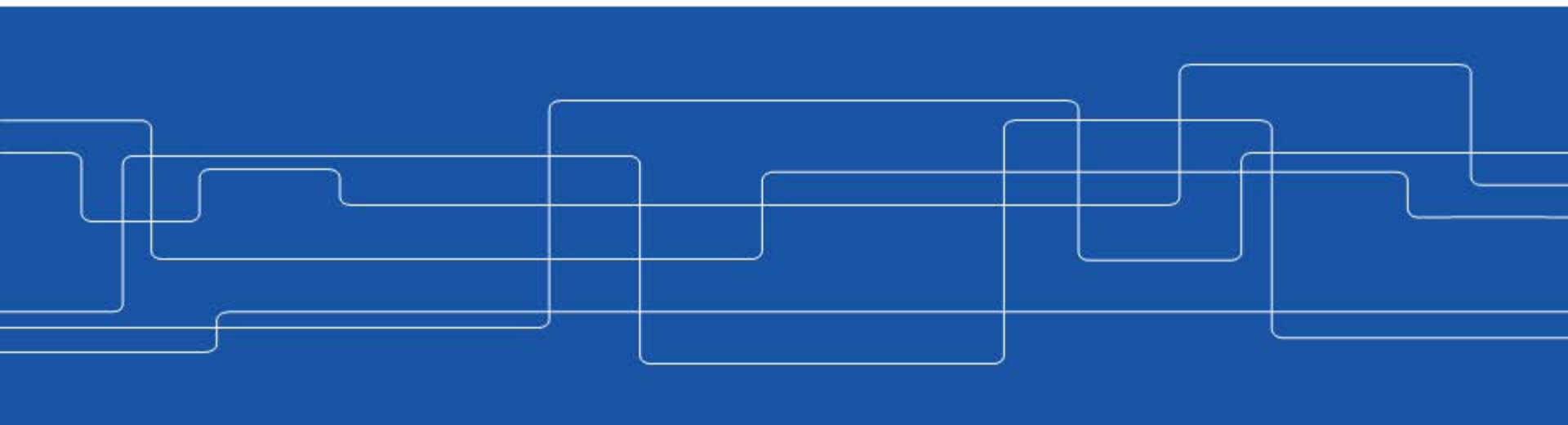




How much CO₂ do I emit?

Björn Hedin
KTH Royal Institute of Technology
Stockholm, Sweden



Introduction – climate change and CO₂ emissions (carbon footprint)



Donald J. Trump
@realDonaldTrump



Following

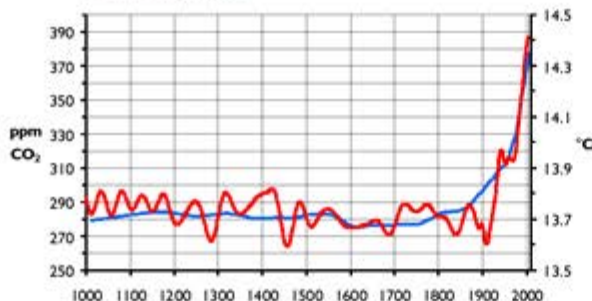
The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive.

