



It's a Systems Issue

Thoughts on what we can do today for better personal and planetary health...

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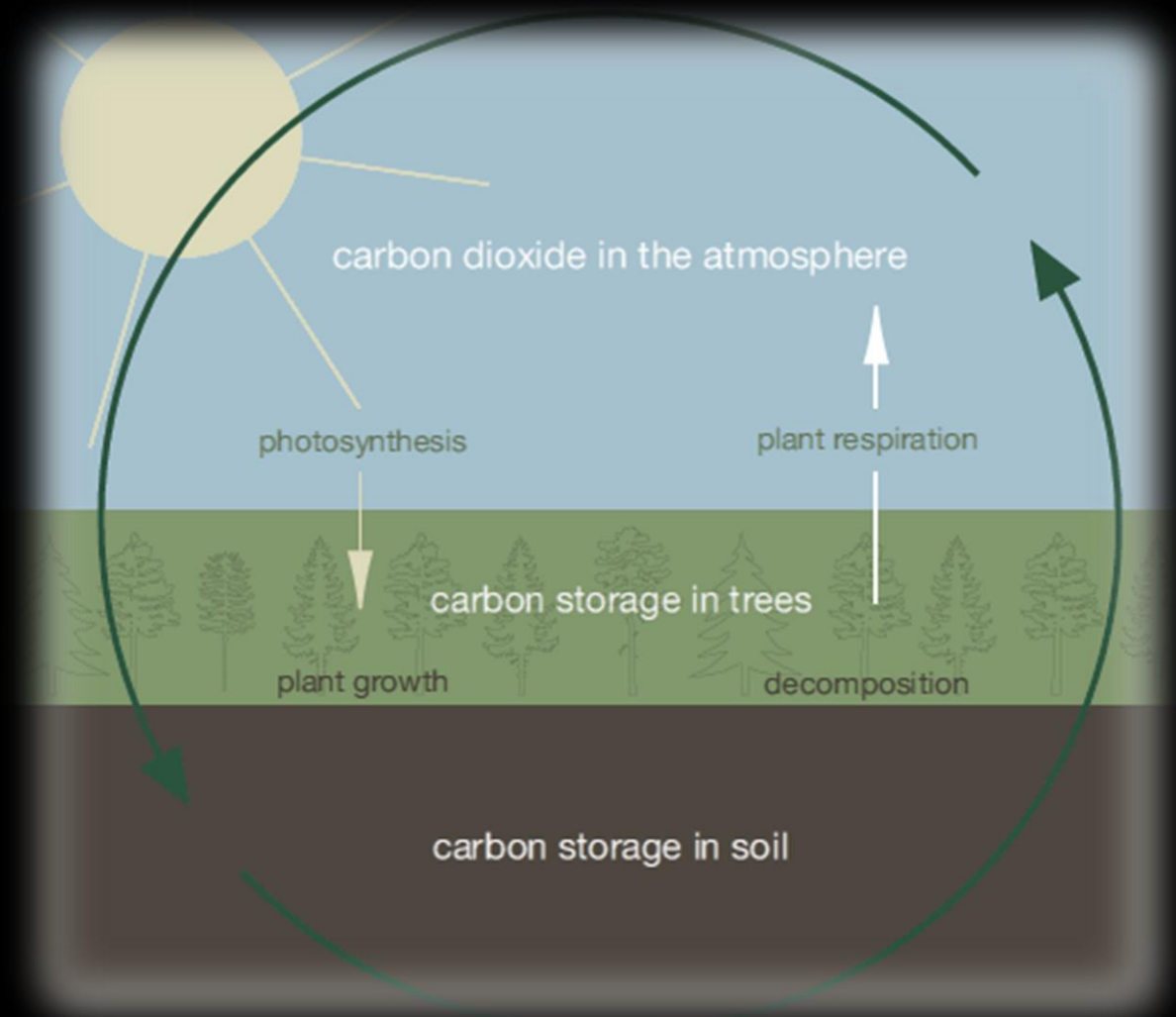
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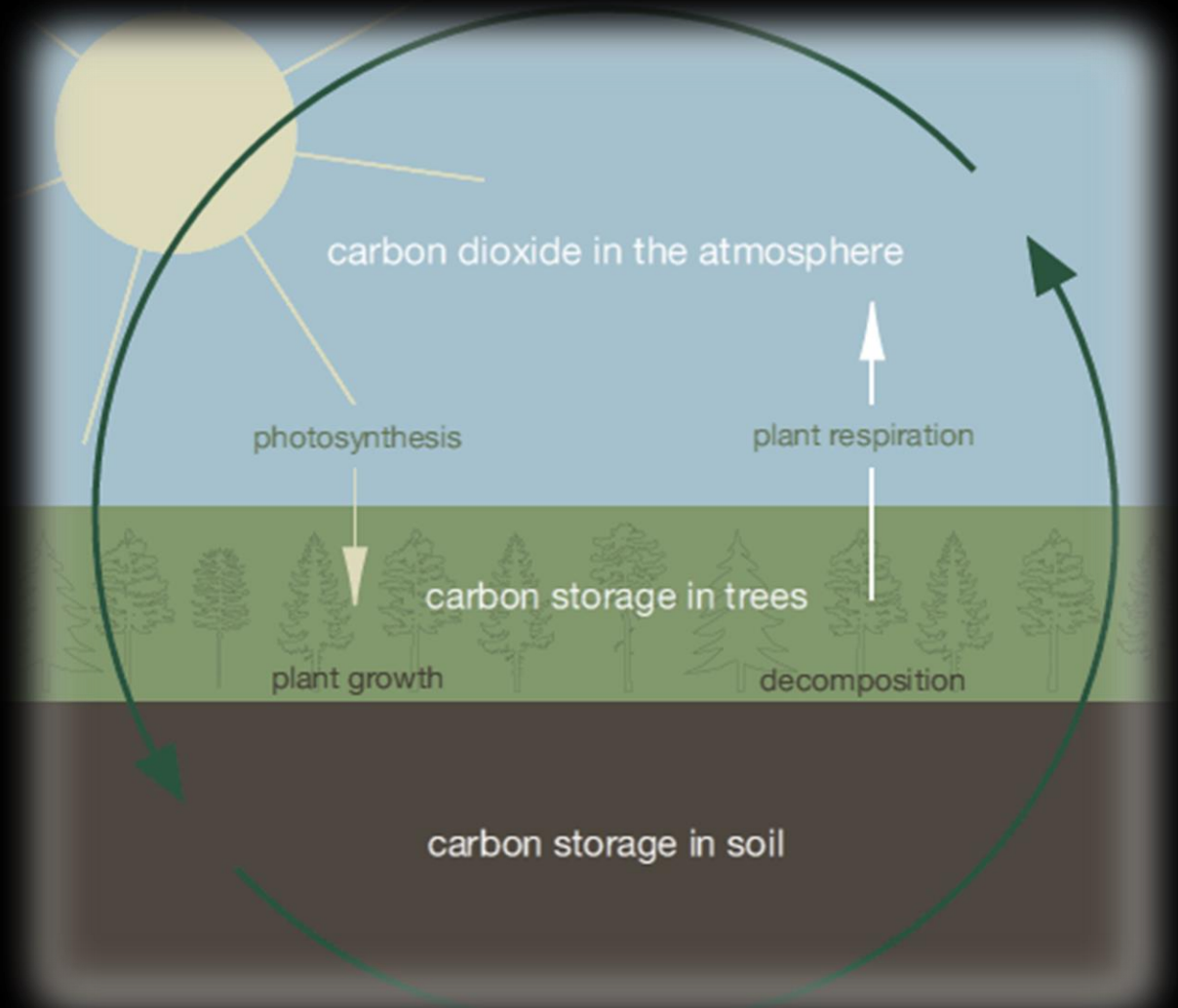
The carbon cycle

