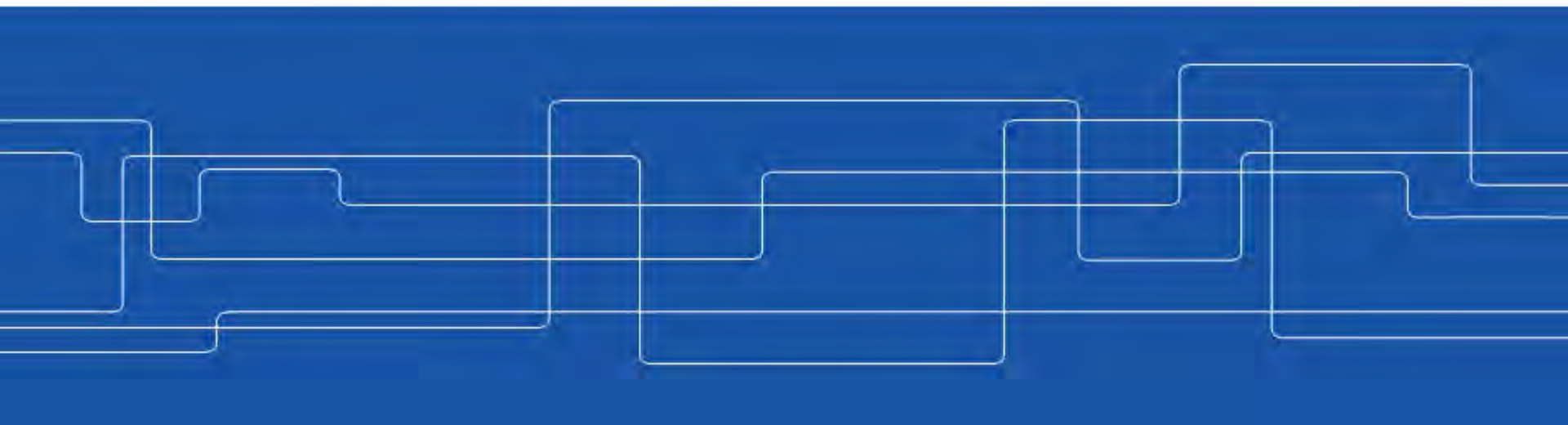




How much CO₂ do I emit?

Björn Hedin
KTH Royal Institute of Technology
Stockholm, Sweden





Introduction – climate change and CO₂ emissions (carbon footprint)



Donald J. Trump

@realDonaldTrump



Following

The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive.