RETWEETS
24,831

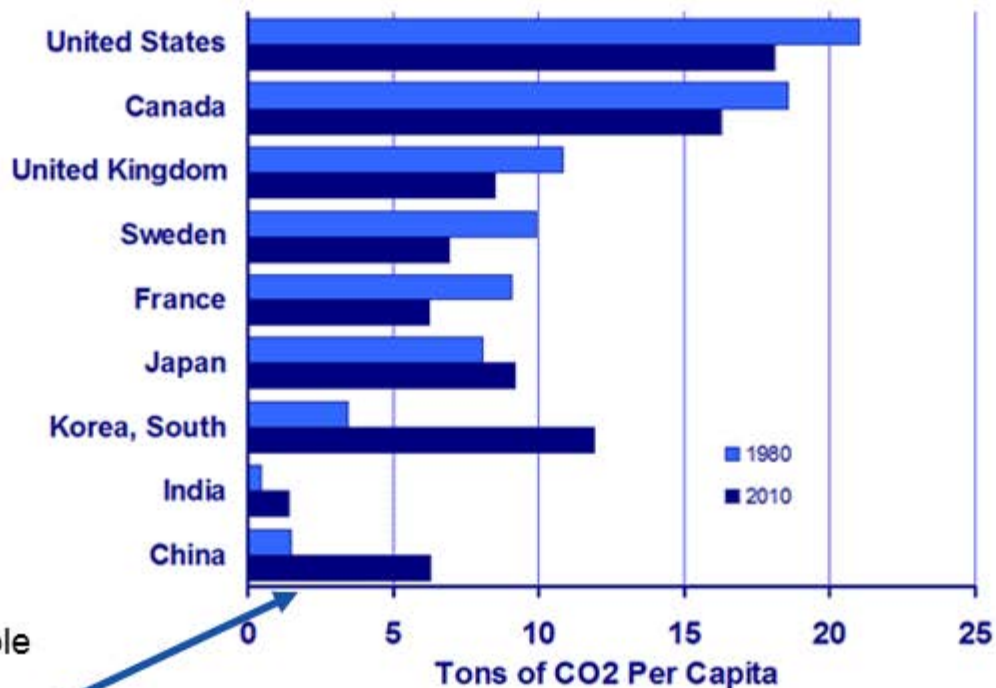
LIKES
14,654



2:15 PM - 6 Nov 2012



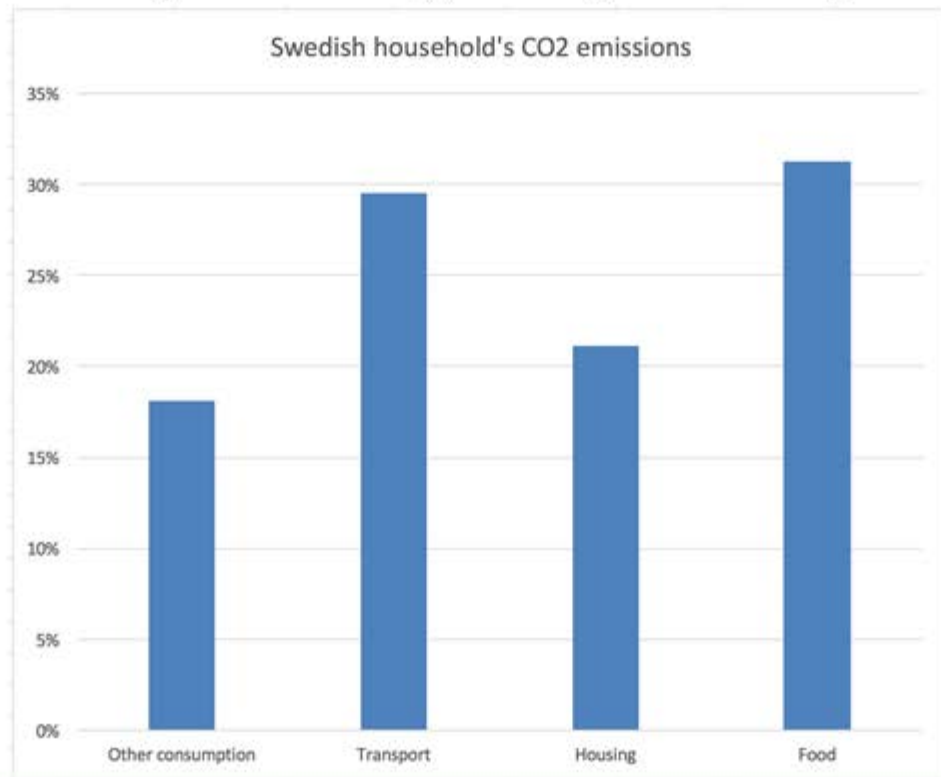
World Per Capita CO2 Emissions 1980 & 2010 Selected Countries



