

Supplementary material for

Food banks against climate change, a solution that works: the case of Navarra, Spain

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Table S1: Activities and emission factors of the Food Bank of Navarra carbon footprint, Scope 1 (2018).

Emission source	Activity data	Unit	Emission factor	Unit	Comments	Source	Emissions	Unit
Consumption of natural gas	52442	kWh	0.183	kg CO ₂ /kWh	Year 2018	MITECO (2019)	9597	kg CO ₂
Vehicle type	Activity data	Unit	Fuel type	Emission factor	Unit	Source	Emissions	Unit
FBN's van	5951.5	litre	Diesel A or B	2.493	kg CO ₂ e/litre	MITECO (2020)	14837	kg CO ₂
Vehicle type	Activity data	Unit	Gas name	Emission factor	Unit	Source	Emissions	Unit
Recharging of refrigerant gases	0	litre			kg CO ₂ e/litre	MITECO (2020)	0	kg CO ₂

MITECO, Ministerio para la Transición Ecológica y el Reto Demográfico (2019 and 2020) *Carbon footprint calculator* [Online] <https://www.miteco.gob.es/es/cambio-climatico/temas/mitigacion-politicas-y-medidas/calculadoras.aspx>.

Table S2: Activities and emission factors of the Food Bank of Navarra carbon footprint, Scope 2 (2018).

Facilities	Emission source	Activity data	Unit	Trading company	Emission factor	Unit	Comments	Source	Emissions	Unit
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Pamplona	Electricity consumption	74023	kWh	EMASP S. COOP	0	Kg CO ₂ e/kWh	Year 2018, wind energy	MITECO (2019)	0	kg CO ₂ e
Tudela	Electricity consumption	10185	kWh	Iberdrola Clientes S.A.U.	0.27	Kg CO ₂ e/kWh	Year 2018	MITECO (2019)	2750	kg CO ₂ e
Total									2750	kg CO₂e

MITECO, Ministerio para la Transición Ecológica y el Reto Demográfico (2019) *Carbon footprint calculator* [Online] <https://www.miteco.gob.es/es/cambio-climatico/temas/mitigacion-politicas-y-medidas/calculadoras.aspx>.

Table S3: Activities and emission factors of the Food Bank of Navarra carbon footprint, Scope 3, Upstream. Transport associated with food inputs (2018).

Origin	Type of vehicle	Fuel type**	Distance travelled	Unit	Speed	Emission factor	Unit	Source	Emissions	Unit
Manufacturers and distributors *	Van (19%)	Gasoline (17%)	331	km	High (87 km/h)	0.26	kg CO ₂ e/km	OCCC (2020)	87	kg CO ₂ e
		Gasoil (83%)	1614	km	High (87 km/h)	0.20	kg CO ₂ e/km	OCCC (2020)	330	kg CO ₂ e
	Rigid lorry > 14 t (31%)	-	3173	km	High (87 km/h)	0.45	kg CO ₂ e/km	OCCC (2020)	1436	kg CO ₂ e
	Articulated lorry <= 34 t (47%)	-	4811	km	High (87 km/h)	0.50	kg CO ₂ e/km	OCCC (2020)	2406	kg CO ₂ e
	Articulated lorry > 34 t (3%)	-	307	km	High (87 km/h)	0.56	kg CO ₂ e/km	OCCC (2020)	172	kg CO ₂ e
	Total	-	10236	km					4431	kg CO₂e
The Fund for European Aid to the Most Deprived program*	Articulated lorry > 34 t	-	23350	km	High (87 km/h)	0.56	kg CO ₂ e/km	OCCC (2020)	13075	kg CO ₂ e
Food collections*	Rigid lorry < 14 t (5%)	-	213	km	High (87 km/h)	0.40	kg CO ₂ e/km	OCCC (2020)	85	kg CO ₂ e

	Rigid lorry > 14 t (10%)	-	426	km	High (87 km/h)	0.45	kg CO ₂ e/km	OCCC (2020)	193	kg CO ₂ e
	Articulated lorry <= 34 t (36%)	-	1464	km	High (87 km/h)	0.50	kg CO ₂ e/km	OCCC (2020)	732	kg CO ₂ e
	Articulated lorry > 34 t (49%)	-	2011	km	High (87 km/h)	0.56	kg CO ₂ e/km	OCCC (2020)	1126	kg CO ₂ e
	Total		4114	km					2136	kg CO₂e
PRC	Van	Gasoline (15.4%)	8609	km	Average between urban speed(21 km/h) and average speed (62 km/h)	0.26	kg CO ₂ e/km	OCCC (2020)	2271	kg CO ₂ e
		Gasoil (84.6%)	47296	km	Average between urban speed(21 km/h) and average speed (62 km/h)	0.20	kg CO ₂ e/km	OCCC (2020)	9681	kg CO ₂ e
	Total	-	55905	km					11951	kg CO₂e
Fruit and Vegetable Producers Organisation	Articulated lorry > 34 t	-	23397	km	High (87 km/h)	0.56	kg CO ₂ e/km	OCCC (2020)	13101	kg CO ₂ e
Others food banks	Articulated lorry<=34t	-	1110	km	High (87 km/h)	0.50	kg CO ₂ e/km	OCCC (2020)	555	kg CO ₂ e
Food donations	Passenger car (75%)	Gasoline (38.0%)	48	km	Average between urban speed(21	0.185	kg CO ₂ e/km	OCCC (2020)	9	kg CO ₂ e

