Blue Ridge Environmental Defense League

Press Conference

Smoke and Mirrors

January 27, 2011

What is biomass?

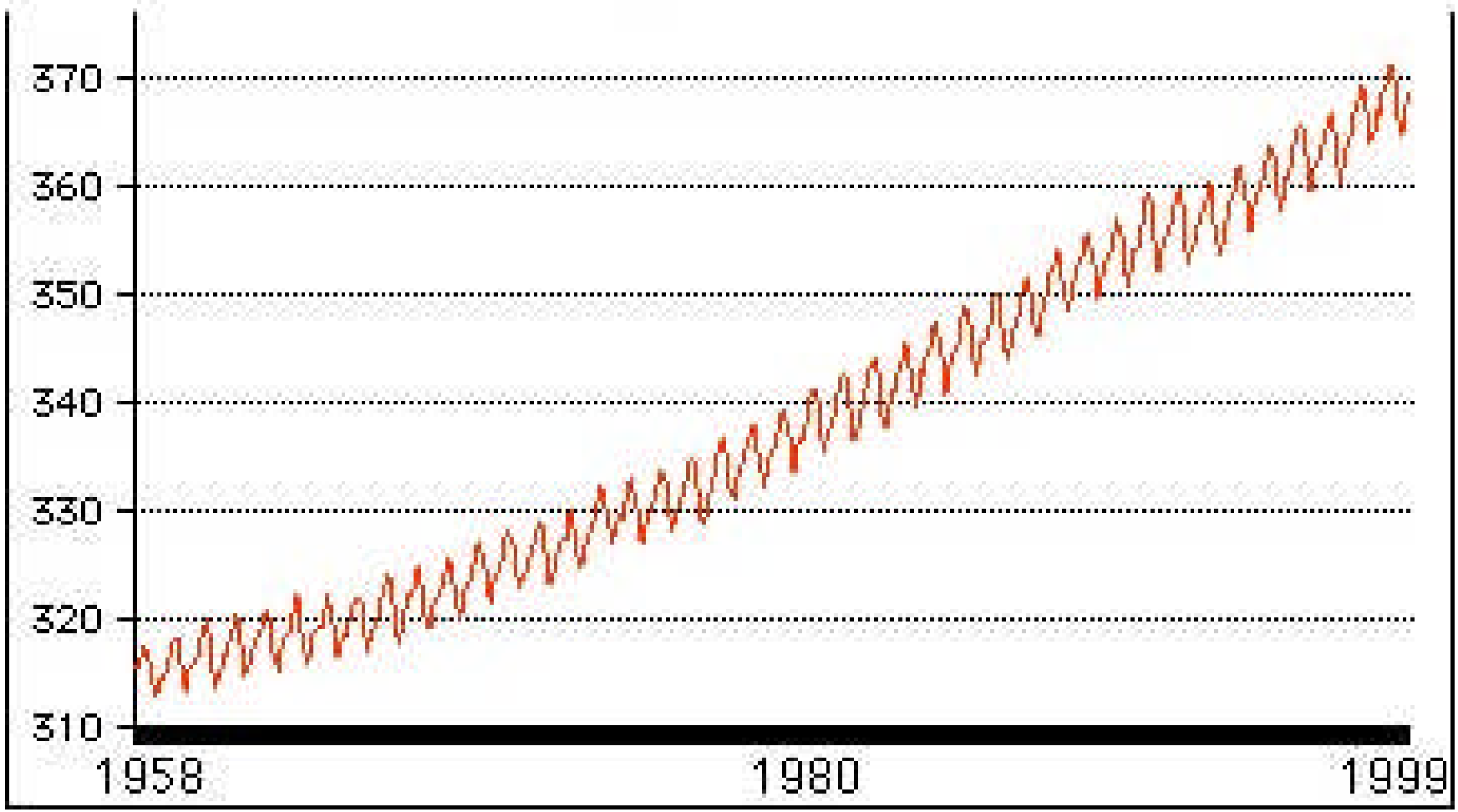
- Biomass is organic matter; carbon is its principal element.
- In the context of energy production, it is generally includes materials which are produced for such purposes or which are by-products of human industry. So the term may include, for example, both corn grown for ethanol and household trash.