RETWEETS

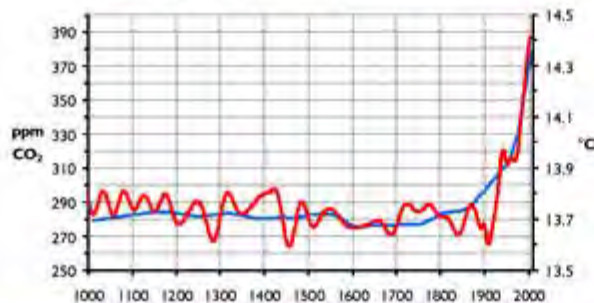
24,831

LIKES

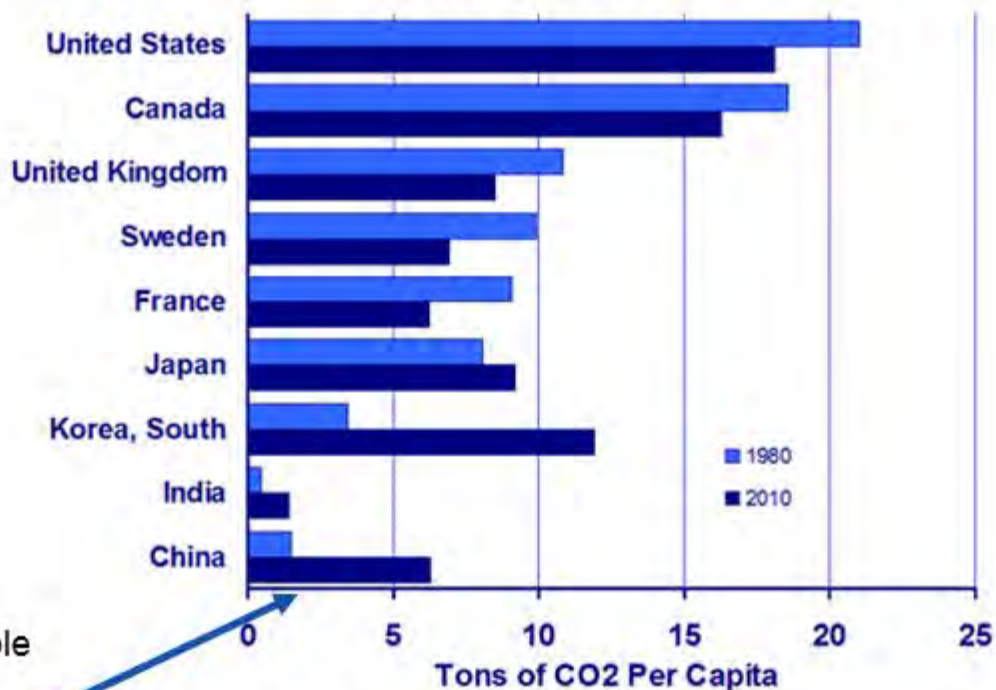
14,654



PM - 5 Nov 2012



World Per Capita CO2 Emissions 1980 & 2010 Selected Countries

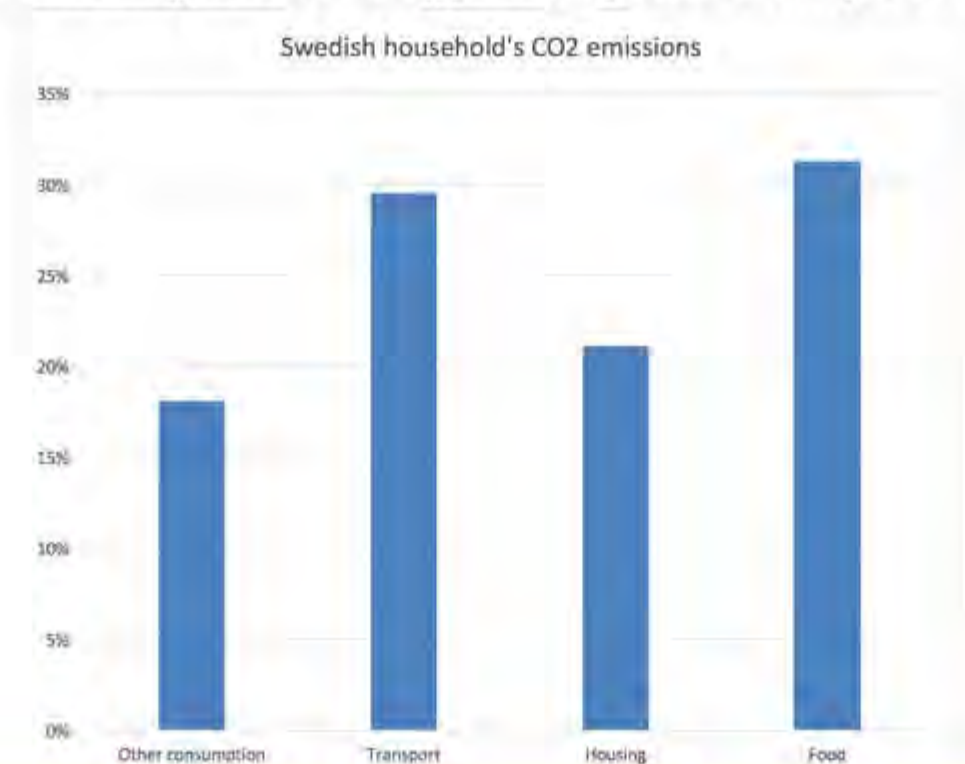


Sustainable
Level:
2 tonnes

Source: US DOE EIA International Energy Statistics



Big 4 of household emissions: Transport, Housing/electricity, Food, Consumption





What did I do? Log my own transportation, meals, heating and electricity use, and consumption





