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Carbon Weight and Body Weight: US and UK Surveys on Diet, Exercise, and Energy Use

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Abstract

Energy Diet is a design concept for a digital bathroom scale that displays personal health information in the form of body weight alongside environmental health information in the form of carbon weight. We intentionally conflate these two types of feedback in an effort to encourage people to regularly monitor their energy use as they weigh themselves and to reflect on the complex relationships between personal health and environmental health. To inform our design we administered two surveys with 500 participants in the United States and the United Kingdom. We hope to understand the preferences and habits from a broader range of participants, and understand how people interpret the term Carbon Weight, and perceive the relationship between body weight and Carbon Weight.

The full results of each survey question are delivered starting from page 5. Our survey results suggest that bathroom scale ownership and use is widespread and that people generally believe that the scale helps them live a healthier life. The surveys also reinforced prior work that people lack an understanding of energy use in terms of its magnitude and basic units of consumption. Though people are familiar with the term kWh, few of them can correctly explain what it means. People also have little knowledge of how much electricity is drawn from various household appliances. In our second survey, we tested design concepts as well as people's reaction to the term "carbon weight". For the most part, respondents were receptive to the term and interpreted it as we expected. Furthermore, the juxtaposition of carbon and body weights as they changed over time was thought-provoking and prompted people to construct interesting explanations for how the two metrics might be related.

Keywords

Environmental sustainability; eco-feedback; bathroom scale; health and fitness; survey

Carbon Weight and Body Weight: US and UK Surveys on Diet, Exercise, and Energy Use

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ABSTRACT

Energy Diet is a design concept for a digital bathroom scale that displays personal health information in the form of body weight alongside environmental health information in the form of carbon weight. We intentionally conflate these two types of feedback in an effort to encourage people to regularly monitor their energy use as they weigh themselves and to reflect on the complex relationships between personal health and environmental health. To inform our design we administered two surveys with 500 participants in the United States and the United Kingdom. We hope to understand the preferences and habits from a broader range of participants, and understand how people interpret the term Carbon Weight, and perceive the relationship between body weight and Carbon Weight.

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SUMMARY OF RESULTS

Bathroom Scale Ownership and Use

Results of survey 1 indicate that the majority of the US and UK respondents reported they own a bathroom scale (66% in the US and 73% in the UK). Similarly, 74% of the 300 respondents in survey 2 expressed they own a bathroom scale, and 55.3% of them weigh themselves at least once a week.

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In survey 2, we have asked participants their attitudes and feelings about the bathroom scale. We found that respondents generally trust their scales -45.3% gave a trust score of 4 on a 5-point scale (5: most). 51.3% of the respondents think that the bathroom scale has a neutral effect on their lives while 36% of them think it has a positive effect. More importantly, 57% of respondents think that the bathroom scale helps them live a healthier life while 39% expressed that it doesn't help. Those who find the scale helpful said it helps them keep track of their weight, makes them more aware, and helps them reduce their weight. Those who think the scale doesn't help them live a healthier life because it makes people obsessive and worry, and that weight isn't an indicator of overall physical health.

People's Understanding of kWh

We have taken the initiative to further examine how people interpret "kilowatt hour (kWh)" by asking them to describe its meaning in an open-ended question from both surveys, resulting in a total of 500 responses. Each response was coded manually using the coding scheme on page 18 (Q19). Two raters independently coded 100 responses obtaining an agreement rate of 96.1% (Kappa=0.81).

First, our results confirm that people don't truly understand what kWh means despite the fact that many of them mentioned they are familiar with the term "kWh". This phenomenon is reflected in the findings of both surveys. For instance, up to 48% of survey 2 respondents chose kWh as the energy consumption unit that helps them understand their energy use because it is the term they are most familiar with. However, only 12.6% of the respondents are able to correctly describe the meaning of kWh out of the 500 responses.

