## Real-world Evidence that CO<sub>2</sub> Emissions and Fossil Energy Enhance the Human Environment

# 13TH INTERNATIONAL CONFERENCE ON CLIMATE CHANGE Best Science, Winning Energy Policies

Dr. Craig D. Idso, Chairman Center for the Study of Carbon Dioxide and Global Change www.co2science.org

## Some Recent Climate Change News Headlines

#### Washington Post

Planet is entering 'new climate regime' with 'extraordinary' heat waves intensified by global warming, study says



#### O The Conversation US

#### Climate change is affecting crop yields and reducing global food supplies



As climate change alters temperature and rainfall patterns, yields of some crops are increasing while others decline. The net result: less food, ... 6 hours ago

#### New Atlas

UN report on global warming warns of "climate apartheid" between ...



S Yale Climate Connections

#### How climate change is making hurricanes more dangerous

Major hurricanes are by far the world's costliest natural weather disasters, in some cases costing well over \$100 billion dollars. There's now ... 1 day ago



#### MBCNews.com

### Climate change is devastating Central America, driving migrants to the US border

Ravaged by climate change-driven drought, farmers in rural Honduras and Guatemala live on the edge of hunger, not knowing if the next ... 23 hours ago



#### The Guardian

### Sanders and Ocasio-Cortez move to declare climate crisis official emergency

Exclusive: Democrats to introduce resolution in House on Tuesday in recognition of extreme threat from global heating. 1 day ago



The UN has published a new report detailing the dangers of climate change, with a particular focus on how it will shape the issue of poverty in ... 2 weeks ago

## The False Narrative of Global Warming

- Rising atmospheric CO2 is presently causing dangerous climate change to the detriment and peril of humanity and the natural world
- Because the combustion of fossil fuels is the principal source behind the CO2 rise, society must abandon all use of fossil energy
  - Activists seek to enforce government and private sector efforts to restrict fossil fuel use via tax, caps or fiat limits on CO<sub>2</sub> emissions

# The Real Story

- There is no climate catastrophe and CO2 emissions and fossil energy should be celebrated for *enhancing life* and *improving the standard of living* for humanity and the natural world
- Efforts to restrict CO2 emissions or limit fossil energy should be avoided
  - Such actions will most certainly bring about adverse outcomes and unintended consequences that will harm humanity and nature

Consider the following four key examples of how CO<sub>2</sub> emissions and fossil energy improve human prosperity and benefit the natural world... CO2 Emissions per Capita (tonnes per person in 2016)



(international \$ adjusted for inflation & country price diferences)

Source: https://ourworldindata.org/grapher/co-emissions-per-capita-vs-gdp-per-capita-international-

## CO<sub>2</sub> emissions per capita vs. the share of people living in extreme poverty, 2014



Average CO<sub>2</sub> emissions per capita are measured in tonnes per year. Extreme poverty is defined as living at a consumption (or income) level below 1.90 "international-\$" per day. International \$ are adjusted for price differences between countries and price changes over time (inflation).



Source: https://ourworldindata.org/grapher/co-emissions-per-capita-vs-the-share-of-people-living-in-extreme-poverty

#### Two-century Trend in Global Illiteracy and Fossil Fuel Consumption



Year

### Two-century Trend in Global Life Expectancy and Fossil Fuel Consumption



The real achievement of increasing life expectancy is in the number of total planetary human life years

### <u>1820</u>

- Population = 1.06 billion
- Life expectancy = 29 years

 Total human life years on the planet = 30.7 billion (1.06 billion x 29 years)

## <u>Today</u>

- Population = 7.38 billion
- Life expectancy = 72 years

 Total human life years on the planet = 527 billion\* (7.38 billion x 72 years)

\* This is a <u>17-fold</u> increase!

## Other Human Benefits from Fossil Energy Use

- Productivity enhancements
- Improvement/expansion of goods and services
- Development of new inventions and innovations
  - Cell phones, air travel, the Internet, CT scans, etc.
  - These products or benefits could not have possibly existed years ago
  - They only exist today thanks to decades of technological and economic progress made possible by fossil energy use

# What about fossil energy benefits to nature?

What about fossil energy-related benefits to the natural world?

 Such benefits generally have their origin in, or are linked to, the carbon dioxide concentration of the atmosphere, which has increased during the Modern Era primarily in response to humanity's combustion of fossil fuels and they include ...

## Higher CO<sub>2</sub> Concentrations Increase Plant Productivity

- Atmospheric CO<sub>2</sub> is the basic food of plants
  - It is the primary raw material utilized by plants to construct their tissues
- Plants love CO2
  - Thousands of laboratory and field experiments have demonstrated that higher atmospheric CO<sub>2</sub> concentrations increase plant productivity and growth
    - The better plants grow, the more food there is available to sustain the entire biosphere

## Higher CO<sub>2</sub> Concentrations Increase Plant Productivity





What does this current and future growth-enhancing benefit of atmospheric CO<sub>2</sub> enrichment portend for the biosphere?

## Benefits of Atmospheric CO<sub>2</sub> Enrichment

### Enhanced Agricultural Productivity

- Increasing atmospheric CO<sub>2</sub>
  concentrations have increased past,
  present and future crop yields
- Without the benefits of CO<sub>2</sub>
  enrichment on agriculture, world food
  supply could fall short of world food
  demand by the year 2050







#### Observed (1961-2011) and Projected (2012-2050) Monetary Benefit of Rising Atmospheric CO<sub>2</sub> on Global Crop Production



Source: Idso (2013). *The Positive Externalities of Carbon Dioxide: Estimating the Monetary Benefits of Rising Atmospheric CO2 Concentrations on Global Food Production*.

