



GREENHOUSE GASES AND FOOD – THINGS YOU SHOULD KNOW

- On average, each calorie of food on your plate requires 7-10 calories of energy from fossil fuel to get there²
- Until 1840, US food production depended almost entirely on renewable energy sources including labor²
- El Nino is a natural model for climate change and explains 15-35% of crop yield variability – climate change will affect crop yields negatively at the global level⁸
- Agriculture and forestry are responsible for 1/3 of all greenhouse gas (GHG) emissions globally⁴
- GHG emissions from agriculture include carbon dioxide (CO₂), methane, and nitrous oxide with CO₂ being the lowest component and least potent GHG¹
- GHG emissions from food come from production (including animal feed), farm machinery, transportation, synthetic fertilizer, pesticides, processing, storage and preparation
- Total food production in the USA uses 50% of US land, 80% of US fresh water and 17% of US fossil fuels¹¹
- Globally, animal agriculture uses 1/3 of the planet surface (the single largest land use) and 2/3 of agricultural land¹⁰
- 18% of global food related GHG emissions come from animal agriculture; more than transportation¹
- Animal agriculture consumes 70% of fresh water globally¹
- Animal agriculture produces 27% of the methane, 65% of the nitrous oxide and 64% of the ammonia globally¹ but only 9% of the CO₂¹⁰
- Methane is 23 times more warming than CO₂⁹ and is produced by anaerobic decomposition in ruminant guts, manure piles and flooded conditions³
- High methane-producing foods are meats (particularly beef and other ruminants), dairy and rice³
- Nitrous oxide is 296 times more warming than CO₂⁹ and comes from synthetic fertilizers and microbial transformation in soil and manure³
- 80% of soybeans and 50% of corn globally are fed to livestock¹⁰
- Annually, the grain fed to livestock in the USA could feed 840 million people¹¹
- 70% of deforested land in Latin America is used for grazing and most of the rest is used to grow feed crops for animals¹
- In the US 45 million tons of plant protein are used to produce 7.5 million tons of animal protein annually¹
- Animal agriculture in the US uses 37% of the pesticides, 32% of the nitrogen and 33% of the phosphorus¹
- In the US between 1995 and 2005, 73% of the \$60 billion in federal commodities payments went to meat, eggs and dairy versus <0.5% to fruits and vegetables¹
- Meals (Sweden) with similar calorie content can vary by a factor of up to 9 in GHG emissions³
- Meals (Sweden) with similar nutrient value can vary by a factor of up to 4 in GHG emissions³
- The most energy intensive foods (animal-based, fats, oils, sweets, snacks, drinks) are most health damaging⁵
- Food miles are less important than transport type (1% of foods in the UK arrive by air but represent 11% of food transport CO₂)⁵
- The 20 million Victory Gardens in the US during WWII produced 40% of the fresh vegetables consumed domestically⁵
- A population with 40% obesity requires 19% more food energy and generates more GHG⁶
- 25% of the food in the USA each year goes to waste⁴
- For the average American diet, 83% of the GHG come from production, 11% from total transport and 5% from wholesale/retail; this does not count emissions from consumer purchase/transport/preparation¹²
- GHG from food production in the USA are 44% CO₂, 23% methane and 32% nitrous oxide¹²
- Shifting American diet away from red meat/dairy 1 day per week is the equivalent of eating 100% locally¹²
- Shifting diet from meat/dairy to chicken/fish/eggs one day a week is equivalent to driving 760 fewer miles per year; shifting to all vegan one day a week is equivalent to driving 1160 fewer miles per year¹²
- Shifting totally away from red meat/dairy to chicken/fish/eggs is equivalent to driving 5340 fewer miles per year; shifting to all vegan is equivalent to driving 8100 fewer miles per year¹²
- It requires 7 kg of grain to produce 1 kg of meat, 4 kg of grain to produce 1 kg of pork and 2 kg of grain to produce 1 kg of chicken⁷
- In the US on average it takes 13 kcals of fossil fuel inputs to produce every kcal we eat, for meat it takes 25 kcals⁴
- In general plant based foods produced locally have a lower carbon footprint but intensive greenhouse technology can make even locally produced, out-of-season fruit as GHG intensive as red meat²
- 2 pounds of bananas picked up from the store 2 miles from home in the family SUV uses the same amount of energy that it takes to carry those same bananas around the world 8 times on a full container ship. The energy from Prius doing the same errand would only allow the ship to circle the world twice.²
- "...most of the power to wean the food system from fossil fuels rests with the eaters, not the farmers."²

1. Akhtar, AZ et al. Health Professional's Role in Animal Agriculture, Climate Change and Human Health. *Am J Prev Med* 2009;36(2)
2. Bromford, M. "Getting Fossil Fuels Off the Plate" in *The Post Carbon Reader: Managing the 21st Century Sustainability Crisis*. Ed. Heinberg, R, and Lerch, D. Post Carbon Institute 2010.
3. Carlson-Kayama, A et al. Potential Contributions of Food Consumption Patterns to Climate Change. *Am J Clin Nutrition* 2009;89(suppl):1704S-9
4. Center for a Livable Future. What you eat affects climate change. Fact Sheet http://www.jhsph.edu/clf/PDF_Files/What_You_Eat.pdf. Accessed 23 April 2012
5. Dixon, JM et al. Functional Foods and Urban Agriculture: two responses to climate change-related food insecurity. *NSW Public Health Journal* 2009;20(1-2):14ff
6. Edwards, P. et al. Population adiposity and climate change. *Int J Epidemiol* 2009;1-4.
7. Horrigan L, et al. How Sustainable Agriculture can address then Environmental and Human Health Harms of Industrial Agriculture. *Envir Health Persp* 2002;110:445-56.
8. Howden, MS, et al. Adapting Agriculture to Climate Change. *Proceedings National Academy Science* 2007;104(50):19691-6.
9. IPCC, 4AR, 2007. WG I.
10. Koneswaran G, et al. Global Farm Animal Production and Global Warming: Impacting and Mitigating Climate Change. *Envir Health Perspect* 2008;116:578-82.
11. Pimentel, D et.al. Sustainability of meat-based and plant-based diets and the environment. *Am J Clin Nutr* 2003;78(suppl):660S-3S.
12. Weber, CL et al. Food Miles and the Relative Impact of Food Choices in the United States. *Enviro Sci Tech* 2008;42:3508-15.