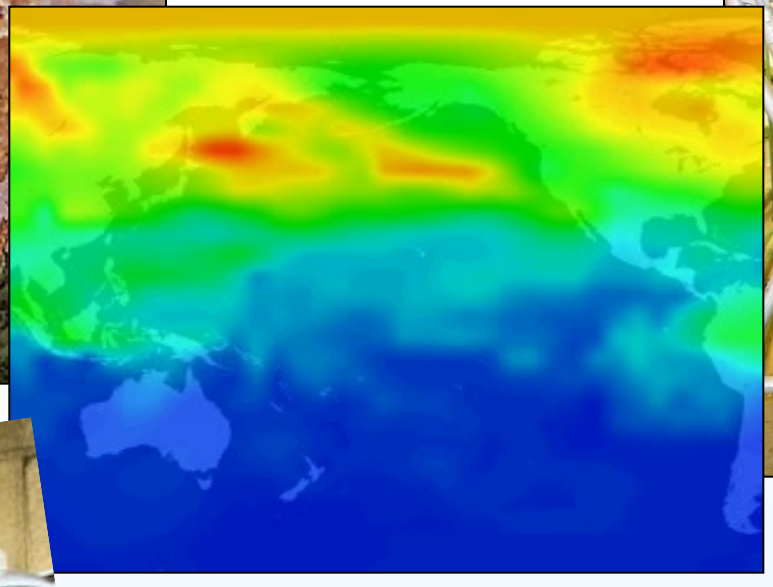
Sorry, but giving up meat is not going to safe the planet



Frank Mitloehner, PhD
Professor & Air Quality CE Specialist
Dept Animal Science
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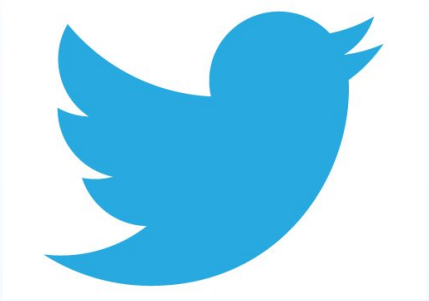
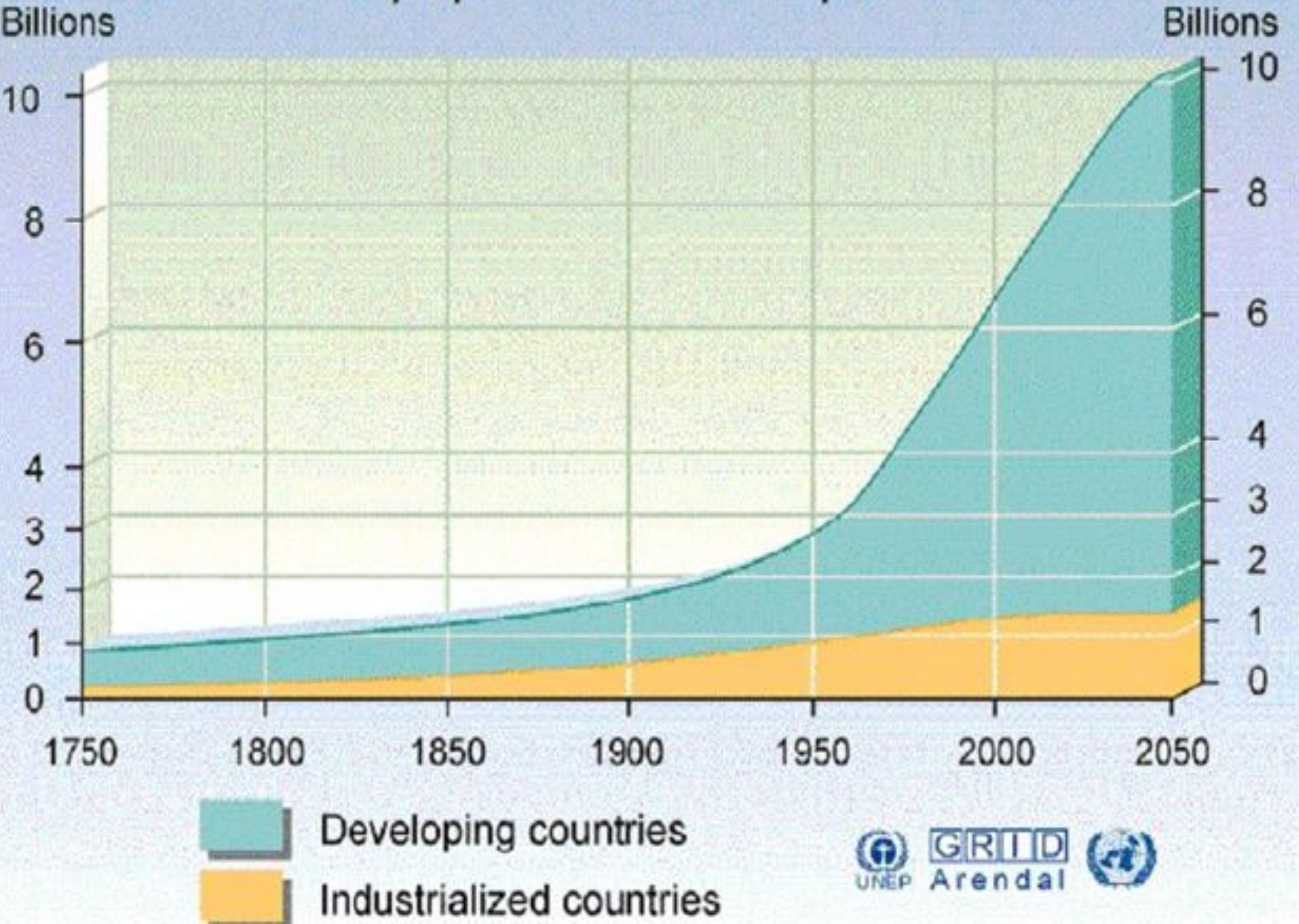


