



efficiency engagement environment

Making It Easy to Engage

Translating Complex Research to Inspire
Behavior Change

Zach Anderson
November 13, 2012



SEATTLE OFFICE OF
Sustainability & Environment



Our Clients

We work to impact change in four primary areas:

- Gas and Electric Utilities
- Production Agriculture
- Local Government
- Sports and Entertainment



Seattle Office of Sustainability and Environment

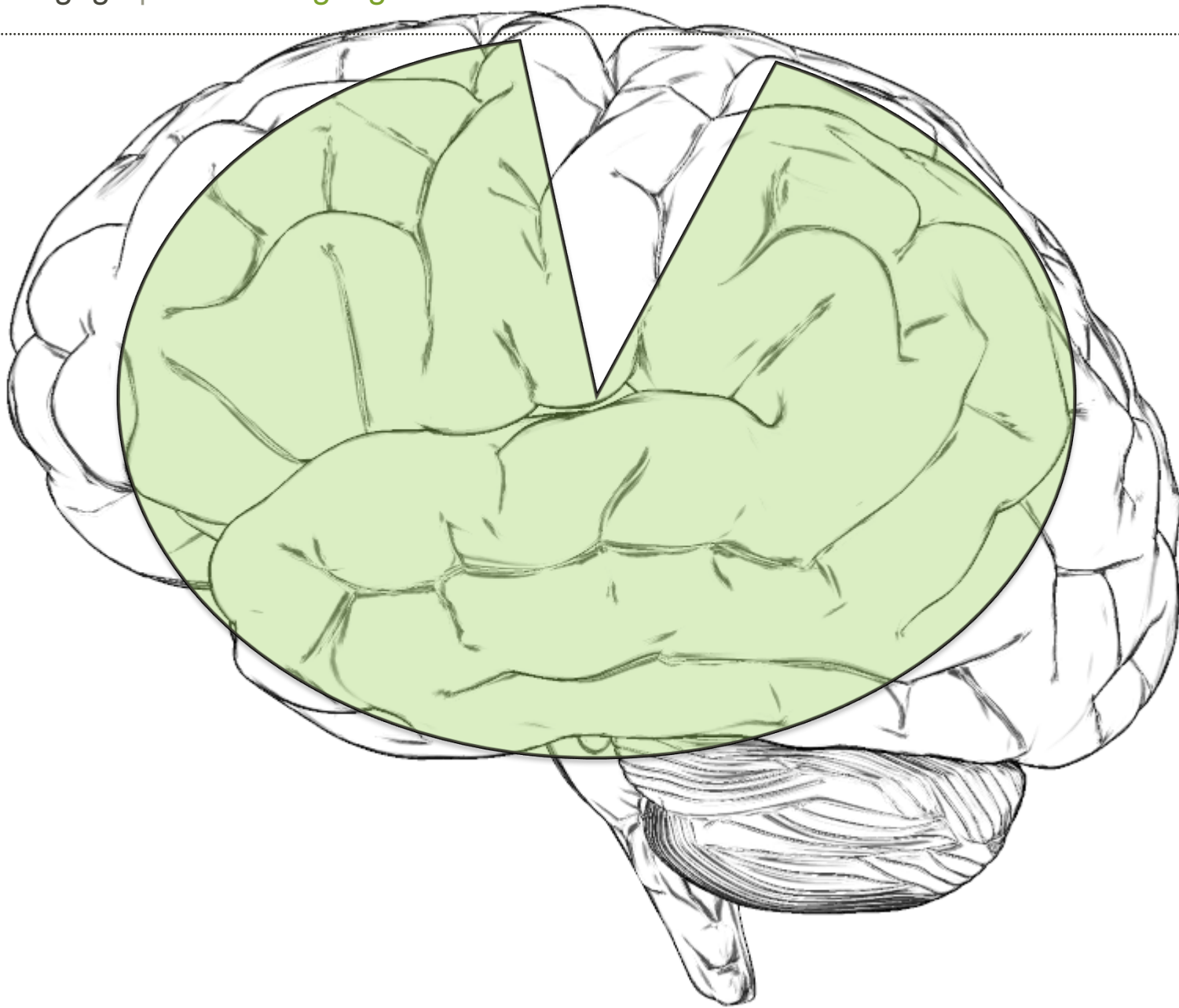
OSE aims to accelerate sustainable practices in Seattle by coordinating efforts between the city and community



The Punch line:

Easy!

Effective!



C:\>dir

Volume in drive C is MS-DOS 6_0
Volume Serial Number is 446B-2781
Directory of C:\

COMMAND	COM	52925	03-10-93	6:00a
	1 file(s)	52925	bytes	
		10219520	bytes free	

C:\>ver

MS-DOS Version 6.00

C:\>

Easy to Engage | Visual Language



The collage features several overlapping application windows from a Windows operating system:

- File Explorer:** Displays the 'EPRI' folder with a list of files including 'Final RTF Presentation HPWH 10-4-11', 'Water_Heater_Market_Profile_Sept2009', and 'Draft Survey Target Guidelines 7-23'.
- Microsoft PowerPoint:** Titled 'BECC Presentation - Microsoft PowerPoint', showing a slide with the text 'This is what computer language look'.
- Command Prompt:** Shows system information: 'Volume in drive C is MS-DOS 6.0', 'Volume Serial Number is 446B-2781', and 'Directory of C:\'.
- Microsoft PowerPoint:** Titled 'November 9 ABW Introduction_1 [Read-Only] - Microsoft Powe...', showing a slide titled 'Outline of 12/1/12 Report to Legislature'.
- Microsoft Word:** Titled 'Agenda Early Deployment HPWH Workshop BPA 2012-11-16 (2) [Read-Only] [Compatibili...', displaying a detailed agenda.