				km/h) and average speed (69 km/h)						
	Gasoil (62.0%)	78	km	Average between urban speed(21 km/h) and average speed (69 km/h)	0.166	kg CO ₂ e/km	OCCC (2020)	13	kg CO ₂ e	
Van (25%)	Gasoline (15.4%)	6	km	Average between urban speed(21 km/h) and average speed (62 km/h)	0.26	kg CO ₂ e/km	OCCC (2020)	2	kg CO ₂ e	
	Gasoil (84.6%)	36	km	Average between urban speed(21 km/h) and average speed (62 km/h)	0.20	kg CO ₂ e/km	OCCC (2020)	7	kg CO ₂ e	
Total		168						31	kg CO₂e	
Total transport associated with food inflows								45281	kg CO₂e	

OCCC, Oficina Catalana del Cambio Climático (2020) *Calculation of GHG emissions derived from municipal waste management.*

* Part of the transport carried out by the FBN.

** Percentages according to the number of vehicles in Navarre in the case of the PRC and collections. Percentage according to the number of vehicles in Spain in the case of Manufacturers and Distributors.

Table S4: Activities and emission factors of the Food Bank of Navarra carbon footprint, Scope 3, Downstream. Transport to social entities (2018).

Destination	Type of vehicle	Fuel type*	Distance travelled	Unit	Speed	Emission factor	Unit	Source	Emissions	Unit
Entities in Navarre	Passenger car	Gasoline 38.0%	24817	km	High (102 km/h)	0.15	kg CO ₂ e/km	OCCC (2020)	3723	kg CO ₂ e
	Passenger car	Gasoil 62.0%	40491	km	High (102 km/h)	0.15	kg CO ₂ e/km	OCCC (2020)	5899	kg CO ₂ e
	Van	Gasoline 15.4%	10057	km	High (92 km/h)	0.19	kg CO ₂ e/km	OCCC (2020)	1872	kg CO ₂ e
	Van	Gasoil 84.6%	55250	km	High (92 km/h)	0.18	kg CO ₂ e/km	OCCC (2020)	10130	kg CO ₂ e
	Total		130616	km					21624	kg CO₂e
Others food banks	Articulated lorry<=34t	-	11677	km	High (87 km/h)	0.50	kg CO ₂ e/km	OCCC (2020)	5840	kg CO ₂ e
Total transport to social entities									27463	kg CO₂e

OCCC, Oficina Catalana del Cambio Climático (2020) Calculation of GHG emissions derived from municipal waste management.

* Fuel type according to the percentage of the vehicle fleet in Navarre. Year 2018.

Table S5: Activities and emission factors of the Food Bank of Navarra carbon footprint, Scope 3, Total transport of goods (2018).

	Emissions	Unit
Total transport of food	72744	kg CO₂e

Table S6: Activities and emission factors of the Food Bank of Navarra carbon footprint, Scope 3. Downstream: Staff and volunteer transport, Transport of volunteers, private vehicle (2018).

Origin	Type of vehicle	Fuel type	Distance travelled (km)	Speed	Emission factor kg CO ₂ e/km	Source	Emissions Kg CO ₂ e
Pamplona	Motorbike	Gasoline	5670	Average between urban speed(25 km/h) and average speed (69 km/h)	0.099	OCCC (2020)	562
Pamplona	Passenger car	Diesel	130617	Average between urban speed(21 km/h) and average speed (69 km/h)	0.166	OCCC (2020)	21737
	Passenger car	Gasoline	96205	Average between urban speed(21 km/h) and average speed (69 km/h)	0.185	OCCC (2020)	17776
	Passenger car	Hybrid	8910	Average between urban speed(21 km/h) and average speed (69 km/h)	0.093	OCCC (2020)	826
Pamplona	Van	Diesel	4320	Average between urban speed(21 km/h) and average speed (62 km/h)	0.205	OCCC (2020)	884
Tudela	Passenger car	Diesel	2880	Average between urban speed(21 km/h) and average speed (69 km/h)	0.166	OCCC (2020)	479
Tudela	Passenger car	Gasoline	6165	Average between urban speed(21 km/h) and average speed (69 km/h)	0.185	OCCC (2020)	1139
Total							43404

OCCC, Oficina Catalana del Cambio Climático (2020) Calculation of GHG emissions derived from municipal waste management.

Table S7: Activities and emission factors of the Food Bank of Navarra carbon footprint, Scope 3. Downstream: Transport of volunteers. Public transport (2018).

Origin	Distance travelled (km)	Average occupancy*	Unit	Emission factor	Unit	Source	Emissions Kg CO ₂ e
City bus Pamplona	10560	16	Passengers/bus	0.08074	kg CO ₂ e/Passenger/km	OCCC (2020)	53

OCCC, Oficina Catalana del Cambio Climático (2020) Calculation of GHG emissions derived from municipal waste management.