@GHGGuru

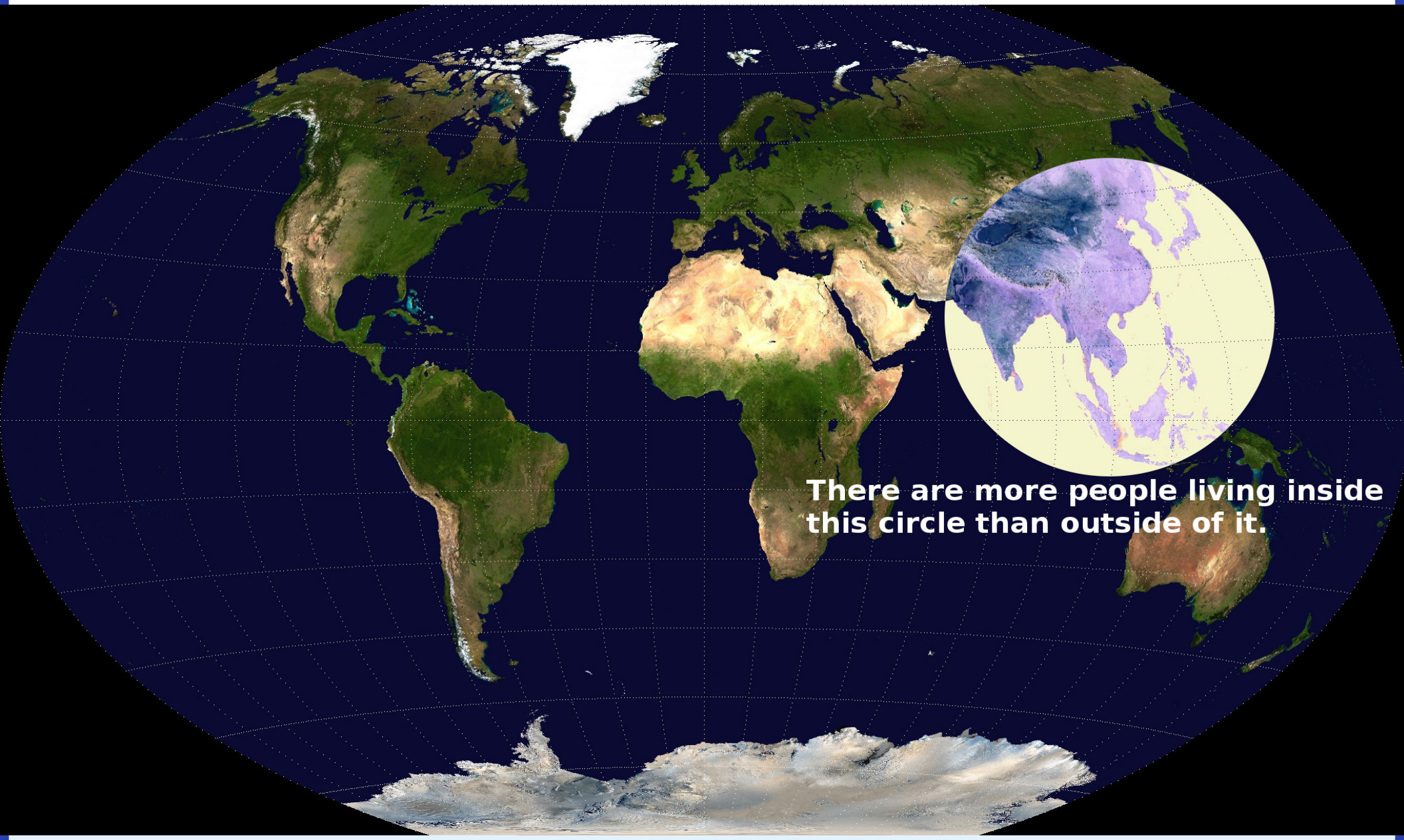
Blog: https://ghgguru.faculty.ucdavis.edu