The agenda window contains the following schedule:

Time	Activity	Participants
11:00 am	EPRI HPWH Research Results, continued	
12:00 pm	Lunch in BPA cafeteria	
1:00 pm	Program Design Brainstorming <ul style="list-style-type: none">• Strategy• Tactics• Discussion• Recommendations/Next Steps	Ellen Pettrill, Rich Hazzard, all
2:45 pm	Break	
3:00 pm	Recap and Next Steps <ul style="list-style-type: none">• Strategy/Tactics• Remaining Questions• Timeline	Ellen Pettrill, Stephanie Vasquez, all



The Infographic





Seattle Climate Action Plan

Greenhouse Gas Emissions in King County

An Updated
Geographic-plus Inventory,
a Consumption-based
Inventory, and an Ongoing
Tracking Framework

Prepared for:
King County, Washington
February, 2012



King County



STOCKHOLM
ENVIRONMENT
INSTITUTE

Consumption Based Emissions

emissions in each subcategory by the cost of purchasing each good or service.²⁷ Emissions intensity is more useful than total emissions when assessing alternative consumption choices because it gives an indication of the emission impacts of a given unit of spending. For example, the emissions associated with an average computer purchase (e.g. \$1,000 for a new computer) is less than an average purchase of *Other transport - air* (e.g. a cross-country airline trip costing \$1,000).²⁸

Furthermore, Table 8 indicates that the most emissions-intensive (on a per-dollar basis) category of consumption is food. Looking at the sub-categories of food suggests opportunities to reduce the GHG intensity of food consumption. For example, our analysis suggests that, on average, red meat and dairy are more emissions intensive than poultry and eggs, which in turn are more intensive than grains, fruits, and vegetables.

Box 3. Methodology for the Consumption-Based GHG Inventory

This method estimates GHG emissions by multiplying consumption (in dollar terms) with the emissions intensity (CO₂-equivalent per dollar) of that consumption. Below the data and process for estimating these two key components is described.

- **Consumption (\$).** Consumption ("final demand" in economic terminology) is measured by total consumer, government and business investment spending for finished goods and services in an economy. Consumption estimates for King County (scaled from national totals) come from the IMPLAN economic modeling software. IMPLAN is a widely used input-output model based on data from the U.S. Commerce Department's Bureau of Economic Analysis, the U.S. Bureau of Labor Statistics, the U.S. Census Bureau, and other sources. Consumption data is processed in IMPLAN's "input-output" tables, which allow for expenditures in one sector of the economy to be tracked to all other sectors.²⁹ For example, using input-output analysis it is possible to estimate what fraction of the cost of an average automobile is retained by the manufacturer, what fraction the manufacturer spends on steel, and what fraction the steel mill spends on iron ore versus electricity and other inputs.³⁰ The IMPLAN model tracks consumption data in 440 sectors of the economy.
- **Emissions intensity (CO₂e / \$).** Emissions intensities for each of these sectors have been developed based on existing GHG inventories (e.g., the U.S. EPA's national inventory and King County's Geographic-plus inventory described in the previous section). For each sector of the economy, the numerator of the emissions coefficient is based on these inventories, while the denominator in terms of \$ of economic activity is derived from data in IMPLAN. Lastly, since an increasing fraction of goods and materials consumed in the U.S. are produced internationally, adjustments are made to emissions intensities for imported goods, based on a global input-output model originally developed at the Center for International Climate and Environmental Research (CICERO).³¹

Finally, a few adjustments and additions to this framework were made where better local data are available. In particular, data from Seattle City Light and Puget Sound Energy characterizes emissions from building energy use, data from the Puget Sound Regional Council to characterize vehicle travel, and data from King County Solid Waste Division and Seattle Public Utilities to characterize waste management (as in the Geographic-plus inventory).³²

The end product is an integrated model of the GHG impacts of King County's consumption, the Consumption-based Emissions Inventory (CBEI) model, which relates consumption (in dollar terms) to GHG emissions in terms of MTCO₂e.³³ A previous version of the CBEI model was developed with funding and input from the Oregon Department of Environmental Quality,³⁴ and the model has also been applied to the City and County of San Francisco and the State of California. Like any model, CBEI is subject to uncertainty. For example, model results are based on commodity sector averages, but there is potential for significant variability between similar products (brands) and/or producers. CBEI results do not characterize the emissions or emissions intensity of any individual product (brand) or producer.

