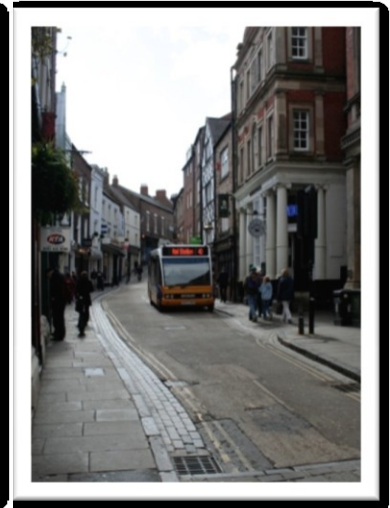


# Enabling Behaviour Change

Dr Erel Avineri & Dr Owen Waygood



# Carbon Awareness



- What is the per capita transport carbon dioxide (CO<sub>2</sub>) of your country? Your city? Your own?
- What is the per capita transport CO<sub>2</sub> emissions amount for Bristol, UK? Any “ballpark” guesses?
  - **1.84 CO<sub>2</sub> tonnes/capita**
- (Let’s assume you are a stakeholder)

Having gained this knowledge:

Is this figure **meaningful** for you and others?

Has it increased **motivation** to change behaviour and perform better (e.g. reduce CO<sub>2</sub>)?

# Transport and Climate Change



- Considerable reductions in emissions are required from all sectors to meet the 2°C target; it cannot be met without climate change mitigation from the transport sector (EEA, 2010).
- In the EU, transport (excluding air travel) represents 18% of all CO<sub>2</sub> emissions (EEA).
- Limiting impacts to acceptable levels require an 80% cut in global emissions by 2050 (relative to 1990).
- This implies per capita annual emissions of 50–100 kg CO<sub>2</sub>-eq (Sager et al., 2011).
- How can we meet targets and reduce GHG emissions?

# How to enable behaviour change? (1)



- A range of methodologies and approaches to change individual behaviour.
- Our decisions are influenced by the context of the problem, not just by the content.
- Attention to the presentation of information can affect interpretation, motivation, behaviour.
- Simply changing the way information is presented or framed has been found to affect choice in fields such as finance, health, and home energy use.



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# How to enable behaviour change? (2)



- Choice Architecture. *Nudge* - small feature in the environment that attracts our attention and enable behaviour change.
- Behavioural economists think savings in carbon emissions can be gained by nudging people to make small changes that increase energy efficiency and reduce demand.



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# The worst catastrophe to take place in a U.S. school building



The remains of the New London School, March 18, 1937

Adding odorant to natural gas (colourless, odourless) began in the United States after the 1937 New London School explosion.



[http://en.wikipedia.org/wiki/File:Marshall\\_03.jpg](http://en.wikipedia.org/wiki/File:Marshall_03.jpg)

# How to enable behaviour change? (3)



- Without feedback, a behavioural change is less likely.
- Individuals need to associate their behaviour with the relevant costs and consequences.
- No feedback - slows down the process of behavioural change.
- Direct feedback on energy consumption (e.g. meter-reading; interactive feedback via a PC) was found to have an impact ranged from 5% to a 15% reduction in energy use.

# The problems with CO<sub>2</sub> and climate change information



- A relatively new concept for many - unfamiliarity with information context;
- Not tangible;
- No 'direct' impact;
- A 'social' rather than a 'private' cost – people may not have a strong tendency to avoid less sustainable choices;
- Perceiving/valuing differences between alternatives might be a challenging task.

# Loss Aversion



- People are more sensitive to 'bad outcomes' than to 'good outcomes': The psychological effect of a loss is about twice than the psychological effect of a same-sized gain.
- People tend to avoid losses more than they seek gains.
- Evidence in travel choice.
- Framing - Semantically changing the presentation of information. (e.g. Reorganizing a sentence)
- *Will loss framing significantly affect how the difference between two amounts of CO<sub>2</sub> is perceived?*



# Gain and Loss framing



Passenger CO<sub>2</sub> produced for a 5 mile (8km) trip:  
500g (A full car (4 passengers)) vs 3400g (1 person in a 4x4)