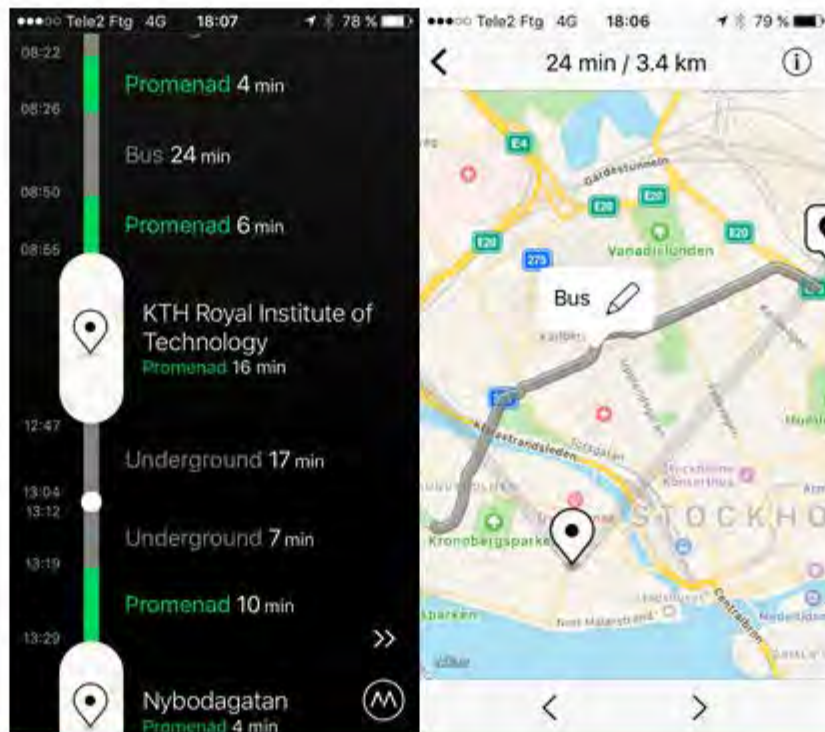
Transportation - intro



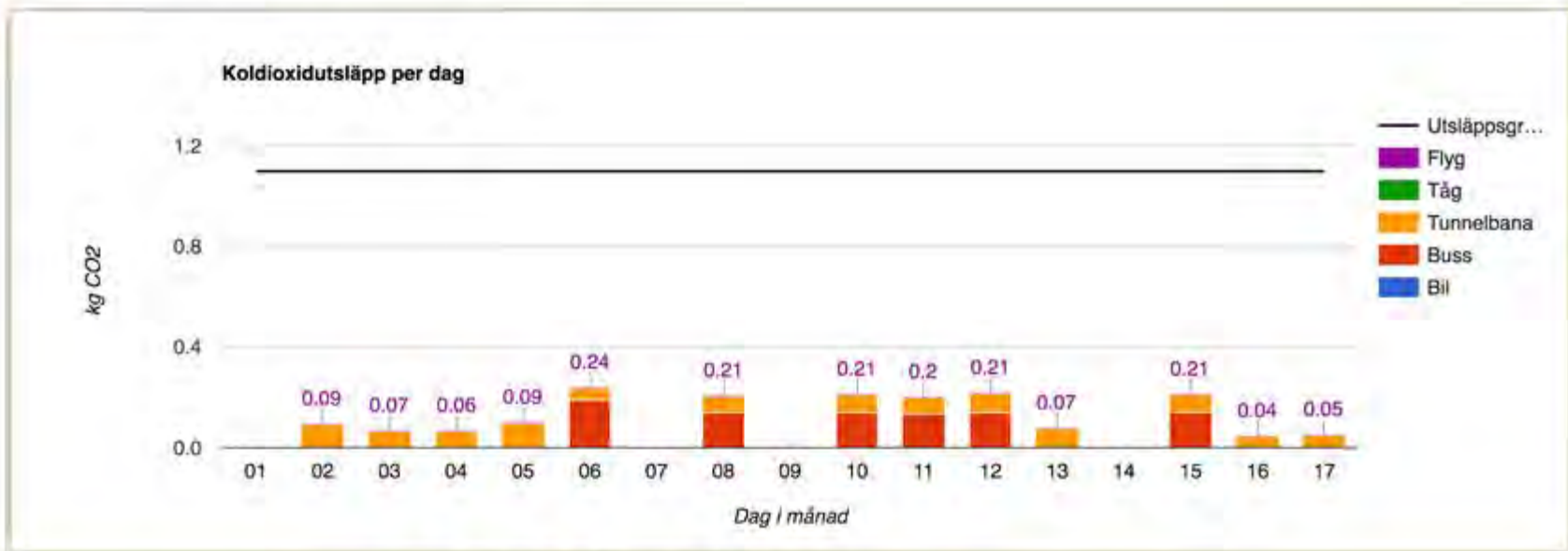
Average Swede: About 30% or 3000 kg CO₂ per year



