

Urban Science - carbon positive city

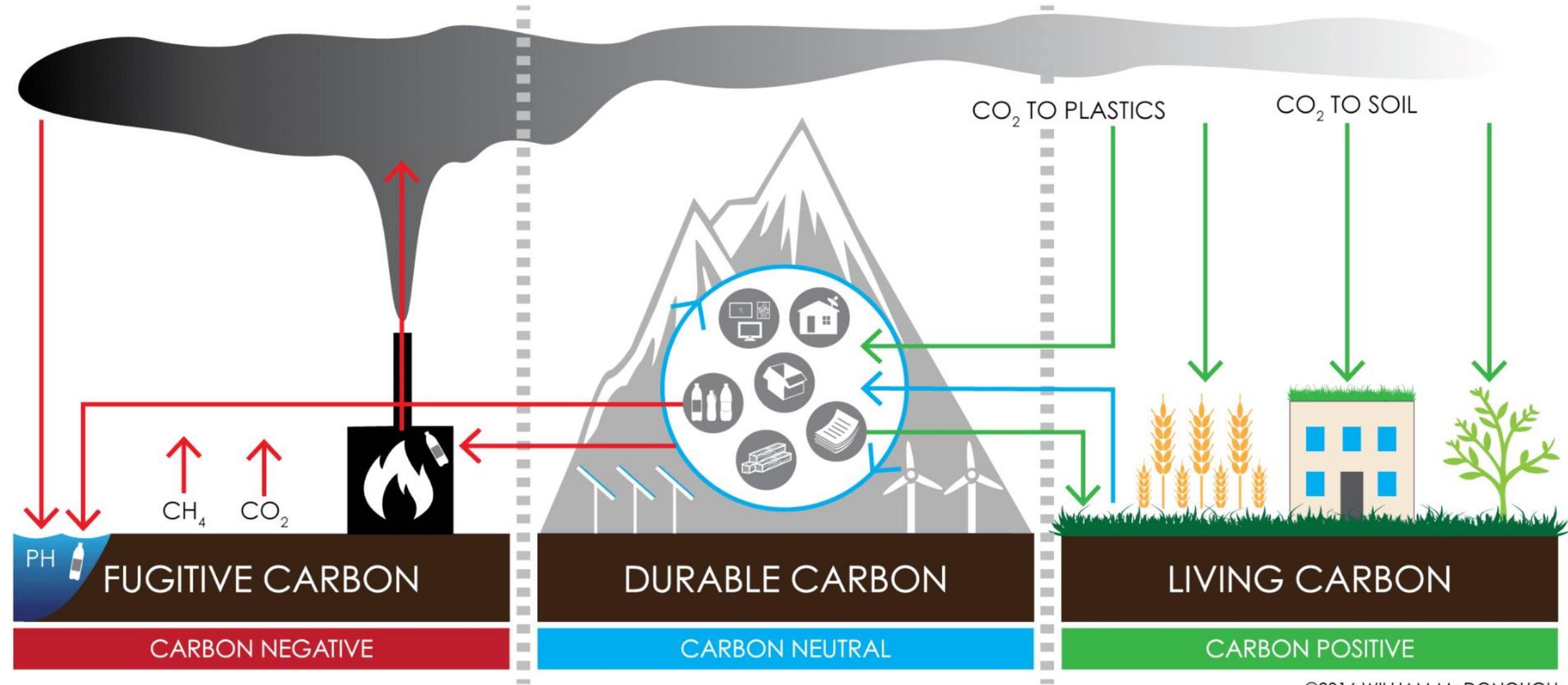
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Carbon as a material being put to human use



Three strategies for carbon management and climate change

- **Carbon positive:** actions converting atmospheric carbon to forms that enhance soil nutrition or to durable forms such as polymers and solid aggregates; also recycling of carbon into nutrients from organic materials, food waste, compostable polymers and sewers
- **Carbon neutral:** actions that transform or maintain carbon in durable Earth-bound forms and cycles across generations; or renewable energy such as solar, wind and hydropower that do not release carbon
- **Carbon negative:** actions that pollute the land, water and atmosphere with various forms of carbon



Why cities?

The world's cities account for roughly 70 percent of global carbon dioxide emissions

With urban populations expected to keep growing, cities' exposure to climate change only looks likely to get worse

However, given their role as hubs of innovation and creativity, we also look to cities to provide us with answers



Emissions and Recommendations

This chart shows two things: what percent of GHG emissions come from what sectors for a large, average, global city; and how those different sectors are addressed by the recommendations in this handbook. (Data sources: C40 and Kennedy)

- Buildings**
Buildings/Stationary, 48%
 - 1 City Building Retrofits
 - 2 Net-Zero Codes
 - 3 Progressive Codes
 - 4 Smart LED Lighting
 - 5 Benchmarking and Transparency
- Biological Resources**
(Not included in standard emissions tracking)
 - 22 Plant-Based Diets
- Transportation and Mobility**
Transport, 36%
 - 6 Fleet Electrification
 - 7 Combustion Vehicle Reduction
 - 8 Freight Reduction
 - 9 EV Charging
 - 10 Car-Free Downtown
 - 11 Mobility Alternatives
 - 12 Public Transit



Note that a wide variety is possible, such as this chart of Lima's emissions, with a much larger proportion in Waste and Transport

Electricity

Of emissions by energy source from all sectors, the average contribution from electricity is 25%



- 13 LED Smart Streetlights
- 14 Electric Districts
- 15 Municipal Solar Installations
- 16 Municipal Renewable Supply