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

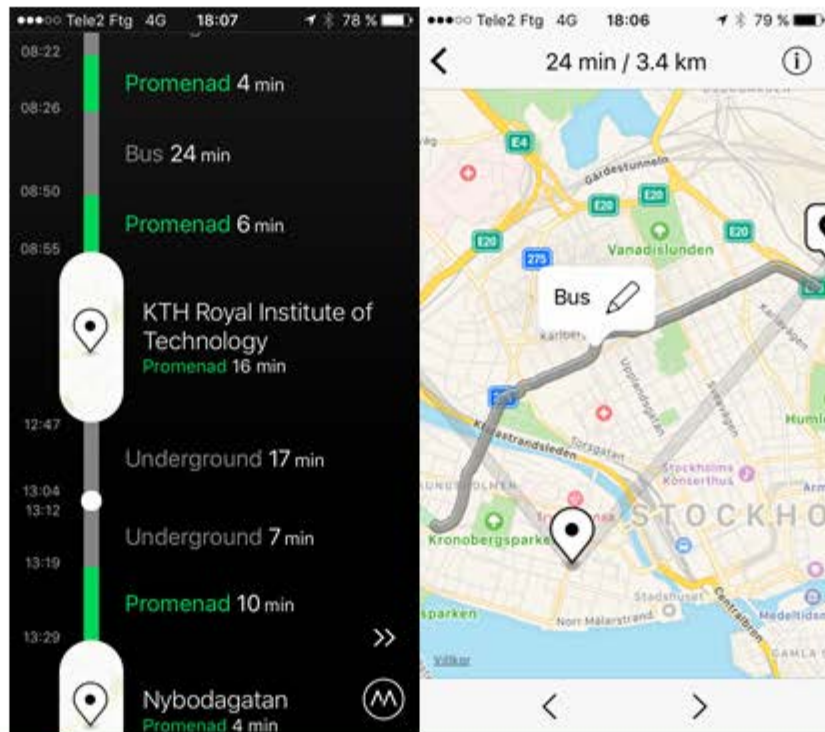


Transportation - intro

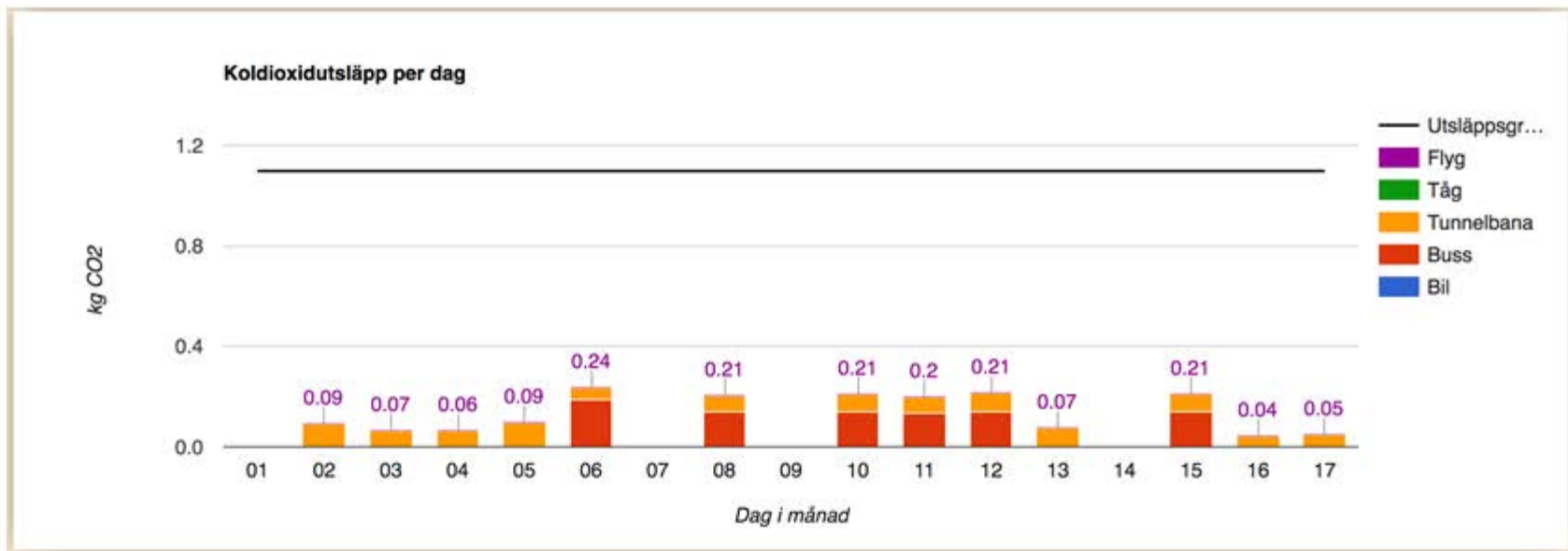


Average Swede: About 30% or 3000 kg CO₂ per year

Log my traveling with the Moves app

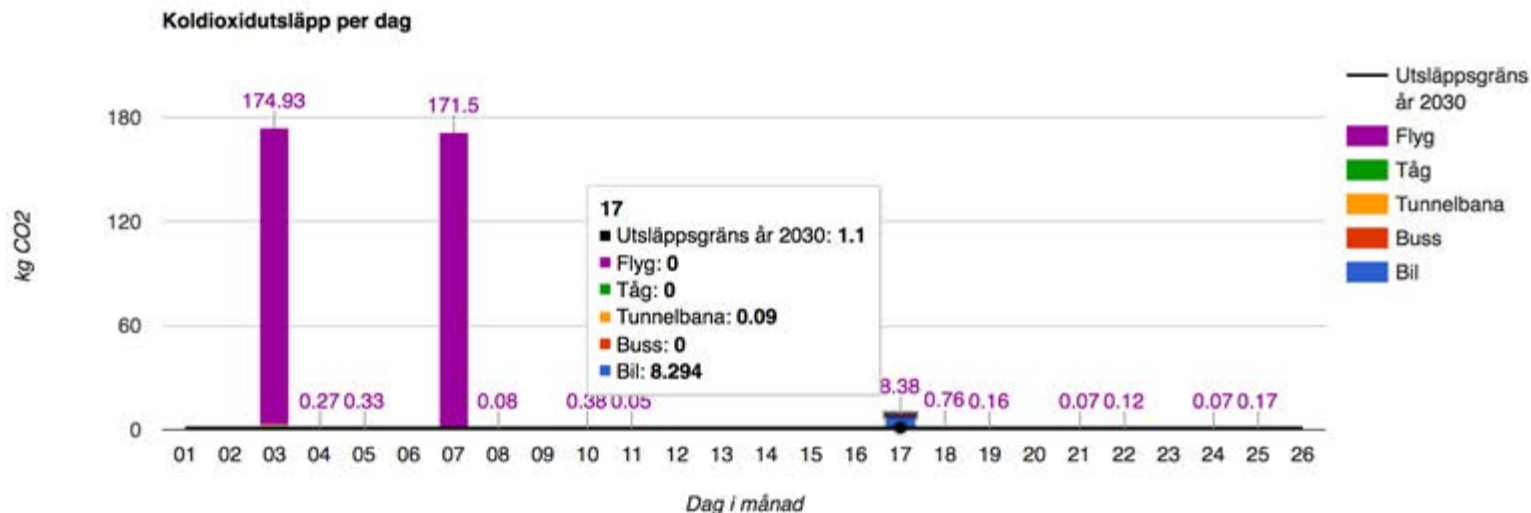


Daily emissions in may