*Average occupation according to OCCC.

Table S8: Activities and emission factors of the Food Bank of Navarra carbon footprint, Scope 3. Downstream: Total volunteer transport (2018).

	Emissions	Unit
Total staff transport	43457	kg CO₂e

Table S9: Activities and emission factors of the Food Bank of Navarra carbon footprint, Scope 3. Consumption of goods and services (2018).

Emission source	Activity data	Unit	Emission factor	Unit	Comments	Source	Others	Emissions (Kg CO ₂ e)	Uncertainty
Purchase of cardboard *	8.85	T of cardboard	390	kg CO ₂ e/t of cardboard	Weight of one box (200 gr)	ADEME	New cardboard (not recycled)	3452	20%
Purchase of wood *	0.82	T of wood	36.7	kg CO ₂ e/t of wood	Weight of one box (2 kg)	ADEME	Short-lived wood (furniture ...) - upstream manufacture	30	50%
Drinking water supply 1	140	m ³	0.081	kg CO ₂ e/m ³		PRC (2018)		11	
Drinking water supply 2	126	m ³	0.081	kg CO ₂ e/m ³		PRC (2018)		10	
Total								3503	

ADEME, Agence de la transition écologique (2020) Base de données Bilan Carbone, Base Carbone V11 [Online] <https://www.bilans-ges.ademe.fr/en/accueil>.

PRC (2018) personal communication from Álvaro Miranda, from the PRC, April 16, 2020

* These purchases are of industrial packaging for the transport and storage of foodstuffs.

Table S10: Greenhouse gas emissions from the different activities of the Food Bank of Navarra by scope in 2018 (tonnes of CO₂e)

		Emissions (t CO₂e)	Emissions (%)
Scope 1	Fixed combustion	9.6	6.5 %
	Transportation fuel consumption	14.8	10.1 %
	refrigerant gas recharge	0	0 %
Scope 2	Electricity consumption in Berrioplano	0	0 %
	Electricity consumption in Tudela	3	2 %
Scope 3	Transport of food inflows	45.3	30.8 %
	Transport of food outflows	27.7	18.8 %
	Transport of volunteers and staff	43.2	29.3 %
	Consumption of goods and services	3.6	2.4 %

Table S11: Activities and emission factors in a scenario without the FBN, Additional food production (2018).

Category*	Activity data	Units	Emission factor (kg CO₂e/kg o L)	Source	Others	Emissions (kg CO₂e)	Uncertainty
Infant food							
Infant food	160	kg	2.00	Veolia (2016)	Baby food	321	
Infant cereals in porridge	118	kg	2.000	Veolia (2016)	Baby food	235	
Unscheduled food							
Unscheduled food	146540	kg	2.000	Veolia (2016)	Miscellaneous foodstuffs	293080	

Frozen unsorted food	68849	kg	3.475	Veolia (2016)	Average of fruits (0.671), vegetables (0.671), pasta (2.766), fish (2.870) and frozen meats (10.395).	239222	
Drinks							
Flavoured shakes	1409	l	1.3	ECODES MITECO (2019)	Shakes	1831	
Water without gas	15	kg	0.393	ADEME	PET bottled water, 0.5L - in the shop, ready to drink	6	30%
Cola drink	135	l	1.090	ADEME	Soda - cola - in shop, ready to drink	147	30%
Orange soft drinks	35	l	2.220	ADEME	Orange juice	78	30%
Drink without gas	422	l	1.307	ADEME	Average between PET water bottle and orange juice in shop	552	30%
Assorted juices and nectars	109573	kg	2.220	ADEME	Orange juice - pure juice - in shop, ready to drink	243252	30%
A variety of soft drinks	13899	kg	1.655	ADEME	Average between orange juice and cola soda	23002	30%
Pastries, biscuits and sweets							
Assorted biscuits	13131	kg	2.508	Veolia (2016)	Biscuits	32934	
Sweet pastries	379	kg	2.525	ADEME	Average cheesecake (0.764 kgCO ₂ e/serving, portion 0.217), strawberry tart (0.345 kgCO ₂ e/serving, portion 0.139) apple tart (0.283 kgCO ₂ e/serving, portion 0.18)	957	30%
Assorted jams	48	kg	2.176	Veolia (2016)	Confectionery	104	
Assorted marmalades	48866	kg	2.176	Veolia (2016)	Confectionery	106333	

Assorted honey	216	kg	0.960	Observatorio CO2web	Honey	208	
Candies	0	kg	2.176	Veolia (2016)		0	
Confectionery	134	kg	2.525	ADEME	Average cheesecake (0.764 kgCO ₂ e/serving, portion 0.217), strawberry tart (0.345 kgCO ₂ e/serving, portion 0.139) apple tart (0.283 kgCO ₂ e/serving, portion 0.18)	339	30%
Nougats, polvorones and chocolates	559	kg	2.176	Veolia (2016)	Confectionery	1216	
Assorted pastries	38214	kg	2.28	ADEME	pastries - chocolate pastry - net weight in shop	87128	30%
Cocoa and chocolate							
Soluble cocoa (Colacao)	2474	kg	4.700	ADEME	Chocolate powder, unsweetened - net weight in shop. Same perimeter as ingredients purchased in bulk. FE variation for this ingredient: Total product consumption - Conversion factor: 100%.	11629	30%
Chocolate powder	3	kg	4.700	ADEME	Chocolate powder, unsweetened - net weight in shop. Same perimeter as ingredients purchased in bulk. FE variation for this ingredient: Total product consumption - Conversion factor: 100%.	14	30%
Chocolate sweets	177	kg	5.870	ADEME	Milk chocolate, lumps - net weight in shop	1038	30%
Chocolates in bars	257	kg	5.870	ADEME	Milk chocolate, lumps - net weight in shop	1508	30%