Carbon is one of the most common elements on earth. It exists in biological materials as carbon (C), and in the atmosphere as carbon dioxide (CO₂). It is so common, in fact, that life on earth is described as “carbon-based”. Carbon moves naturally between its four major pools—vegetation, soils, fossil fuels, and the atmosphere — in a process known as the carbon cycle. All organisms, whether living or dead, exchange carbon with their surroundings. Trees, for example, absorb carbon dioxide from the atmosphere through photosynthesis, store it as carbon within their tissues and fluids, then return it to the atmosphere as carbon dioxide through respiration. In a natural ecosystem, this process is largely a balanced one. But fossil fuel burning, deforestation, and other human activities have caused massive amounts of stored carbon to be released into the atmosphere very rapidly, amplifying the greenhouse effect and disrupting the Earth’s climate.

Turning Up the Heat: Global Warming and the Degradation of Canada’s Boreal Forest - 2008



The carbon cycle



...climate change (“...the earth’s atmosphere traps heat.”)

Jean Baptiste Joseph Fourier

Born: Auxerre, France, March 21, 1768,

Died: Paris, France, May 16, 1830

In 1822 he published his *Théorie analytique de la chaleur*, in which he bases his reasoning on Newton's law of cooling, namely, that the flow of heat between two adjacent molecules is proportional to the infinitely small difference of their temperatures,

In 1824 he demonstrated that the, earth’s atmosphere traps heat...

or in simple terms “the greenhouse effect.”



...climate change (“...carbon dioxide and water traps most of the heat.”)

John Tyndall, Irish Physicist

Born: August 2, 1820

Died December 4, 1893

In the 1860s Tyndall constructed the first ratio spectrophotometer which he used to measure the absorptive powers of the gases nitrogen, oxygen, water vapour, carbon dioxide, ozone, hydrocarbons, etc.

He is credited with the first ever atmospheric pollution measurements using infrared and scattering measurement instruments to monitor a city's air quality (in London).

He concluded that water vapor and carbon dioxide are the strongest absorbers of heat in the atmosphere and that water vapor is the principal gas controlling air temperature.



...climate change
 (“...burning coal adds to the greenhouse effect.”)

“...if the quantity of carbonic acid increases in geometric progression, the augmentation of the temperature will increase nearly in arithmetic progression. ”
 ...in simple terms, “...burn coal – heat planet.”



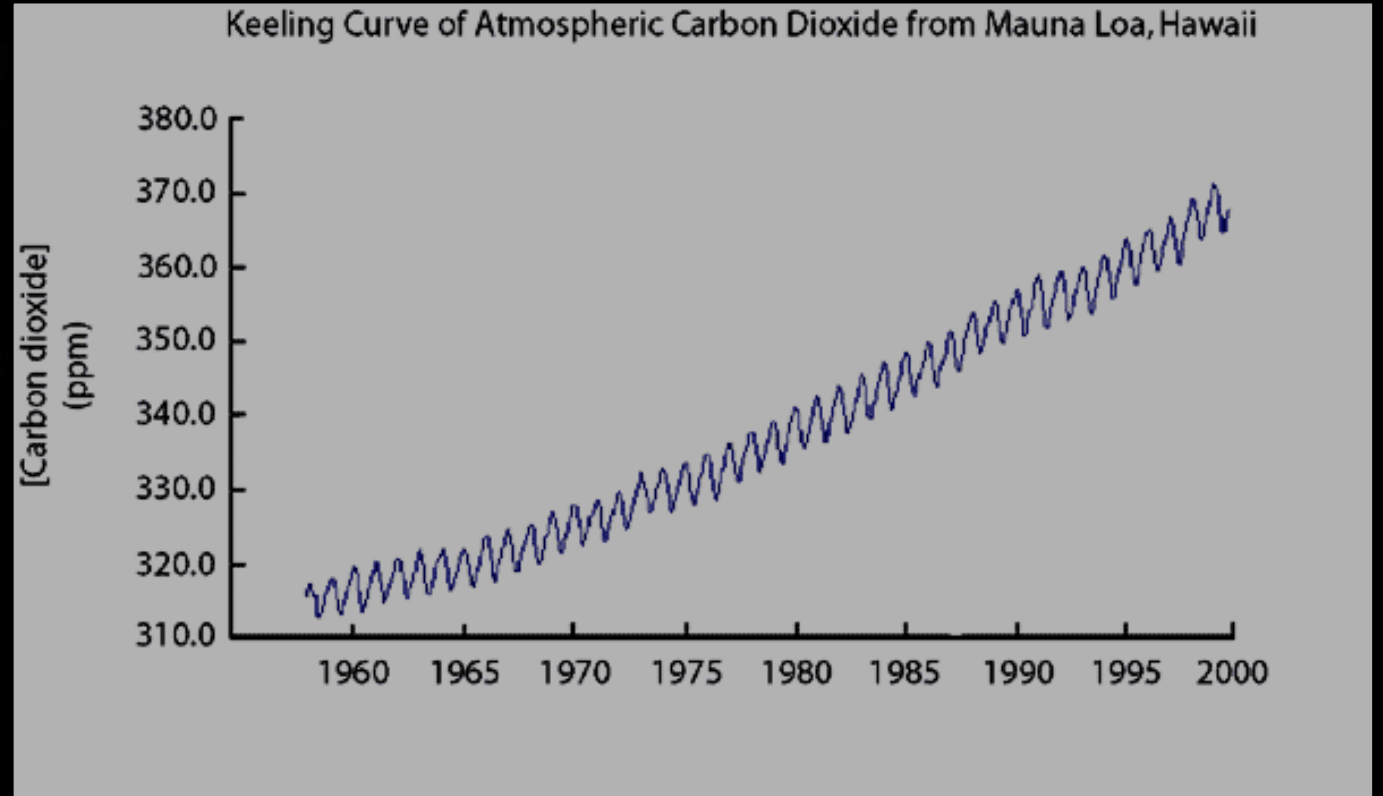
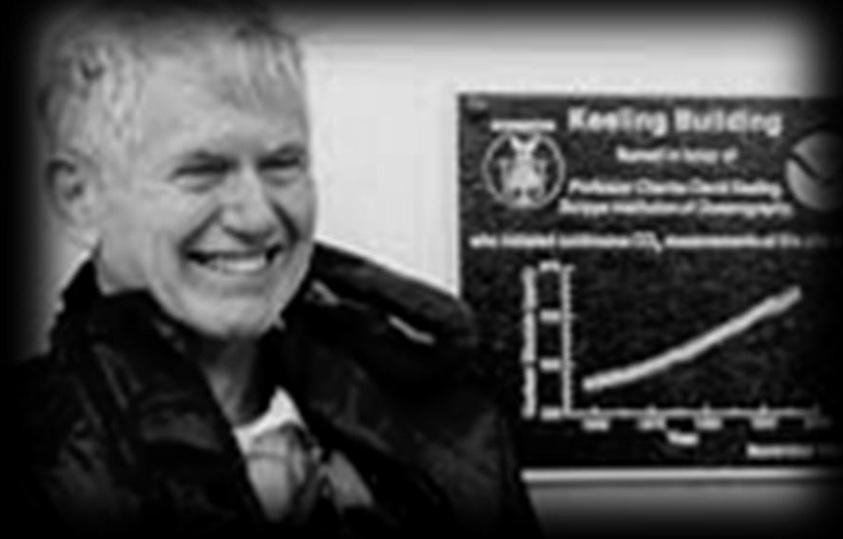
Svante Arrhenius – 1896