*Loss framing for comparison:* 500, 500+2900

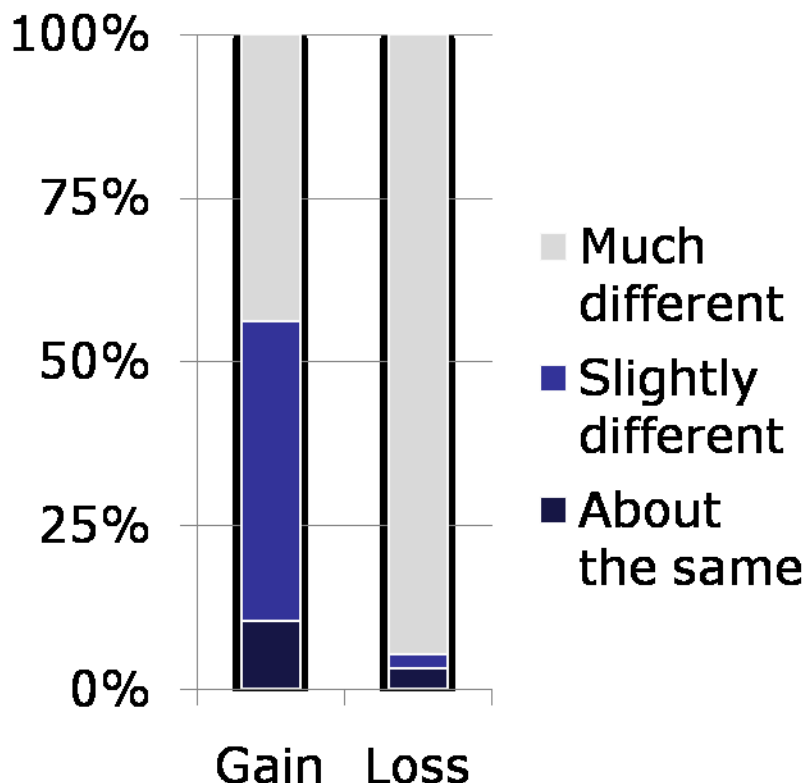
- Mode X produces 500g of CO<sub>2</sub> for a 5 mile trip. The amount produced by mode Y is **2900g higher (i.e. worse)**

*Gain framing for comparison:* 3400, 3400-2900

- Mode X produces 3400g of CO<sub>2</sub> for a 5 mile trip. The amount produced by mode Y is **2900g lower (i.e. better)**

# Descriptive Results

Comparison:  
500g vs 3400g



Loss framing is a more effective way of highlighting differences in CO<sub>2</sub> amounts

Gain	Loss
500, 500+2900	3400, 3400-2900

Avineri and Waygood (2011)

# The 'Social Nudge'



- People do many things by observing others and imitating/learning.
- People are encouraged to continue to do things when they feel other people approve of their behaviour.
- 'Nudge' people via social comparisons.
- 300 households in California<sup>1</sup> were informed about how much energy they and households in their neighbourhood had used.
  - Above average users reduced their use

1. Schultz et al. (2007) The Constructive, destructive, and reconstructive power of social norms



# 1. Start with your home economic information



Select U.S. State

Florida



Nearest major U.S. city or region

Miami



How many people live in your household?