171 Pages

²⁷ Emissions associated with use and disposal are not included in the emissions intensity metrics since decisions on when and to what extent to use and dispose products are distinct from decisions to purchase them, and because use and disposal usually also involve separate purchases – such as energy to power a car or appliance. For example, at a producer (wholesale) price of \$2.50 per gallon, the emissions intensity of purchasing and burning a gallon of gasoline would be 3.5 kg CO₂e per \$ (considering combustion emissions only).

²⁸ The figures in this table are based on the "producer dollars" of final demand without taking into account the markups (margin) applied by wholesale and retail establishments.

²⁹ Besides IMPLAN, other sources of input-output data in the U.S. include the Bureau of Economic Analysis' RIMS II (simpler than IMPLAN) and the commercially available REMI (more complex).

³⁰ Data are not available for individual products or manufacturers, just in aggregate for many detailed sectors of the economy.

³¹ Peters and Hertwich (2008). Thanks to Glen Peters for sharing his model results with us.

³² However, unlike in the geographic-plus methodology, emissions for building energy use or vehicle travel as reported in the Consumption-based methodology (for example, in Table 8) also include the upstream emissions of producing the fuels combusted (e.g., natural gas, gasoline) in these activities.

³³ Model citation: Stanton et al (2011).

³⁴ Thank you to David Allaway at Oregon DEQ for his extensive collaboration with us on the prior iteration of CBEI.

Table 8. King County 2008 GHG Emissions by Product or Service Category, Consumption-Based Methodology
(Million MTCO₂e, unless otherwise specified) ^a

Category	Subcategory	Total Emissions	Embodied (pre-purchase) Emissions	Use Emissions	Disposal Emissions	Embodied Emissions Intensity (kgCO ₂ e/\$) ^b
Personal Transportation		9.0	1.5	7.5	<0.1	0.52
	Cars and trucks	9.0	1.4	7.5	<0.1	0.54
	Public transportation	<0.1	<0.1	*	<0.1	0.26
Home Energy and Appliances		7.1	0.3	6.8	<0.1	0.66
	Heating and cooling appliances	4.6	<0.1	4.5	<0.1	0.59
	Lighting	1.1	<0.1	1.1	<0.1	0.73
	Food-related appliances	0.8	0.1	0.7	<0.1	0.69
	Other appliances	0.6	0.1	0.5	<0.1	0.63
Food		7.7	7.6	*	0.1	0.78
	Red meat	1.3	1.3	*	<0.1	2.25
	Dairy	0.8	0.8	*	<0.1	1.71
	Beverages	0.8	0.8	*	<0.1	0.63
	Grains, baked goods	0.8	0.8	*	<0.1	0.79
	Fruit and vegetables	0.6	0.6	*	<0.1	0.98
	Poultry and eggs	0.5	0.5	*	<0.1	1.42
	Frozen food	0.2	0.2	*	<0.1	1.02
	Other food	0.9	0.9	*	<0.1	0.75
	Restaurants	1.8	1.8	*	0.1	0.42
Other Goods		7.6	6.8	0.6	0.0	0.26
	Furnishings and supplies	3.5	3.4	*	<0.1	0.18
	Computers	1.5	1.3	0.1	<0.1	0.25
	Clothing	1.3	1.3	*	<0.1	1.07
	Other electronics	1.0	0.6	0.4	<0.1	0.64
	Lawn and garden	0.3	0.2	0.1	0.1	0.95
Services		7.9	7.9	*	0.0	0.19
	Healthcare	3.1	3.1	*	<0.1	0.19
	Finance, insurance, real estate, legal	1.4	1.4	*	<0.1	0.12
	Entertainment	1.3	1.3	*	<0.1	0.29
	Education	0.9	0.9	*	<0.1	0.29
	Other services	1.2	1.1	*	<0.1	0.19
Construction		4.2	4.2	*	0.1	0.36
	Non-residential	2.6	2.5	*	0.1	0.34
	Residential	1.7	1.7	*	<0.1	0.40
Other^c		11.4	11.4	<0.1	<0.1	0.21
	Retail and wholesale	2.6	2.6	*	<0.1	0.16
	Other transport – truck	1.2	1.2	*	<0.1	1.55
	Other transport – air	1.0	1.0	*	<0.1	1.19
	Other transport – water, rail, other	0.6	0.6	*	<0.1	0.32
	Other	6.0	6.0	<0.1	<0.1	0.26
Total		55.0	39.6	15.0	0.4	0.38

