal parking space at a much higher cost placed alongside a more reasonably priced shared space). • Set default choices to the desired outcome.
CHOICE OVERLOAD	The greater the number and/or complexity of choices offered, the more likely a consumer will take mental shortcuts to substitute a difficult question with an easier one.	Choice-overload scenarios: • Consumers may have multiple transportation apps that are not synced. • Complex train/bus schedules and fare grids. • Multiple transportation options with comparatively similar/equal costs and benefits.	• Consolidate transportation services in a single app. • Chatbots/natural language processing technologies can be used to simplify the user experience with multimodal apps.

CONCEPT	DEFINITION	MOBILITY CONTEXT	SUGGESTED TACTICS
TIME DISCOUNTING	Present rewards are weighted more heavily than future ones. Once rewards are considered too distant, their persuasion and perceived value are reduced.	Delayed disbursement of rewards, however practical or necessary to ensure compliance and sustainability, devalues the reward and reduces conversion rates.	• Financial incentives for mode-shift should be distributed quickly and/or up front (appeal to innate desire for instant gratification).
SCARCITY HEURISTIC	When an object or resource is less readily available, people tend to perceive it as more valuable.	Presenting subsidies as limited, one-time-only opportunities might encourage immediate changes to improve commuting scores and to take advantage of a subsidy or amenity.	• Time-sensitive price structure: incentivize purchase of lower-priced services in advance, as prices will rise later on, or the amenity will become unavailable. • Emphasize potential loss (vis-à-vis inaction) to compel action.
ZERO PRICE EFFECT	The zero price effect suggests traditional cost-benefit models cannot account for the psychological effect of a free good. It instead suggests that there will be an increase in a good's intrinsic value when the price is reduced to zero.	Fully subsidized (free) transportation amenities will be valued more by the end user than partial subsidies or future reimbursements (see temporal discounting), and are therefore more likely to be used.	• Provide free amenities up front and early on in the behavior change process. • Design commuter scoring to encourage a perfect score, which is functionally equivalent to a cost- and carbon-free commute.
ROUND NUMBER CLUSTERING	Round numbers have particularly strong motivational—and potentially demotivational—consequences as people are psychologically drawn to, and more satisfied by, round number performance scores (e.g., 0s, 5s, 10s).	Commuter scoring can leverage this psychological preference for round number performance measurements by creating incentives tied to reaching higher round number brackets, e.g., raising a score of 78 to 80.	• Bracketing benefits by round number achievements, with disincentives for backsliding to a round number (e.g., from 77 to 75). • Real-time data collection can be used to alert users to potential loss of benefits (score backsliding), and leverage loss aversion.

CONCEPT	DEFINITION	MOBILITY CONTEXT	SUGGESTED TACTICS
ENDOWMENT EFFECT	People overvalue goods that they already own, regardless of their objective market value.	People will overvalue their SOVs, even when viable alternatives exist. Change is therefore unlikely unless the alternative is at least three times better, observable, and trialable.	• Structure benefits to ensure alternative options are three times better (e.g., subsidized Uber/Lyft for employees who walk/bike to work in case of bad weather). • What is better is inherently subjective and will vary by individual. Discovering baseline criteria (one times as good) is essential for creating three-times better products and services.

07 ENDNOTES

ENDNOTES

[1] Kiron Chatterjee, Ben Clark, Adam Martin, and Adrian Davis, "The Commuting and Wellbeing Study: Understanding the Impact of Commuting on People's Lives," UWE Bristol, UK (2017).

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