Biological Resources

Waste, 7%



- 20 Organic Waste Diversion

Industry

Industry 7%



- 17 Clean Industrial Heat
- 18 Efficient Motors
- 19 Operator Training

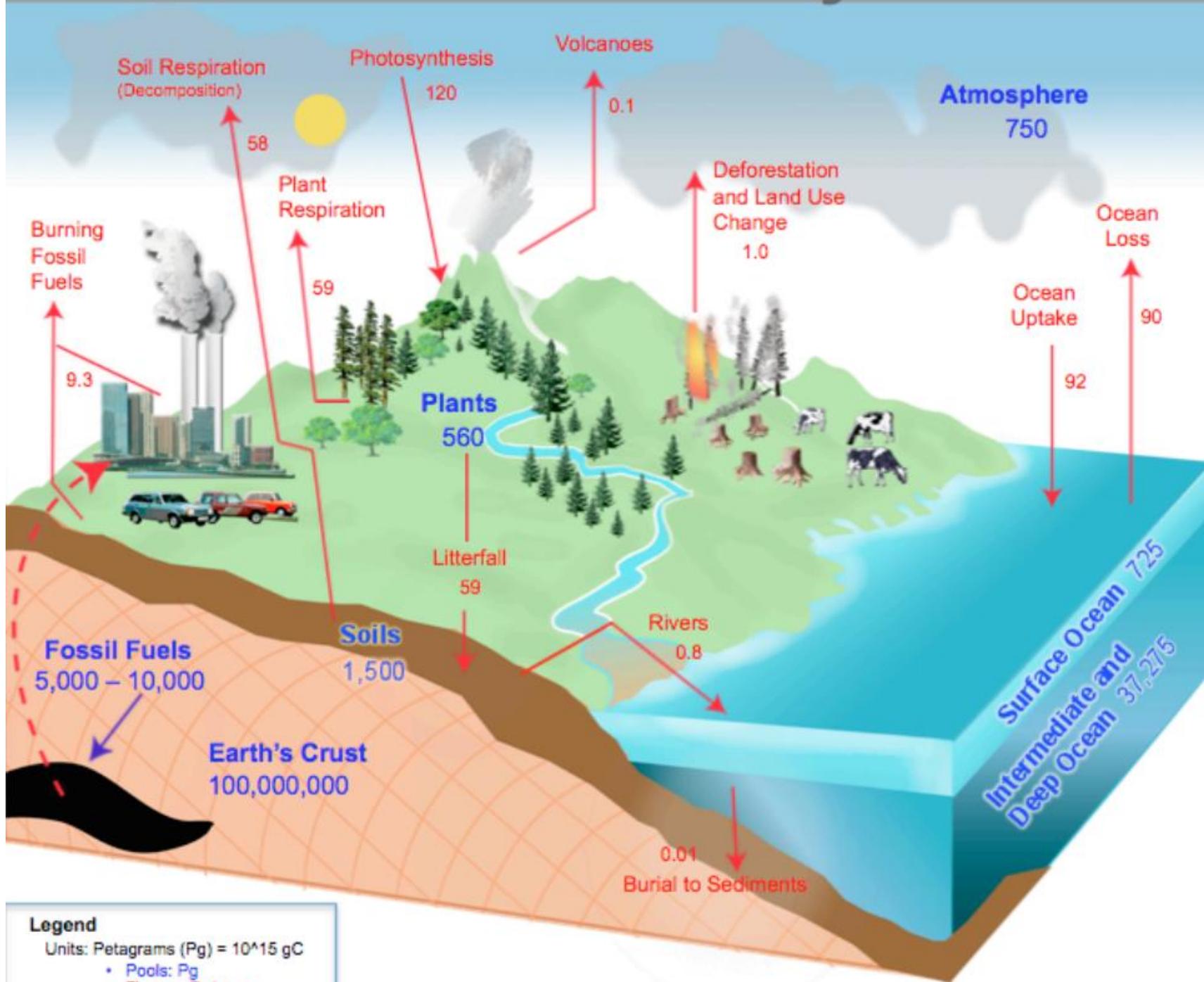
Biological Resources

Agriculture, Forestry, and Other Land Use (AFOLU), 3%



- 21 Urban Forestry





Legend
 Units: Petagrams (Pg) = 10¹⁵ gC
 • Pools: Pg
 • Fluxes: Pg/year



Carbon Cycle

Carbon Pools (storage) - Atmosphere, Terrestrial Life, Soil, Surface Ocean, Marine Life, Deep Ocean, Fossil Fuels, Ocean Sediment/Earth's Crust

Carbon fluxes - respiration, photosynthesis, dissolving, burning, decomposing, burying

Carbon sink: A carbon reservoir that takes in and stores (sequesters) more carbon than it releases

Carbon source: A reservoir or component of the carbon cycle that releases more carbon than it absorbs

The Earth's carbon *pools* naturally act as both *sources*, adding carbon to the atmosphere, and *sinks*, removing carbon from the atmosphere

Sources=sinks (balance)



Urban Science

Urban Science is delivering a means to teach pupils how science can develop solutions for sustainable cities, motivating them to view the positive benefits of science to the urban environment.

Hands-on inquiry based science engaging learners in everyday issues that have relevance and meaning.

Urban environment as ‘living laboratories’ where pupils explore how science can help create healthier places to live and work.

City as urban ecosystem where everything is interconnected

<https://urbanscience.eu/>



Paldies par uzmanību!

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