four



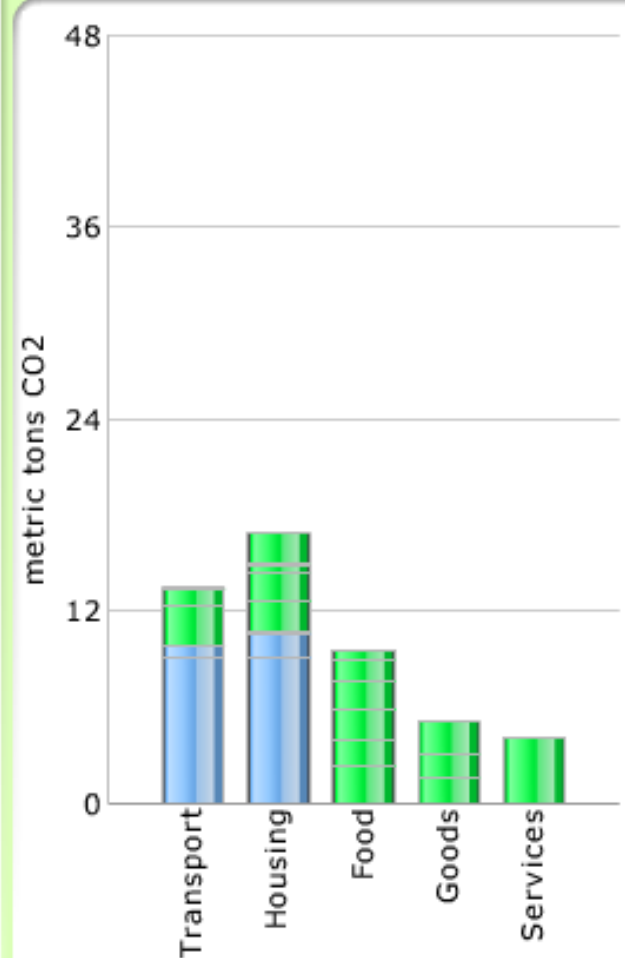
What is your gross annual household income?

\$50,000 to \$59,999

This info can not be viewed by others. Learn more

- Click "Transportation" or other links at top to continue
- Then, either keep the "default" values or enter your own

## Your Footprint: 49 tons CO<sub>2</sub>/yr



How do you compare to the averages?