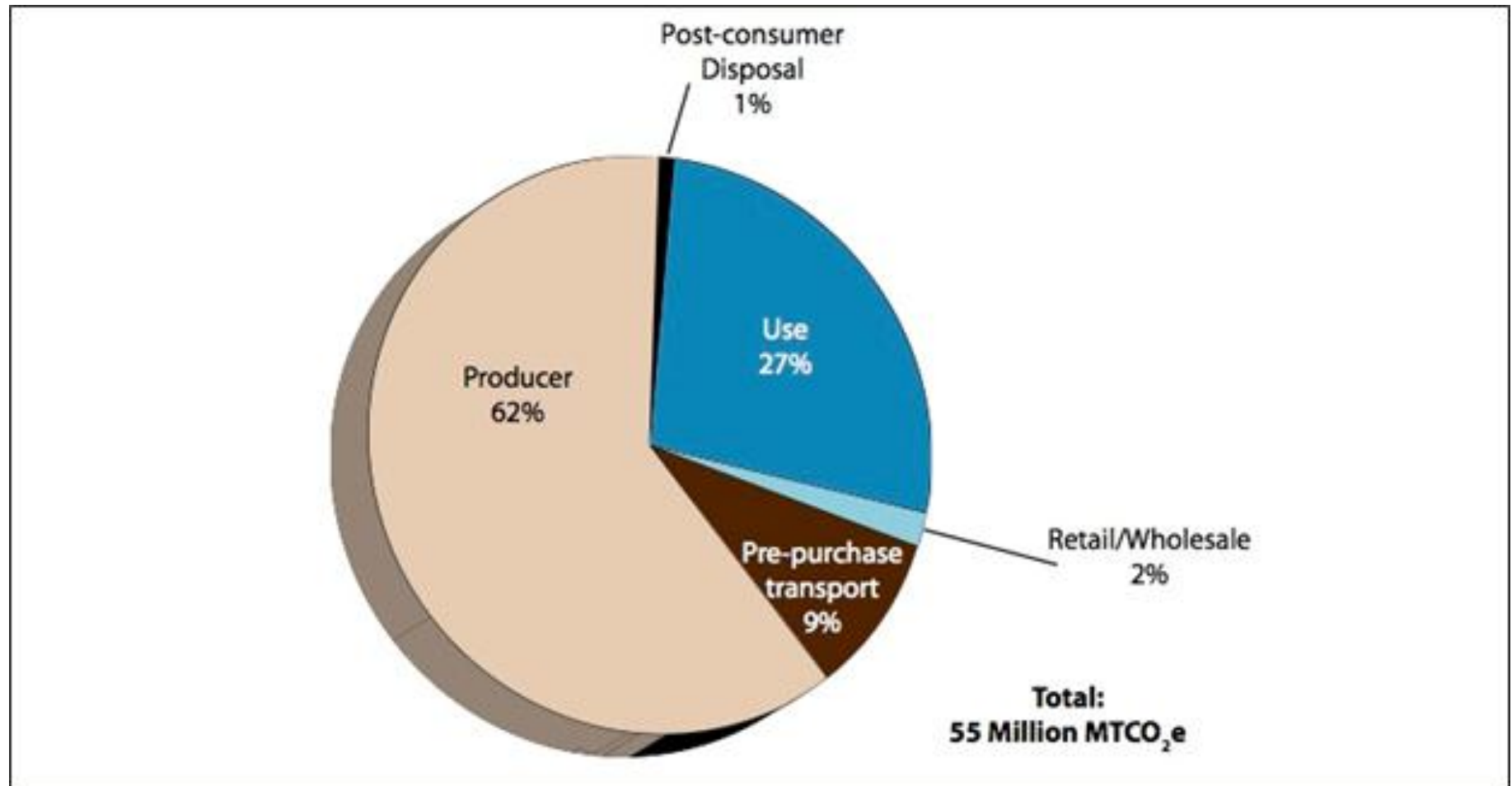
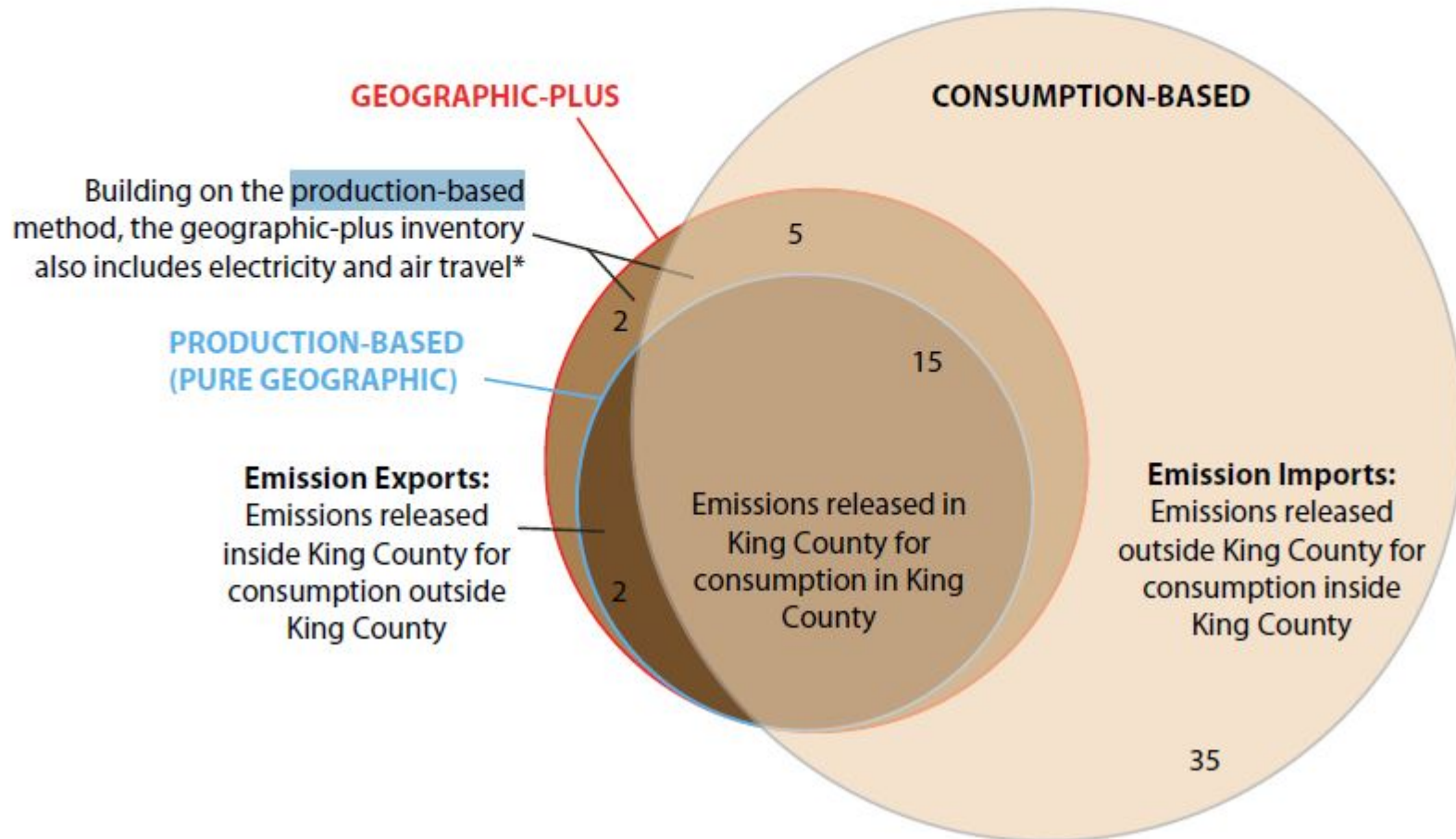