The 2050 Challenge

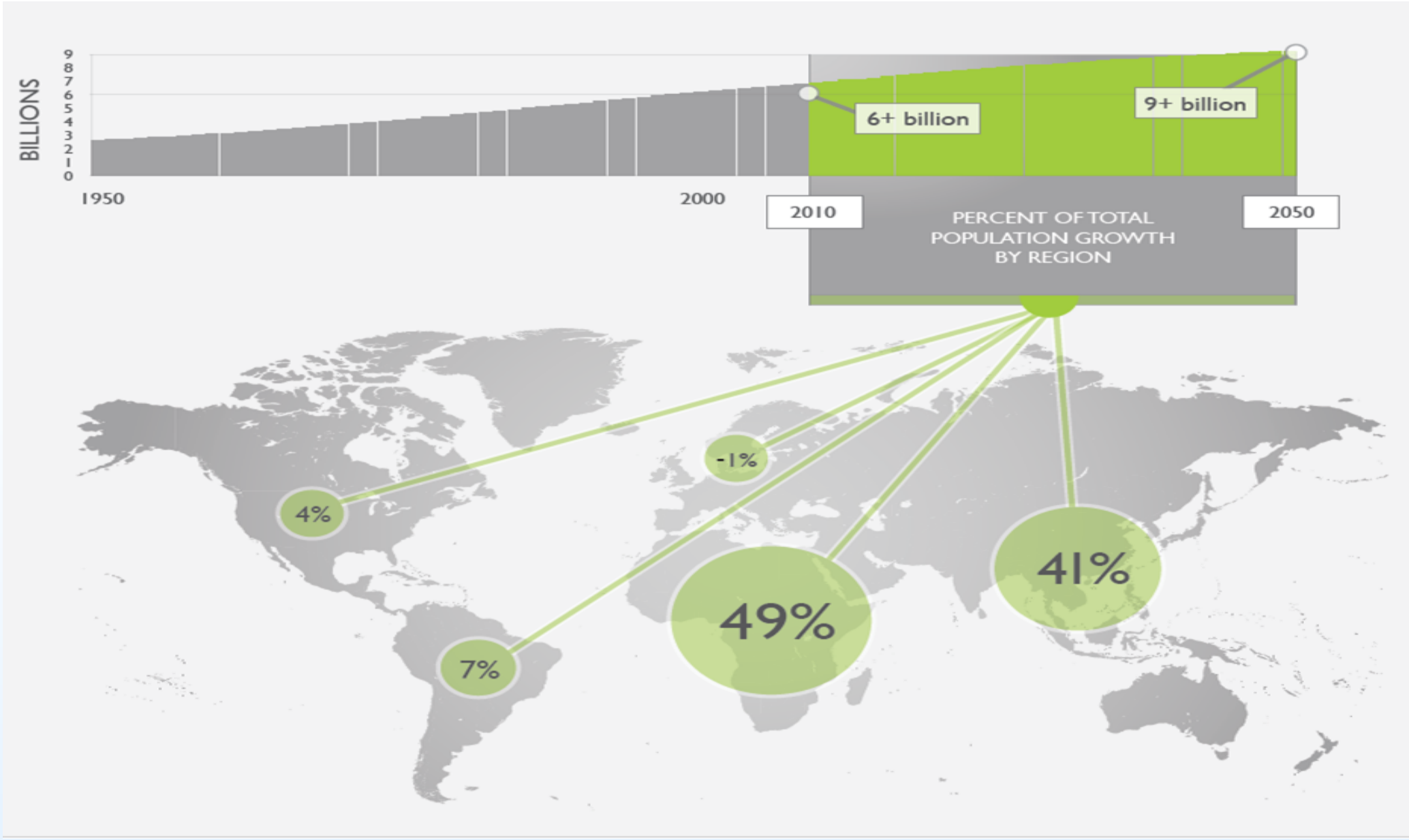
World population development



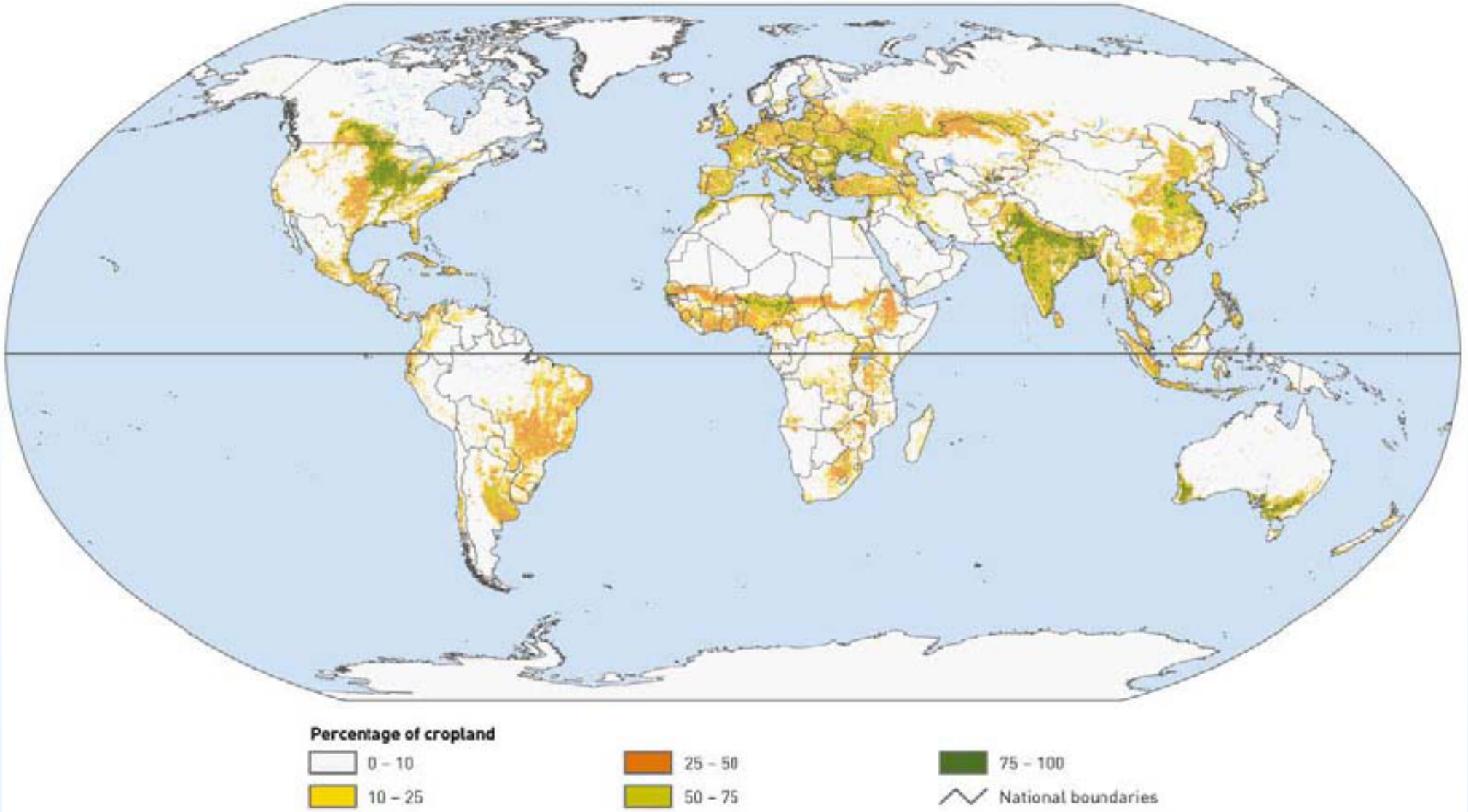
4.5 Billion + population of USA in 10 years



2050 Challenge – Population Growth by Region



Global cropland



Source: FAO, 2006f.

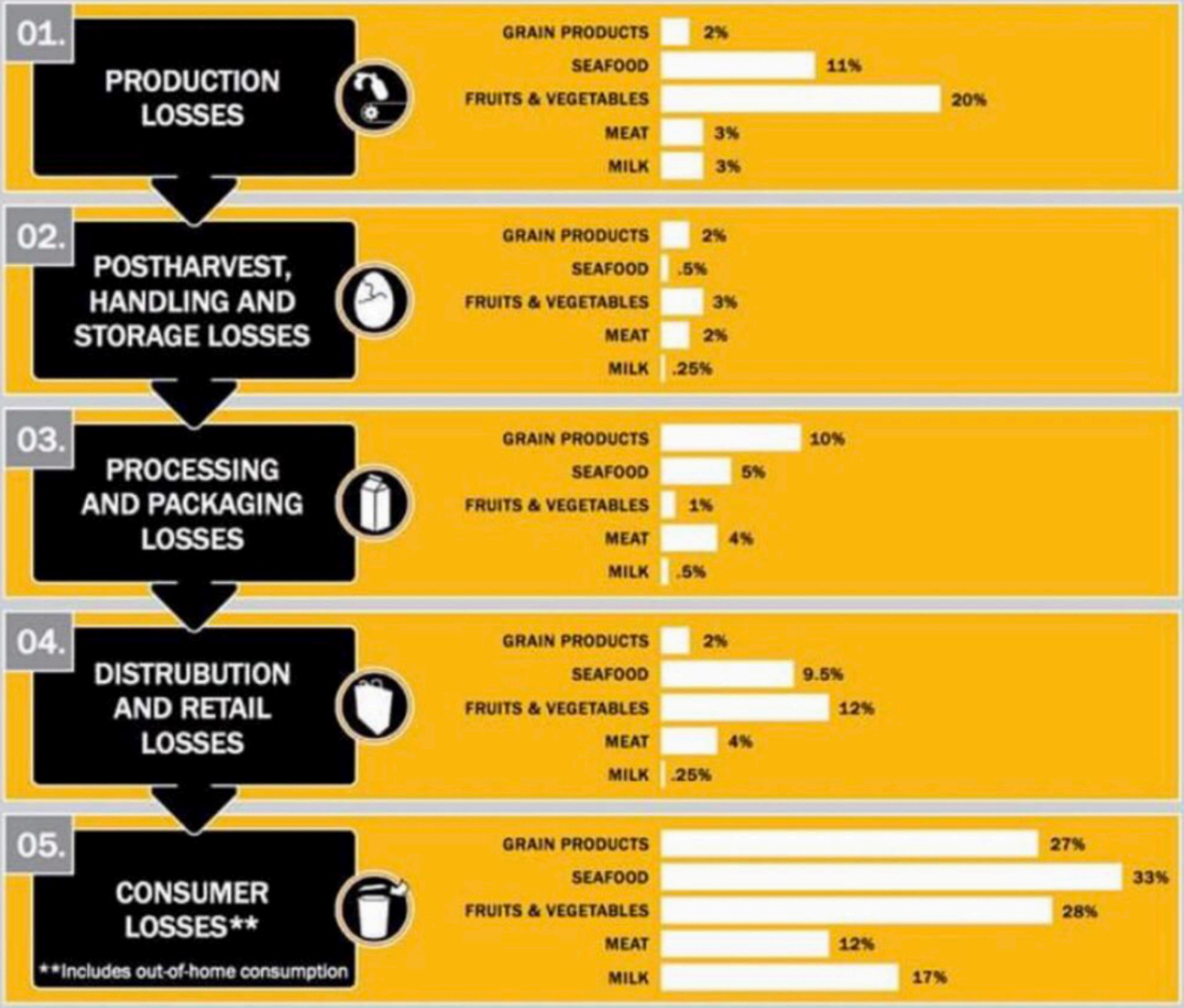
FAO (2006)

Turning Challenges into Solutions

National Geograpic

NORTH AMERICAN* FOOD LOSSES AT EACH STEP IN THE SUPPLY CHAIN

*Percentages calculated collectively for USA, Canada, Australia, and New Zealand.



