URBAN GREEN TRAIN

Module 2.2.1 – Climate change mitigation: proximity and foodmiles

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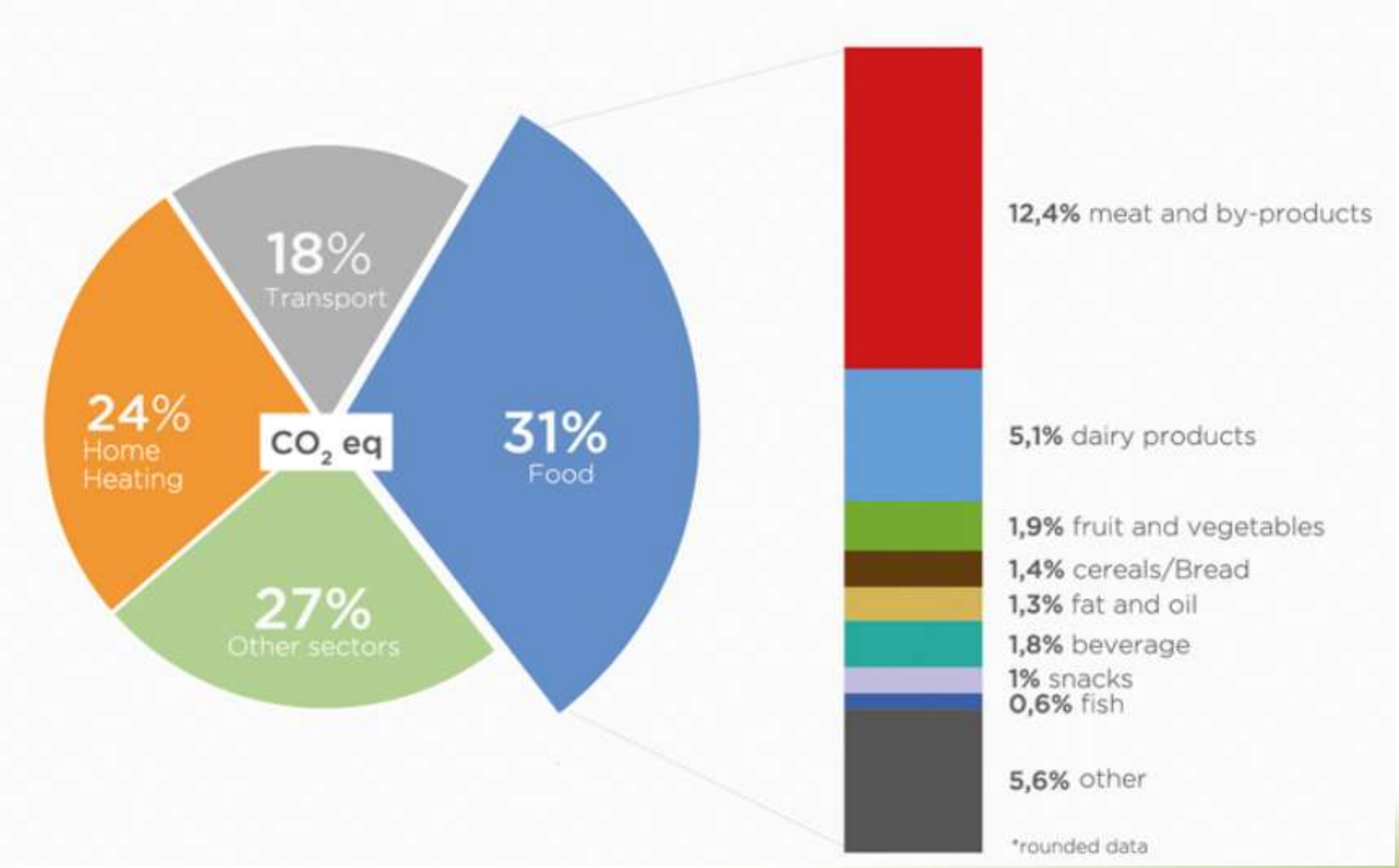
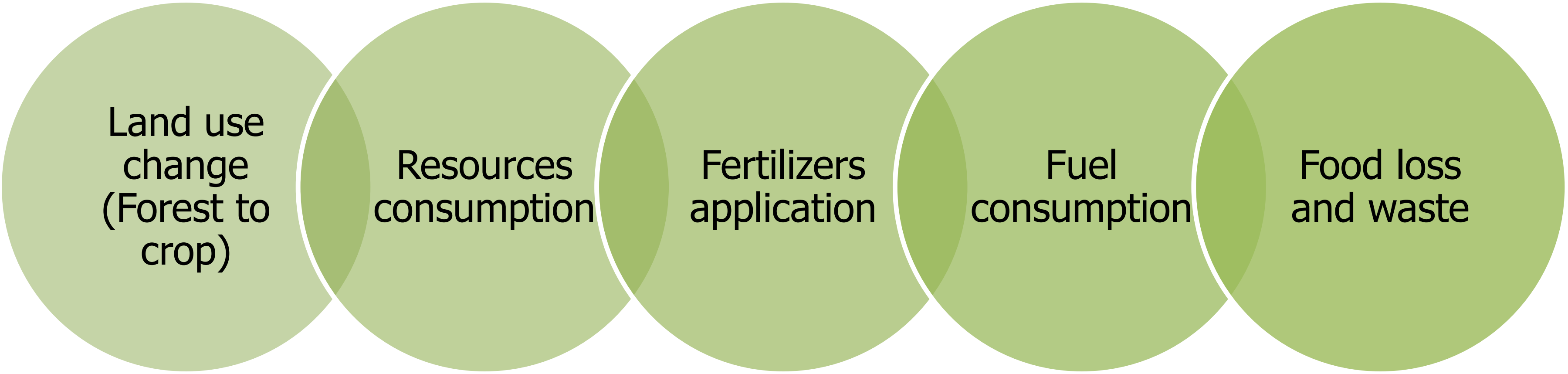
European greenhouse gas emissions, by sector