Second, it is noteworthy that up to 29% of the 500 responses show that respondents misunderstood the kWh concept, and they think it means energy consumption per hour (*"the amount of electricity I use per hour"-survey 2-90*). This "per hour misconception" is seen in both surveys and across UK and US respondents. In fact, only about 6% of the 500 responses give precise definition of kWh (*"It's an energy unit and it's is equal to 1000 watt hours or 3.6 mega joules."-UK 78*). Regardless, people have different interpretations of the meaning of kWh. 29% of the respondents understand kWh as a unit or

measure of energy or electricity consumption. Up to 43% of participants thinks kWh represents the amount of consumption, meaning the quantity of energy use ("Kilowatts per hour is how much power you use."-US 28). 12% indicated kWh refers to the energy required to run an appliance and device, or to power the house ("amount of electricity an appliance uses in one hour"-UK 74); 5.4% understand it from the cost perspective and say it's a billing unit used by utility company ("This is usually used on your electricity bill to show how many energy you've used."- survey 2-254). Other responses include: kWh is a rating ("It is a rating that is essentially one kilowatt of electrical energy used per hour."-US 59), an electrical or energy term ("I believe that the term is used for electricity usage"-US 82), or the energy used in an hour ("I know it has something to do with electricity. I assume how many kilowatts are used in one hour."survey 2-243).

People's Understanding of Household Appliances

In survey 1, we have asked respondents to rank 10 household appliances in the order of their electricity consumption, assuming an equal amount of time of use (1: most to 10: least). These appliances include: lights, TV, dishwasher, refrigerator, washing machine, oven, dryer, computer, fans, and coffee maker. Results show that respondents have less knowledge on the electricity consumption of household appliances.

Among these appliances, dryer and oven fall in the highest bracket of electricity consumption (above 2000 watts, rank 1st or 2nd), dishwasher and coffee maker fall in the middle-to-high bracket (between 1000-2000 watts, rank 3rd or 4th). Washing machine, refrigerator, and TV fall in the middle bracket (150-999 watts, rank 5th~7th) while computer, fans, and lights are in the low bracket of electricity consumption (below 150 watts, rank 8th~10th).

To our surprise, we found that only 16% of the US respondents and 22% of the UK respondents are able to correctly point out dryers and ovens as the appliances consuming the most electricity, and rank them as 1^{st} or 2^{nd} . Interestingly, both in the US and the UK, respondents have the tendency to underestimate the electricity consumption of coffee maker (US: 75%, UK: 40%, and ranked it as the 9th or 10th); to overestimate that of lights (US: 27%, UK: 17%, and ranked it as the 1st or 2nd) and washing machine (US: 24%, UK: 27%, and ranked it as the 1st or 2nd); and have the incorrect idea that a washing machine consumes more electricity than a dryer (US: 48%, UK: 49%).

People's Reactions to Carbon Weight

Prior to being told what Carbon Weight means, survey 2 respondents were asked what Carbon Weight means in the first question. They interpreted Carbon Weight from different perspectives, including who and what causes it, where it goes, and when it is produced. Out of the 300 responses, there is one negative answer (*"To me, it's*")

another useless propaganda term like "global warming."-R136). Roughly 21.7% of the respondents think Carbon Weight represents the CO₂ generated from different types of human behaviors and actions in everyday life, from breathing, pollution, traveling, to driving, eating, cooking, recycling, purchasing and consuming products, as well as manufacturing. For example, one respondent wrote "Carbon Weight is the amount of carbon dioxide released into the air due to activities because (1) electric use (2) driving a car, (3) cooking food and eating, and (4) using many other products." About 15.7% of the respondents linked it to carbon footprint or carbon emissions ("I think it is likely a synonym for Carbon footprint."-R77). Other types of response include: carbon released from objects or products such as devices and foods, carbon/ carbon dioxide released into the air, and the impact of CO₂ on the planet.

After knowing the definition of Carbon Weight, respondents were then asked how concerned they are about it. Overall, people are concerned about Carbon Weight: 36% of them used the score of 3 on a five-point scale (5: most concerned) to express their concern, followed by the score of 4 (25%). Similar to one's expectation on body weight, up to 94% of the respondents think it is better to have less instead of more Carbon Weight.

People's Understanding of the Relationship between body and carbon weights

In survey 2, we have asked five open-ended questions to understand how people understand the relationship between body weight and Carbon Weight. First, respondents were asked "how do you think your Carbon Weight relates to your body weight?". 23.3% of the respondents believe there is no relationship between body weight and Carbon Weight; 30% of the respondents believe there is a positive relationship between the two – Carbon Weight increases as body weight increases. Moreover, 8.7% of the respondents related Carbon Weight to body weight by comparing their amounts. Relatively more people think the value of Carbon Weight should be less than body weight. Other responses include the relation between BW and CW lies in one's lifestyle, one's food consumption, and how active one is. ("it probably relates in terms of lifestyle. Someone with a healthy lifestyle probably has a good carbon weight."-199).