Source: Food and Agriculture Organization 2011

A)	B)	C)
Water, Pea Protein Isolate*, Expeller-Pressed Canola Oil, Refined Coconut Oil , Rice Protein, Natural Flavors, Cocoa Butter, Mung Bean Protein, Methylcellulose , Potato Starch, Apple Extract, Salt, Potassium Chloride, Vinegar, Lemon Juice Concentrate, Sunflower Lecithin, Pomegranate Fruit Powder, Beet Juice Extract	Pea, Sweet Potato, Pea Protein, Pea Starch, Lentils, Flaxseed Meal, Sunflower Oil Preserved with Mixed Tocopherols, Calcium Carbonate, Vegetable Flavoring, Salt, Vitamins (Choline Chloride, Vitamin E Supplement, Vitamin A Supplement, Vitamin D3 Supplement, Calcium Pantothenate, Thiamine Mononitrate, Pyridoxine Hydrochloride, Riboflavin Supplement, Niacin, Folic Acid, Biotin, Vitamin B12 Supplement), Minerals	Water, Soy Protein Concentrate, Coconut Oil, Sunflower Oil, Natural Flavors, 2% or less of: Potato Protein, Methylcellulose, Yeast Extract, Cultured Dextrose , Food Starch Modified , Soy Leghemoglobin, Salt, Soy Protein Isolate , Mixed Tocopherols (Vitamin E), Zinc Gluconate, Thiamine Hydrochloride (Vitamin B1), Sodium Ascorbate (Vitamin C), Niacin, Pyridoxine Hydrochloride (Vitamin B6), Riboflavin (Vitamin B2), Vitamin B12


BEYOND MEAT


Walk About
Dog Food
Super Premium Dog Food
CANINE EXOTICS
Grain Free ♥ Vegan Recipe
Super Premium Dog Food


IMPOSSIBLE

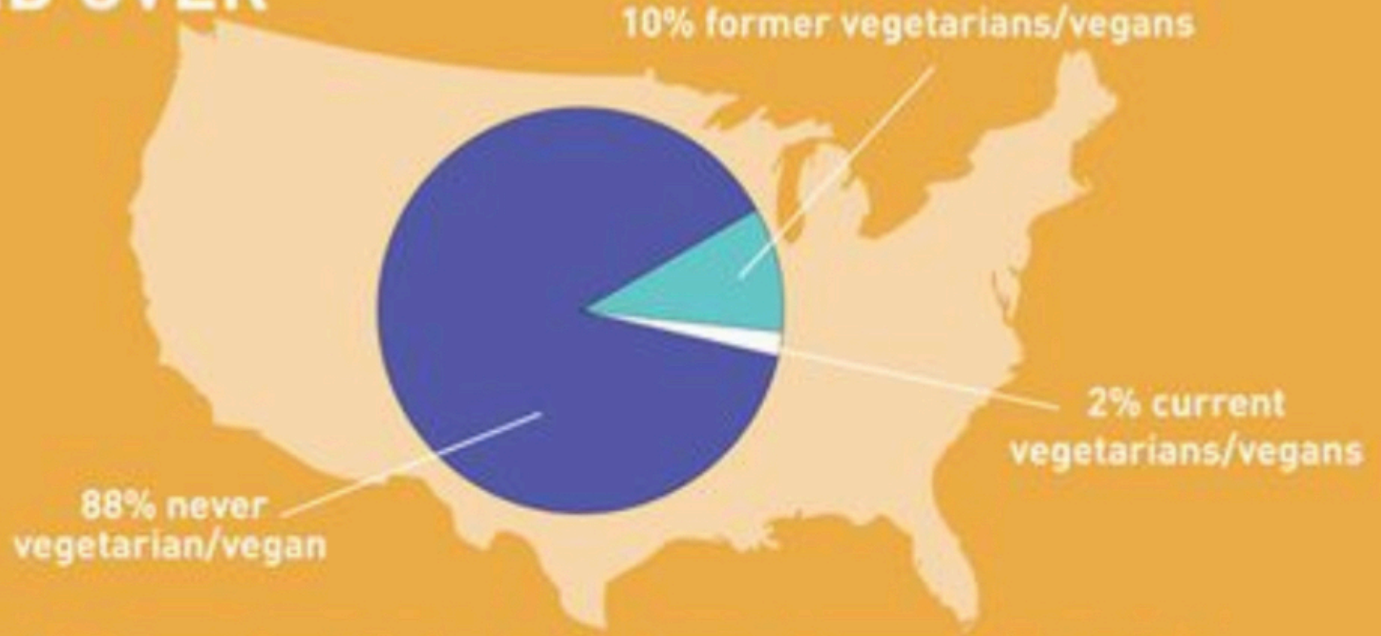
Can we eat our way out of climate change?

- Omnivore to vegan (per yr) = 0.8 tons CO2e
- One trans-atlantic flight (per passenger) = 1.6 tons CO2e
- Meatless Monday (US) = 0.3% GHG reduction
- Vegan US = 2.6%

STAYING VEG

lessons from former vegetarians/vegans

U.S. POPULATION 17 AND OVER



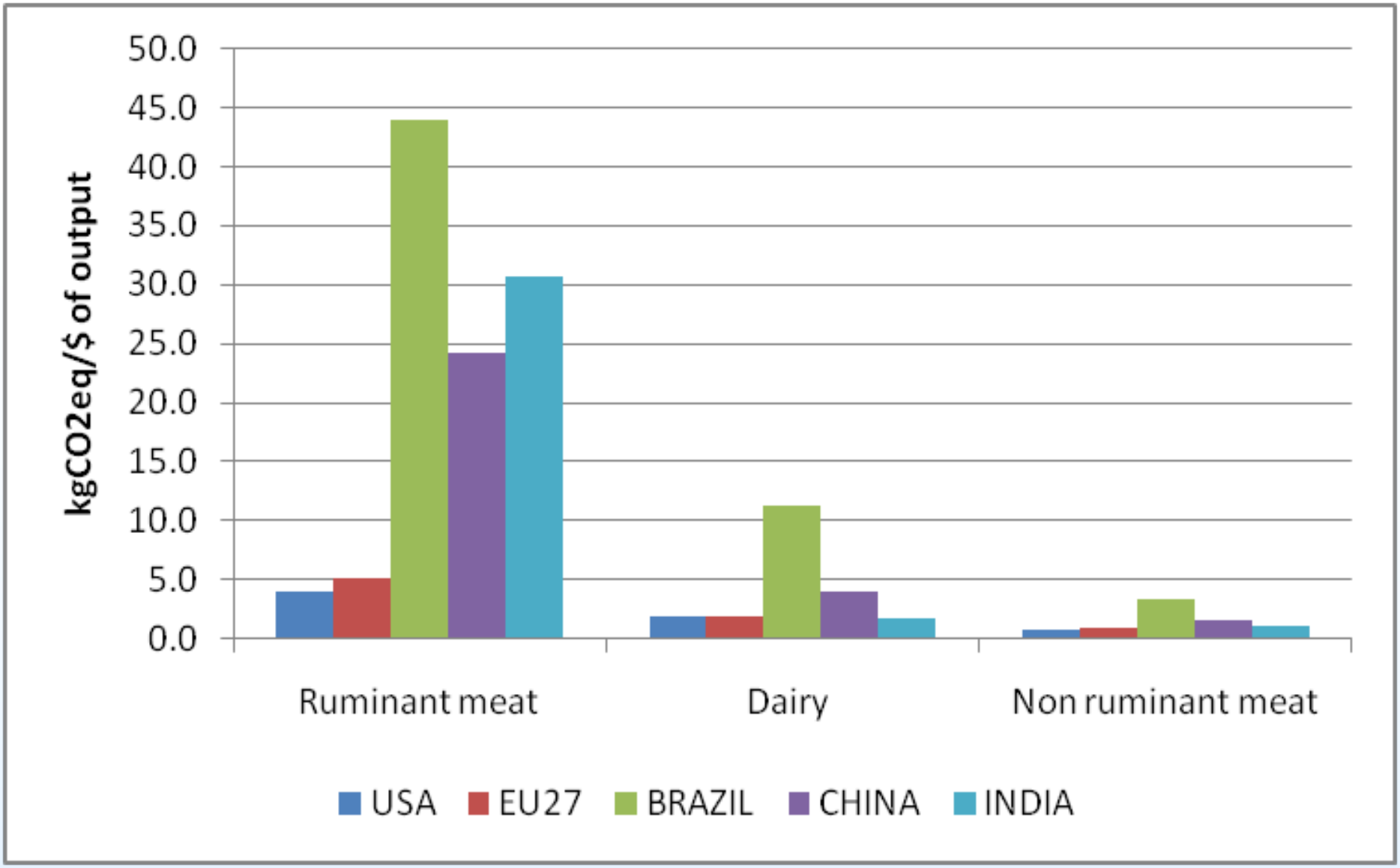
There are more than 24 million former vegetarians/vegans and fewer than 5 million current vegetarians/vegans.