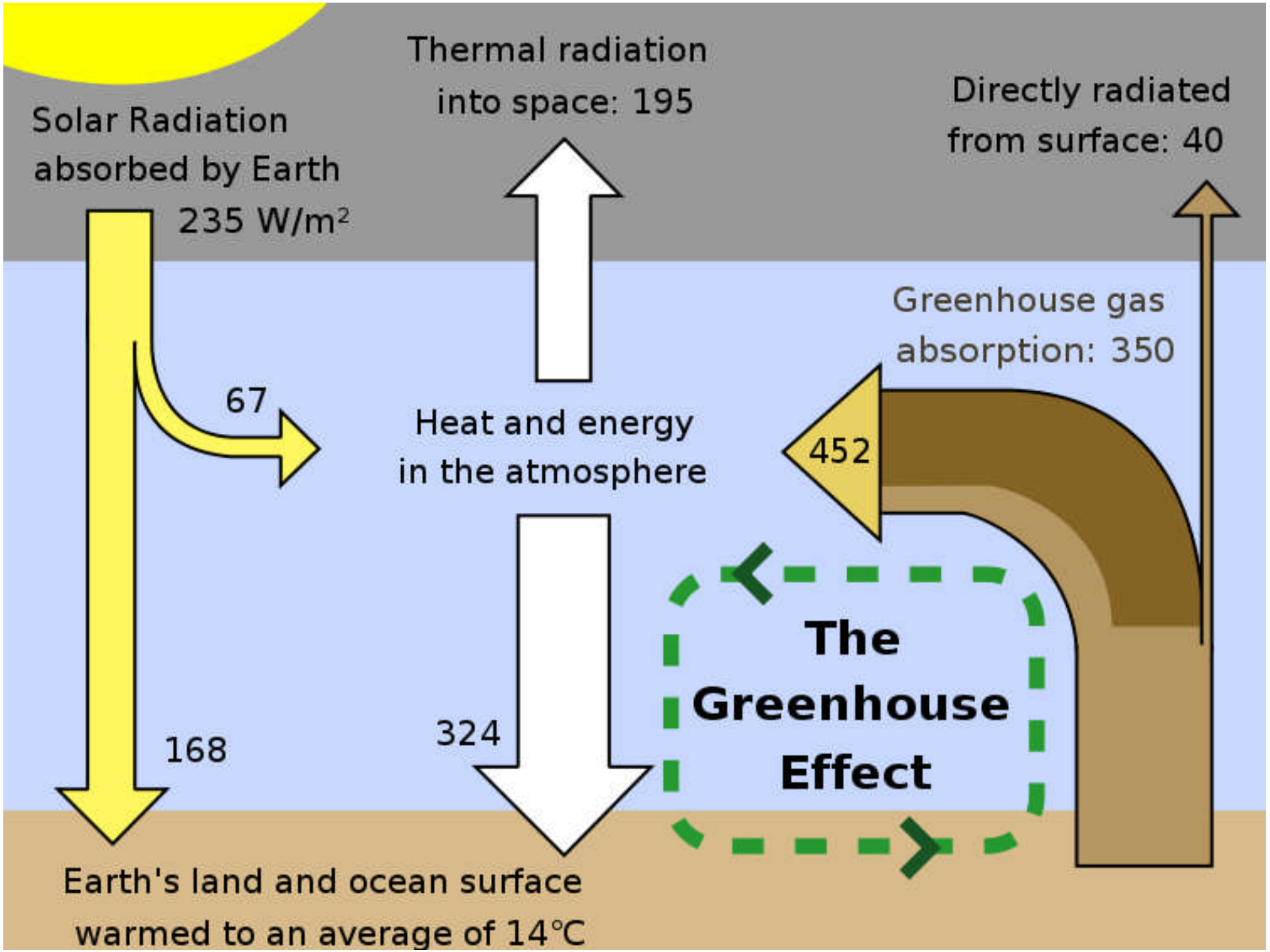
What is biomass?

- **“Biomass is organic materials derived from plants and animals and includes agricultural and forestry residues, municipal solid wastes, industrial wastes, and land and aquatic crops grown solely for energy purposes.”** [1]

[1] *Southern Bioenergy Roadmap*, Pennock C, Doron S, (2009) Executive Summary Endnote 2, published by the Southeastern Agriculture and Forestry Energy Resources Alliance (SAFER) and the Southern Growth Policies Board, www.saferalliance.net. The *Southern Bioenergy Roadmap* promotes the “research, production and distribution of bioenergy” by, among other things, “improving the regulatory environment of the industry” and “mitigating the risk to entrepreneurs” through tax incentives, tax credits, loans and grants. See “The Center for Climate Strategies” at www.climatestrategies.us

Atmospheric Carbon Dioxide Concentrations




Thermal radiation
into space: 195
Directly radiated
from surface: 40
Solar Radiation
absorbed by Earth
235 W/m²
Greenhouse gas
absorption: 350
67
Heat and energy
in the atmosphere
452
The
Greenhouse
Effect
324
168
Earth's land and ocean surface
warmed to an average of 14°C

Burning Biomass to Make So-called Renewable Electricity Accelerates Climate Change

- Burning biomass and trash accelerates the rise in atmospheric CO_2
- Burning to generate renewable electricity
  - Emits highly toxic air pollutants
  - Uses large volumes of water
  - Discharge of heated effluent to our waters
  - Results in deforestation when wood is the fuel