Your Household  
Similar U.S. Households  
U.S. Average  
World Average



Transportation  
Housing  
Food  
Goods  
Services

# Goals and Norms



# 1.84 Tonnes? CO<sub>2</sub> information, context, and formats



- 1.84 tonnes/capita per year



**X 0.9**



**X 6.1 (If just transport's share)**

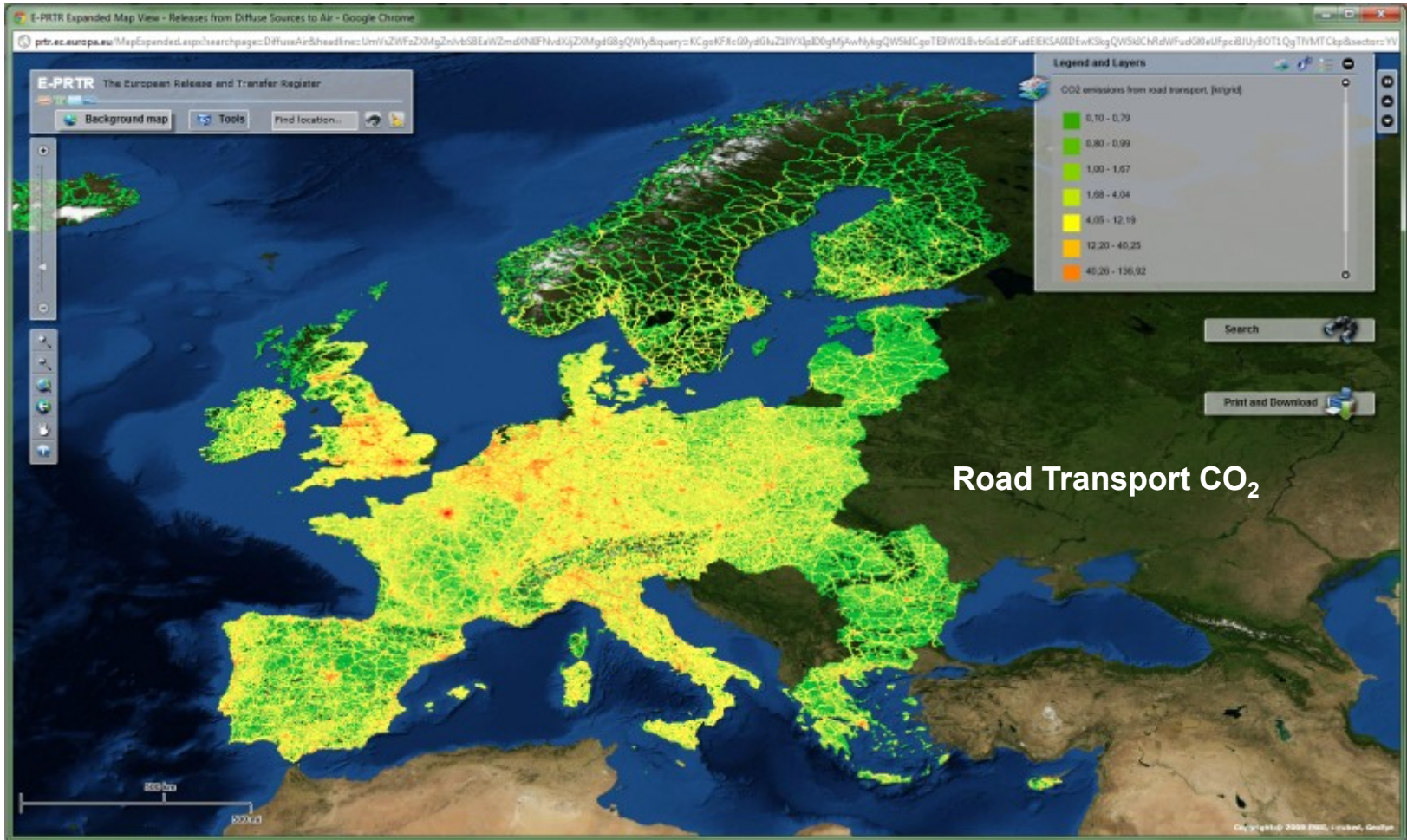


**123% of 2020 target**

# E-PRTR Diffuse Emissions (2008)



<http://prtr.ec.europa.eu/DiffuseSourcesAir.aspx>



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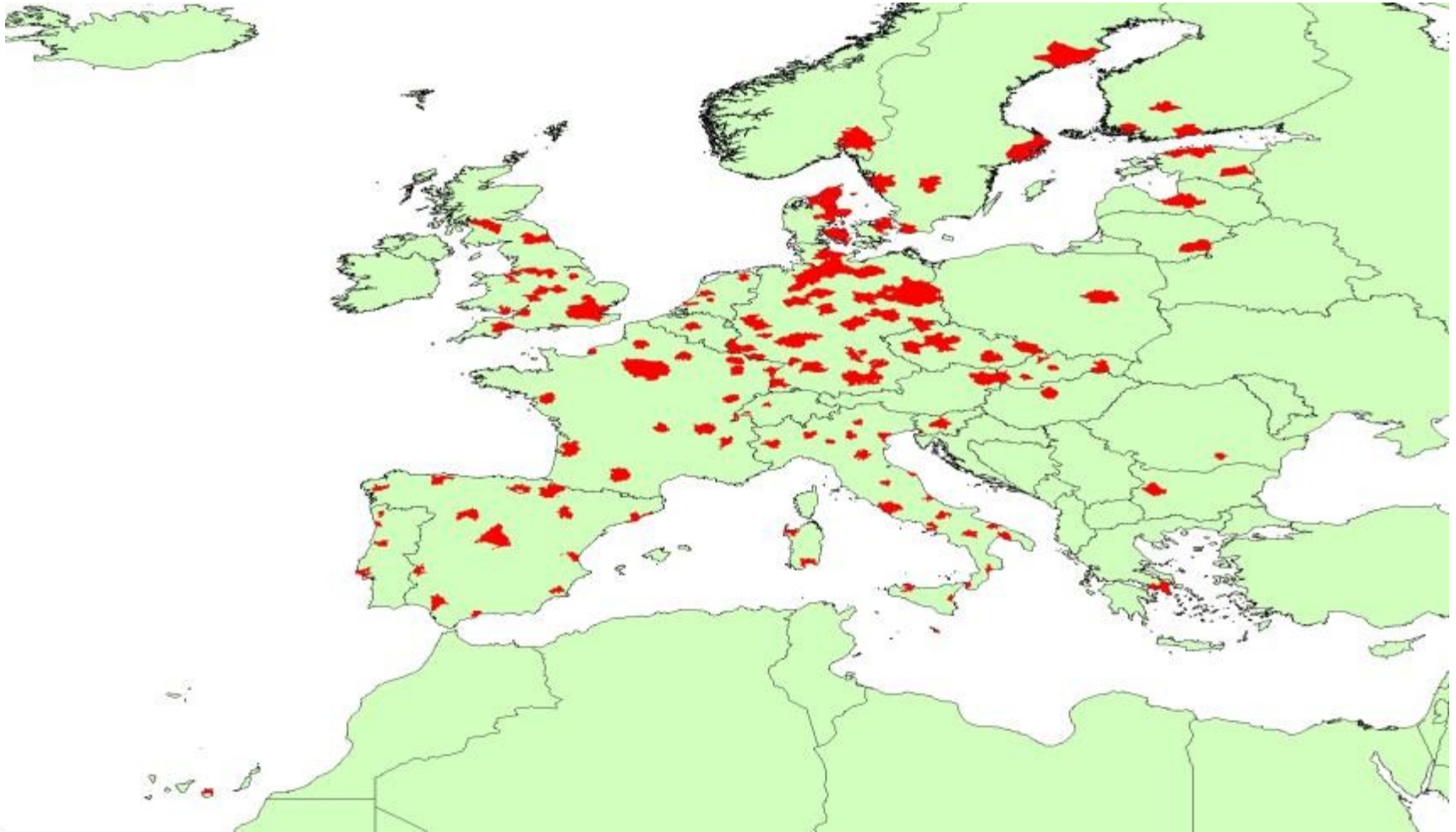