Log my traveling with the Moves app

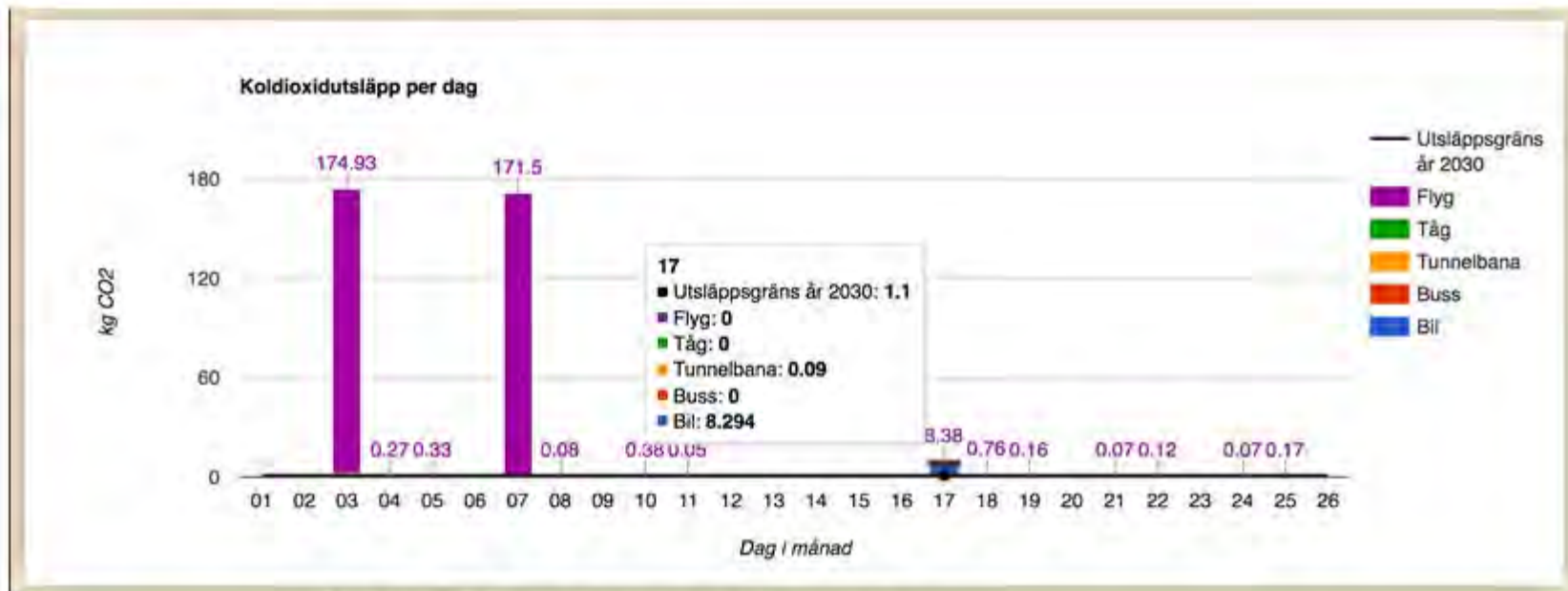


Daily emissions in may



... or a total of 1.56kg in 17 days
 Which would mean 33kg/year compared to
 The average Swede with 3000kg/year

But daily emissions in April



355 kg CO₂ after one trip to Amsterdam
 Which would mean 4300kg/year compared to
 The average Swede with 3000kg/year



Other yearly travel routines

Daily travel to/from work = 33 kg

3 ferry trips to Finland = 600 kg

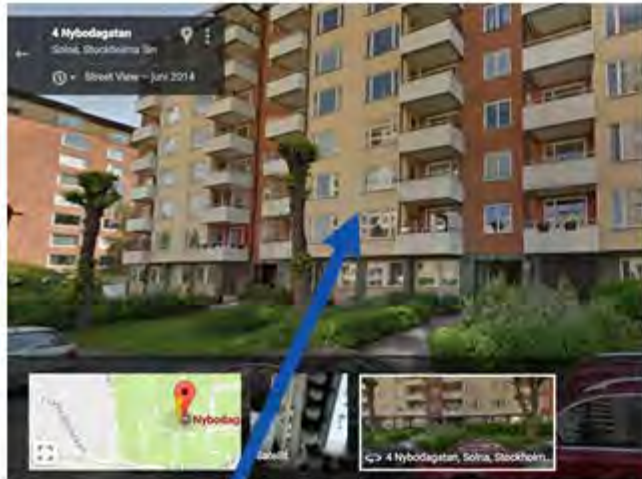
About 2500 km by car (cottage + holidays, 4 people) = 87 kg