Figure 6. Comparison of King County GHG Inventories

(Numbers indicate approximate 2008 emissions, in million MTCO_2e , in each portion of the diagram;
Areas are approximately proportional to emissions)





The Challenge





- Make it usable
- Make it engaging
- Make it something people want to put on their walls

The Right Actions Add Up

YOUR CHOICES + YOUR NEIGHBORS' CHOICES = A BIG DIFFERENCE FOR THE CLIMATE



OUR GOAL

30% REDUCTION
IN GREENHOUSE GAS (GHG)
EMISSIONS BY 2020



OUR GOAL IS EQUIVALENT TO:
4.7 MILLION BARRELS OF OIL SAVED or **\$395.7 MILLION SAVED***

*Based on Spot Oil Crude @ \$83.96



C'MON SEATTLE, WE CAN DO THIS - AND HERE'S HOW!

Together we can make a **BIG** difference by making improvements in four areas

HALF
OF BARRELS SAVED
ARE CREATED
IN YOUR HOME



IN YOUR HOME

Is your home an energy hog costing you money? Simple changes can save money, increase comfort and reduce your home's GHG impact.



GETTING AROUND

Mix use of bike, walking and transit to save money on gas, reduce your GHG footprint, and live a healthier life!



EATING

Eating a healthy diet rich in fruits and vegetables will improve you and your family's health and reduce your impact on the planet.



BUYING STUFF

When buying new things, consider how long they will last. The things we buy and throwaway carry a big GHG footprint.

GHG EMISSIONS COME FROM MORE THAN JUST YOUR CAR

A lot of GHG emissions are embedded in the things we buy and use everyday - here are some examples

GHG SOURCES

- RAW MATERIALS
- MANUFACTURING
- TRANSPORTATION
- RETAIL
- PRODUCT USE
- DISPOSAL



EQUIVALENT TO
100 TONS

The largest source of GHG emissions in your jeans comes from cleaning them. Reduce your impact by washing on cold and line drying.

*Emissions calculated using the average lifespan of the product - 10 years with 10 washes per year and a 100% cotton shirt.

EQUIVALENT TO
50 TONS

The largest source of GHG emissions in beef comes from raising the cows. Reduce your impact by going meat free one day a week.

*Emissions calculated using the conversion of one pound of beef and a 100% cotton shirt.

EQUIVALENT TO
100 TONS

The largest source of GHG emissions in your laptop comes from its materials and making it. Reduce your impact by using technology tools to make your laptop last longer.

*Emissions calculated using the average lifespan of the product - 8 years of normal office use and a 100% cotton shirt.

SIMPLE ACTIONS THAT ADD UP - LET'S START SAVING

Examples of easy actions that you can implement into your daily routine and save on many levels



IN YOUR HOME UPGRADE YOUR INSULATION

Upgrade to your home energy system such as new insulation will make your home more comfortable, and you'll save money on your energy bill.

ANNUAL SAVINGS*

\$170
DOLLARS

2.5
BARRELS

\$1,700
DOLLARS

22
BARRELS

\$17,000
DOLLARS

220
BARRELS

\$1,694
DOLLARS

1.6M
BARRELS

\$17M
DOLLARS

\$170,000
DOLLARS

\$1,694,000
DOLLARS

\$16,940,000
DOLLARS

*Based on average energy use and savings. Savings assumed that upgrading insulation reduced energy costs by 10%.