Biomass Plants Have Smokestacks

http://nobiomass.org/images/usplant_650.jpg

Biomass Burning is not Carbon Neutral

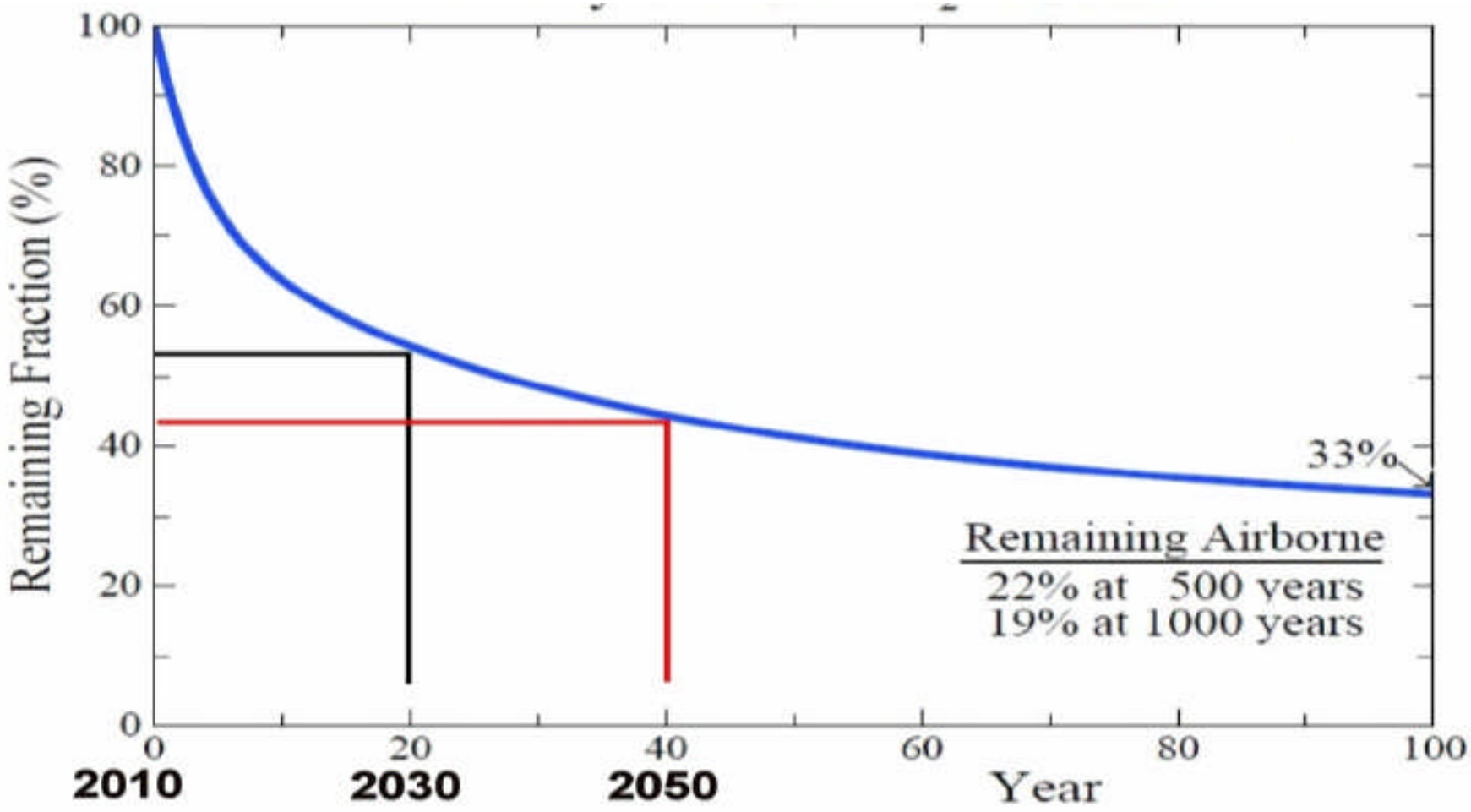
- Burning releases CO_2 in minutes but the CO_2 won't be re-sequestered for centuries.
- Therefore, burning biomass will accelerate climate change not curb it.