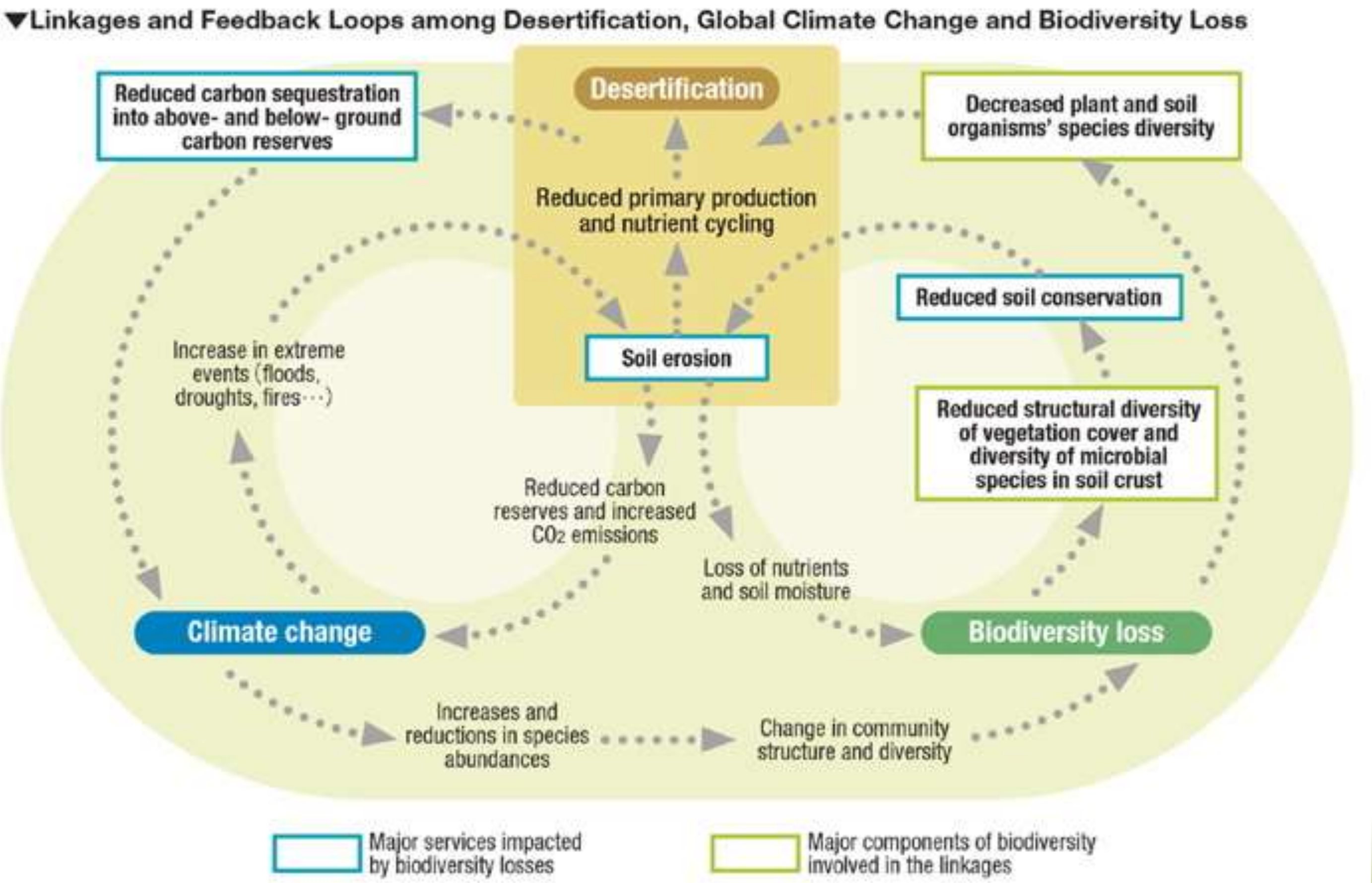


Source: Barilla Center for Food and Nutrition

Agriculture contribution to climate change

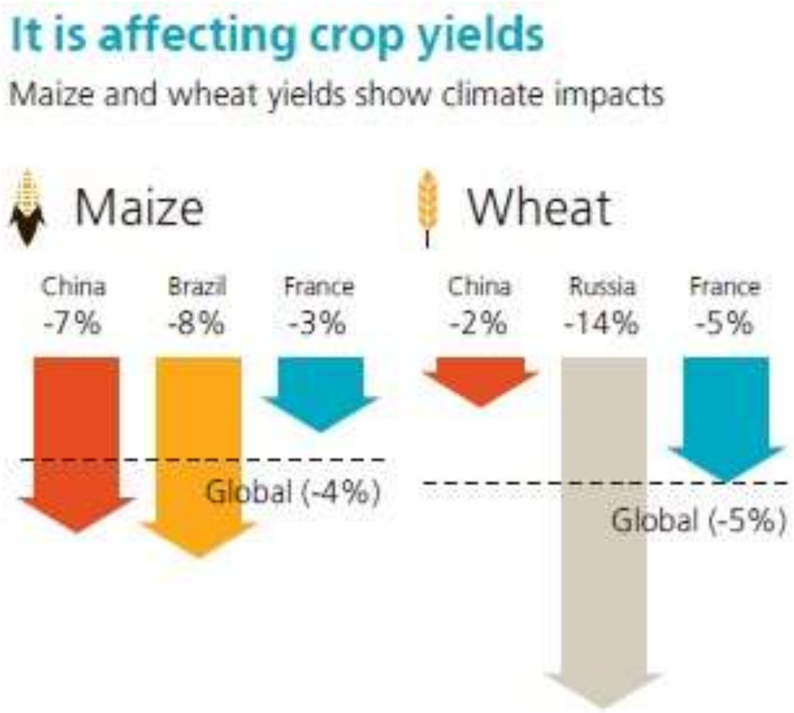


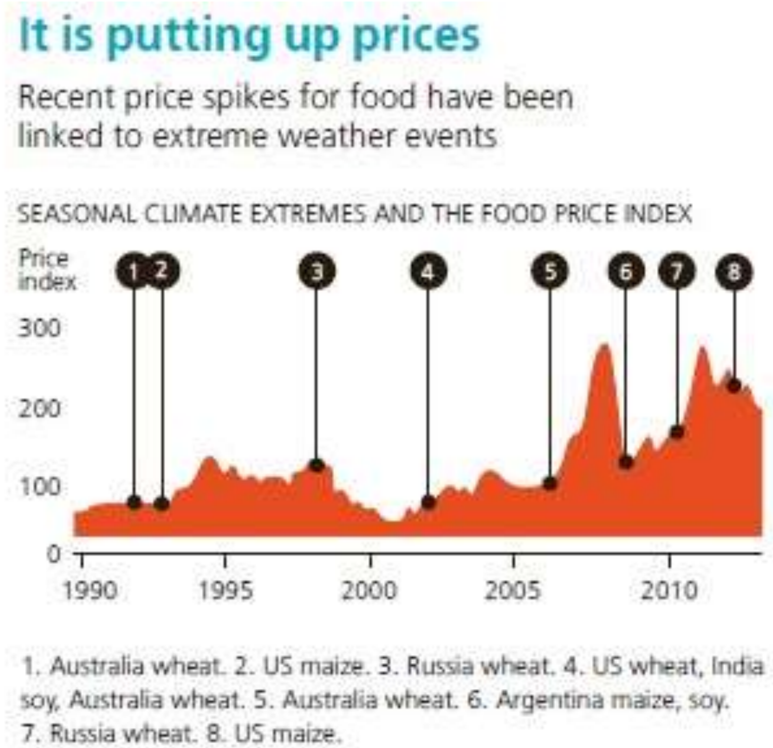