... 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

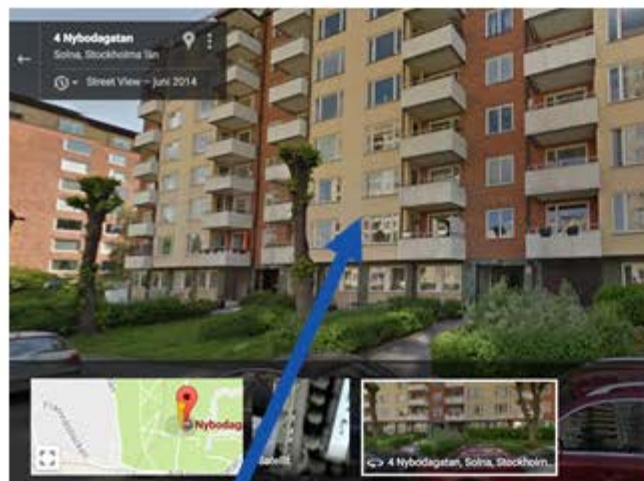
About 2500 km by car (cottage + holidays, 4 people) = 87 kg

4 conference trips in Europe by plane = 1400 kg

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

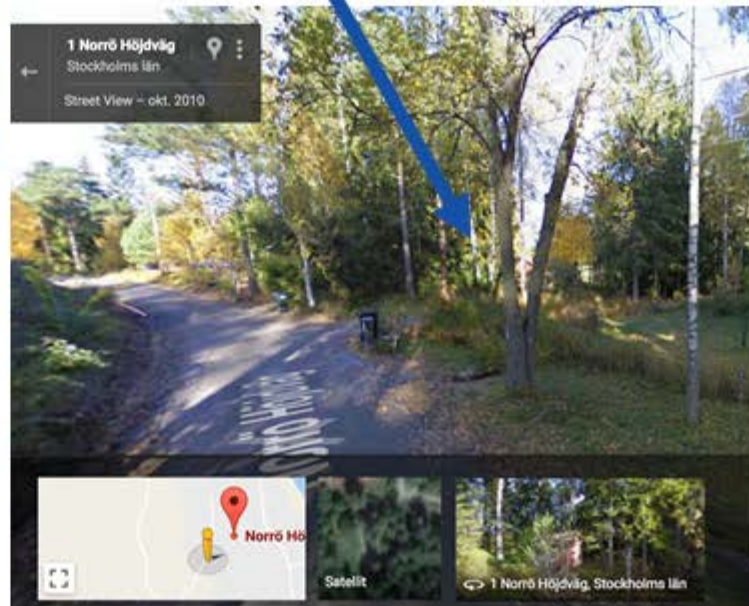
Compared to average Swede 3000 kg CO₂/year