CO_2 Remains in the Air for a Very Long Time

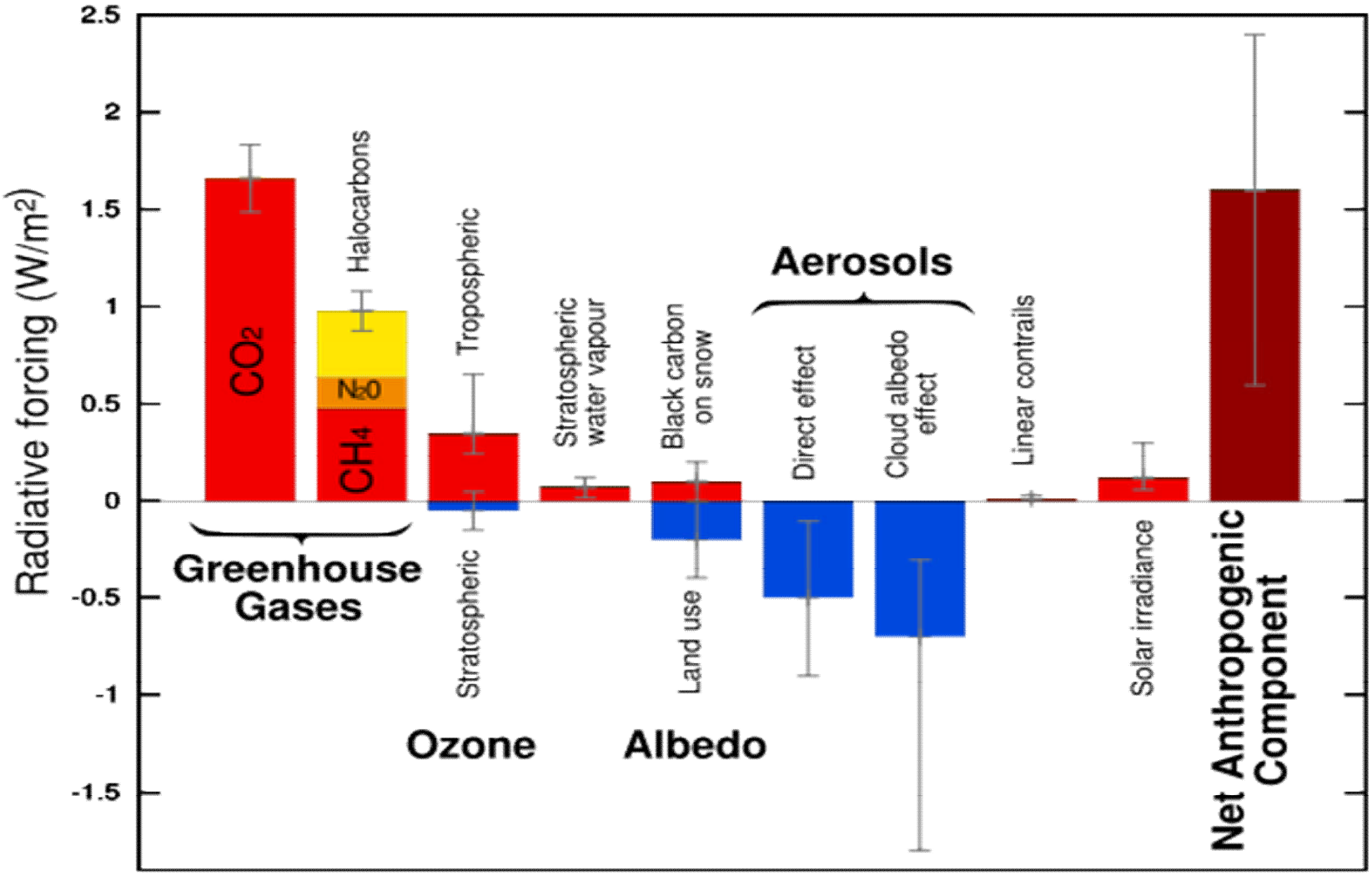
"Indeed, for a given amount of CO_2 released today, about half will be taken up by the oceans and terrestrial vegetation over the next 30 years, a further **30 percent will be removed over a few centuries**, and the remaining **20 percent will** only slowly decay over time such that it will **take many thousands of years** to remove from the atmosphere."