...first formulated the idea that changes in the levels of carbon dioxide in the atmosphere could substantially alter the surface temperature through the greenhouse effect.

On the Influence of Carbonic Acid in the Air Upon the Temperature of the Ground", Philosophical Magazine 1896(41): 237-76, Arrhenius, Svante

...climate change

(“...temperature and carbon dioxide are increasing together.”)



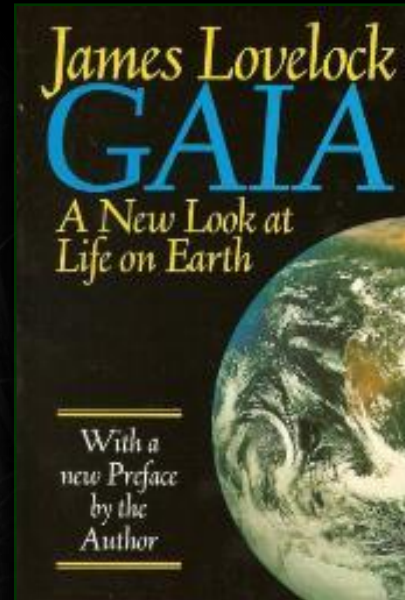
Charles Keeling at the dedication of the Keeling Building, Mauna Loa Observatory, Hawaii.

...climate change

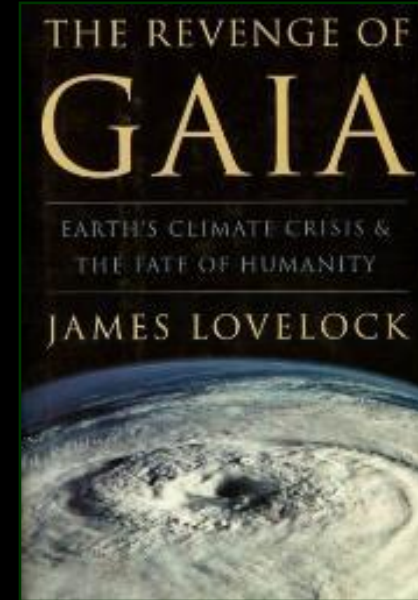
James Lovelock, a story of our place...