Second, respondents were asked a series of four questions on how they would interpret and respond to the scenarios where body weight and Carbon Weight change in the same direction versus different directions (Figure 1). Suppose the image below shows your body weight and Carbon Weight compared to last week.

Please describe how your body weight and Carbon Weight change. Suppose another image below shows your body weight and Carbon Weight compared to last week.

Please describe how your body weight and Carbon Weight change.



Do you think seeing these numbers might change your behaviors (based on the previous question)? Why or why not? Do you think seeing these numbers might change your behaviors (based on the previous question)? Why or why not?

Figure 1. Body and carbon weights change in same direction (left) versus in different directions (right).

Reactions When Body and Carbon Weights Both Increase: For this scenario, up to 52.3% of the respondents think there is a positive correlation between the two numbers. Four respondents particularly attributed the increase of Carbon Weight to the increase of body weight. On the other hand, five respondents pointed out the different factors that contribute to the increases of body weight and Carbon Weight (55: "My body weight has increased due to higher consumption of food and my Carbon Weight has increased due to higher consumption of resources and use of technology that produces CO_2 ."). There are also instances where respondents are only concerned about their body weight. About 17.3% of the respondents firmly expressed seeing these numbers might change their behaviors while 20% stated they will not make any changes. Those who are willing to change their behaviors mentioned the numbers make them feel the guilt and the need to decrease, and help them keep track on things (176: "Yes. Just like actual weight, people may feel the need to reduce the numbers presented to them in carbon weight."). Reasons pointed by those who won't change include: need to perform everyday activity (159:

No, because I really can't change my weekly routine."), need to know the baseline, prefer to stay comfortable, and already feel satisfied with their current lifestyle and weight.

Reactions When Body and Carbon Weights Change in Different Directions: Interestingly, respondents have quite different reactions to this scenario. 5.3% of the respondents expressed it is confusing and makes no sense to them ("the weight went down and the Carbon Weight went up, this is counter intuitive to me."-110). 6.3% mentioned it made them think there is no link between body weight and Carbon Weight ("It doesn't seem that body weight really effects the carbon weight since the carbon weight went up even though body weight dropped."-278) while 10.7% changed their view and said body weight and Carbon Weight are negatively correlated. Only twenty respondents were able to describe various possible scenarios that could result in the decreased body weight and the increased Carbon Weight. For example, change of driving, exercising and eating behaviors could be beneficial to personal health yet detrimental to the environment (82: "A person may have driven more to the gym or go to a specialty store to buy healthier food. " 259: "Going to the gym and using the treadmill to burn fat may have been compensated by the increase in electricity usage at the gym."). 49.3% of the respondents declined to change their behaviors for various reasons. For instance, some believe the decrease of body weight causes the increase of Carbon Weight, and they don't want to increase their body weight to decrease Carbon Weight. Regardless, about 10% of the respondents suggested ways to lower their Carbon Weight ("I might jog outside to lose weight as opposed using electronic workout equipment."-119; "I may become more conscious about my driving habits."-181).

EXTENDED RESULTS

Survey 1

US & UK: Diet, Exercise, Energy-Use & Bathroom Scale Use Habits

Introduction

The purpose of the first survey was to gain insight into potential users' knowledge about electricity consumption due to household appliance use; to gauge environmental attitudes and knowledge; and to assess the extent of bathroom scale ownership and use. Survey 1 was administered on Amazon Mechanical Turk from March to July in 2013. Mechanical Turk was chosen for its convenience in recruiting participants from different countries. A total of 200 anonymous respondents were recruited from the United States and the United Kingdom (US: 100, UK: 100). Respondents earned \$1 for completing the survey. Survey 1 consisted of 30 multiple-choice questions and two open-ended questions. Fifteen of the questions were adopted from existing surveys on health and energy use [1, 2, 3, 4, 5]. Overall, the participant profiles in the US and UK were similar.