GETTING AROUND BIKE OR WALK FOR SHORT TRIPS

40% of our urban travel is two miles or less. Combine your workout with your commute. You'll save money and look great too.

ANNUAL SAVINGS*

\$116
DOLLARS

6
BARRELS

\$1,160
DOLLARS

6.15
BARRELS

\$11,600
DOLLARS

62.5
BARRELS

\$116,000
DOLLARS

625
BARRELS

\$1,160,000
DOLLARS

\$11,600,000
DOLLARS

\$116,000,000
DOLLARS

\$1,160,000,000
DOLLARS

*Based on a person biking and walking four times a week. Savings assumed that each way four miles roundtrip (average assumed) 10% biking and walking reduction.

EATING GO MEAT FREE ONE DAY A WEEK

Join the world wide campaign Meatless Mondays, and go meat free for an entire day each week and watch the calories and your footprint shrink.

ANNUAL SAVINGS*

\$75
DOLLARS

25
BARRELS

\$750
DOLLARS

2.5
BARRELS

\$7,500
DOLLARS

25
BARRELS

\$75,000
DOLLARS

250
BARRELS

\$750,000
DOLLARS

\$7,500,000
DOLLARS

\$75,000,000
DOLLARS

\$750,000,000
DOLLARS

*Based on eating a healthy vegetarian diet and reducing meat consumption. Savings assumed by replacing 0.5 ounces of meat with 0.5 ounce of vegetable one day a week for 52 weeks.

BUYING STUFF BUY SECOND-HAND CHILDREN'S CLOTHING

Children grow out of clothes so fast. You can reduce your impact and save money by purchasing gently used clothing.

ANNUAL SAVINGS*

\$300
DOLLARS

88
BARRELS

\$3,000
DOLLARS

8
BARRELS

\$30,000
DOLLARS

88
BARRELS

\$300,000
DOLLARS

880
BARRELS

\$3,000,000
DOLLARS

8,800
BARRELS

\$30,000,000
DOLLARS

\$300,000,000
DOLLARS

*Based on purchasing 20 second-hand children's clothing items annually. Savings assumed that new clothing has 10% of CO2 per unit and that second-hand clothing is 10% of the cost.



The Process





- Storyboard it
- Collaborate
- Check in



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IN GREENHOUSE GAS (GHG)
EMISSIONS BY 2020



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*Based on Spot Off Crude 6/19/12 at \$83.98



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Together we can make a **BIG** difference by making improvements in four areas

HALF

OF SEATTLE'S HOUSEHOLD
GHG EMISSIONS ARE CREATED
IN THESE FOUR AREAS



IN YOUR HOME

Is your home an energy hog costing you money? Simple changes can save money, increase comfort and reduce your home's GHG impact.



GETTING AROUND

Mix use of bike, walking and transit to save money on gas, reduce your GHG footprint, and live a healthier life!



EATING

Eating a healthy diet rich in fruits and vegetables will improve you and your family's health and reduce your impact on the planet.



BUYING STUFF

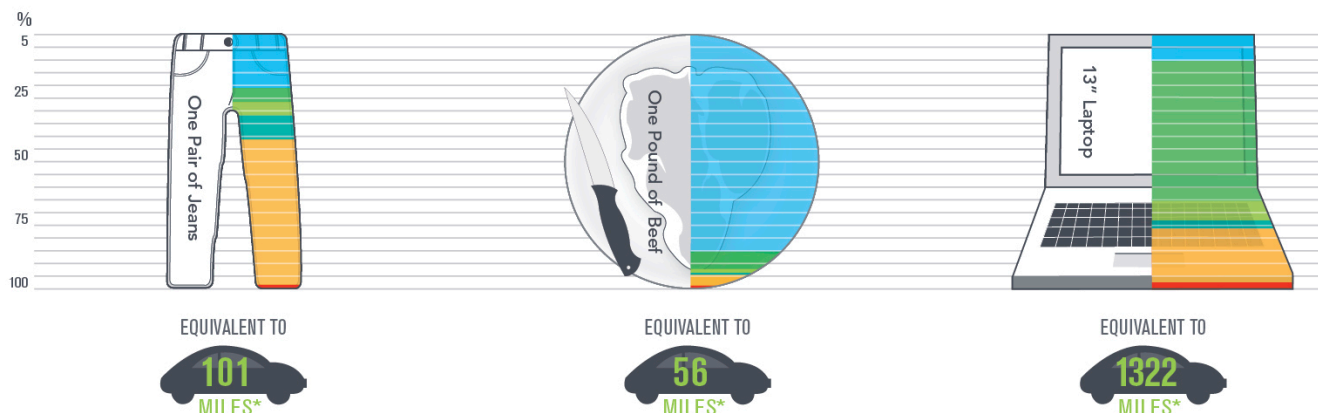
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- DISPOSAL



The largest source of GHG emissions in your jeans comes from cleaning them. Reduce your impact by washing on cold and line drying.

*Mileage calculated using the average lifetime of this product - 2 years with 52 washes per year and a 28MPG vehicle.