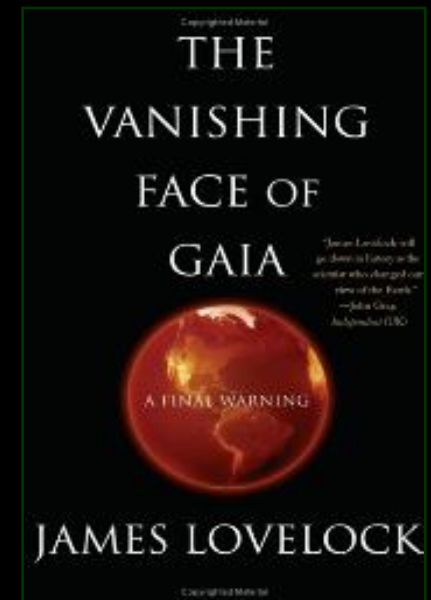
The Gaia Theory



1979



2006



2009

Watson, A.J. and J.E. Lovelock, 1983. Biological homeostasis of the global environment: the parable of Daisyworld. Tellus 35B, 286-289. .

Lovelock invented the electron capture detector, which ultimately assisted in discoveries about the persistence of CFCs and other chemicals

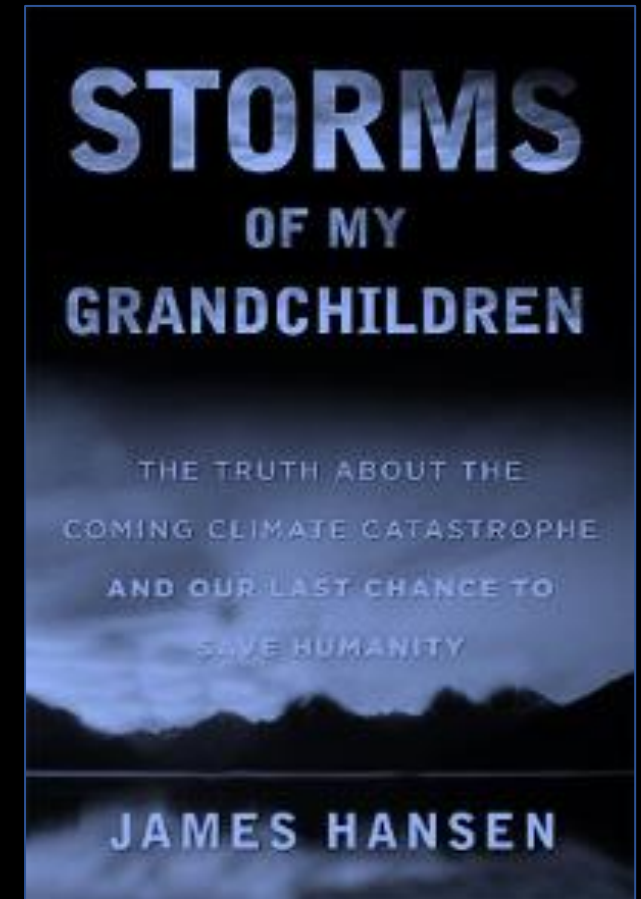
...climate change



“reduction of CO2 emissions is a top priority..”

“..the world has a 10-year window of opportunity to take decisive action on global warming and avert a weather catastrophe.”