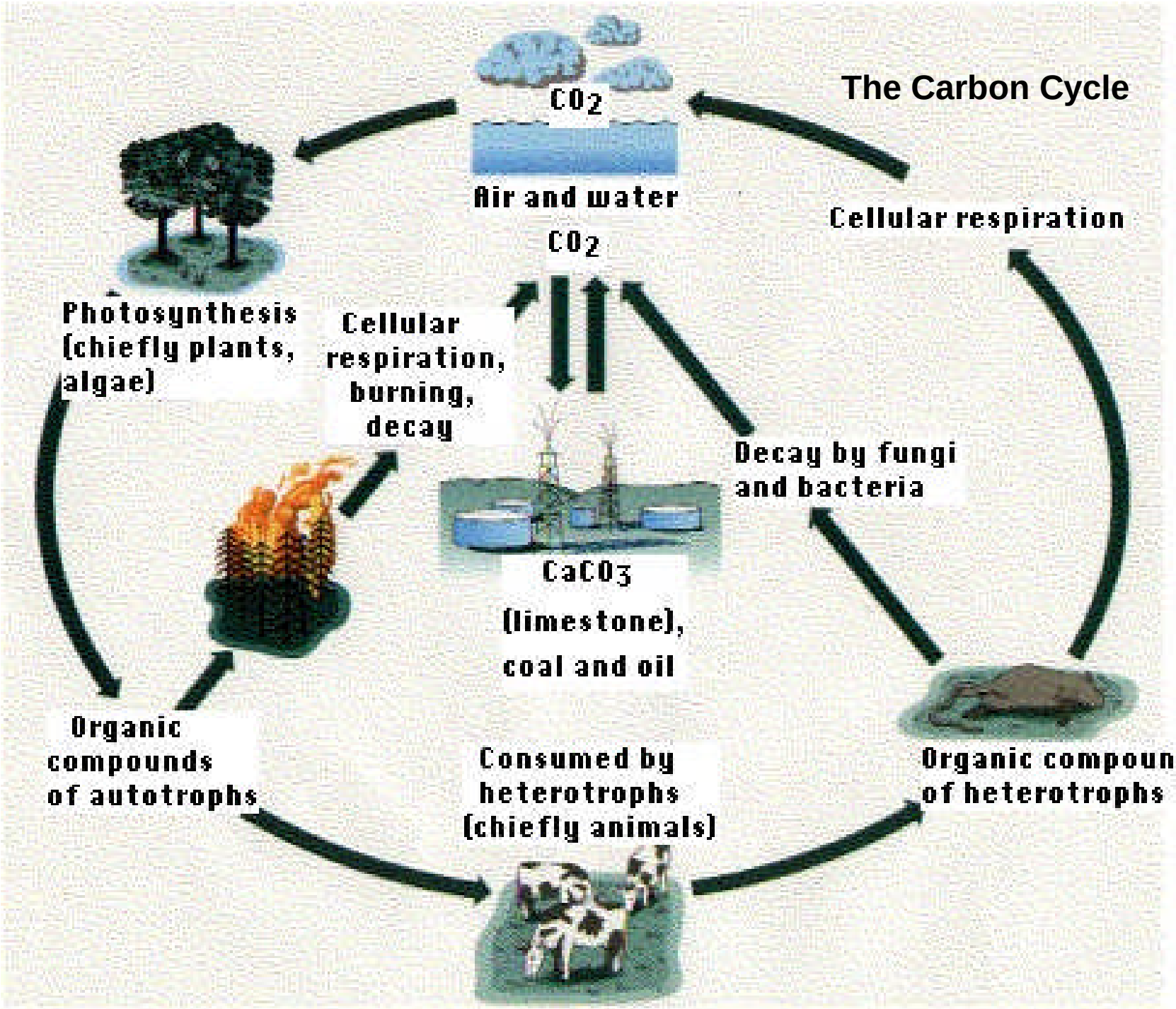
Federal Register Vol. 74, pp. 18886-18899, April 24, 2009

Long-term Carbon Dioxide Residence in the Atmosphere



Radiative Forcing Components




The Carbon Cycle
CO_2
Air and water
CO_2
Cellular respiration
Photosynthesis (chiefly plants, algae)
Cellular respiration, burning, decay
Decay by fungi and bacteria
$CaCO_3$
(limestone), coal and oil
Organic compounds of autotrophs
Consumed by heterotrophs (chiefly animals)
Organic compounds of heterotrophs

The stoichiometric chemical equation for respiration-photosynthesis looks like this: [KIMBALL]

$$C_6H_{12}O_6 + 6O_2, \Delta G \leftrightarrow 6CO_2 + 6H_2O, \Delta G$$

Glucose + oxygen ←→ carbon dioxide + water

(Where $C_6H_{12}O_6$ is glucose, Δ G is energy)

Burning propane and oxygen yields carbon dioxide and water

$$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$$

Likewise, burning wood or paper, (largely the carbohydrate cellulose):