84% OF VEGETARIANS/VEGANS ABANDON THEIR DIET.

[these figures are devised by extrapolating survey findings to the U.S. population as a whole.]

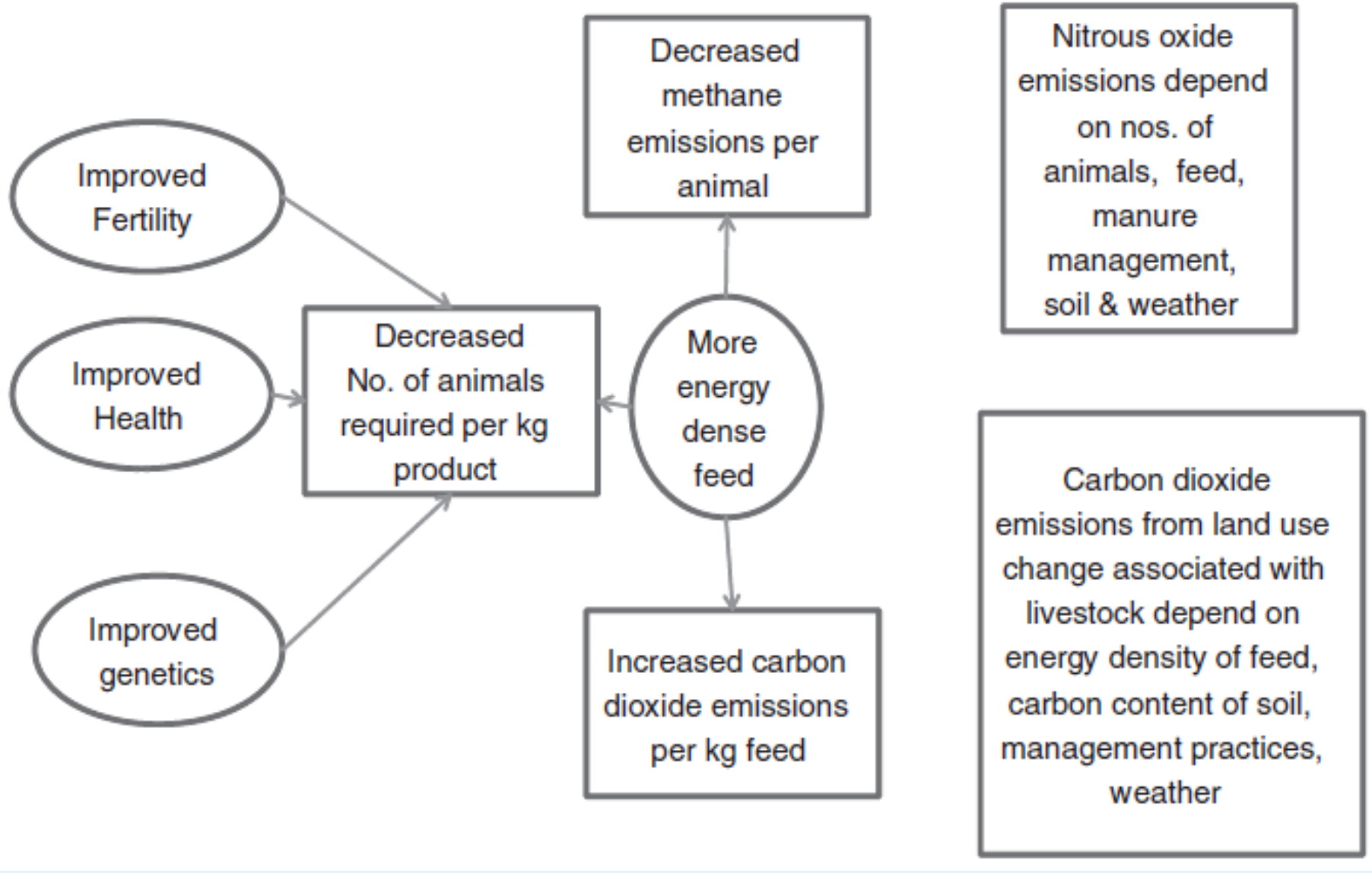
Climate change and GHG

Emission Intensities
(direct emissions from livestock)