Climate change impacts on agriculture



Source: Ministry of the Environment, Government of Japan

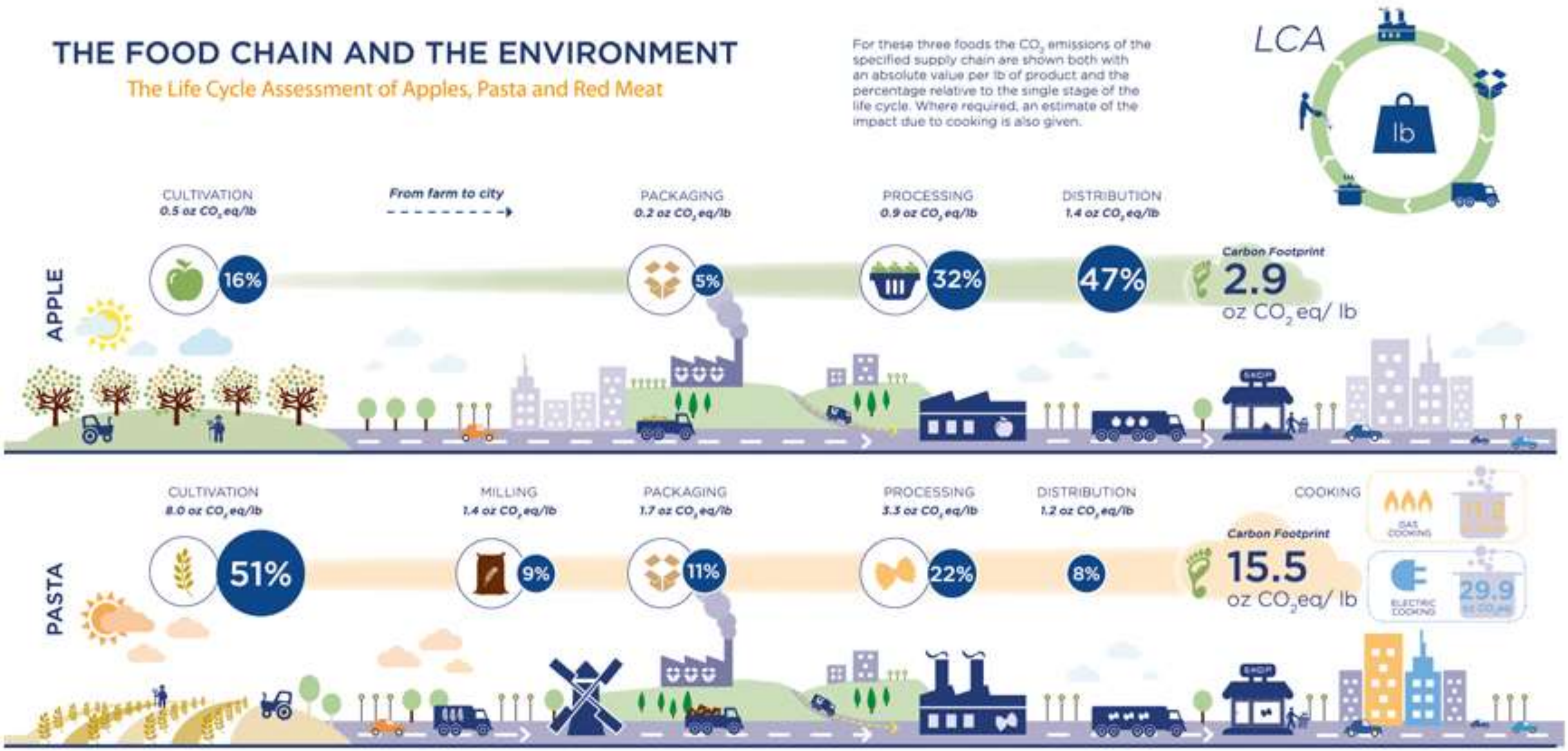
Climate change impacts on agriculture





Source: CGIAR Annual report

Food chain impacts



Source: Barilla Center for Food and Nutrition

Food-miles concept

Food-miles accounts for the distance that food is transported between producer and consumer