$$CH_2O + O_2 \rightarrow CO_2 + H_2O, \Delta G$$

Wood + oxygen → carbon dioxide + water

Fossil-fuel Carbon Tax Impacts on Land Use

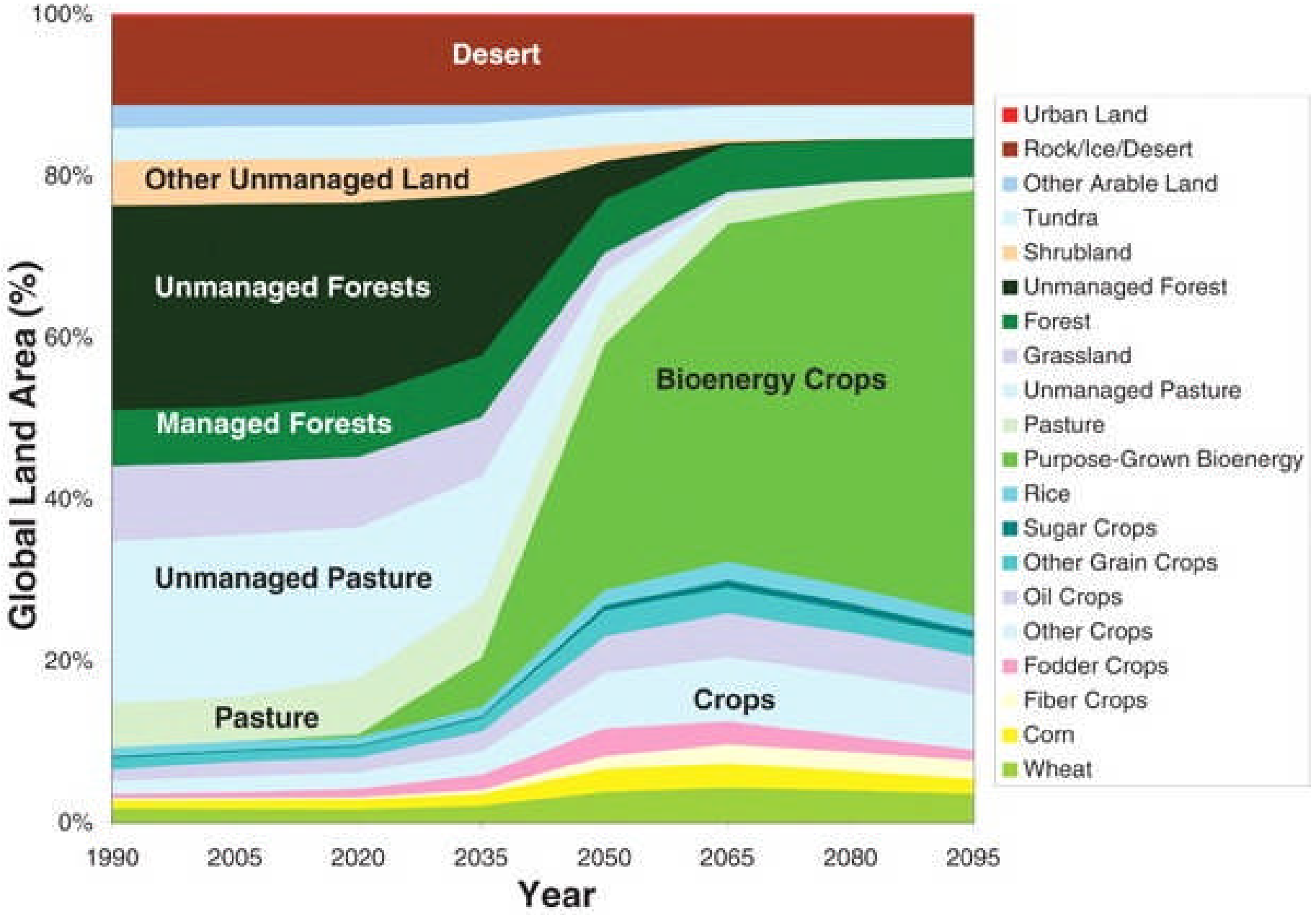


Table B. Relative Annual Carbon Content of Electric Power Plant Fuels

	BTU/ton	% Carbon	kWh/BTU	kWh/year	Tons of fuel	Tons of carbon
Wood	17 million	49	0.000293	4.38E+08	88,235	43,729
Coal	26 million	68	0.000293	4.38E+08	57,692	39,231

Table C. Annual Air Pollution Totals from Poultry Litter Power plant[1]

Pollutant	Air Emissions 2004
Carbon Dioxide	455,006 tons
Carbon Monoxide	258 tons
Sulphur Oxides (SO2)	351 tons
PM10	23 tons
Nitrogen Oxides (NO2)	619 tons

[1] British Environmental Agency, http://maps.environment-agency.gov.uk /wiyby/queryController? topic= pollution&ep=2ndtierquery&lang=_e&layerGroups=1&x=585200.0&y=286800.0&extraClause=AUTHORISATION_ID~'AP0844'&extraClause=YEAR~'2004'

Table E. Annual Energy and Fuel Oil Needed to Replace NC Poultry Litter

	Content %	*Pounds/year (3 million tons litter)*	*BTU/pound (Table 1)*	*BTU/year*	*Fuel oil per pound* [1]	*Fuel oil gallons per year*
N	3.522	211 million	29899	6.32E+12	0.24	50,716,800
P_2O_5	2.971	178 million	3313	5.91E+11	0.054	9,626,040
K_2O	2.343	141 million	2753	3.87E+11	0.042	5,904,360

[1] Gallons of #2 fuel oil (diesel) to produce one pound of nutrient

Table G: Energy Debt of Burning Paper

Fuel	Heat value BTU
185 gallons gasoline[1]	23,125,000
2000 pounds of paper[2]	15,180,000
Energy debt per ton	**7,945,000**

[1] College of Natural Resources at the University of Wisconsin Stevens Point, Energy Conversion and Resource Tables, http://www.uwsp.edu/CNR

[2] *Air Pollution Engineering Manual*, Second Edition, Danielson, United States Environmental Protection Agency, Office of Air Quality Planning and Standards, May 1973

Table H. Energy Savings and Environmental Benefits of Recycling

Reduction of:	Aluminum	Steel	Paper	Glass
Energy Use	95%	60%	50%	20%
Air Pollution	95%	85%	74%	20%
Water Pollution	97%	76%	35%	-
Water Use	-	40%	58%	50%

[1] Source: The Solid Waste Handbook: A Practical Guide, William D. Robinson, Editor, ISBN: 978-0-471-87711-0, March 1986