NASA scientist James Hansen - 2006



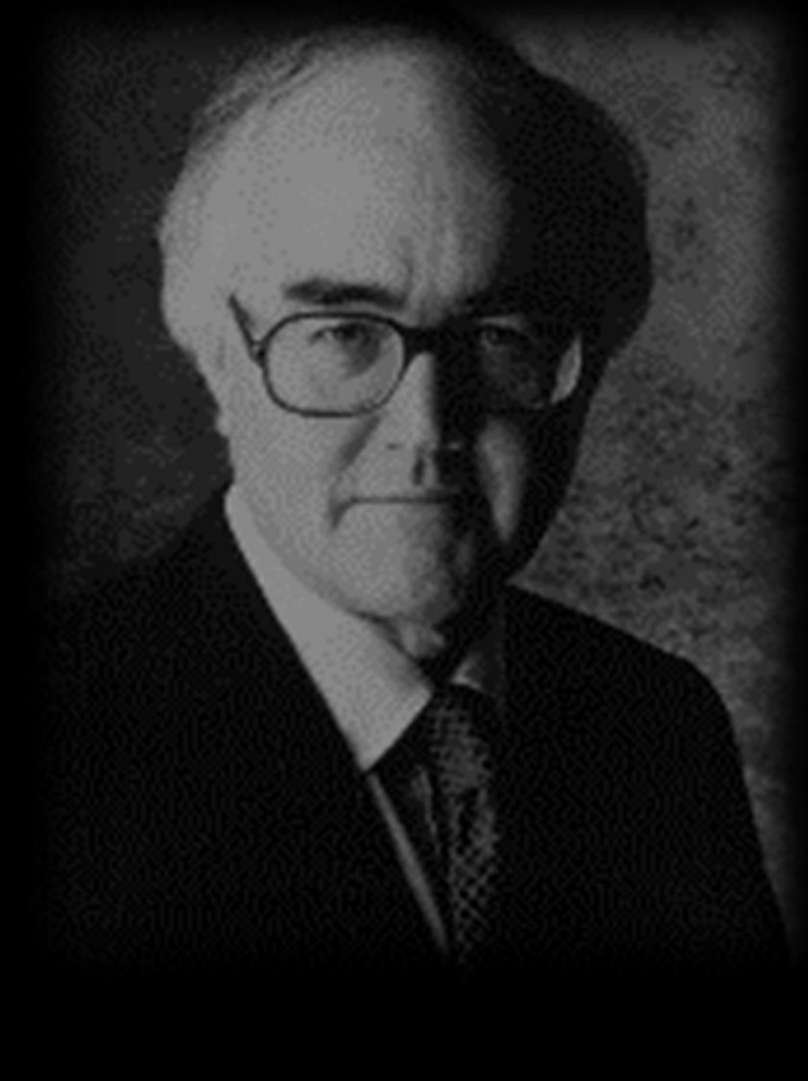
Milliken , Mary, “World has 10-Year Window to Act on Climate Warming – NASA Expert,” Reuters, September 14, 2006.

...climate change
After the Warming
by James Burke, 1989

Science historian James Burke produced this engaging program back in 1989. It's sometimes hard to believe this program was made 20 years ago -- so much of it sounds like today's news.

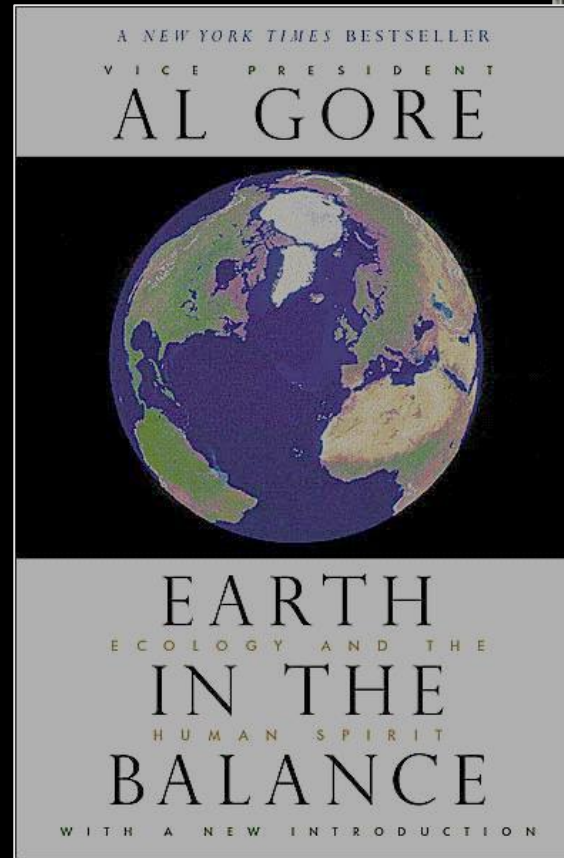
It starts with a scene of New Orleans being evacuated due to sea flooding...

Really!