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# 149 city LUZs for benchmarking



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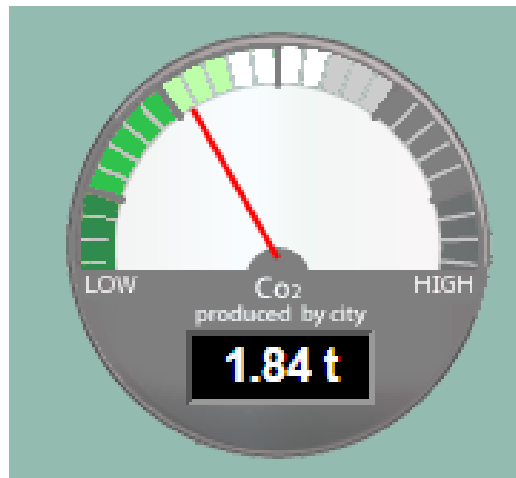


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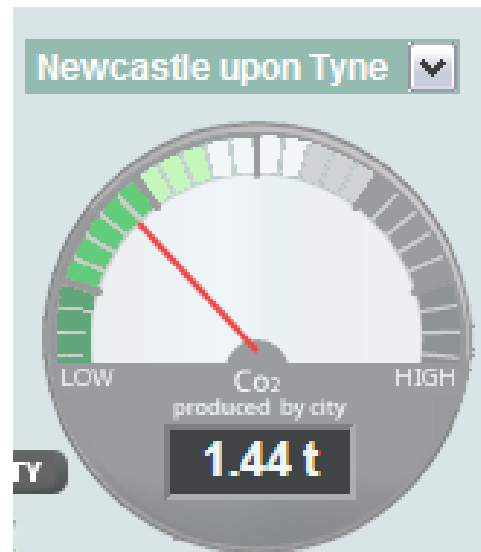
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# Bristol's Transport CO<sub>2</sub>



...and its TARGET FOR 2020 is:

**1.50 t**



## The top 5 cities

1	NEWCASTLE..	1.44 t
2	MANCHESTER	1.51 t
3	GREATER L..	1.58 t
4	BRISTOL	<b>1.84 t</b>
5	GLASGOW	2.13 t
...		
16	LINCOLN	4.07 t



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# My City Performance Gauge



## BRISTOL

Co2 meter *i*



...and its TARGET FOR 2020 is:

**1.50 t**

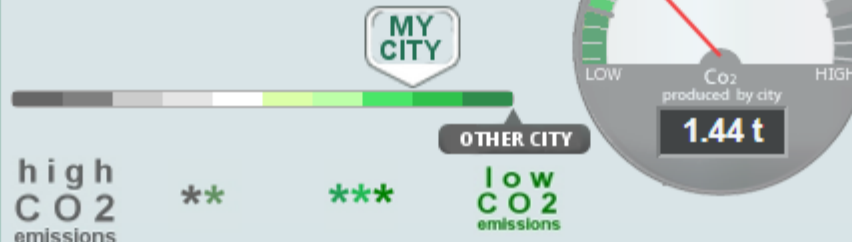
### CO2 EMISSIONS FROM PASSENGER TRANSPORT

(in tonnes per year per capita)

Filter cities by..