Coffee and infusions							
Assorted coffee	488	kg	3.140	ADEME	Ground coffee - net weight in shop	1531	30%
Assorted infusions	1257	kg	6.110	ADEME	Tea - for infusion - net weight in shop	7679	30%
Meats							
Cured ham	425	kg	9.310	ECODES MITECO (2019)	Ham and cured pork shoulder	3959	
Cured sausages, chorizo	19691	kg	5.120	ADEME	Salchichon (pork)	100820	30%
Assorted canned pâté	6	kg	10.395	Veolia (2016)	Canned pâté	58	
Packaged meats	2	kg	4.390	ADEME	Pork sausage, but net in shop	11	30%
Canned meat	3	kg	4.39	ADEME	Pork sausage	11	30%
Assorted cured sausages	13379	kg	5.120	ADEME	Salchichon (pork)	68502	30%
Assorted cold meats	163	kg	5.120	ADEME	Salchichon (pork)	835	30%
Cereals, flour, bread and pasta							
Various pastas	1903	kg	1.48	ADEME	Paste - dry - net weight shop	2817	30%
Macaroni	2409	kg	1.48	ADEME	Paste - dry - net weight shop	3566	30%
Spaguetti	4624	kg	1.48	ADEME	Paste - dry - net weight shop	6844	30%
Rice	14709	kg	4.230	ADEME	Rice - jasmine, Thailand - net weight in shop	62219	30%
Corn	9	kg	0.869	ADEME	Cereal bowl - ready-to-eat dishes. Mass of consumable ingredients in the bowl for one serving (kg): 0.337	8	30%

Sliced bread	10305	kg	1.520	ADEME	Bread - net weight in shop. Wheat flour	15664	30%
Toasted bread	5067	kg	1.520	ADEME	Bread - net weight in shop. Wheat flour	7702	30%
Breakfast cereals	1824	kg	0.869	ADEME	Cereal bowl - ready-to-eat dishes. Mass of consumable ingredients in the bowl for one serving (kg): 0.337	1586	30%
Flour	1774	kg	1.170	ADEME	Flour - wheat - net weight in shop	2075	30%
Condiments and sauces							
Assorted vinegar	573	l	4.17	ADEME	Wine vinegar - net weight in shop. 1.2 kg of grapes to make 1 litre of wine vinegar.	2391	30%
Salt	2	kg	0.544	ADEME	Salt - net weight in shop	1	30%
Oil	9995	kg	2.11	ADEME	Half olive and sunflower oil - net weight in shop.	21089	30%
Sugar	2385	kg	0.682	ADEME	Beet sugar, refined - net weight in shop. 90% of sugar consumption in France	1626	30%
Assorted prepared sauces	30336	kg	2.940	ADEME	Tomato sauce - net weight in shop. Same perimeter as ingredients purchased in bulk.	89188	30%
Mayonnaise	2128	kg	2.000	Veolia (2016)	Miscellaneous foods	4255	
Ketchup	16347	kg	2.4	ADEME	Ketchup - net weight in shop	39232	30%
Mustard	3565	kg	3.27	ADEME	Condiment. Mustard - net weight in shop	11658	30%
Canned vegetables/legumes							

Cooked red kidney beans	17658	kg	0.873	Veolia (2016)	Canned vegetables/legumes	15415
Cooked or canned mixed legumes	86097	kg	0.873	Veolia (2016)	Canned vegetables/legumes	75163
Cooked beans with vegetables	14873	kg	0.873	Veolia (2016)	Canned vegetables/legumes	12985
Cooked chickpeas	20427	kg	0.873	Veolia (2016)	Canned vegetables/legumes	17833
Cooked lentils in their natural state	95107	kg	0.873	Veolia (2016)	Canned vegetables/vegetables	83028
Canned vegetables artichoke hearts	3432	kg	0.873	Veolia (2016)	Canned vegetables	2996
Canned vegetables white asparagus	5089	kg	0.873	Veolia (2016)	Canned asparagus, Origin China, net weight in shop	4443
Canned vegetables thin peas	27739	kg	0.873	Veolia (2016)	Canned peas, net weight in shop	24216
Canned vegetables green beans	9754	kg	0.873	Veolia (2016)	Canned vegetables	8515
Canned vegetables maíz dulce	8785	kg	0.873	Veolia (2016)	Canned vegetables	7669
Canned vegetables cooked chard	11487	kg	0.873	Veolia (2016)	Canned vegetables	10028
Canned vegetables celery strips	5904	kg	0.873	Veolia (2016)	Canned vegetables	5154
Canned vegetables mixed vegetables	325	kg	0.873	Veolia (2016)	Canned vegetables	284
Canned vegetables whole potatoes	5437	kg	0.873	Veolia (2016)	Canned vegetables	4747
Canned vegetables cooked beetroot	261	kg	0.873	Veolia (2016)	Canned vegetables	228
Canned vegetables canned peppers piquillo peppers	1504	kg	0.873	Veolia (2016)	Canned vegetables	1313