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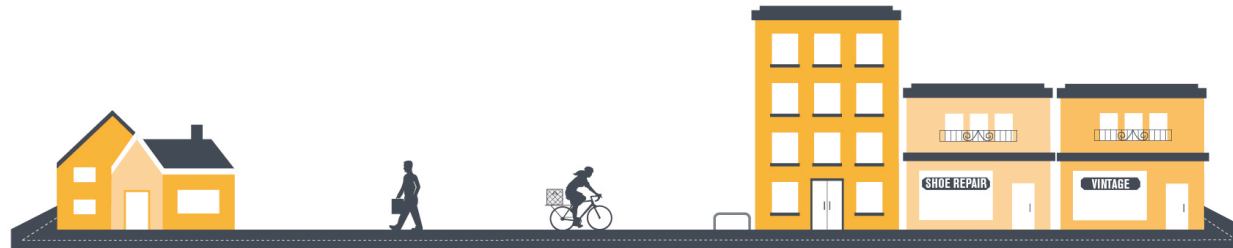
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40% of our urban travel is two miles or less. Combine your workout with your errands. You'll save money and look great too.

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Children grow out of clothes so fast. You can reduce your impact and save money by purchasing gently used clothing.

	ANNUAL SAVINGS*		ANNUAL SAVINGS*			ANNUAL SAVINGS*		ANNUAL SAVINGS*	
 YOU	 \$170 DOLLARS	 2.3 BARRELS	 \$116 DOLLARS	 .6 BARRELS	 52,000 CALORIES	 .25 BARREL	 14,300 CALORIES	 \$300 DOLLARS	 .88 BARRELS
 10 OF YOUR FRIENDS	\$1,700 DOLLARS	23 BARRELS	\$1,160 DOLLARS	6.25 BARRELS	520,000 CALORIES	2.5 BARRELS	143,000 CALORIES	\$3,000 DOLLARS	9 BARRELS
 10 OF THEIR FRIENDS	\$17,000 DOLLARS	230 BARRELS	\$11,600 DOLLARS	62.5 BARRELS	5.2M CALORIES	25 BARRELS	1.4M CALORIES	\$30,000 DOLLARS	88 BARRELS
 ALL OF SEATTLE	\$104M DOLLARS	1.4M BARRELS	\$71M DOLLARS	382,562 BARRELS	32.9B CALORIES	150,263 BARRELS	8.7B CALORIES	\$183.6M DOLLARS	538,648 BARRELS

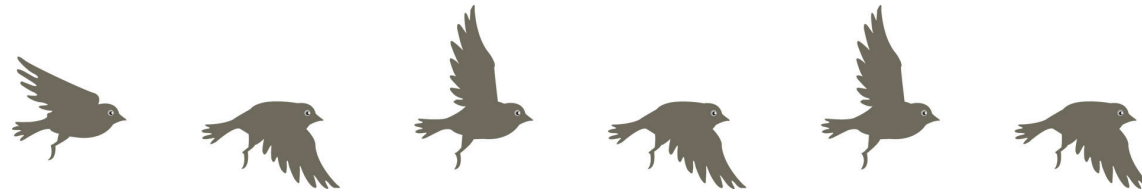
*Based on average energy use and costs in Seattle. Savings assumed that upgrading insulation reduced energy costs by 10%.

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*Based on eating a healthy vegetarian diet for all meals one day a week. Savings calculated by replacing 5.5 ounces of meat with 5.5 cups of vegetables one day a week for 52 weeks.

*Based on purchasing 20 first-hand \$30 children's outfits annually. Savings assumed that new clothing has 19kg of CO₂e per outfit and that second-hand clothing is 50% of the cost.

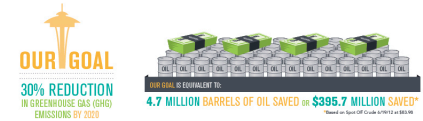
Key Takeaways | Remember this



Key Takeaways

The Right Actions Add Up

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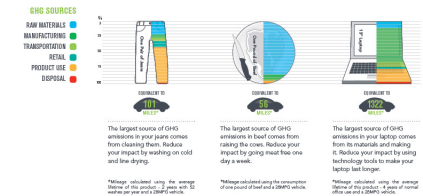
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More use of bikes, walking and transit to save money on gas, reduce your GHG footprint, and live a healthier life!
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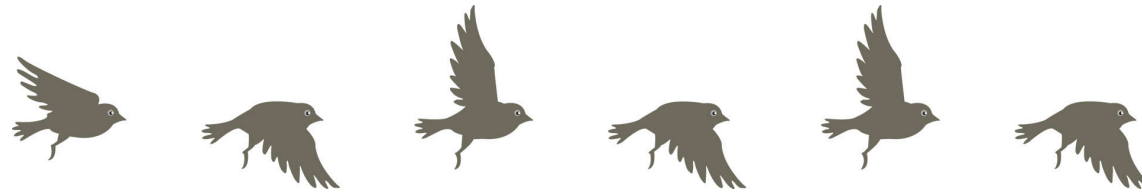


SIMPLE ACTIONS THAT ADD UP - LET'S START SAVING

Examples of easy actions that you can implement into your daily routine and save on many levels