Respondents Profile



1. What is your gender?

2. What is your current age?



3. What is your current marital status? (Select one)



4. Who do you live with?

More UK respondents live with roommate(s) compared to US respondents (US: 7%, UK: 17%, $X^2=4.735$, p=0.030).



5. Please identify the type of the building you live in.



6. What is the highest level of education you have completed?





7. Which category below best describes your personal income before taxes for 2011-2012?



8. Which country do you reside in?

US: 100 respondents. UK: 100 respondents.

Results

1. How would you describe the extent to which you lead healthy lives in general?



2. Which of the following best describes what you are currently doing regarding your weight? (Select one)



3. How often do you exercise?



4. Where do you exercise? (Select one that occurs to you more frequently.)

It is worth noting that more US respondents (26%) used electric exercising machine than UK respondents (14%), whether at home or in the gym (X^2 =4.500, p=0.034).



5. Why do you exercise? (Select one that is most important to you)



6. Would you use any of the following terms to describe your diet? (Check All that apply.)

The number of UK respondents who are vegetarian (21%) is almost three times of the US respondents (7%) (X^2 =8.140, p=0.004).



7. How important is cost to you in your choice of products?



8. How important is convenience to you in your choice of products?



9. How important is quality to you in your choice of products?



10. How important is environmental impact to you in your choice of products?





11. How much of an impact does taste have on your decision to buy foods and beverages?

12. How much of an impact does price have on your decision to buy foods and beverages?

"Price" plays a less important role in the UK respondents' purchasing decisions of foods and beverages (X^2 =10.785, p=0.013).



13. How much of an impact does healthfulness have on your decision to buy foods and beverages?



"Healthfulness" plays a less important role in the UK respondents' purchasing decisions of foods and beverages $(X^2=9.561, p=0.023)$.

14. How much of an impact does convenience have on your decision to buy foods and beverages?



15. How much of an impact does environmental impact have on your decision to buy foods and beverages?

"Environmental impact" plays a less important role in the UK respondents' purchasing decisions of foods and beverages $(X^2=9.920, p=0.019)$.



16. How much have you read or heard about the concept of sustainability in food production?

More than twice of the respondents in the US compared to the UK has <u>never</u> read or heard of the concept of sustainability in food production (US: 20%, UK: 7%, X^2 =10.675, p=0.014).



17. Which of the following, if any, do you purposefully do on a regular basis? (Check All that apply.)

- More US respondents buy foods and beverages with the word "natural" on the label compared to UK respondents (US: 52%, UK: 29%, X²=10.004, p=0.002).
- More US than UK respondents buy foods and beverages that have "organic" on the label (US: 50%, UK: 26%, $X^2=12.224, p=0.000$).
- More UK respondents purchase products that employ cost/energy-efficient production/ distribution methods (US: 4%, UK: 14%, X²=6.105, p=0.013).

Results for each option:

| Option | US (number of respondents) | UK (number of respondents) |
|--|----------------------------|----------------------------|
| Buy foods and beverages that are advertised as "local" | 40 | 40 |
| Buy foods and beverages at farmers markets | 44 | 34 |
| Buy foods and beverages in recycled and/or recyclable packaging | 43 | 35 |
| Buy foods and beverages with the word "natural" on the label | 52 | 29 |
| Buy foods and beverages packaged using reduced materials (e.g. less plastic) | 37 | 35 |
| Buy foods and beverages that have "organic" on the label | 50 | 26 |
| Purchase products made by companies that donate to charitable causes | 22 | 20 |
| Grow your own food | 27 | 27 |
| Purchase products from companies that are ranked high in sustainability rating programs | 6 | 12 |
| Purchase products that employ cost/energy-efficient production/ distribution methods | 4 | 14 |
| None | 16 | 16 |

18. How familiar are you with the term "kilowatt hour (kWh)"?



More US respondents (26%) than UK respondents (14%) checked the answer "not at all familiar with kWh" (X^2 =12.426, p=0.006).

19. Can you describe what "kilowatt hour (kWh)" means?

We have taken the initiative to further examine how people interpret "kilowatt hour (kWh)" by asking them to describe its meaning in an open-ended question in both survey 1 and 2, resulting in a total of 500 responses. Each response was coded manually using the coding scheme developed below. Two raters independently coded 100 responses obtaining an agreement rate of 96.1% (Kappa=0.81).