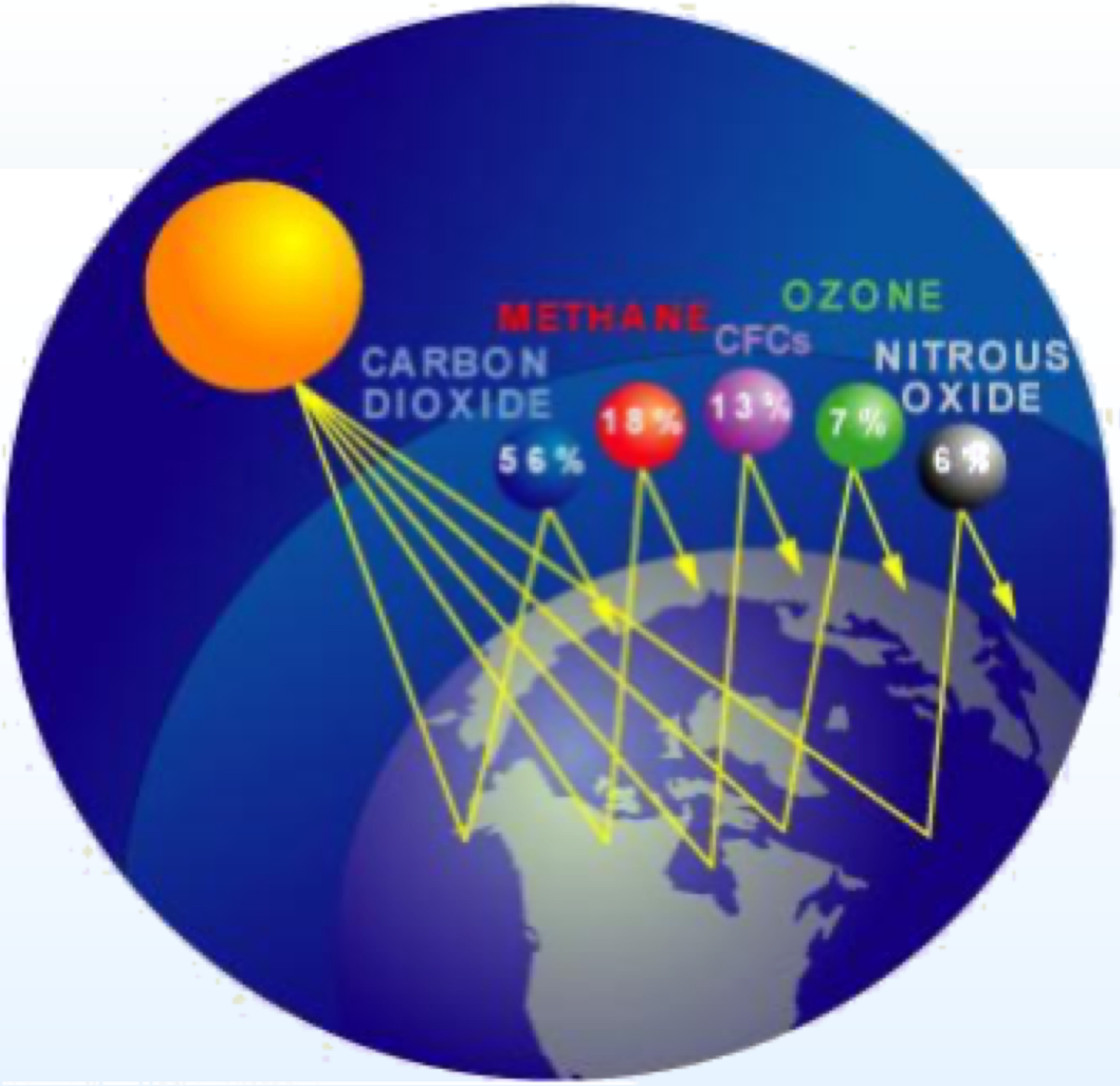


GTAP 2001 data base

Mitigation: interventions to improve productivity



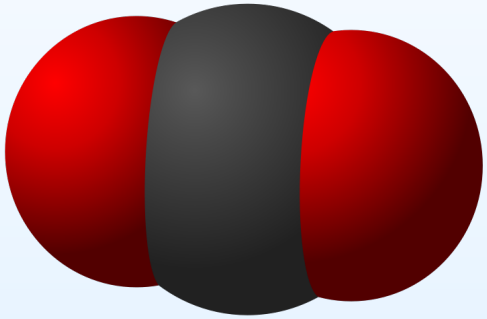
Gill et al. (2010)


METHANE
OZONE
CFCs
CARBON DIOXIDE
NITROUS OXIDE
56%
18%
13%
7%
6%

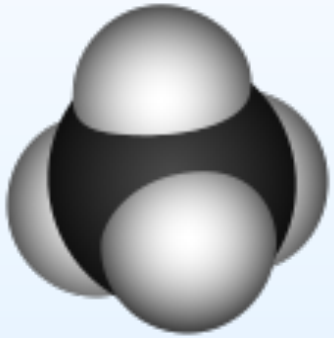
GHG & GWP

Global Warming Potential (GWP_{100}) of Main GHG

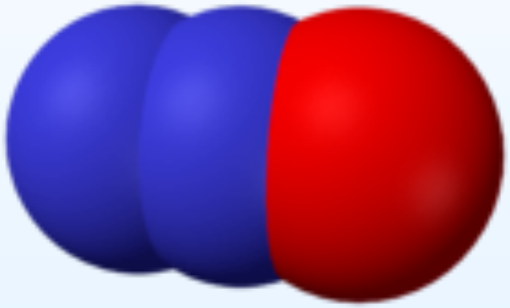
- Carbon Dioxide, CO_2 1
- Methane, CH_4 28
- Nitrous Oxide, N_2O 298