Table I: Summary of Per Ton Emissions by Management Method

	Pounds of Emissions (Reduction)/Increase Per Ton						
Management Method *	**Climate Change**	**Human Health – Particulates**	**Human Health - Toxics**	**Human Health- Carcinogens**	**Eutrophi-cation**	**Acidifi-cation**	**Ecosystem Toxicity**
Toxic equivalent (e)	**eCO_2**	**ePM2.5**	**eToluene**	**eBenzene**	**eN**	**eSO2**	**e2,4-D**
Recycle/ Compost	(3620)	(4.78)	(1587)	(0.7603)	(1.51)	(15.86)	(3.48)
Landfill	(504)	2.82	275	0.0001	0.10	2.38	0.21
WTE Incineration	(143)	(0.30)	68	0.0019	(0.01)	0.04	0.29
Gasification/ Pyrolysis	(204)	(0.36)	(1)	(0.0000)	(0.05)	(0.93)	0.09

Numbers in parentheses are negative, meaning reduction of harmful impacts.

[1] *Assessment of Materials Management Options for the Massachusetts Solid Waste Master Plan Review, Final Report*, Tellus Institute, Boston MA, Massachusetts Department of Environmental Protection Contract EQEH193, December 2008

Table J: Net Energy Generation Potential Per Ton MSW

Management Method	**Energy Potential** (kWh per ton MSW)
Recycling	2,250
Landfilling	105
WTE Incineration	585
Gasification	660
Pyrolysis	660
Anaerobic Digestion	250

[1] *Assessment of Materials Management Options for the Massachusetts Solid Waste Master Plan Review, Final Report*, Tellus Institute, Boston MA, Massachusetts Department of Environmental Protection Contract EQEH193, December 2008

Table K. Covanta Annual Air Pollution Emissions

AIR POLLUTANT	POUNDS
Carbon dioxide	1,150,480,000
Nitrogen oxides	2,079,040
Sulfur dioxide	323,536
Carbon monoxide	270,392
Hydrochloric acid	123,224
Particulates	36,208
Mercury	1,284.8
Lead	152.4
Chromium	17.52
Cadmium	15.83
Arsenic	2.47
Dioxin/furan	0.039

Table L. Hertford Renewable Energy Emission Rates[1]

Pollutant	Emissions (Tons per year)
Carbon dioxide (CO_2)	
Nitrogen oxides (NO_x)	377.37
Particulates (PM-10)	139.92
Sulfur dioxide (SO_2)	93.98
Volatile organic compounds (VOC)	63.95
Ammonia (NH_4)	858.17
Carbon monoxide at 90-100%	941.03
Carbon monoxide at 60-90%	1127.41
Carbon monoxide at 40-60%	1503.22

[1] NC Division of Air Quality Permit No. 09947R00, Carbon monoxide emissions vary according to the heat input. Higher emission rates per mmBTU are permitted at lower input.

