Cariaco Basin

Greenland

Great Ocean Conveyor Belt

Temperature (°C)

Age (thousands of years)
THE GREENHOUSE EFFECT

NATURAL WARMING
Solar energy is absorbed by the Earth's atmosphere and certain other gases are not completely absorbed, causing the Earth to warm up. This is known as the greenhouse effect.

AMPLIFIED WARMING
The natural greenhouse effect causes an increase in temperature, which is then amplified by human activities, such as burning fossil fuels and deforestation, leading to a much greater increase in temperature. This is known as amplified warming.

The display uses a globe to simulate the effects of greenhouse gases on the Earth's temperature.
XXXI. On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground. By Prof. Svante Arrhenius *.

I. Introduction: Observations of Langley on Atmospherical Absorption.

A great deal has been written on the influence of the absorption of the atmosphere upon the climate. Tyndall † in particular has pointed out the enormous importance of this question. To him it was chiefly the diurnal
The Greenhouse Effect

blocking of outgoing infrared radiation by “greenhouse gases”
water vapor, carbon dioxide, methane, N2O, CFCs

without it, global-mean surface temperature would be 0°C
Greenhouse gas concentrations are increasing
Greenhouse gas concentrations are increasing
NCEP/NCAR Reanalysis
Surface air (C) Composite Anomaly 1968-1996 climo

Apr 2008

NOAA/ESRL Physical Sciences DMelion
Glacier Bay, AK, in 1940 and in 2004

Record melting of Arctic sea ice in 2007

Mountain Pine Beetle outbreaks

Photos: USGS

Picture: NASA

Photos: Forest Service of Canada
Climate Impacts

- winter snow pack
- agriculture
- fisheries
- natural ecosystems
- coral
- sea level
- traditional cultures
- health
Catastrophic impacts?
"HOW ON EARTH DO WE TURN IT OFF?"
# Carbon Facts

**Product Size 1 Cheeseburger (130g)**

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kilograms CO₂ Equivalent</td>
<td>3.08</td>
</tr>
<tr>
<td>Kilograms CO₂</td>
<td>0.243</td>
</tr>
<tr>
<td>Kilograms</td>
<td>0.123</td>
</tr>
</tbody>
</table>

**Total C: Energy Sources**

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>243g</td>
</tr>
<tr>
<td>Fossil Fuel (Diesel)</td>
<td>120g</td>
</tr>
<tr>
<td>Fossil Fuel (Gasoline)</td>
<td>48g</td>
</tr>
<tr>
<td>Electricity Production</td>
<td></td>
</tr>
<tr>
<td>Fossil Fuel (Natural Gas)</td>
<td>75g</td>
</tr>
<tr>
<td>Fossil Fuel (Coal)</td>
<td>0g</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

**Total C: Non-Energy Sources**

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enteric Fermentation</td>
<td>2840gCO₂</td>
</tr>
<tr>
<td>Manure</td>
<td>81.0g(1864gCO₂E)</td>
</tr>
<tr>
<td>Other</td>
<td>25.8g(856gCO₂E)</td>
</tr>
<tr>
<td></td>
<td>5.2g(120gCO₂E)</td>
</tr>
</tbody>
</table>

**Carbon Product Ratio**

- 23.7

**Localism Rating**
- C+

**Sustainable Production Rating**
- D+

**Overall Carbon Code:** ORANGE

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*Base on a 3 burgers/week consumption estimate, a typical American’s annual burger consumption would result in at least 540kg of greenhouse gas emission.*

**Estimates are based on calculations by Jamais Cascio @ www.openthefuture.com who kindly granted permission for publishing his data here.**

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**Did You Know?**

One estimate suggests that the annual American cheeseburger consumption and production results in GHG equivalent to that emitted by 6-20million Hummer SUVs.
Mitigation strategies

conserv energy
develop renewable energy sources
sequester carbon
apply geo-engineering solutions
Adaptation strategies

- build infrastructure
- abandon / fortify low lying areas
- adapt agricultural practices
water
food
energy
wood
minerals
waste

preserving, restoring habitat
preserving resources
containing toxic substances
limiting global warming