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

Skellefteå Kraft		Förbrukningsrapport				
	År 2010	År 2011	År 2012	År 2013	År 2014	
Januari		426	376	373	303	
Februari		368	297	290	290	
Mars		254	342	247	267	
April		343	298	285	268	
Maj		322	280	284	287	
Juni		229	247	237	235	
Juli		187	188	188	192	
Augusti	220	229	225	214	234	
September	296	345	276	287	288	
Oktober	326	354	312	297	248	
November	300	291	341	312	312	
December	470	438	418	420	302	
Summa	1 707	3 491	3 595	3 345	3 087	



**Skellefteå
Kraft**

Förbrukningsrapport

	År 2010	År 2011	År 2012	År 2013	År 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



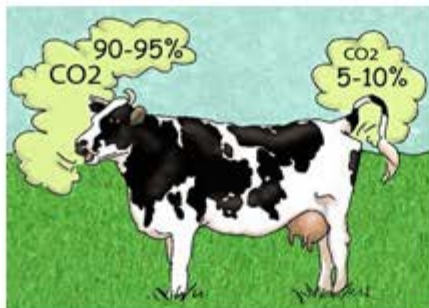
For me with 8500 kWh this would mean

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

lcafdb.org/kategori/8

LCAFDB Bök livsmedel Q Alla Skapa bjornh

Kategori: Fil och yoghurt

LCA-data Livsmedel

Sammanfattad koldioxidinfo

Medel: 1.38
Max: 2.5
Min: 0.8

Inrapporterad koldioxiddata

Här visas de koldioxidrapporter för fil och yoghurt som användarna har rapporterat in.

Koldioxid (CO ₂ /g)	Källa	Land	Skapare	Verifierad av	Korrekt?
1	Visa källa	Sverige	kappe	kappe	👍 0 👎 0
1.2	Visa källa	Sverige	antonlundstrom88@gmail.com	antonlundstrom88@gmail.com	👍 0 👎 0
0.8	Visa källa	Sverige	antonlundstrom88@gmail.com	antonlundstrom88@gmail.com	👍 0 👎 0
2.5	Visa källa	Sverige	antonlundstrom88@gmail.com	antonlundstrom88@gmail.com	👍 0 👎 0



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 the ICA website. The URL is www.ica.se/recept/gammelmormors-kottbullar-338364/. The page features a red navigation bar with the ICA logo and links for 'Recept', 'Handla', 'Hälsa', and 'Buffé'. Below the navigation bar, there are search filters and a search bar. The main content area displays the recipe 'Gammelmormors köttbullar' with a star rating of three stars and 154 reviews. The recipe description states: 'Köttbullar är ett ständigt inslag på de allra flestas julbord och detta köttbullsrecept är en uppskattad favorit. Köttbullarna ger du en festlig smak av bland annat ansjovis, kryddpeppar och lök samt en ljuvlig rundhet från vispgräddde. Mumm!'. A blue arrow points to a green-bordered box that displays the CO2 emission calculation: 'RECEPTETS UTSLÄPP: 7327.35 g CO₂ (1 portion)'. Below this, it says 'Det motsvarar: ca 44 km bilresa.' and there are two buttons: 'VISA UTSLÄPP' and 'VÄLJ'. To the right of the text, there is a photo of the meatballs in a bowl, with a 'buffé' label at the bottom left of the image.

ICA Recept Handla Hälsa Buffé Sök Logga in Mitt ICA

Ingrediens Specialkost Måltid Tillfälle Världens kök Tillagningssätt Typ av recept

Sök recept Dela med dig här → f t p 3

RECEPT MEDEL TID: UNDER 45 MINUTER

Gammelmormors köttbullar

★★★ 154 röster

Köttbullar är ett ständigt inslag på de allra flestas julbord och detta köttbullsrecept är en uppskattad favorit. Köttbullarna ger du en festlig smak av bland annat ansjovis, kryddpeppar och lök samt en ljuvlig rundhet från vispgräddde. Mumm!

Detta är ett recept från Buffé nr 12, 2003.