4 conference trips in Europe by plane = 1400 kg

A grand total of about **2120 kg CO₂/year**

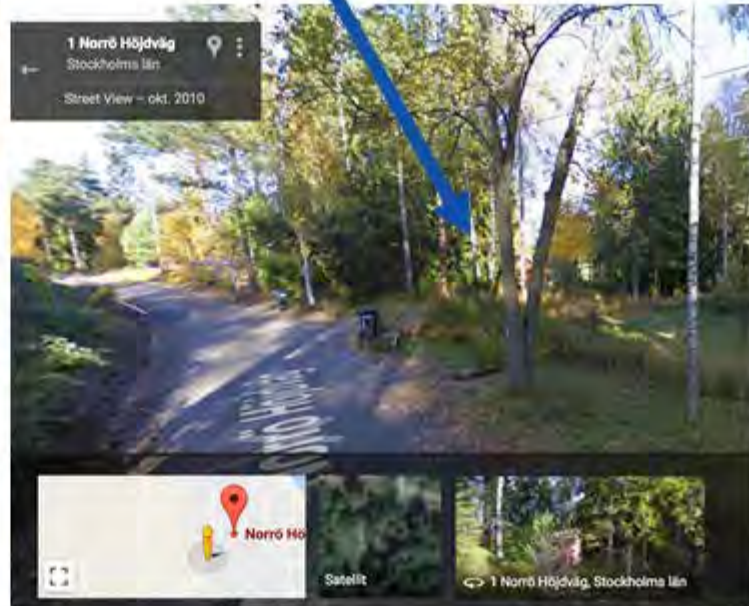
Compared to average Swede 3000 kg CO₂/year

Heating and electricity - intro



My home

My cottage



Average Swede: About 21% or 2100 kg CO₂ per year



Heating at home – district heating

17.400kWh
6 g/kWh
=
104 kg CO₂

4 people
=
26kg/year





My electricity bills. Home + cottage Total about 8500 kWh/year

	Ar 2010	Ar 2011	Ar 2012	Ar 2013	Ar 2014
Januari		426	378	373	362
Februari		368	297	291	280
Mars		224	342	247	267
April		343	288	295	288
Maj		322	263	264	267
Juni		228	247	237	235
Juli		187	181	168	152
Augusti	220	227	225	214	224
September	250	245	275	287	298
Oktober	435	224	312	237	248
November	542	291	344	312	312
December	1412	420	416	421	302
Summa	1 921	3 491	3 595	3 345	3 087



Skellefteå
Kraft

Förbrukningsrapport

	Ar 2010	Ar 2011	Ar 2012	Ar 2013	Ar 2014
Januari		965	714	818	868
Februari		871	710	615	451
Mars		571	392	909	411
April		473	332	333	410
Maj	301	322	335	361	305
Juni	278	182	263	179	318
Juli	186	248	220	278	315
Augusti	222	257	187	235	36
September	250	228	164	302	191
Oktober	435	220	348	329	282
November	542	300	396	342	301
December	1 412	490	782	421	853
Summa	3 626	5 127	4 843	5 122	4 741



CO₂ emissions for electricity depends on energy mix in your country

Country	% fossile	g CO ₂ /kWh
Estonia	95%	1419
Poland	86%	731
US/Germany	45-60%	375
Sweden	3%	41



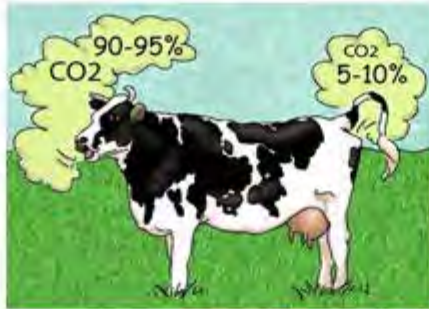
For me with 8500 kWh this would mean

Country	% fossile	g CO ₂ /kWh	Total emissions (tonnes CO ₂) for 8500kWh
Estonia	95%	1419	12,06
Poland	86%	731	6,21
US/Germany/Italy	45-60%	375	3,19
Sweden	3%	41	0,35

Divided by 4 people in the household gives

87 kg CO₂/year emissions

Food – introduction



Average Swede: About 31% or 3100 kg CO₂ per year



Total emissions for foodstuffs calculated using LCA – Life Cycle Assessment

The screenshot shows a web browser displaying the CAFDDB website. The page title is 'Kategori: Fil och yoghurt'. Below the title, there are navigation links for 'CA-data' and 'Leveranser'. The main content area is titled 'Sammanfattad koldioxidinfo' and includes summary statistics: 'Medel: 1.38', 'Max: 2.5', and 'Min: 0.8'. Below this is a section titled 'Inrapporterad koldioxiddata' with a sub-header 'Här visas de koldioxidrapporter för fil och yoghurt som användarna har rapporterat in'. A table follows, listing four data entries with columns for 'Koldioxid (CO₂/g)', 'Källa', 'Land', 'Skapare', 'Verifierad av', and 'Korrekt?'. Each entry has a 'Visa källa' link and a 'Korrekt?' column with two radio buttons.