Compare to.. **Newcastle upon Tyne** ▼

Filter: NATION



### The top 5 cities

1	NEWCASTLE..	1.44 t
2	MANCHESTER	1.51 t
3	GREATER L..	1.58 t
4	BRISTOL	1.84 t
5	GLASGOW	2.13 t
...		
16	LINCOLN	4.07 t

Show wider benefits



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# Co-Benefit: Time



BRISTOL

BUDGET COMMUNITY HEALTH PLANNING SAFETY

TIME

Cobenefit *i*

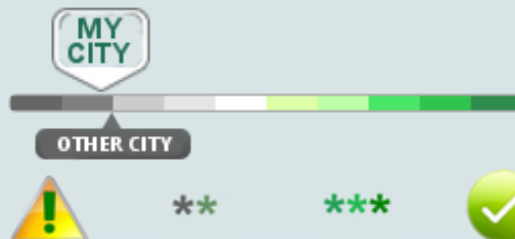
JTW DURATION (minutes)

Select another..

Compare to.. Newcastle upon Tyne



29



28

The top 5 cities

1	CAMPOBASSO	14.38
2	SOFIA	15
3	PESCARA	15.48
4	CREMONA	15.64
5	SASSARI	15.79
...		
118	BRISTOL	29
...		
143	BUDAPEST	71

How can my city improve?  
Find inspiration here

Go back to CO2 comparison



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# Co-Benefit: Health



BRISTOL

BUDGET COMMUNITY **HEALTH** PLANNING SAFETY TIME

Cobenefit *i*

**NUMBER OF DAY PM10 CONCENTRATION EXCEEDS**  
(Number of Days)

Select another..

Compare to.. Newcastle upon Tyne

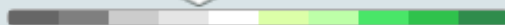
The top 5 cities

1	METZ	1
2	LUXEMBOURG	1
3	GÖTTINGEN	1
4	COPENHAGEN	2
5	MAGDEBURG	2
...		
77	<b>BRISTOL</b>	<b>15</b>
...		
124	SOFIA	176.3

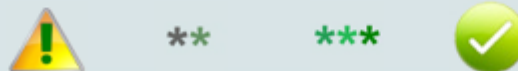


15

MY CITY



OTHER CITY



5

How can my city improve?  
Find inspiration here

Go back to CO2 comparison



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# Co-Benefit: Budget



BRISTOL

Cobenefit *i*



468.7

BUDGET

COMMUNITY

HEALTH

PLANNING

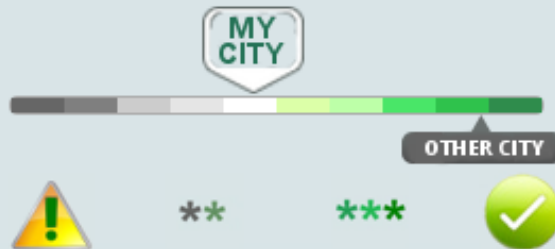
SAFETY

TIME

LUZ REGISTERED CARS (Number of cars/1000 inhabitants)

Select another..

Compare to.. Newcastle upon Tyne



354.8

The top 5 cities

1	TALLINN	196.3
2	ZILINA	216.7
3	PRESOV	222.8
4	VIENNA	231.8
5	NITRA	240.6
...		
72	BRISTOL	468.7
...		
132	LUXEMBOURG	321538

How can my city improve?  
Find inspiration here

Go back to CO2 comparison



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# The Research and Evaluation Approach



Concepts that have inspired the contextual design of the CATCH tools

- Providing (relevant) feedback
  - Gain/Loss Framing
  - ‘Social nudges’ through benchmarking and comparisons
  - Visual/contextual formats
  - ...
- **Grounding**: literature review, experiments, focus group discussions have informed the design of the tools
  - **Database development**: City-based indicators of CO<sub>2</sub> and other (‘co-benefit’) performances
  - **Evaluation** of the designed tools (professionals, general public): surveys, focus groups



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**Thank you**