RECEPTETS UTSLÄPP:
7327.35 g CO₂
(1 portion)

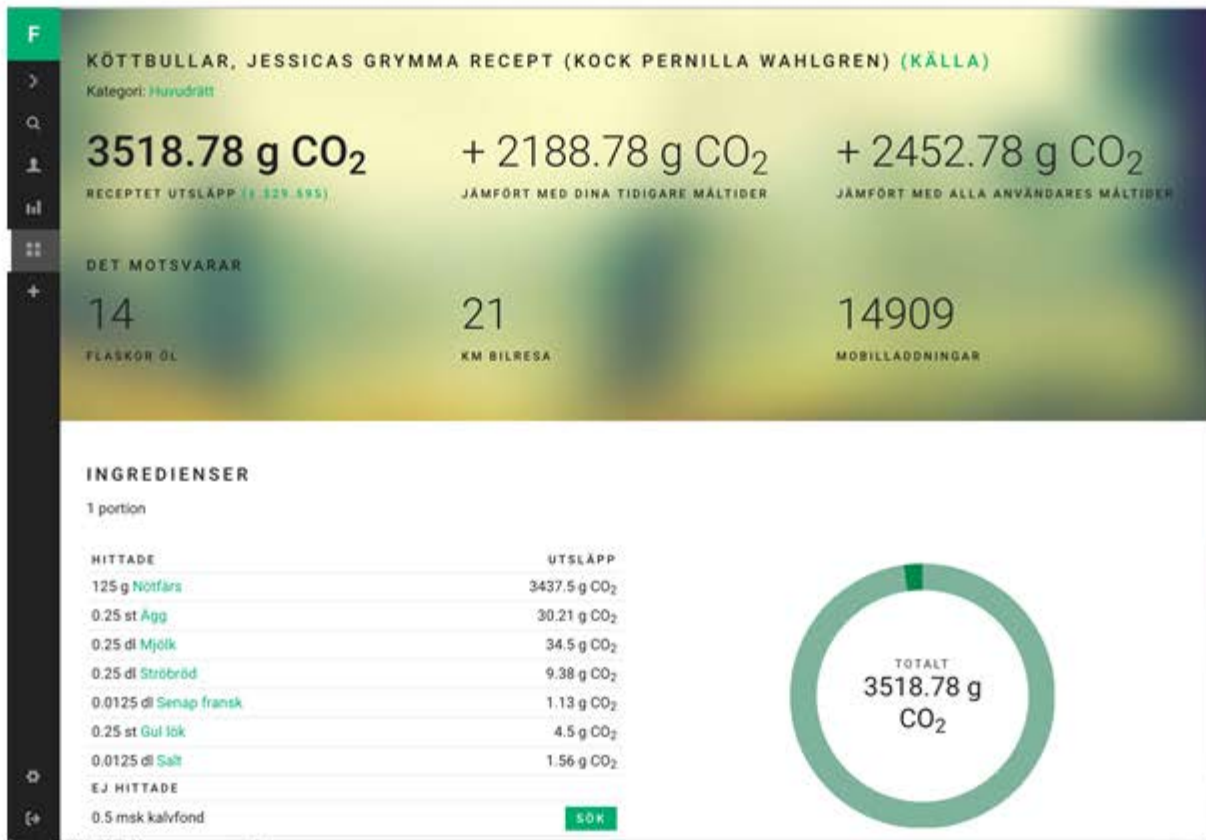
Det motsvarar: ca 44 km bilresa.