Koldioxid (CO ₂ /g)	Källa	Land	Skapare	Verifierad av	Korrekt?
1	Visa källa	Sverige	kappa	kappa	<input type="radio"/> <input type="radio"/>
1.2	Visa källa	Sverige	anton.lundstrom65@gmail.com	anton.lundstrom65@gmail.com	<input type="radio"/> <input type="radio"/>
0.8	Visa källa	Sverige	anton.lundstrom65@gmail.com	anton.lundstrom65@gmail.com	<input type="radio"/> <input type="radio"/>
2.5	Visa källa	Sverige	anton.lundstrom65@gmail.com	anton.lundstrom65@gmail.com	<input type="radio"/> <input type="radio"/>



Tracking what I eat – developed chrome plugin that calculates CO2 emissions from recipes on the web – www.foodprint.nu

The screenshot shows a web browser displaying a recipe page for "Gammelmormors köttbullar" on the ICA website. The browser's address bar shows the URL www.ica.se/recept/gammelmormors-kottbullar-335566/. The page features a search bar, navigation tabs (Recept, Handla, Hälso, Buffé), and a search icon. Below the navigation, there are filters for ingredients, special diets, portion size, and preparation time. The recipe title "Gammelmormors köttbullar" is prominently displayed, along with a star rating and a description. A blue arrow points to a green-bordered box that has been overlaid on the page, containing the following information:

RECEPTETS UTSLÄPP:
7327.35 g CO₂
(1 portion)
Det motsvarar ca 44 km bilresa
VISA UTSLÄPP VÄLJ

To the right of the text box is a photograph of a bowl of meatballs, with a "buffé" logo overlaid on the bottom left corner of the image.