Canned vegetables mushroom	866	kg	0.873	Veolia (2016)	Canned vegetables	756	
Canned vegetables carrot	1193	kg	0.873	Veolia (2016)	Canned vegetables	1042	
Canned mixed vegetables	47737	kg	0.873	Veolia (2016)	Canned vegetables	41675	
Fruits							
Cherry	13824	kg	0.663	ADEME	Cherry - net weight in shop	9165	30%
Plum	26000	kg	0.259	ADEME	Fruit (or vegetable) - generic, seasonal, locally produced - net in-store weight	6734	30%
Apple	30890	kg	0.259	ADEME	Apple France - net weight in shop	8000	30%
Peach	19863	kg	0.346	ADEME	Peach France - net weight in shop	6873	30%
Melon	23360	kg	0.313	ADEME	Melon - net weight in shop	7312	30%
Orange	140940	kg	0.500	ADEME	Half orange, fresh and for industry - net weight in shop	70470	30%
Nectarine	22530	kg	0.346	ADEME	Peach France - net weight in shop	7795	30%
Pear	38151	kg	0.45	ADEME	Representative of a pear produced in Belgium, use this value for French production.	17168	30%
Papaya	44552	kg	2.24	ADEME	Fruit (or vegetable) - generic, out of season, produced in a climate-controlled greenhouse - net in-store weight	99796	30%
Banana	11618	kg	0.698	ADEME	Banana - net retail weight	8109	30%
Grape	6525	kg	0.642	ADEME	Grapes - net weight in shop	4189	30%
Fresh fruit	57050	kg	0.259	ADEME	Fruit (or vegetable) - generic, seasonal, locally produced - net weight in shop	14776	30%
Tangerines	267574	kg	0.767	ADEME	Tangerine - net weight in shop	205230	30%

Canned fruit							
Canned fruit, assorted	939	kg	2.176	Veolia (2016)	Canned Fruit	2044	
Peach in syrup	5678	kg	2.176	Veolia (2016)	Canned Fruit	12356	
Pineapple in juice	43	kg	2.176	Veolia (2016)	Canned Fruit	93	
Nuts							
Nuts	318	kg	0.663	ADEME	Walnuts	211	30%
Walnuts	131	kg	0.663	ADEME	Whole walnuts - net weight in shop	87	30%
Vegetables and pulses							
Garlic	3000	kg	0.57	Observatorio CO2web	Place of calculation: United Kingdom	1710	
Pumpkin	10792	kg	0.729	ADEME	Pumpkin - net shop weight	7867	30%
Onion	35610	kg	0.485	ADEME	Onions - net shop weight	17271	30%
Lettuce	25440	kg	0.479	ADEME	Salad - net shop weight - Agricultural production system: espYearla	12186	30%
Sweet corn	544	kg	0.701	ADEME	Maize - net shop weight	381	30%
Potatoes	76707	kg	0.585	ADEME	Potato - net shop weight	44874	30%
Cucumbers	22699	kg	1.38	ADEME	Cucumber - seasonal - net weight in shop	31324	30%
Peppers	2728	kg	0.871	ADEME	Pepper - net shop weight	2376	30%
Tomatoes	94872	kg	0.343	ADEME	Tomato - fresh seasonal, France - net in-store weight	32541	30%

Fresh vegetables	91024	kg	0.259	ADEME	Fruit (or vegetable) - generic, seasonal, locally produced - net weight in shop	23575	30%
Tomato preserves	242519	kg	1.41	ADEME	Tomato - pulp or peeled - net weight in shop	341951	30%
Lentils	149	kg	0.887	ADEME	Green lentils - net weight in shop	132	30%
Various pulses	1610	kg	0.887	ADEME	Green lentils - net weight in shop	1428	30%
Eggs							
Eggs	6596	kg	2.090	ADEME	Egg - national average - net weight in shop. Representing the French egg market, with an industrial part and an outdoor/label part.	13785	30%
Quail eggs	23	kg	2.090	ADEME	Egg - national average - net weight in shop. To represent the French egg market, with an industrial part and an outside/label part.	48	30%
Fish							
Tuna in vegetable oil	39	kg	3.160	ADEME	Canned tuna - net weight in shop	124	30%
Canned fish, assorted	781	kg	3.70	Veolia (2016)	Canned fish. Exotic fish and canned tuna	2890	
Ready to eat meals							
Assorted frozen ready to eat meals	6908	kg	6.780	Veolia (2016)	Prepared meals. Based on the ADEME V11 "composite meal"	46836	30%
Canned ready to eat meals assorted	681	kg	4.389	ADEME	Average of the following ready meals: lasagne (2.91 kgCO ₂ e/serving, serving 0.594), beans with meat (2.37	2989	30%