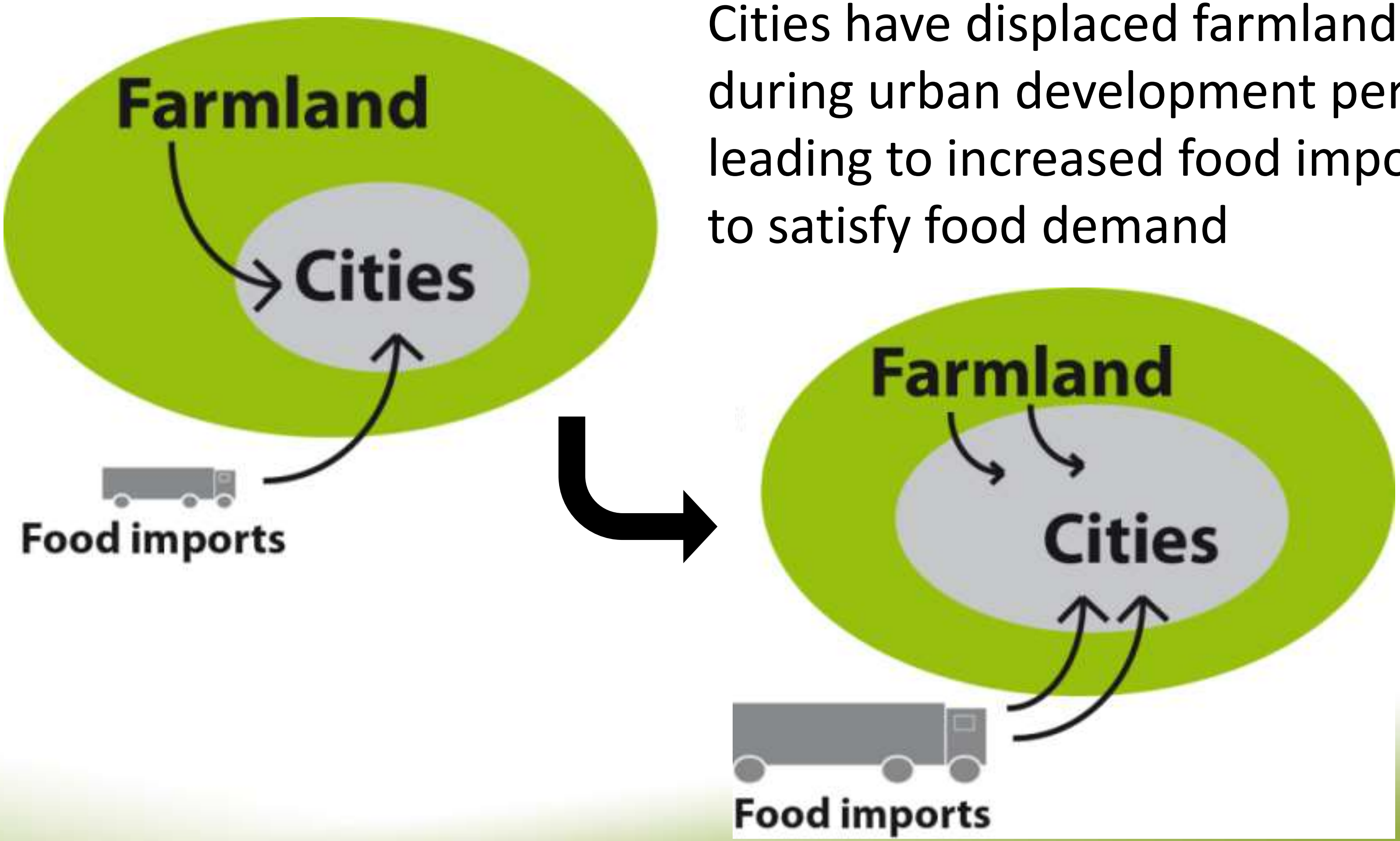
"how far food travels en route to your stomach." (Schnell, 2013)

''Hundred-mile diet'' a challenge to get people to eat as much as possible from within 100 miles of their home (Smith and MacKinnon 2007).

Schnell, Steven M. "Food miles, local eating, and community supported agriculture: putting local food in its place." Agriculture and Human Values 30.4 (2013): 615-628.

Smith, A., and J.B. MacKinnon. 2007. Plenty: Eating locally on the 100-mile diet (originally published as The 100-mile diet: A year of eating locally (in Canada) and as Plenty: One man, one woman, and a raucous year of eating locally (in the U.S.)). New York: Three Rivers Press.