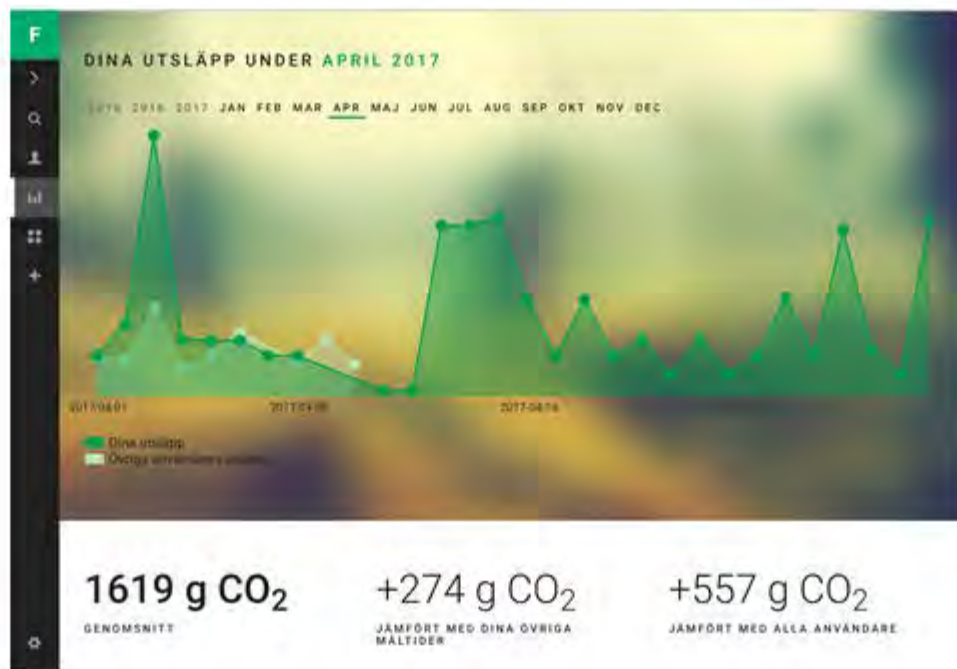


Swedish meatballs





Foodprint – my results





Sum of emissions from ingredients over one month





Yearly CO₂ footprint from food

1600g lunch + 1600 g dinner + 300 g breakfast = 3500g/day

3500 g/day * 365 days = 1300 kg per year

Adding food waste (average 25% in Sweden) the total is

1700 kg/year

Average Swede = 3100 kg/year



Download my last 200 purchases from my bank

Date	Store	Amount	
2017-06-01	HALLON.SE, STOCKHOLM	145,8	Electronic sales
2017-06-01	HALLON.SE, STOCKHOLM	89	Electronic sales
2017-05-31	ICA KVANTUM AKERSBERGA, AKERSBERGA	71,8	Grocery Stores and Supermarkets
2017-05-31	PRESSBYRÄN 4205608, ÅKERSBERGA	25	Grocery Stores and Supermarkets
2017-05-30	ICA SUPERMARKET VASTERMAL, STOCKHOLM	196,77	Grocery Stores and Supermarkets
2017-05-30	PRESSBYRÄN 4308164, STOCKHOLM	70	Grocery Stores and Supermarkets
2017-05-29	PAYPAL *BANGGOOD, 4029357733	270,03	Electronic sales
2017-05-29	BUTIKKNR 309 KITCHN SOLNA, SOLNA	249	Hardware Stores
2017-05-29	ZTORY, KARLSTAD	99	Electronic sales
2017-05-29	HEMKÖP SOLNA C, SOLNA	47,75	Grocery Stores and Supermarkets
2017-05-29	HEMKÖP BIRGER JÄRL, STOCKHOLM	67,81	Grocery Stores and Supermarkets
2017-05-29	RUSTA SOLNA, SOLNA	99,9	Hardware Stores
2017-05-28	AKERSBERGA VEXTFÖRSELJ, TEBY	61	Florist
2017-05-27	ICA TREVEHALLEN, AKERSBERGA	182,7	Grocery Stores and Supermarkets
2017-05-26	NYBADDAT HOME, AKERSBERGA	299	Grocery Stores and Supermarkets
2017-05-26	H M 117 AKERSBERGA, AKERSBERGA	398	Clothing
2017-05-26	SUBWAY AKERSBERGA, AKERSBERGA	146	Restaurants
2017-05-26	REST GULD PANDA, ÅKERSBERGA	500	Restaurants
2017-05-26	801 TEKNIKMAGASINET, ÅKERSBERGA	319,99	Electronic sales
2017-05-26	ICA KVANTUM AKERSBERGA, AKERSBERGA	38,6	Grocery Stores and Supermarkets
2017-05-26	ICA TREVEHALLEN, AKERSBERGA	54,5	Grocery Stores and Supermarkets
2017-05-26	DJURMAGAZINET AKERSBERG, AKERSBERGA	29	Pet shops, pet foods and supplies
2017-05-25	ICA SUPERMARKET STOP TABY, TABY	527,83	Grocery Stores and Supermarkets
2017-05-25	ITUNES.COM/BILL, ITUNES.COM	85	Electronic sales

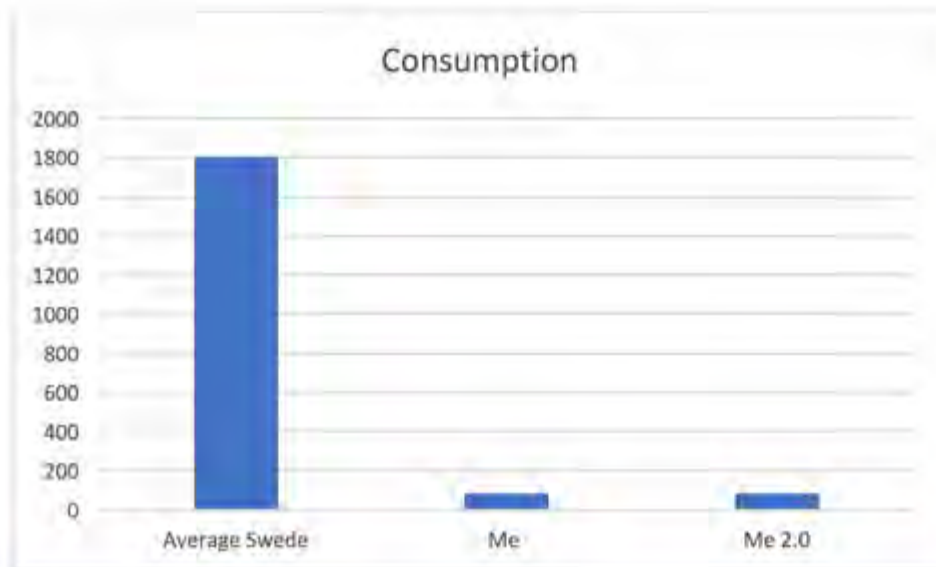


Map to Åland index (CO_2 /Euro/category)