Coding Scheme:

- o Don't Know (no idea, never heard of the term, no knowledge, not familiar)
- Unit (a unit/ measure of energy consumption)
- Energy (only mention related words such as "energy/ power/ electricity")
- Term (a energy/ electrical term)
- Quantity (amount of electricity consumption)
- o Rate
- Home (mention energy consumption at households/ home)
- o Per Hour Misconception
- Examples (use examples to describe)
- Definition (give precise definition)
- Cost (cost/ billing unit used in electricity bill)
- Appliance (energy consumption of an appliance/ device/ product)
- Production (energy consumption of manufacturing/ production)
- Emotional (negative emotional words)

20. Please rank the following 10 appliances in the order of their electricity consumption.

Assume an equal amount of time of use. (1:least to 10:most)







21. Please use the scale below to indicate how much you agree or disagree with the following statements.

In terms of the attitudes on whether environmental concerns have been overblown, more US (82%) respondents than UK (69%) respondents disagree with this statement (X^2 =9.293, p=0.026).



22. Do you have a bathroom scale?



23. How often do you weigh yourself? (Select one)



24. Where do you usually use a scale to weigh yourself? (Select one that occurs to you more frequently.)



Survey 2

US: Reactions toward Carbon Weight & Energy Diet

Introduction

Survey 2 focused on US respondents and examined their attitudes toward the term "carbon weight" and toward the idea of using a bathroom scale as an eco-feedback display. Survey 2 was administered on Mechanical Turk in June 2013. We collected 300 anonymous responses, and each participant earned \$1. Survey 2 consisted of 37 questions, including 20 multiple-choice and 17 open-ended questions. We manually coded 300 responses for each of the 17 open-ended questions, and presented both quantitative and qualitative analysis below. Percentages reported for the open-ended questions may not add up to 100%, as participant responses may have been coded in multiple ways.

Respondents Profile









3. Which state do you currently reside in the U.S.?



4. Would you use any of the following terms to describe your diet? (Check All that apply.)



5. What is the highest level of education you have completed?



6. Which category below best describes your personal income before taxes for 2011-2012?



Results

1. What do you think the term "Carbon Weight" might mean?

- Respondents interpreted Carbon Weight from different perspectives, including who and what causes it, where it goes, and when it is produced.
- Out of the 300 responses, there is one negative answer (*"To me, it's another useless propaganda term like "global warming."*-R136.)
- Most common response (21.7%): Carbon Weight referred to the CO₂ generated from human behaviors.
- Another 15.7% of the responses linked the term to carbon footprint or carbon emissions.
- Other responses included: carbon released from objects or products such as devices and foods, carbon released into the atmosphere, and the impact of CO_2 on the planet.

2. "A person's Carbon Weight is the amount of carbon dioxide (CO_2) released into the atmosphere (in one week) due to activities such as using electricity, driving, cooking, and consuming food or products that were generated or transported using fossil fuels. It could be measured using sensors installed in homes to record the CO_2 you produce from your daily activities."

Do you think it's better to have more or less Carbon Weight?



3. What do you think an appropriate unit of measure would be for Carbon Weight?

The top three units respondents mentioned are: pounds, ounces, and tons. The list below shows a range of respondents' answers:

- Units of weight: pounds, ounces, kilogram, gram
- Units of volume: ml, gallon
- Unit of measuring gas: pounds per square inch
- Units of measuring pressure
- Units of measuring volume
- Units of measuring length: centimeter
- Carbon weight per person
- % of weight
- No idea



4. In a 5 point scale, please indicate how concerned you are about Carbon Weight.

5. If it could be measured, what do you think your Carbon Weight would be for the past week? Please also explain how you come up with this value.

Respondents estimated their Carbon Weight for the past week differently. Some gave **random numerical values** such as 2, 5, 100, 1000 in various units, while some used "**low, medium, high, or above average**" to describe their consumption level in comparison with others. They tend to use **certain behaviors** such as driving, using electricity & A/C, and food consumption (e.g. meat) as the basis to determine the level of their Carbon Weights. Several respondents mentioned their Carbon Weights are low because they don't own a car or they walk & bicycle a lot, while some indicated high level due to intense use of A/C.