<http://video.google.com/videoplay?docid=6514270139930450081>

...climate change
balance and truth
Al Gore, 1993 and 2006



An Inconvenient Truth – Gore, Al – ISBN: 1594865671 Pub. Date: June 2006

Earth In The Balance - Gore, Al. – ISBN: 0-452—26935-0 Pub. Date: January 1993

...climate change the numbers

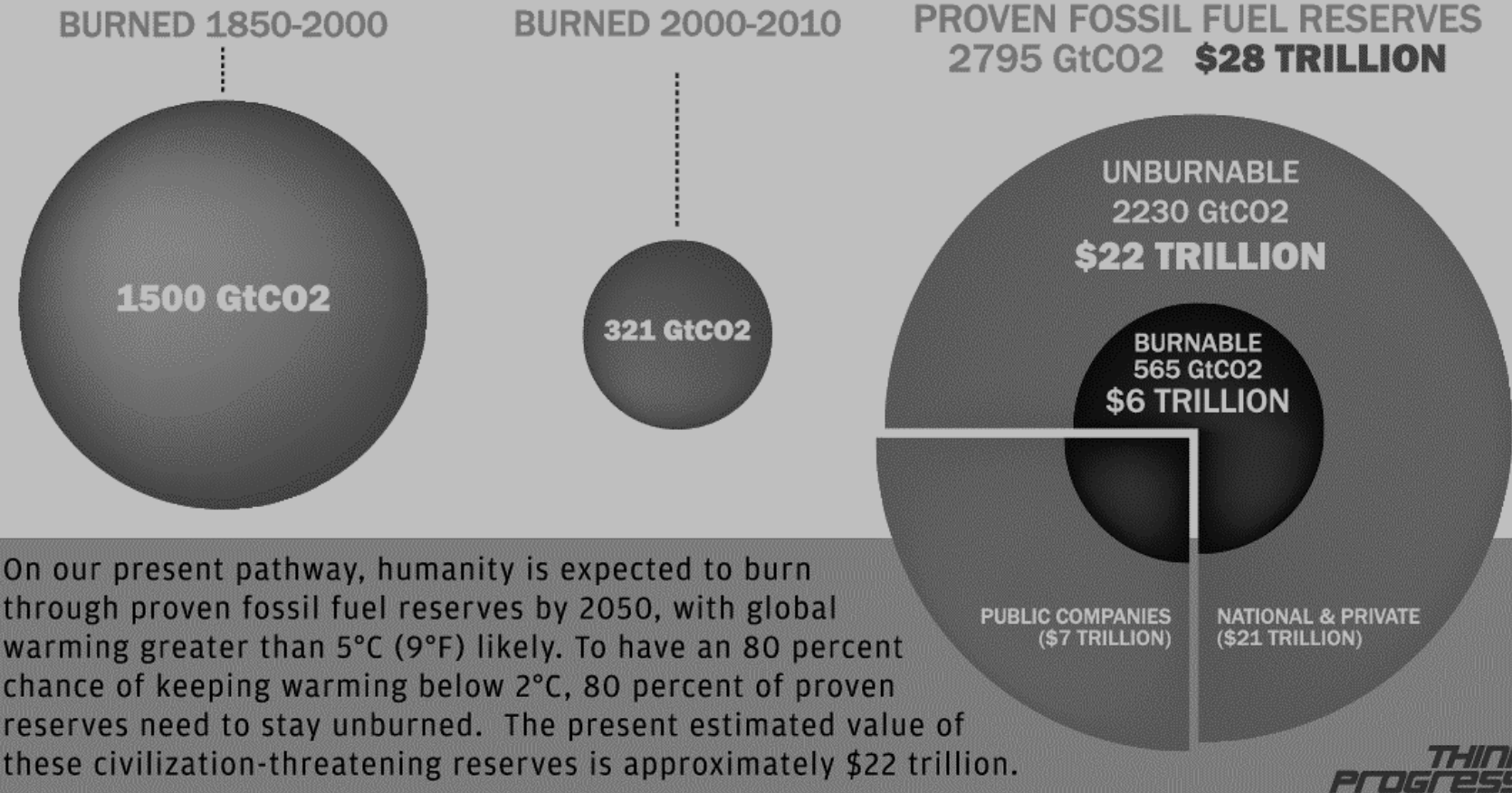


- **2.0°C.**
The upper limit increase if we are to have a chance...
Note: Given our current path, the increase in global temperature by the end of the century will likely reach 4.8°C.
- **565 Gigatons of carbon.**
The amount of carbon we can emit by mid-century if we are to stand a chance...
- **2,795 Gigatons of carbon.**
The amount of carbon already contained in the proven coal, oil and gas reserves of fossil fuel companies and the countries that act like fossil fuel companies...