Result: **82 kg CO_2 per year**
Average Swede = 1800 kg



Wrapping up: What did I learn? Consumption

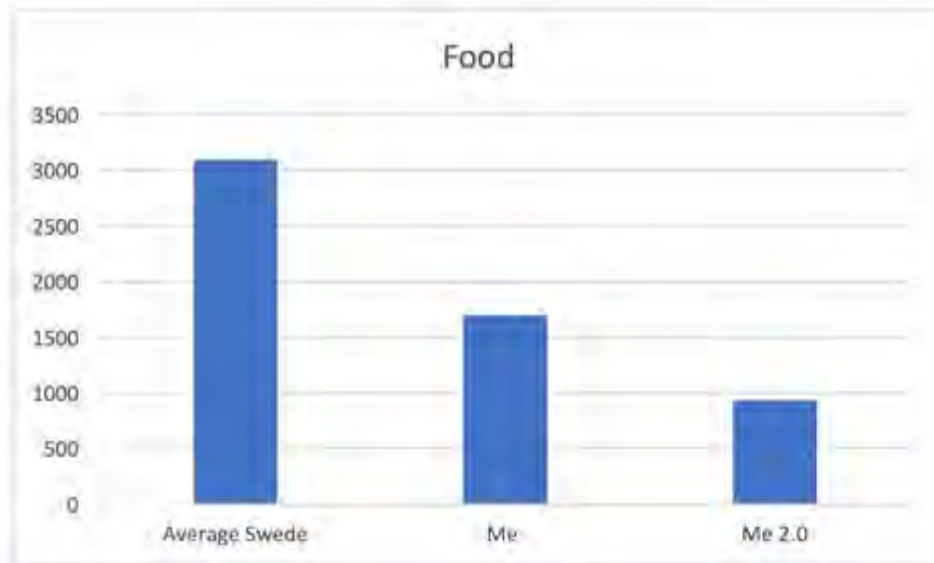


Average Swede	1800
Me	82
Me 2.0	82

Very low scores,
not much I can
change



Wrapping up: What did I learn? Food

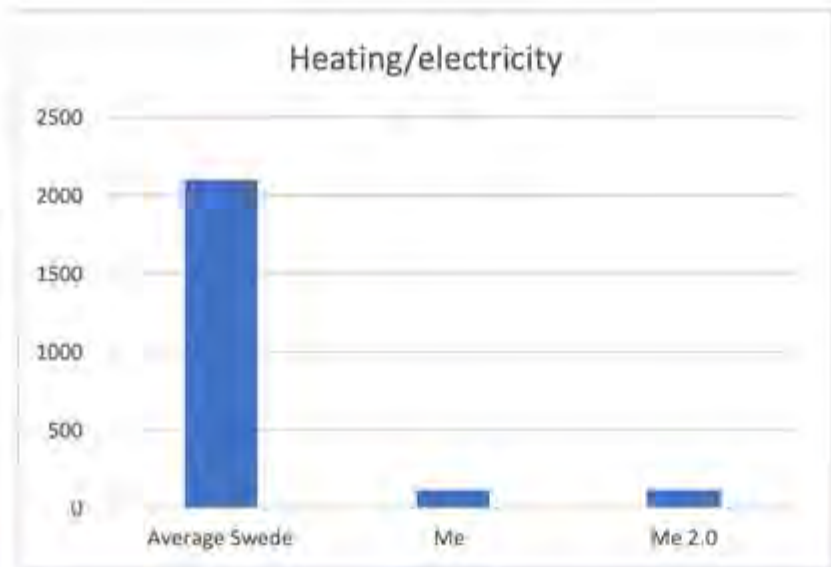


Average Swede	3100
Me	1700
Me 2.0	930

Change minced
meat to soy
based version
lowers footprint
for food by 40%



Wrapping up: What did I learn? Heating/electricity

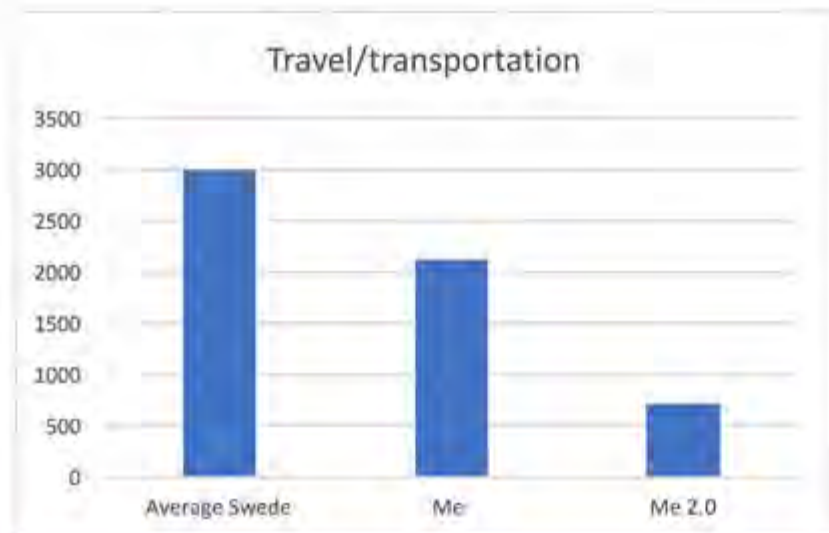


Average Swede	2100
Me	113
Me 2.0	113

Not much I can
do



Wrapping up: What did I learn? Travel



Average Swede	3000
Me	2120
Me 2.0	720

Stop going to
conferences
reduces CO2 by
76%



So: Do I live at a sustainable level: No
Can I live at a sustainable level: YES!

Björn Hedin
bjornh@kth.se