					kgCO ₂ e/serving, serving 0.37), pasta with ham (1.36 kgCO ₂ e/serving, serving 0.535), chicken with curry rice (1.19 kgCO ₂ e/serving, serving 0.567), cou cous (4.92 kgCO ₂ e/serving, serving 0.82).		
Assorted ready to eat meals	50219	kg	6.78	Veolia (2016)	Prepared meals. Based on the ADEME V11 "composite meals"	340484	
Frozen pizzas	805	kg	5.112	ADEME	Pizza: ready-to-eat meals. Mass of consumable ingredients for one portion (kg): 0.143	4114	30%
Chilled pizzas and Others	3302	kg	5.112	ADEME	Pizza: ready-to-eat dishes. Mass of consumable ingredients for one portion (kg): 0,143	16881	30%
Assorted soups	60	kg	0.873	Veolia (2016)	Soups	52	
Various broths	29144	kg	0.873	Veolia (2016)	Soups	25443	
Gazpacho	72	kg	2.000	Veolia (2016)	Miscellaneous foods	144	
Assorted creams	11189	kg	5.320	Observatorio CO2web	Creams	59523	
Hygiene products							
Grooming drugstore	1319	kg	2.000	Veolia (2016)	Hygiene products	2638	
Cleaning drugstore	80	kg	2.000	ADEME		159	30%
Diapers	1034	kg	2.000	Veolia (2016)	Hygiene products	2068	
Dairy products							
Assorted dairy desserts	9591	kg	2.52	ECODES MITECO (2019)	dairy desserts	24170	

assorted yogurts	253661	kg	2.88	ADEME	Yogurt - store net weight. Quantity of milk considered for a kg of yogurt: 1.5 kg. Approximation to use any type of yogurt (flavored, whole milk, etc.)	730545	30%
Custard	579	kg	2.90	ADEME	Crème brûlée - ready-to-eat dishes. One serving: 0.187	1681	30%
fresh cheeses	446	kg	3.510	ADEME	Fresh cow cheese, 58% fat - net store weight	1567	30%
assorted cheeses	713	kg	4.94	ADEME	Average of hard cheese (Emmental type) and soft cheese (Camembert type) - net weight in store	3524	30%
assorted milk	89925	l	1.22	ADEME	Milk - cow's milk, semi-skimmed, pasteurized - store net weight. Approximation to use in all milks	109709	30%
fresh milk	1130	kg	1.220	ADEME	Milk - cow's milk, semi-skimmed, pasteurized - store net weight. Approximation to use in all milks	1379	30%
Milk powder	80	kg	2.000	Veolia (2016)	various foods	160	
butters	2428	kg	9.490	ADEME	Sweet butter - net store weight	23042	30%
Varied snacks							
Chips	1622	kg	1.776	ADEME	chips. Portion 0.196	2879	30%
Fries and assorted snacks	9646	kg	1.776	ADEME	chips. Portion 0.196	17127	30%
Assorted cereal bar	7792	kg	2.000	Veolia (2016)	various foods	15585	
assorted olives	7331	kg	0.858	ADEME	Olives in jar, net weight in store	6290	30%
Total	2767536	kg				4271808	

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* The products considered are those that avoid food waste:

- Manufacturers and distributors
- Fruits and vegetables from market withdrawals (the Fruit and Vegetable Producers Organisation)
- PRC (surplus from commercial surfaces)
- Other Food Banks

Table S12: Activities and emission factors in a scenario without the FBN, Waste management, products whose donors are in the PRC (2018).

Origin	Waste fractions*	Unit	Activity data (kg)	Emission factor (kgCO ₂ eq/kg)	Source	Comments	Emissions kg CO ₂ e
Landfill	9.1	%	70829	0.624	PRC (2018)	0.624 tCO ₂ eq/ t of organic matter during 30 Years	44198
Organic matter	49.0	%	381357				34785
Biomethanisation	53.0	%	202119	0.020	MITECO (2020)	Spain	4042
Composting	47.0	%	179238	0.172	MITECO (2020)	Spain	30743
Paper and cardboard	8.7	%	67375	0.052	OCCC (2020)	Catalonia	3512
Light packaging	27.2	%	211299	0.016	OCCC (2020)	Catalonia	3429
Glass	6.1	%	47277	0.007	OCCC (2020)	Catalonia	354
Total	100	%	778137				86278

OCCC, Oficina Catalana del Cambio Climático (2020) *Calculation of GHG emissions derived from municipal waste management*.

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PRC (2018) personal communication from Álvaro Miranda, from the PRC, April 16, 2020.

* Inventory of household and commercial waste for the PRC (Government of Navarra, 2019) reweighted to exclude the "Other" fraction composed of items not handled by the FBN (batteries, medicines, electrical and electronic products). Values reweighted according to the composition percentages of the waste fraction container.

Table S13: Activities and emission factors in a scenario without the FBN, Waste management, Products originating in Navarra (except for the PRC) (2018).