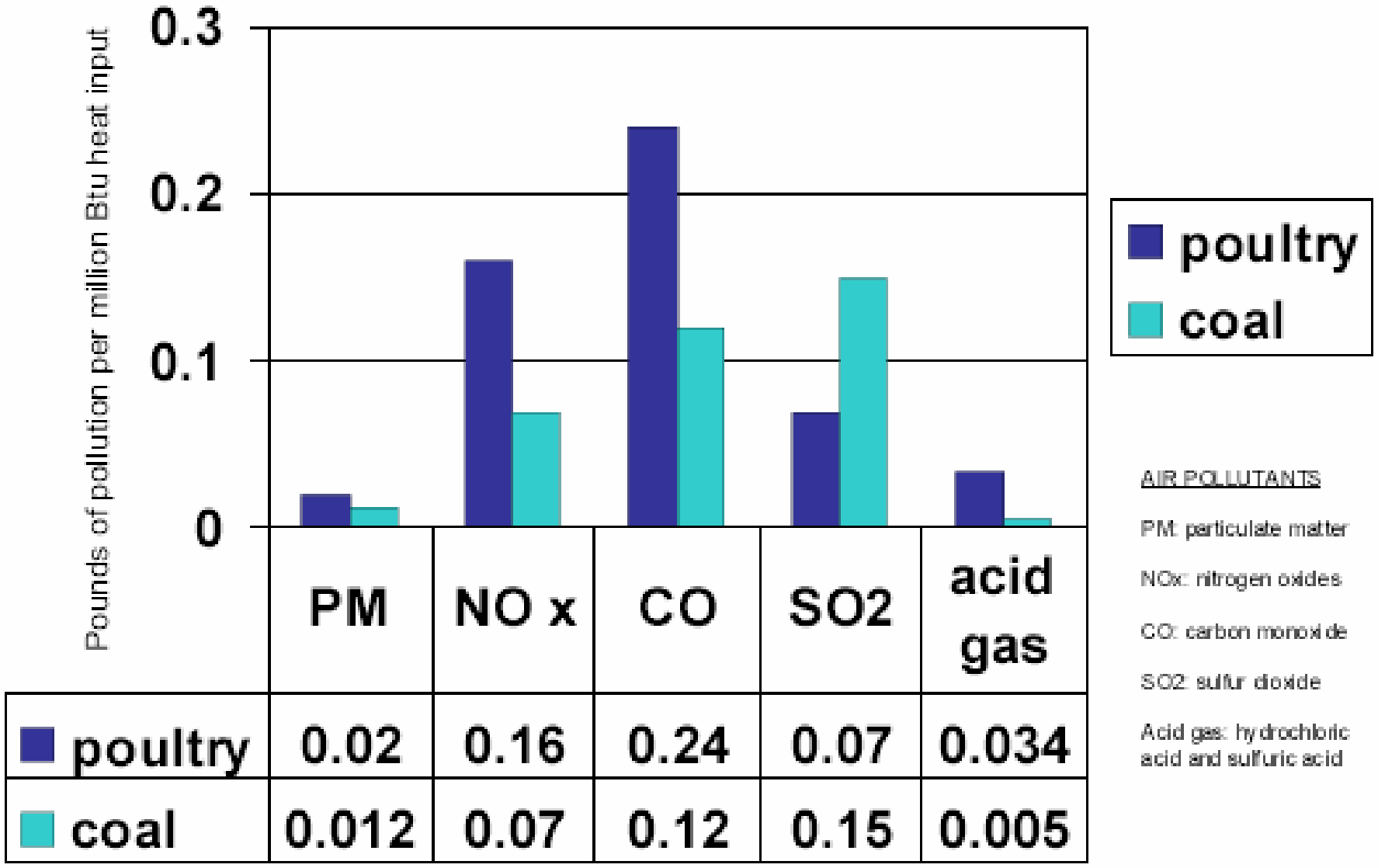

Pounds of pollution per million Btu heat input
0.3
0.2
0.1
0
poultry
coal
PM
NO x
CO
SO2
acid gas
poultry 0.02 0.16 0.24 0.07 0.034
coal 0.012 0.07 0.12 0.15 0.005
AIR POLLUTANTS
PM: particulate matter
NOx: nitrogen oxides
CO: carbon monoxide
SO2: sulfur dioxide
Acid gas: hydrochloric acid and sulfuric acid

Table N. Wiregrass Energy Major Pollutants

Pollutant	Tons per year
Major pollutants (criteria)	
Carbon monoxide	246.8
Nitrogen oxides	246.8
Particulate matter (PM)	135
PM < 10 microns (PM-10)	112.7
PM < 2.5 microns (PM-2.5)	86.3
Sulfur dioxide	246.8
Volatile organic compounds	60.3
Lead	1.03
Hazardous air pollutants-Total	13.9

[1] Emissions data from Air Construction Permit Application, Table 12, "New Facility Emissions Summary," and Form 4.00 "Emission Information," Submitted to GEPD by Golder Associates Inc. for Wiregrass Power, LLC, December 2009, 093-90124

Table O. Wiregrass Energy Hazardous Air Pollutants[1]

Hazardous air pollutant	Pounds per year
Sulfuric acid H_2SO_4	30200
Benzene*	3235
Arsenic	15
Carbon tetrachloride	112
Chlorine	1940
Formaldehyde*	2577
Hydrochloric acid (HCl)	16400
Styrene	260
Trichloroethylene	74
Xylene	62
Vinyl chloride	44

[1] Emissions data from Air Construction Permit Application, Tables 2-2 and 2-3, Submitted to GEPD by Golder Associates Inc. for Wiregrass Power, LLC, December 2009, 093-90124.

Biomass Challenges

- State and federal energy policy is strongly tilted toward the timber and waste industries, resulting in broad definitions of what qualifies as “renewable biomass.”
- Biomass is viewed as “carbon neutral” at the Environmental Protection Agency, in federal energy legislation and in the Kyoto Protocol.
- The science supporting the carbon neutral position is unfounded, but remains largely unchallenged.
- Carbon neutral claims are leading many environmental groups to favor biomass as the preferred substitute for coal.
- The biomass industry is organized with a well-funded public relations campaign and a “green energy” message.
- Global interests are pushing local biomass developments and communities are not participating in the decision-making process.
- State policy makers in the South have not taken a long-range precautionary view of the implications of biomass energy and lack the tools to manage energy and the impacts from global warming.

We Must Reduce CO_2 Now

- " Sizable early cuts in emissions would significantly reduce the pace and the overall amount of climate change. Earlier cuts on emissions would have a greater effect in reducing climate change than comparable emissions made later"
  - President Obama's White House Report, "Global Climate Change Impacts" Executive Summary, p. 9, June 2009.

Blue Ridge Environmental Defense League

Questions from the press for:

William Blackley, Citizens for A Clean Healthy Environment

William Frederick, Sampson County Citizens for a Safe Environment

Karen Noll, Wiregrass Activists for Clean Energy

Louis Zeller, Blue Ridge Environmental Defense League