CO2 – Carbon Dioxide

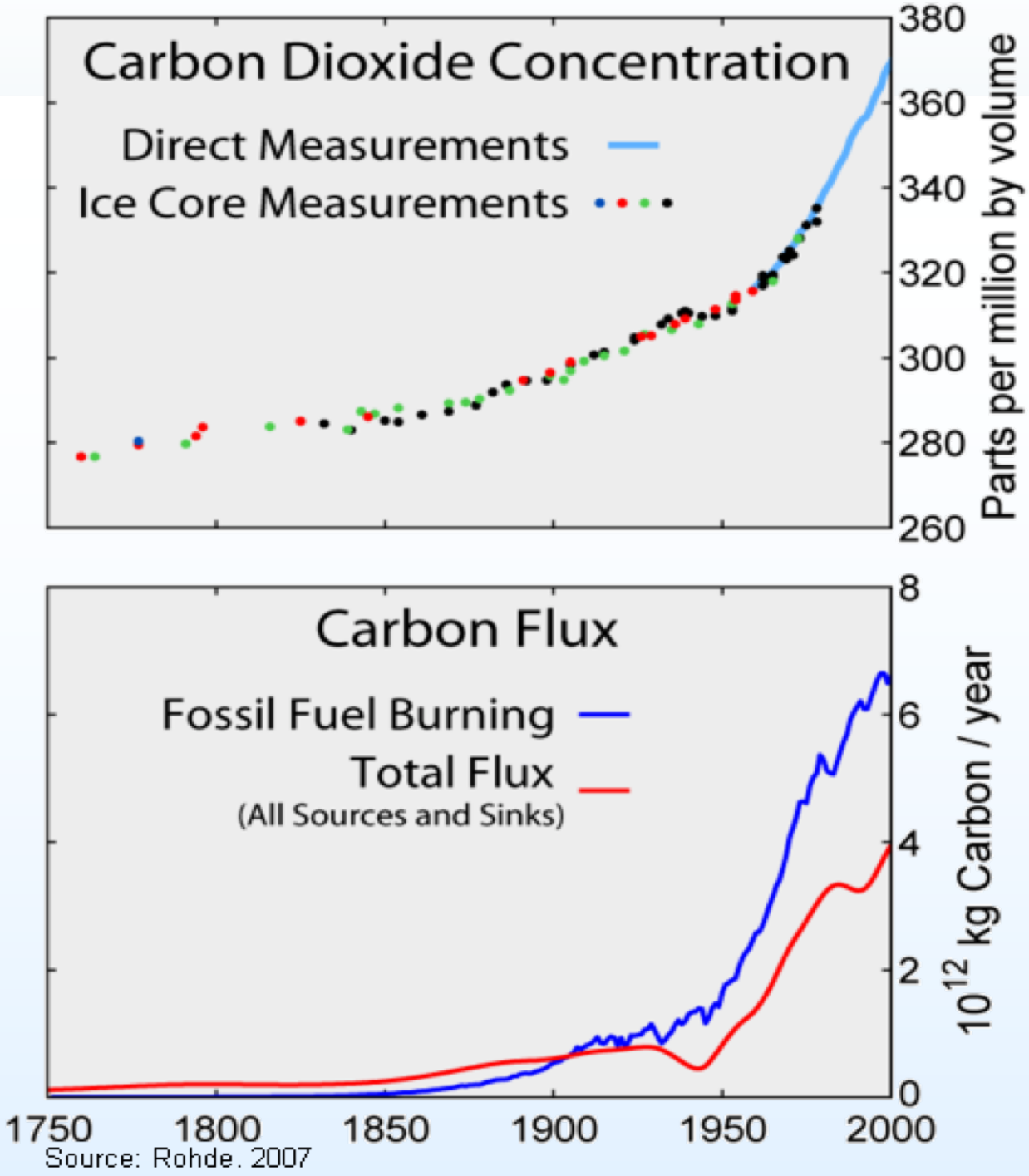


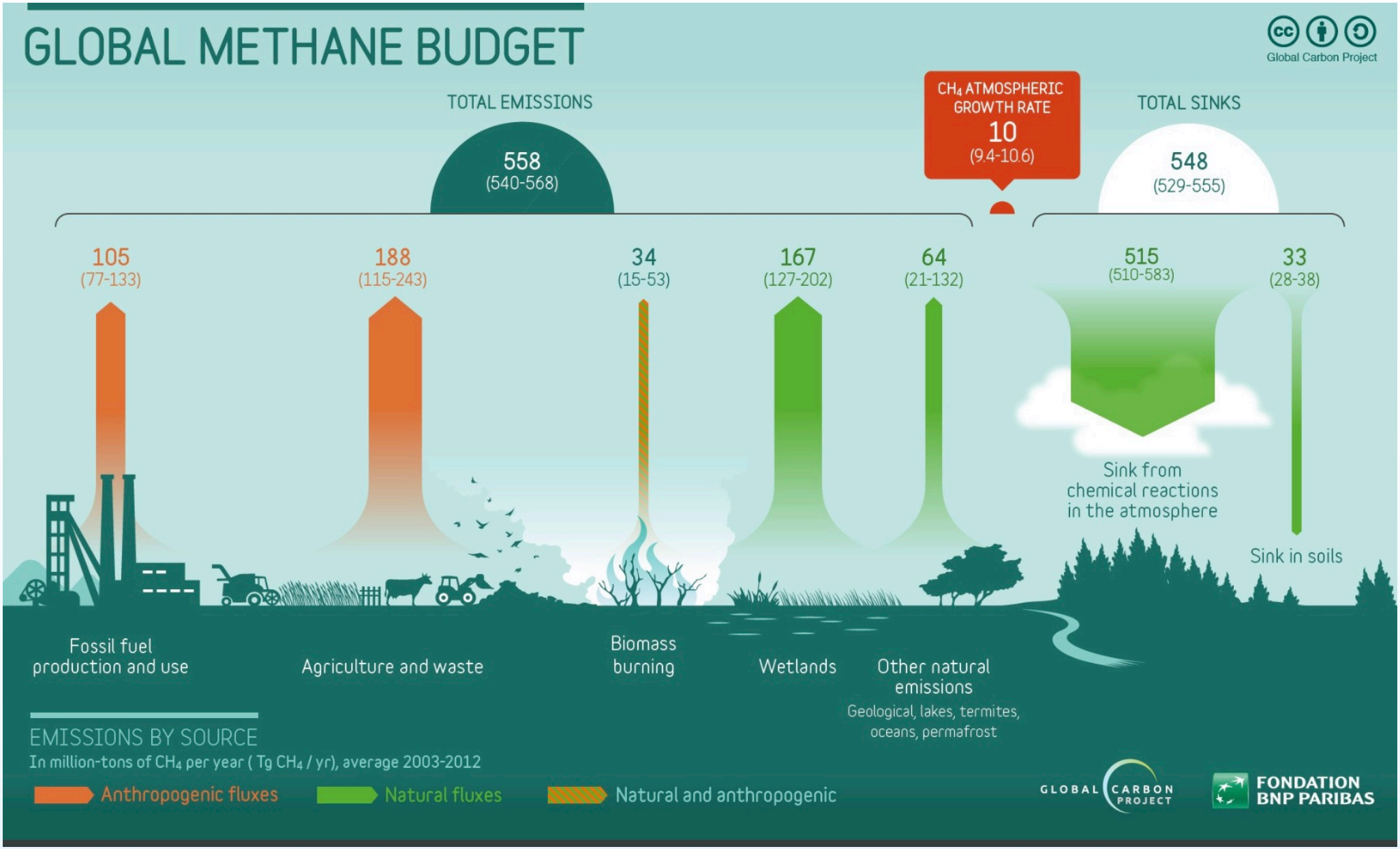
CH4 – Methane

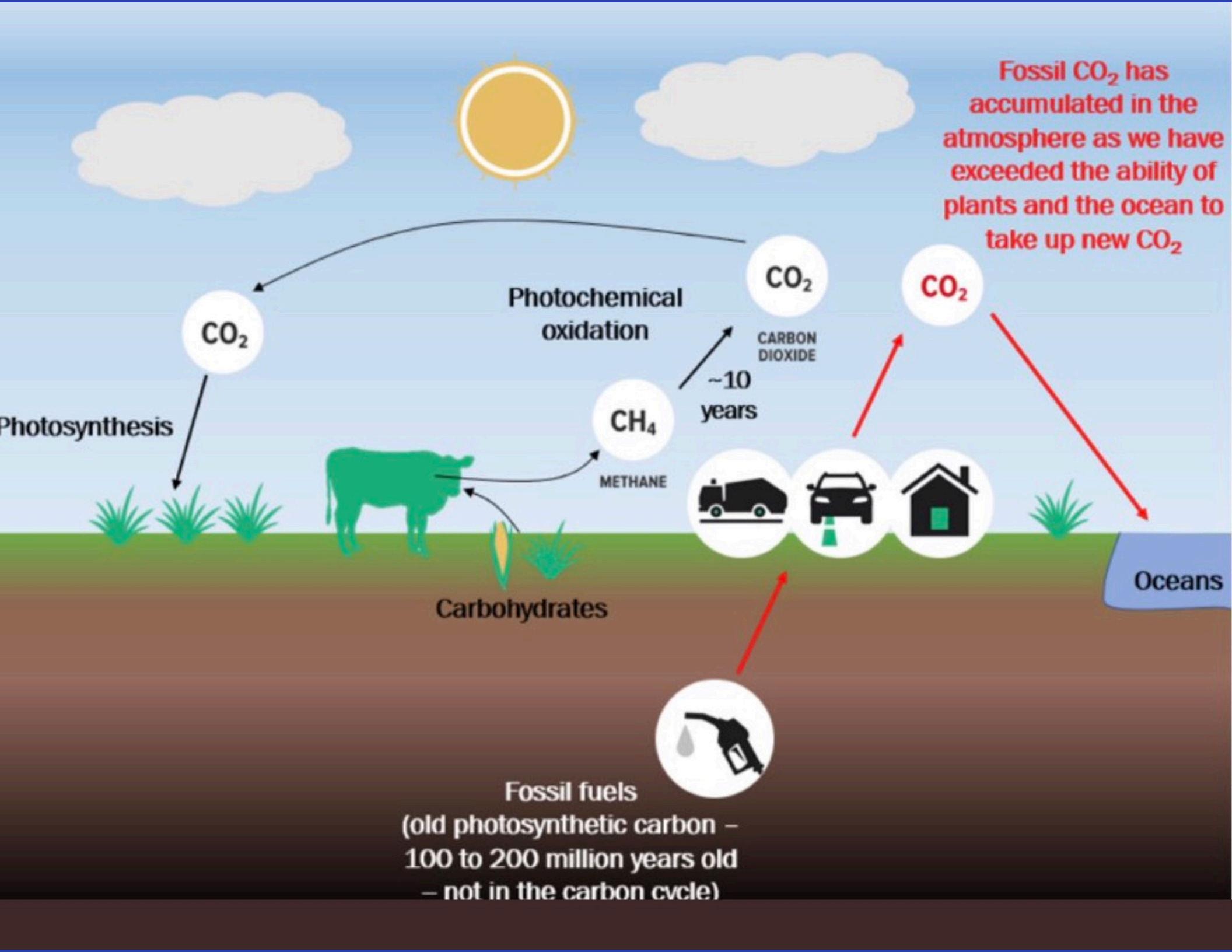


N2O – Nitrous Oxide

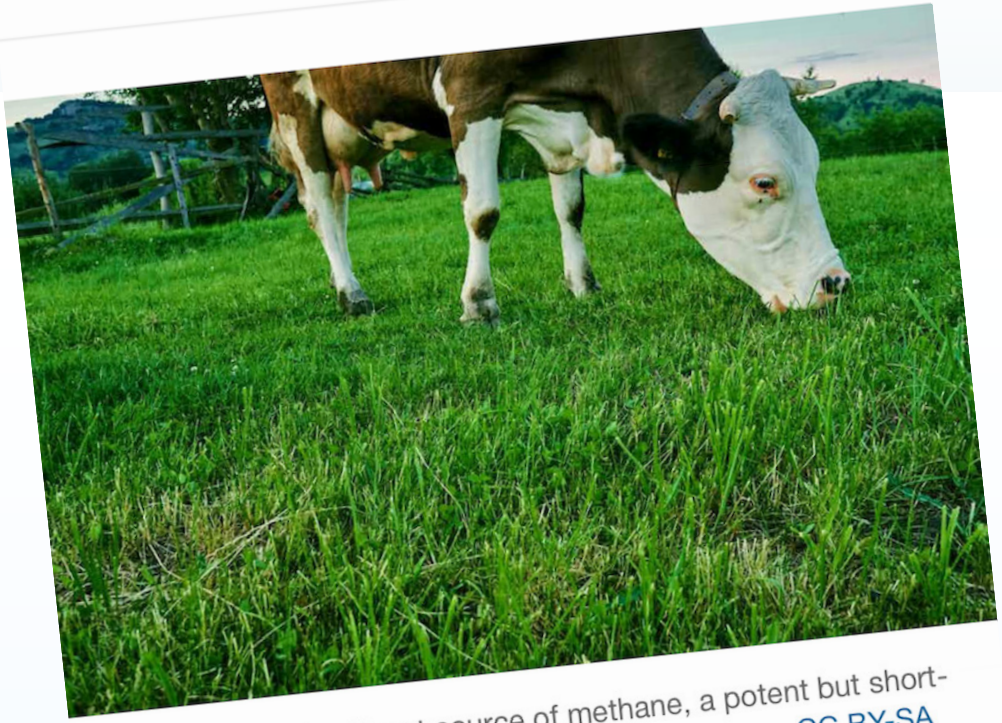
Carbon Dioxide and Carbon Flux




GLOBAL METHANE BUDGET
Global Carbon Project
TOTAL EMISSIONS
558
(540-568)
CH4 ATMOSPHERIC GROWTH RATE
10
(9.4-10.6)
TOTAL SINKS
548
(529-555)
105
(77-133)
188
(115-243)
34
(15-53)
167
(127-202)
64
(21-132)
515
(510-583)
33
(28-38)
Sink from chemical reactions in the atmosphere
Sink in soils
Fossil fuel production and use
Agriculture and waste
Biomass burning
Wetlands
Other natural emissions
Geological, lakes, termites, oceans, permafrost
EMISSIONS BY SOURCE
In million-tons of CH4 per year (Tg CH4 / yr), average 2003-2012
Anthropogenic fluxes
Natural fluxes
Natural and anthropogenic
GLOBAL CARBON PROJECT
FONDATION BNP PARIBAS


Fossil CO_2 has accumulated in the atmosphere as we have exceeded the ability of plants and the ocean to take up new CO_2
CO_2
Photochemical oxidation