Key takeaways | Don't forget



- Tell a story
- Easy on the eyes
- Take a Risk



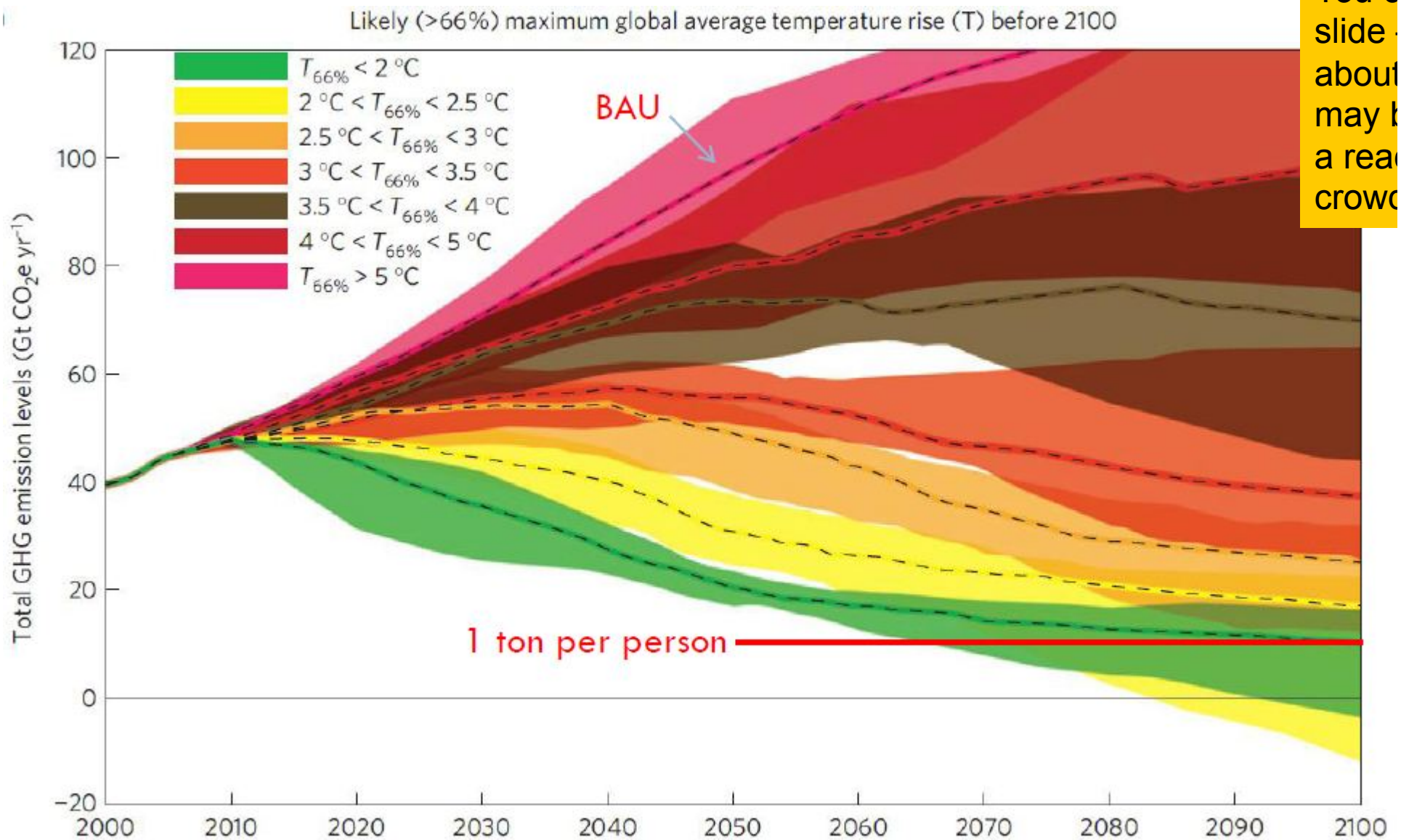
milepost



efficiency engagement environment

Zach Anderson
Senior Consultant
zach@milepostconsulting.com

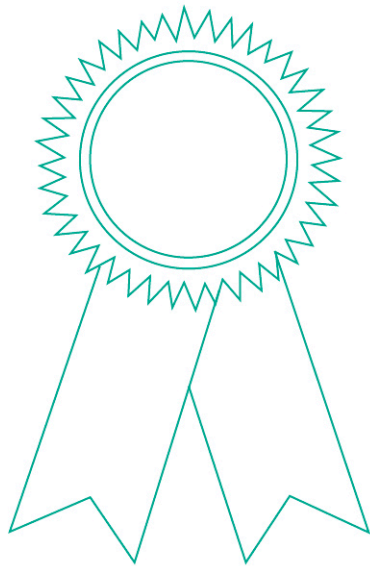




You can slide about may be a real crowd

BEHAVIOR CHANGE

BEST PRACTICES



- 1 Step approach
- 2 Simple path
- 3 Participant-centric design
- 4 Trusted source delivery
- 5 Reward based
- 6 Compelling visual story
- 7 Community design
- 8 Engagement tools