6. How do you think your Carbon Weight relates to your body weight?

- 23.3%: No relationship between body weight and Carbon Weight.
- 30%: Positive relationship between body weight and Carbon Weight (Carbon Weight increases as body weight increases.)
- 8.7%: Relate Carbon Weight to body weight by comparing their amounts.
- Other responses: Relations between body weight and Carbon Weight lies in one's lifestyle, one's food consumption, and how active one is.

7. Which of the following designs is most useful for understanding what 78 pounds (lb) of Carbon Weight means?

(Choose one)





8. Suppose the image below shows your body weight and Carbon Weight compared to last week. Please describe how your body weight and Carbon Weight change.



- 52.3%: Perceived positive correlation between the two numbers.
- 4 respondents: Particularly attribute the increase of Carbon Weight to the increase of body weight.
- 5 respondents: Point out the different factors that contribute the increases of body weight and Carbon Weight, respectively.

9. Do you think seeing these numbers might change your behaviors (based on the previous question)? Why or why not?

- 17.3%: Gave a clear YES answer to this question. They mentioned the numbers make them feel the build and the need to decrease, and help them keep track on things.
- 20%: Gave a clear NO answer to this question. Reasons included they need to preform everyday activities, need to know the baseline, prefer to stay comfortable, or already feel satisfied with their current lifestyle and weight.

10. Suppose another image below shows your body weight and Carbon Weight compared to last week. Please describe how your body weight and Carbon Weight change.



- 5.3%: Express it's confusing and makes no sense to them.
- 6.3%: Make them think there is no link between body weight and Carbon Weight.
- 10.7%: Change their view and said body weight and Carbon Weight are negatively correlated.
- 20 respondents: Able to point out various possible scenarios that could result in the decreased body weight and increased Carbon Weight.

11. Do you think seeing these numbers might change your behaviors (based on the previous question)? Why or why not?

- 10%: Gave a clear YES answer to this question. They suggested ways to lower their Carbon Weight while lowering their body weight at the same time.
- 49.3%: Gave a clear NO answer to this question. Various reasons were given: some believed the decrease of body weight causes the increase of Carbon Weight, thus they don't want to increase their body weight to decease their Carbon Weight. Some mentioned this confusing outcome didn't make them change due to lack of understanding.

12. When you think of Carbon Weight, list 5 other words that you can think of.

• Top mentioned words include: carbon, environment, pollution, footprint, global warming, gas, emission, green, waste, ozone, energy.

13. If you had to choose ONE device to show your Carbon Weight, what would it be?

| # | Answer | Bar | Response |
|----|---|-----|----------|
| 1 | A Watch | | 62 |
| 2 | A key chain | | 41 |
| 3 | On your ID or Bus Pass | I | 5 |
| 4 | On your clothes | L | 5 |
| 5 | On your TV | | 12 |
| 6 | On a small display embedded on the shoes | | 5 |
| 7 | On a bathroom Scale shown together with body weight | | 84 |
| 8 | On a small display on a refrigerator | | 57 |
| 9 | On a plate you use to consume the meals | | 1 |
| 10 | Others (please specify): | | 28 |

14. How often would you want to see your Carbon Weight?



15. How would you choose to be reminded to decrease your Carbon Weight? (Choose one)

| # | Answer | Bar | Response |
|---|--|-----|----------|
| 1 | Via apps on smart phones | | 132 |
| 2 | Via email | | 53 |
| 3 | Via your bathroom scale | | 50 |
| 4 | Via tablets (e.g. iPad) | | 5 |
| 5 | Via computers | | 33 |
| 6 | Via social networking sites (e.g. Facebook) | | 6 |
| 7 | Other (please specify): | | 21 |

16. What kind of information do you think would help you decrease your Carbon Weight?

The top three information that are mostly mentioned include:

- 1. Tips or advices on how to improve Carbon Weight
 - Tips and advice people pointed out include carpooling, energy saving tips, how to buy healthier foods, and how to use less water and gas.
- 2. Activity breakdown of carbon consumption or carbon contributions from each activities/ products/ foods
 - A list of specific activities and their carbon contributions provide people more clues in terms of what to do.
- 3. What causes high Carbon Weight
 - This helps people identify where their problems lie in.
- 4. Other types of information being brought up include: acceptable amount of Carbon Weight, benefits to decrease Carbon Weight, damages Carbon Weight can cause, reminders and alerts via emails and apps, driving and transportation information, and one's electricity consumption information.
- 17. Can you describe what "kilowatt hour (kWh)" means?