CO_2
CARBON DIOXIDE
CO_2
Photosynthesis
~10 years
CH_4
METHANE
Oceans
Carbohydrates
Fossil fuels
(old photosynthetic carbon – 100 to 200 million years old – not in the carbon cycle)

THE CONVERSATION



Livestock is a significant source of methane, a potent but short-lived greenhouse gas. from www.shutterstock.com, CC BY-SA

Why methane should be treated differently compared to long-lived greenhouse gases

CarbonBrief
CLEAR ON CLIMATE

Cattle round-up before shipping on a West Texas ranch. Credit: Luc Novovitch / Alamy Stock Photo.

GUEST POSTS 7 June 2018 10:08

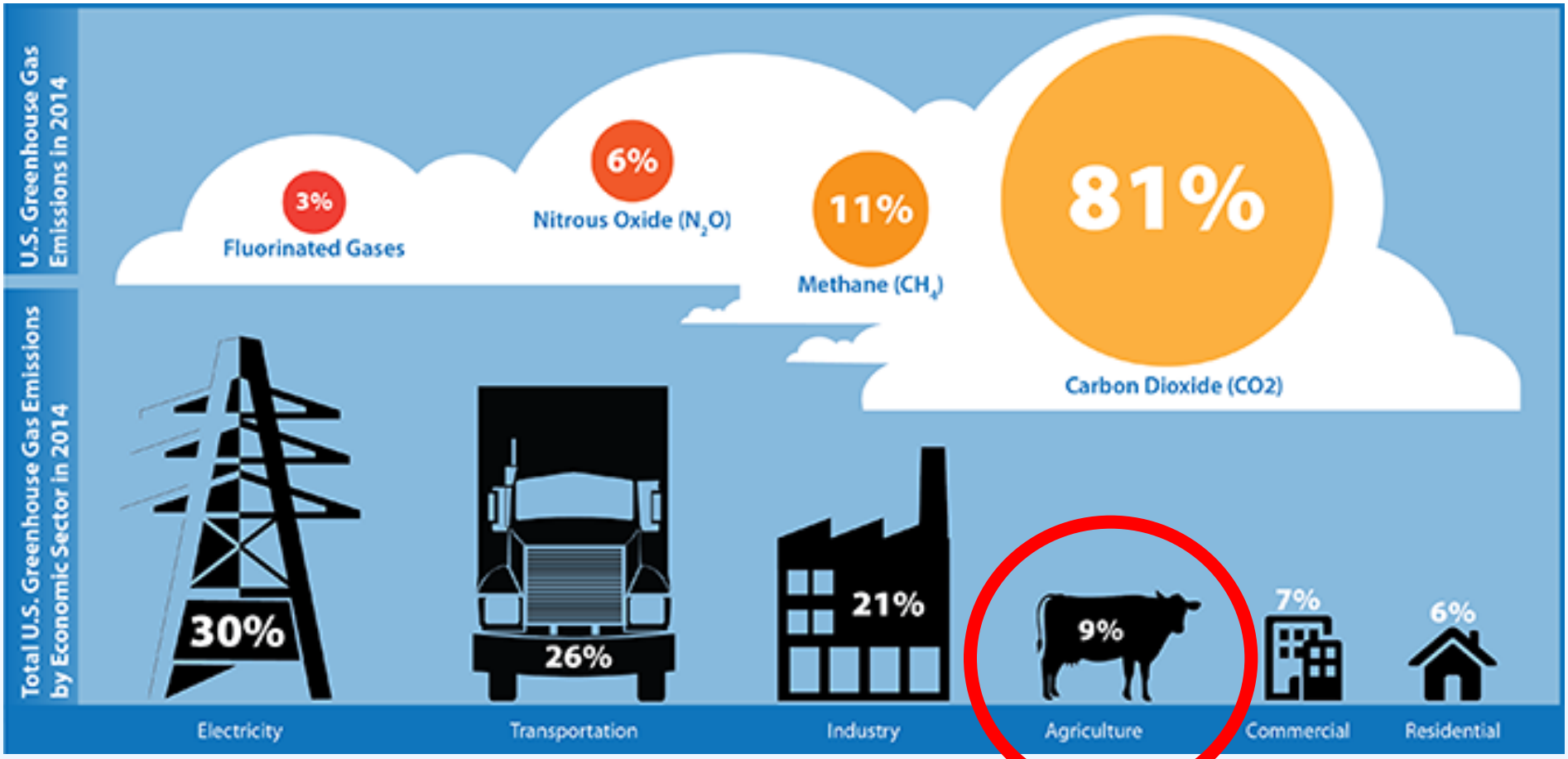
Guest post: A new way to assess 'global warming potential' of short-lived pollutants

CB DR MICHELLE CAIN
06.07.18

GUEST POSTS Guest post: A new way to assess 'global warming potential' of short-lived pollutants

Dr Michelle Cain in a science and policy research associate on the Oxford Martin School's

National-Level U.S. GHG Inventory



Source: EPA (2016)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A
LET THERE BE
LIGHT
1868