Origin	Waste fractions (%)	Activity data (kg)	Emission factor	Unit	Source	Comments	Emissions	Unit
Landfill	35.0	298601	0.625	kgCO ₂ eq/kg	OCCC (2020)	Catalonia	186479	kg CO ₂ e
Biomethanisation	64.1	547213	0.020	kgCO ₂ eq/kg	MITECO (2020)	Spain	10944	kg CO ₂ e
Light packaging	0.1	740	0.016	kgCO ₂ eq/kg	OCCC (2020)	Catalonia	12	kg CO ₂ e
Refuse	0.8	6590	-	-				
Total	99	853145					197435	kg CO₂e

OCCC, Oficina Catalana del Cambio Climático (2020) *Calculation of GHG emissions derived from municipal waste management*.

MITECO, Ministerio para la Transición Ecológica y el Reto Demográfico (2020) *Inventario Nacional de Gases de Efecto Invernadero*. Gobierno de España.

Table S14: Activities and emission factors in a scenario without the FBN, Waste management, Products originating in the rest of Spain (except Catalonia) (2018).

C.1. Rest of Spain	Waste fractions * (%)	Activity data** (kg)	Emission factor	Unit	Source	Comments	Emissions	Unit
Landfill	35.0	198845	0.625	kgCO ₂ eq/kg	OCCC (2020)	Catalonia	124181	kg CO ₂ e
Biomethanisation	64.1	364403	0.020	kgCO ₂ eq/kg	MITECO (2020)	Spain	7288	kg CO ₂ e
Light packaging	0.1	493	0.016	kgCO ₂ eq/kg	OCCC (2020)	Catalonia	8	kg CO ₂ e
Refuse	0.8	4389	-	-				
Total	100	568130					131477	kg CO₂e

OCCC, Oficina Catalana del Cambio Climático (2020) *Calculation of GHG emissions derived from municipal waste management.*

MITECO, Ministerio para la Transición Ecológica y el Reto Demográfico (2020) *Inventario Nacional de Gases de Efecto Invernadero.* Gobierno de España.

* Waste fractions taken from the waste managers of the FBN in Navarra.

**Data on the activity of distributors and manufacturers, other Food Banks and the Fruit and Vegetable Producers Organisation.

Table S15: Activities and emission factors in a scenario without the FBN, Waste management, Products originating in Catalonia (2018).

C.2. Rest of Spain	Waste fractions * (%)	Activity data** (kg)	Emission factor	Unit	Source	Comments	Emissions	Unit
Landfill	5.8	33208	0.625	kgCO ₂ eq/kg	OCCC (2020)	Catalonia	20739	kg CO ₂ e
Paper and cardboard	19.8	112419	0.052	kgCO ₂ eq/kg	OCCC (2020)	Catalonia	5860	kg CO ₂ e
Light packaging	16.6	94395	0.016	kgCO ₂ eq/kg	OCCC (2020)	Catalonia	1532	kg CO ₂ e
Others***	57.8	328107	-	-				
Total	100	568130					28131	kg CO₂e

OCCC, Oficina Catalana del Cambio Climático (2020) *Calculation of GHG emissions derived from municipal waste management.*

* Waste fractions taken from FBN's waste managers in Catalonia.

**Data on the activity of distributors and manufacturers, other Food Banks and the Fruit and Vegetable Producers Organisation.

***Other refers to: specific treatments, other, management through a collection and transfer centre, use in agriculture, municipal collection, recycling and reuse of wood.

Table S16: Activities and emission factors in a scenario without the FBN, total Waste management in the rest of Spain (2018).

Total rest of Spain	Emissions	Unit
Total	159608	kg CO₂e

Table S17: Activities and emission factors in a scenario without the FBN, Waste management total data (2018).

Total waste management	Emissions	Unit
Total	443322	kg CO₂e

Table S18: Quantity (tonnes) and GHG emissions (in tonnes CO₂e and percentage) of food donations by food category to the Food Bank of Navarra in 2018.

Food Category	Quantity (t)	GHG Emissions (kg CO ₂ e/kg)	GHG Emissions (%)
Dairy products	359	896	21.0
Unscheduled food	215	532	12.5
Vegetables and legumes	608	518	12.1
Prepared dishes	102	496	11.6
Fruits	703	466	10.9
Canned vegetables/legumes	364	317	7.4
Beverages	125	269	6.3
Pastries, biscuits and sweets	102	229	5.4
Meats	34	174	4.1

Condiments and sauces	65	169	4.0
Cereals, flour, bread and pasta	43	102	2.4
Assorted snacks	26	42	1.0
Preserved fruits	7	14	0.3
Cocoa and chocolate	3	14	0.3
Eggs	7	14	0.3
Coffees and infusions	2	9	0.2
Fish	1	3	0.1
Children's food	0	1	0.01
Nuts	0	0	0.001
Hygiene products	2	5	0.1
Total	2768	4272	100.0