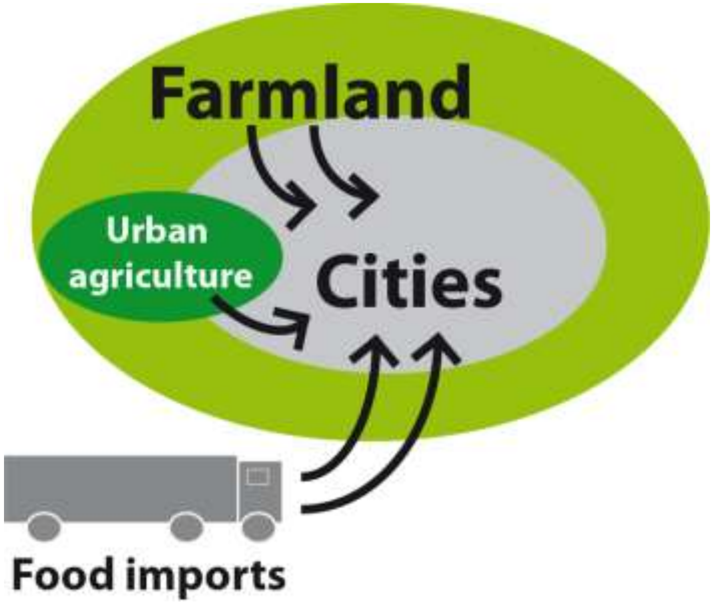
Local production



Cities have displaced farmland during urban development periods, leading to increased food imports to satisfy food demand

Local production

Local food systems, such as urban agriculture, aims to recover farmland spaces or create new ones to increase local food production and shorten the distance between producers and consumers



Environmental awareness

Local consumers

Urban agriculture

Sustainable cities

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Local production

Environmental benefits of local supply-chains

↓ DISTANCE = ↓ Transport requirements

↓ Packaging use

↓ Food waste

Sanyé-Mengual et al. "Environmental analysis of the logistics of agricultural products from roof top greenhouses in Mediterranean urban areas."Journal of the Science of Food and Agriculture 93.1 (2013): 100-109.

Case studies

Blanke and Burdick (2005)

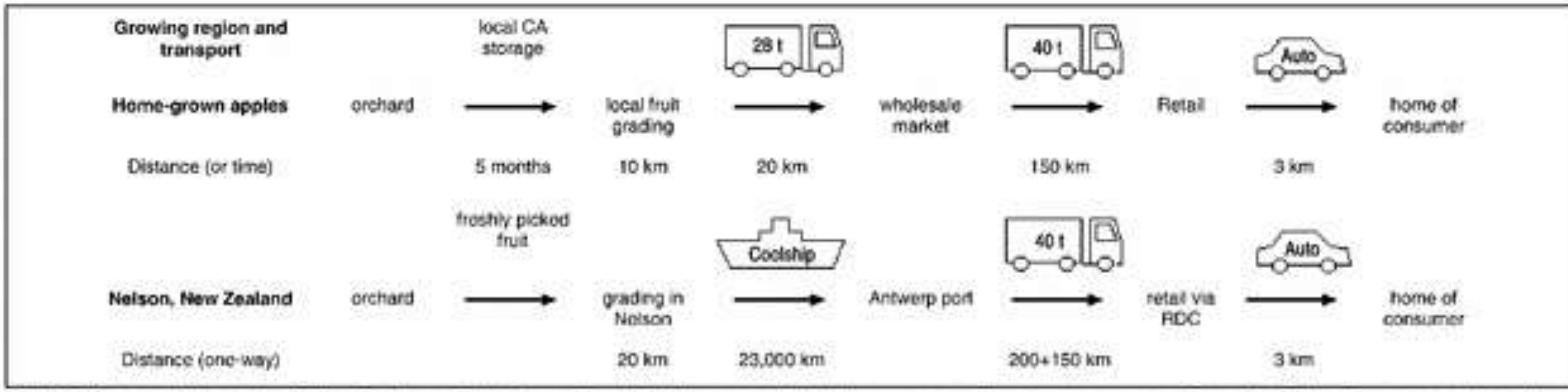

Fig. 1: Transport channels of the food supply chain employed in the present study to compare primary energy requirements of locally-grown apples stored for 5 months versus freshly harvested apples imported from New Zealand in March/April

Comparison of apple production in Germany (supply chain: 200km) and imported apples from New Zealand (Supply-chain: 23.400km)

Blanke and Burdick (2005)

Table 2: Food miles – primary energy requirement per kg of locally-grown versus apples imported from New Zealand in April