Please see Question 19 on page 18.



18. Which of the following unit is better for helping you understand how much energy you consume at home? (Choose one)

19. And please explain why you made the choice.

In general, respondents made their decisions based on which unit they are more familiar with.

- 48% "kilowatt hour (kWh)": They mentioned it's a unit most often used, and it's an accurate and direct measure.
- 28.7% "pounds (lb) of carbon dioxide emission": They said it's hard to figure out what kWh means, and they are more ware that CO₂ is harmful and it relates more to sustainable practices in general.
- 13% "pounds (lb) of body fat": It's simple for people to make association with their body. It's also a unit people already understand, and intuitively know lower value is good.
- 7.3% "amount of nutritional calories": Nutritional calories helps them replicate the same understanding from body weight to energy consumption.

20. Which of the following statements best describes you?



21. How important is bathroom scale to you in your daily life?





22. Do you think of a bathroom scale as having a positive, neutral, or negative effect on your life?

23. Would you like to see any feedback other than your weight on a bathroom scale?

- 19.7%: body fat information
- 9.3%: BMI
- 4.3%: Carbon Weight
- 48%: No. The majority of them hardly uses a scale while few of them want to keep things simple. Those who don't use scale expressed they don't obsess with pounds of body weight going up and down, or they are already satisfied with their current weight and health condition and thus feel no need for it.
- Other types of feedback respondents mention include: weather information, time, outdoor temperature, change from last measurement, muscle mass, water level, and so on.

24. Do you have a bathroom scale?



25. How often do you weigh yourself?



26. Do you think your scale helps you live a healthier life?

- YES (57%): The scale helps them keep track of their weight, makes them more aware, and helps them reduce their weight.
- NO (39%): The scale makes them feel obsessive and worry, and they think weight isn't an indicator of overall physical health.

- 27. How many people share your scale at your home?
 - None/ Zero/ By Oneself: 107 respondents
 - Two: 81 respondents
 - Three: 32 respondents
 - Four: 31 respondents
 - Five: 12 respondents
 - Six: 1 respondents
 - Seven: 2 respondents
 - Eight: 1 respondents
 - NA: 12 respondents
 - No Scale: 21 respondents

28. On a 5-point scale, how much do you trust your scale?



29. What time of the day do you most often use your scale? (Check All that apply.)



30. What features do you like best about your scale?

- 21.7% of the respondents like their scale to be digital.
- 14% of them like it's easy to read (e.g. big numbers).
- 11.3% said it's simple to use.
- Other preferred features include its accuracy, design (e.g. lightweight, portable), and functionality (e.g. separate user profiles, bone mass, water level).
- 31. Which statement best describes your feelings about bathroom scales?

(Choose one)

| # | Answer | Bar | Responses |
|---|--|-----|-----------|
| 1 | Useful: Help me keep track of my weight. | | 146 |
| 2 | Love them!: Make me feel good about myself. | | 7 |
| 3 | Dislike/ Hate them!: But I still feel the need to check my weight. | | 22 |
| 4 | Depends on what the scale says when I step on it. | | 24 |
| 5 | I don't really have an opinion. | | 52 |
| 6 | I don't use bathroom scales. | | 47 |
| 7 | Other (please specify): | | 2 |

REFERENCES

- Deloitte reSources 2012 Study. http:// http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/Energy_us_er/us_er_reSources2012Study_Consumer_Report_71712.pdf. Retrieved on Aug. 10, 2014.
- 2. European Commission. Sport and Physical Activity Survey (March 2010).
- 3. IBM 2007 Energy and Utilities Global Residential/ Small Business Consumer Survey. http://www-935.ibm.com/services/us/gbs/bus/pdf/2007_ibv_consumer_survey_results_v1_1212a.pdf. Retrieved on Aug. 10, 2014.
- IBM 2011 Global Utility Consumer Survey. http://public.dhe.ibm.com/common/ssi/ecm/en/gbe03475usen/GBE03475USEN.PDF. Retrieved on Aug. 10, 2014.
- 5. International Food Information Council Foundation. Food & Health Surveys: Consumer Attitudes Toward Food Safety, Nutrition & Health (2011, 2012).