## Elevated Atmospheric CO<sub>2</sub> Enhances Plant Water Use Efficiency

- Plant water use efficiency (WUE) is the amount of biomass produced per unit of water lost
- The result is a reduction in water loss via transpiration, thus increasing plant WUE by as much as 70-100%

# Plant Stomatal Pore

Low CO<sub>2</sub>

High CO<sub>2</sub>



Larger Opening

### Elevated Atmospheric CO<sub>2</sub> Enhances Plant Water Use Efficiency

### • Water Use Efficiency Benefits

- Can produce the same amount of crop yields using less water
- Less-susceptible to drought
- Plants will be able to grow and reproduce where it has previously been too dry to exist
- Win back lands lost previously to desertification
- Greater vegetative cover can reduce adverse effects of soil erosion
- Ample real-world evidence of these benefits

### Elevated Atmospheric CO2 Ameliorates Environmental Stresses

- Higher levels of atmospheric CO<sub>2</sub> reduce the deleterious effects of high soil salinity, high/low air temperature, high/low light intensity, low levels of soil fertility, oxidative stress, pathogen attack, macro and micro nutrient excesses/deficiencies, and the stress of herbivory
- The percentage growth enhancement produced by an increase in the air's CO<sub>2</sub> content is generally greater under stressful and resource-limited conditions than when growing conditions are ideal

Increasing Atmospheric CO2 Benefits the Biosphere



# Atmospheric CO2 is Greening the Earth!

• Observations from all across the globe indicate that the whole of the terrestrial biosphere is reaping incredible benefits from the approximate 45 percent increase in atmospheric CO<sub>2</sub> since the beginning of the Industrial Revolution – Global Greening!

## The State of Earth's Terrestrial Biosphere:

How is it Responding to Rising Atmospheric CO2 and Warmer Temperatures?



Craig D. Idso, Ph.D. Center for the Study of Carbon Dioxide and Global Change 5 December 2012

## **Concluding Comments**

- These benefits to the human environment, which includes both humanity and the natural world, are undeniable
  - Without adequate supplies of low-cost centralized energy, few, if any, of the major technological and innovative advancements of the past two centuries that have enhanced and prolonged human life could have occurred
  - Without the increased CO<sub>2</sub> emissions from fossil fuel use over the past two centuries, Earth's terrestrial biosphere would be nowhere near as vigorous or productive as it is today

# **Concluding Comments**

 It is scientifically and morally indefensible to demonize fossil energy and claim that CO<sub>2</sub> emissions are a current threat to human health and welfare

- *More*, not less, fossil energy is needed to enhance the future human environment
  - This is the critical message that must be shared with scientists, activists, policy makers, educators and the general public

# The Institute for the Human Environment

- www.human-environment.org
- Non-profit organization advocating for the continued development and improvement of society and the natural environment
- Supports the unfettered use of fossil energy to enhance and protect the human environment
- Seeks to reverse the 2009 EPA Endangerment Finding & restore critical policy balance



### Institute for the Human Environment

ome About Fossil Fuel Benefits Policy Videos Contribute

#### Welcome & Our Purpose

The Institute for the Human Environment is a non-profit educational organization advocating for the continued development and improvement of society and the natural environment. Its mission is to support the unfettered use of fossil fuels so that the industrial evolution of the human community can continue unoppressed by the heavy hand of government.

The concept of the Human Environment, which includes both the natural world and humanity's impact upon it, has its origin the U.S. <u>National Environmental Policy Act (NEPA)</u> of 1969, as more succinctly defined by the nations of the world -- including the United States -- in the <u>Stockholm Declaration on the Human Environment</u> in 1972. Among the principles set forth in this latter Declaration is the philosophy that protecting the human environment not only includes safeguarding the natural environment, it also includes defending a fundamental right of society to utilize and transform the natural environment so as to sustain and enhance the quality of *human* life.

George Soros, Michael Bloomfield, Al Gore, industrial, government and professional environmental groups that fund efforts to outlaw fossil fuel use have grown immensely in recent years. Their motives invariably include aquiring money and political power, whether for individuals, environmental groups, companies, politicians or governments. Their efforts enabled President Obama's EPA to declare in late 2009 that CO2 emissions resulting from the combustion of carbon-based fossil fuels are a "current threat" to human health and welfare. This declaration has subsequently served as the foundation for numerous State and federal regulatory actions since.

Sadly, the entire narrative promulgated by the anti-fossil fuel movement is based on predictions of dangerous future global warming derived from computer model *projections* that have since been invalidated by real-world *observations*. When critically examined, there exists *no compelling evidence* that CO2 emissions are significantly altering global climate or harming humanity in "current", real time. Furthermore, those who seek to regulate CO2 emissions and control fossil fuel use almost always fail to conduct a realistic benefit-cost analysis; they rarely acknowledge, let alone incorporate, the numerous *benefits* fossil fuel use provides to society and nature alike. When such *positive* externalities are accounted for (many of which are noted and discussed under our heading <u>Fossil Fuel Benefits</u>), it becomes scientifically and morally indefensible to demonize fossil fuel use and continue to maintain that CO2 emissions are a "current threat" to human health and welfare.

More, not less, fossil fuel use is needed to enhance the future human environment. Accordingly, our Institute seeks to bring these new facts to light for all regulators at the State level and to reverse the 2009 EPA Endangerment Finding,



# Institute for the Human Environment

- Our message is simple:
  - Atmospheric CO<sub>2</sub> is an aerial *fertilizer*, not an airborne pollutant
  - Fossil energy *enhances* civilization and the human experience, it doesn't diminish it
  - More, not less, fossil energy is needed to enhance and protect the human environment
- Far too many regulations and laws have tilted the scales toward safeguarding the natural environment at the *expense* of humanity and it is time for that to change

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