Home-grown, local fruit	Energy per unit [per kg, t, km or day]	Primary energy requirement [MJ/kg apples]	Import from New Zealand	Energy per unit [per kg, t, km or day]	Primary energy requirement [MJ/kg apples]
Apple cultivation	2.8 MJ/kg[1]	2.800	Apple cultivation	2.8 MJ/kg[1]	2.100
20 km transport to Meco	3.47 MJ/t/km[2]	0.069	40 km transport to Nelson	3.47 MJ/t/km[2]	0.139
Initial cooling	86.3 kJ/kg[3]	0.086	Initial cooling	86.3 kJ/kg[3]	0.086
150 days CA storage at 1°C in Meckenheim	5.4 kJ/kg/day	0.810	23,000 km reefer Nelson-Antwerp[3]	0.11 kJ/kg/km[3]	2.534
			28 days cooling on board[3]	10.8 kJ/kg/day[3]	0.302
Packaging	650 kJ/kg	0.650	Packaging	650 kJ/kg	0.65
40 km in < 28 t truck to wholesale market Roisdorf	2.32 MJ/t/km[2]	0.093	200 km in < 40 t truck to regional distribution centre	1,38 MJ/t/km[2]	0.276
150 km < 40 t truck to retail	1.38 MJ/t/km[2]	0.207	150 km < 40 t truck to retail	1.38 MJ/t/km[2]	0.207
Cooling on truck 95 km	0.3 MJ/t/km	0.028	Cooling on truck 175 km	0.3 MJ/t/km	0.055
Consumer shopping 6 km[4]	3.83 MJ/km[4]	1.150	Consumer shopping 6 km[4]	3.83 MJ/km[4]	1.150
	Local fruit	5.893		Imported fruit	7.499

[1] Pimentel (1979); [2] Frischknecht et al. (1994); [3] Hochhaus et al. (1994); [4] Kjer et al. (1994)

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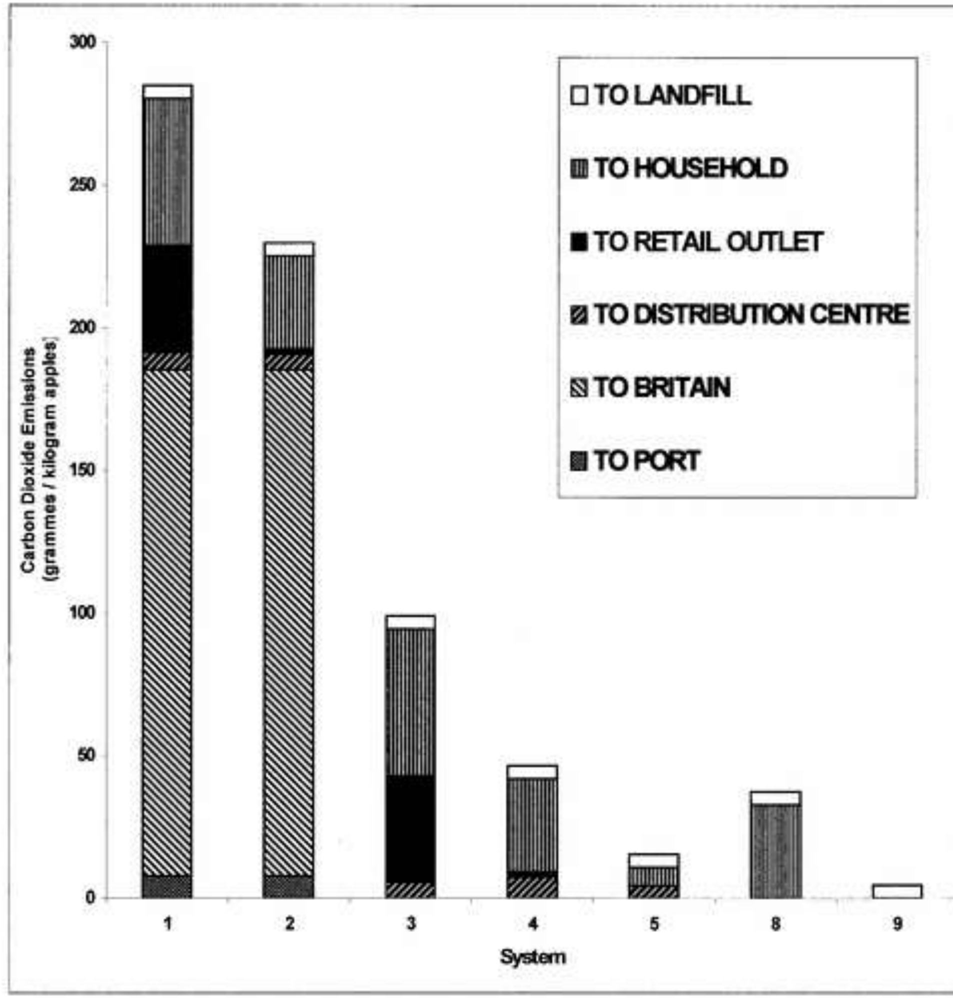
Jones (2002)