We must reduce CO² emissions by 70% By 2050!

...climate change
the numbers

THE \$22 TRILLION CARBON BUBBLE



Sources: Meinshausen et al. 2009; Allen et al. 2009; Sokolov et al. 2009; Carbon Tracker Initiative 2011. Carbon reserves as of the start of 2011; since then approximately 50 gigatons of carbon dioxide have been burned. Total fossil reserves are projected to be four times larger than proven reserves, and exploration for new reserves continues.

...climate change the carbon bomb (reverse of sequestration. methyl hydrate, permafrost methane)

Forest fires, insect outbreaks, permafrost melting, and logging in Canada's Boreal Forest have the potential to worsen global warming, while industrial development has the potential to weaken the Boreal's resistance and resilience in the face of global warming's intensifying impacts.

If left unchecked, this situation could culminate in a catastrophic scenario known as "the carbon bomb".

The carbon bomb describes a massive release of greenhouse gasses into the atmosphere, driven, for example, by a widespread outbreak of forest or peat fires. As Greenpeace first warned in its 1994 report, *The Carbon Bomb*, because Canada's Boreal Forest contains 186 billion tonnes of carbon - 27 times the world's annual fossil fuel emissions—a rapid release of its carbon into the atmosphere could cause a disastrous spike in emissions.

Turning Up the Heat: Global Warming and the Degradation of Canada's Boreal Forest - 2008

...climate change

Lead

We Need an Apartheid-style Boycott to Save the Planet

“People of conscience need to break their ties with corporations financing the injustice of climate change.”

The Guardian, April 10, 2014

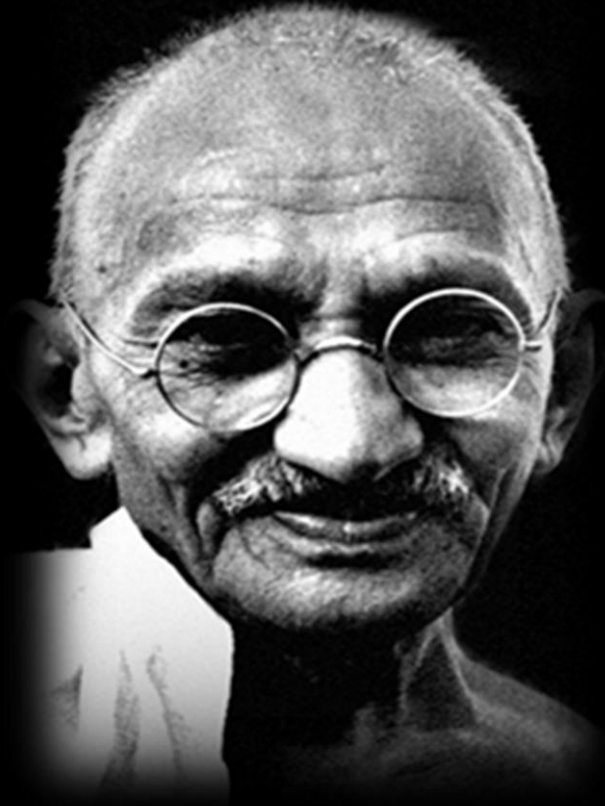


...climate change
changing the system...



Ellen Dorsey is executive director of the Wallace Global Fund and a catalyst in the coalition of 17 foundations known as [Divest-Invest Philanthropy](#). Thomas Van Dyck is Senior Vice President – Financial Advisor at RBC Wealth Management, and founder of [As You Sow](#), a shareholder advocacy foundation.

...climate change
what I (we) can do...



- Reconnect with, listen to, and learn from Nature...
- Join real efforts that connect with your values...
- Divest from fossil fuel and Invest in renewable fuel ...
- **Vote on your ballot and with your pocketbook...**
- Lead by example in family and community...
- Share the CO₂ story with colleagues , with children ...
- Learn the Science
 - Know your CO₂ footprint of your:
 - dwelling,
 - transport,
 - the products you consume (food, water, clothing, fuel etc.)

“The future depends on what you do today.” Mahatma Gandhi



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