VISA UTSLÄPP VÄLJ

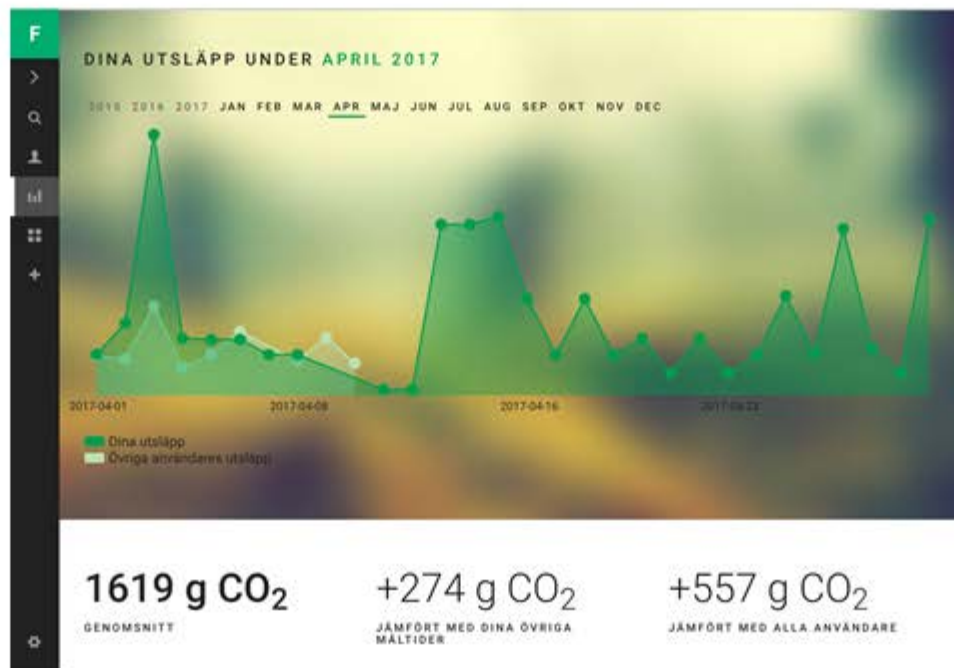
buffé



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	PRESSBYRÅN 4205608, ÅKERSBERGA	25	Grocery Stores and Supermarkets
2017-05-30	ICA SUPERMARKET VASTERMAL, STOCKHOLM	196,77	Grocery Stores and Supermarkets
2017-05-30	PRESSBYRÅN 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 JARL, STOCKHOLM	67,81	Grocery Stores and Supermarkets
2017-05-29	RUSTA SOLNA, SOLNA	99,9	Hardware Stores
2017-05-28	AKERSBERGA VEXTFORSELJ, 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 AKERSBER, AKERSBERGA	29	Pet shops, pet foods and supplies
2017-05-25	ICA SUPERMARKET STOP TABY, TABY	527,63	Grocery Stores and Supermarkets
2017-05-25	ITUNES.COM/BILL, ITUNES.COM	85	Electronic sales

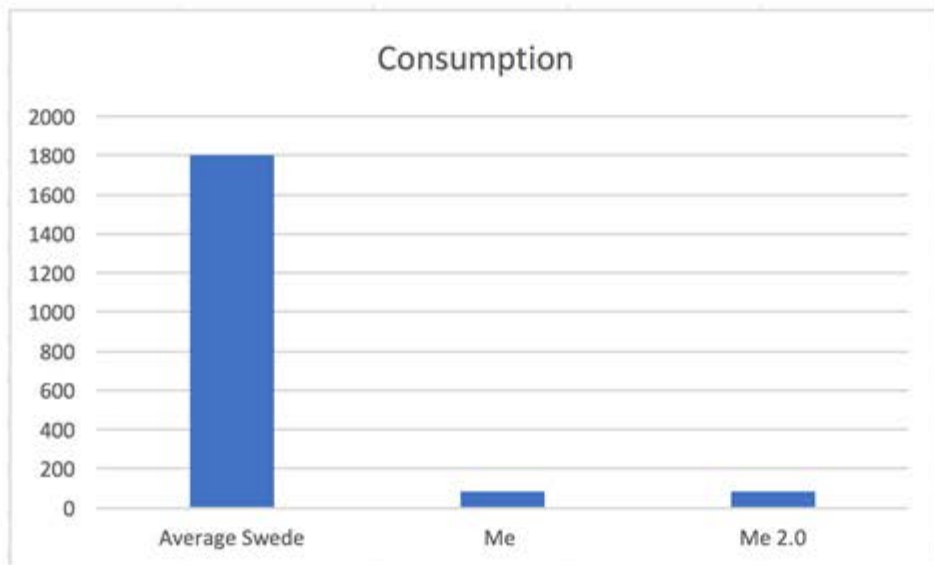


Map to Åland index (CO_2 /Euro/category)