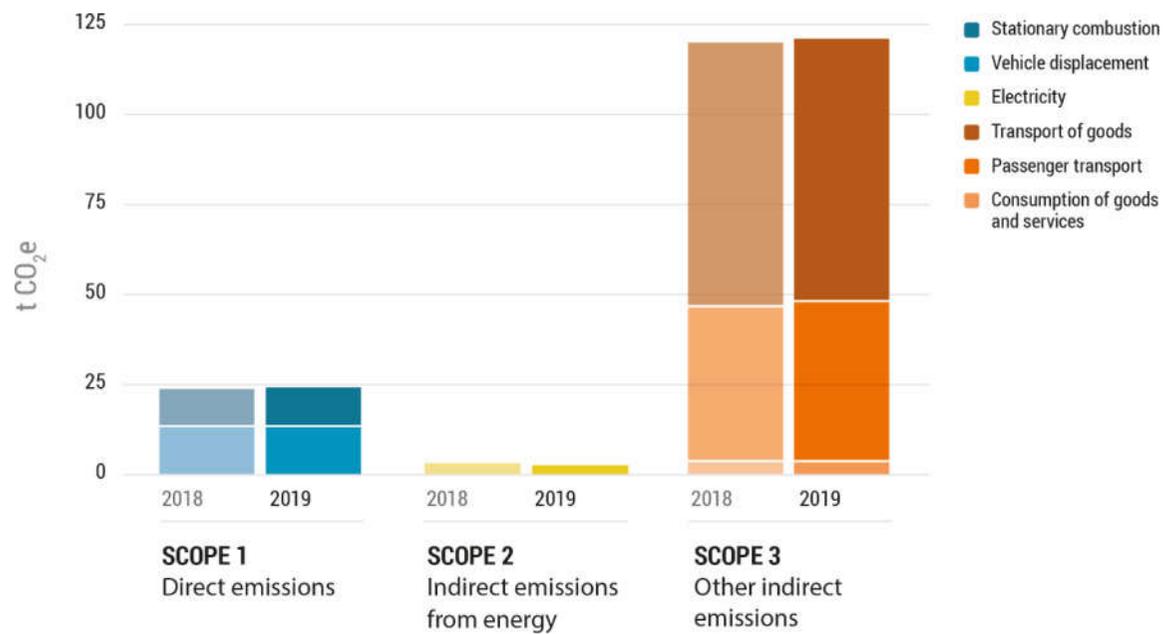


Figure S1: Comparison of greenhouse gas emissions from the activities of the Food Bank of Navarra by scope between 2018 and 2019 (tonnes CO₂e).

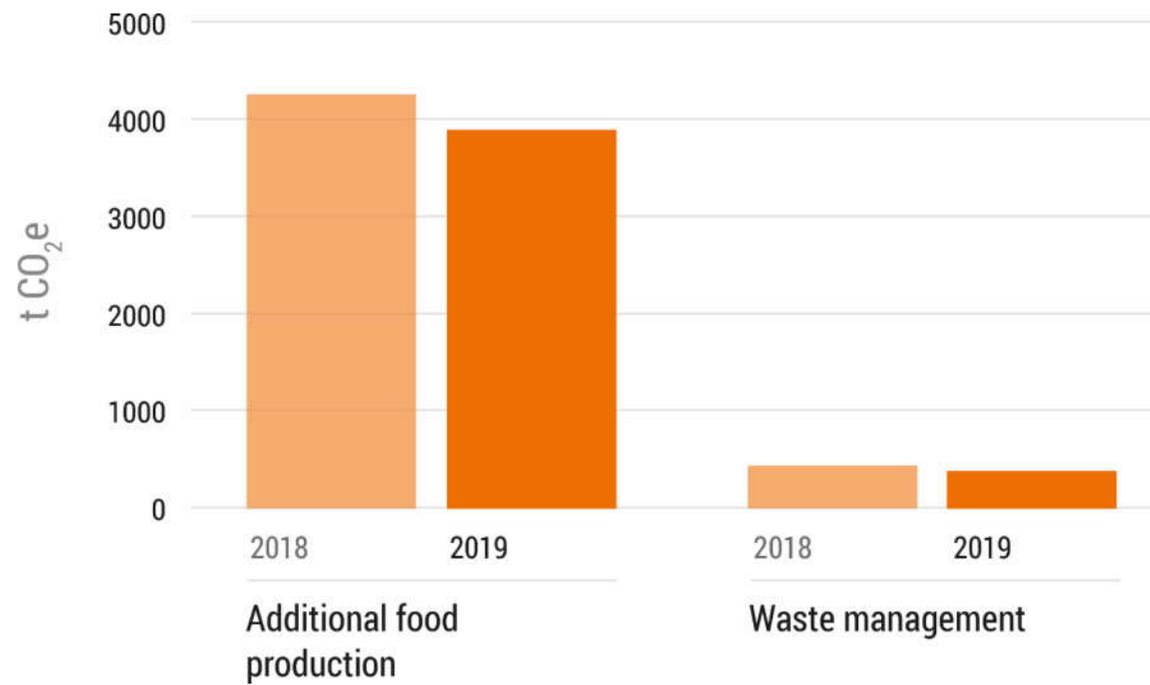


Figure S2: Comparison of greenhouse gas emissions by category in a scenario “without the action of the Food Bank of Navarra” between 2018 and 2019 (tonnes of CO₂e).



Figure S3: Comparison of total greenhouse gas emissions in the scenarios "with" and "without" the action of the Food Bank of Navarra, and emissions avoided by the Food Bank of Navarra between 2018 and 2019 (tonnes of CO₂e).