Homegrown and local apples had a lower climate change impact than imported apples



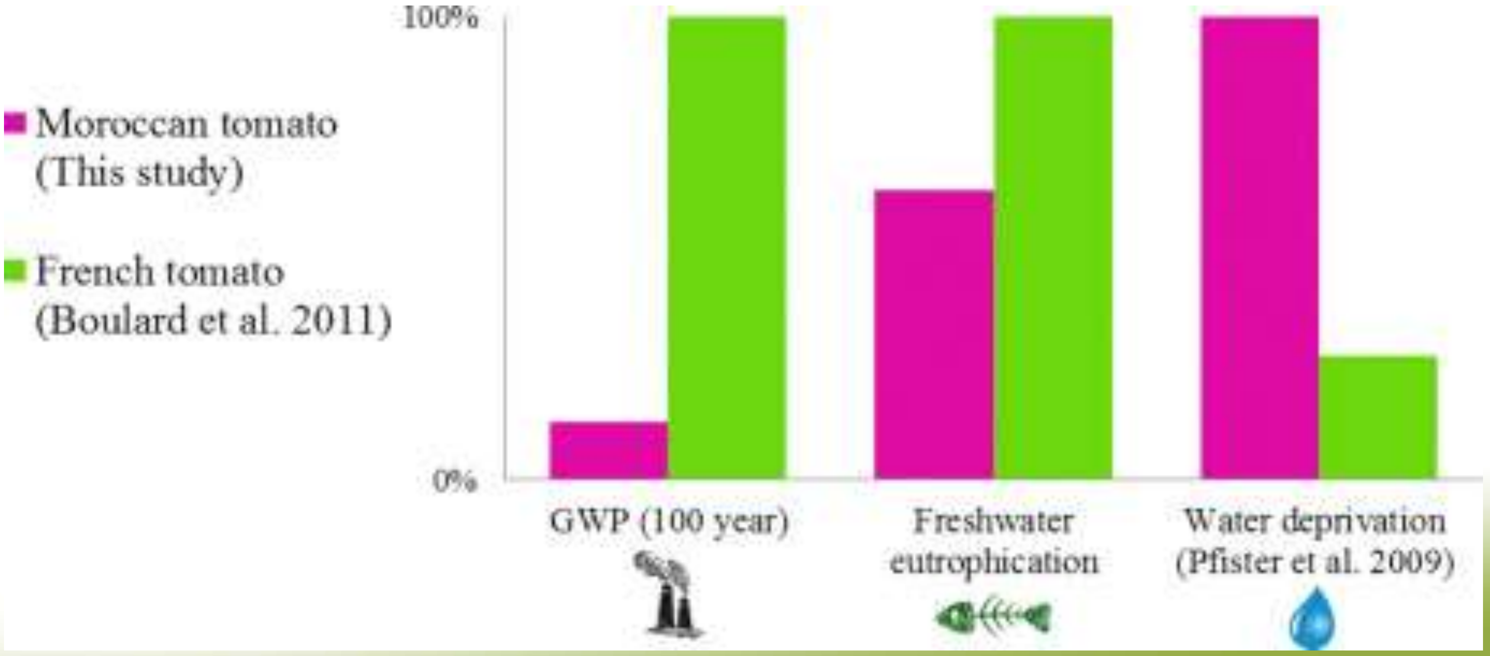
KEY

System	Description of supply chain
1	Imported from the USA, marketed at a supermarket, shopping trip of 3 km in a medium sized car
2	Imported from the USA, marketed at a street market, shopping trip of 2 km in a medium sized car
3	UK sourced, marketed at a supermarket, shopping trip of 3 km in a medium sized car
4	UK sourced, marketed at a street market, shopping trip of 2 km in a medium sized car
5	Sourced locally, home delivery
8	Sourced locally, picked up in a journey of 2 km in a medium sized car
9	Homegrown

Payen (2015)

Limitations of climate change as single indicator:

Payen (2015) highlighted the **potential trade-offs** between climate change and water deprivation when comparing tomatoes from Morocco and from France.



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References

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- Jones, Andy. "An environmental assessment of food supply chains: a case study on dessert apples." *Environmental management* 30.4 (2002): 560-576.
- Payen, Sandra, Claudine Basset-Mens, and Sylvain Perret. "LCA of local and imported tomato: an energy and water trade-off." *Journal of Cleaner Production* 87 (2015): 139-148.

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