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



Wrapping up: What did I learn? Consumption

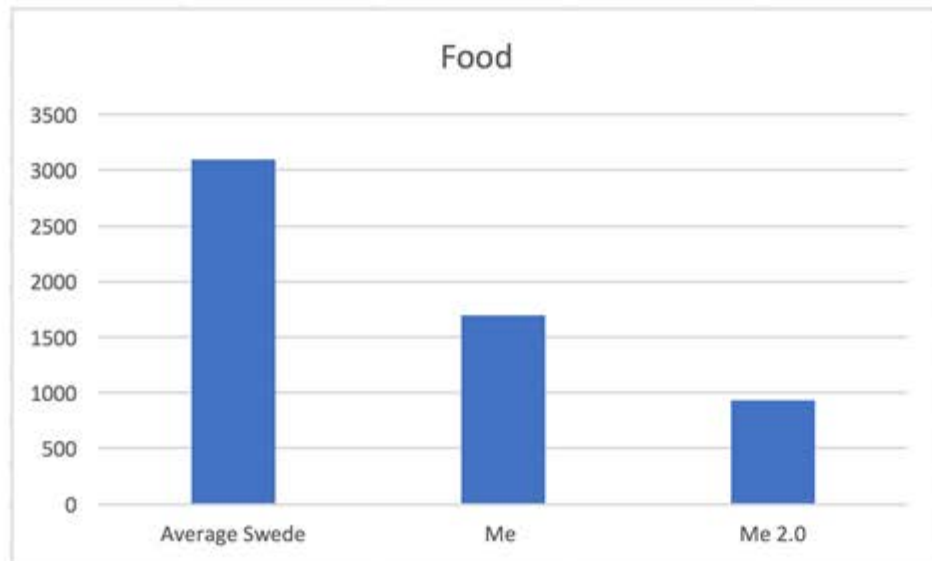


Average Swede	1800
Me	82
Me 2.0	82

Very low scores,
not much I can
change



Wrapping up: What did I learn? Food

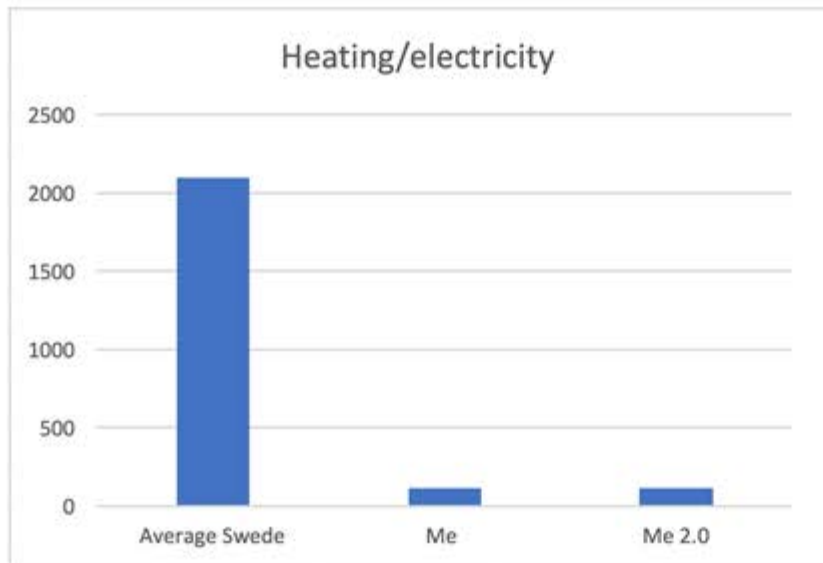


Average Swede	3100
Me	1700
Me 2.0	930

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



Wrapping up: What did I learn? Heating/electricity

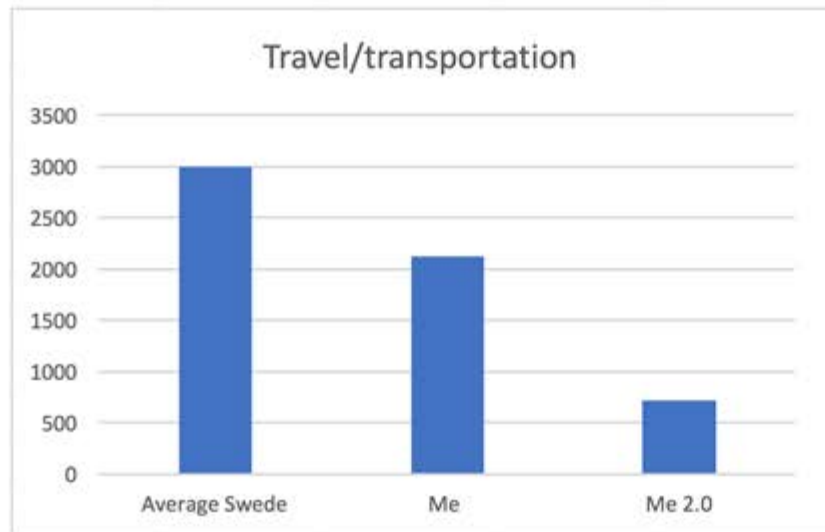


Average Swede	2100
Me	113
Me 2.0	113

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

