THE BLESSINGS OF BIOMASS; POWERING THE BIOMASS WHEEL GREENING THE AMERICAS

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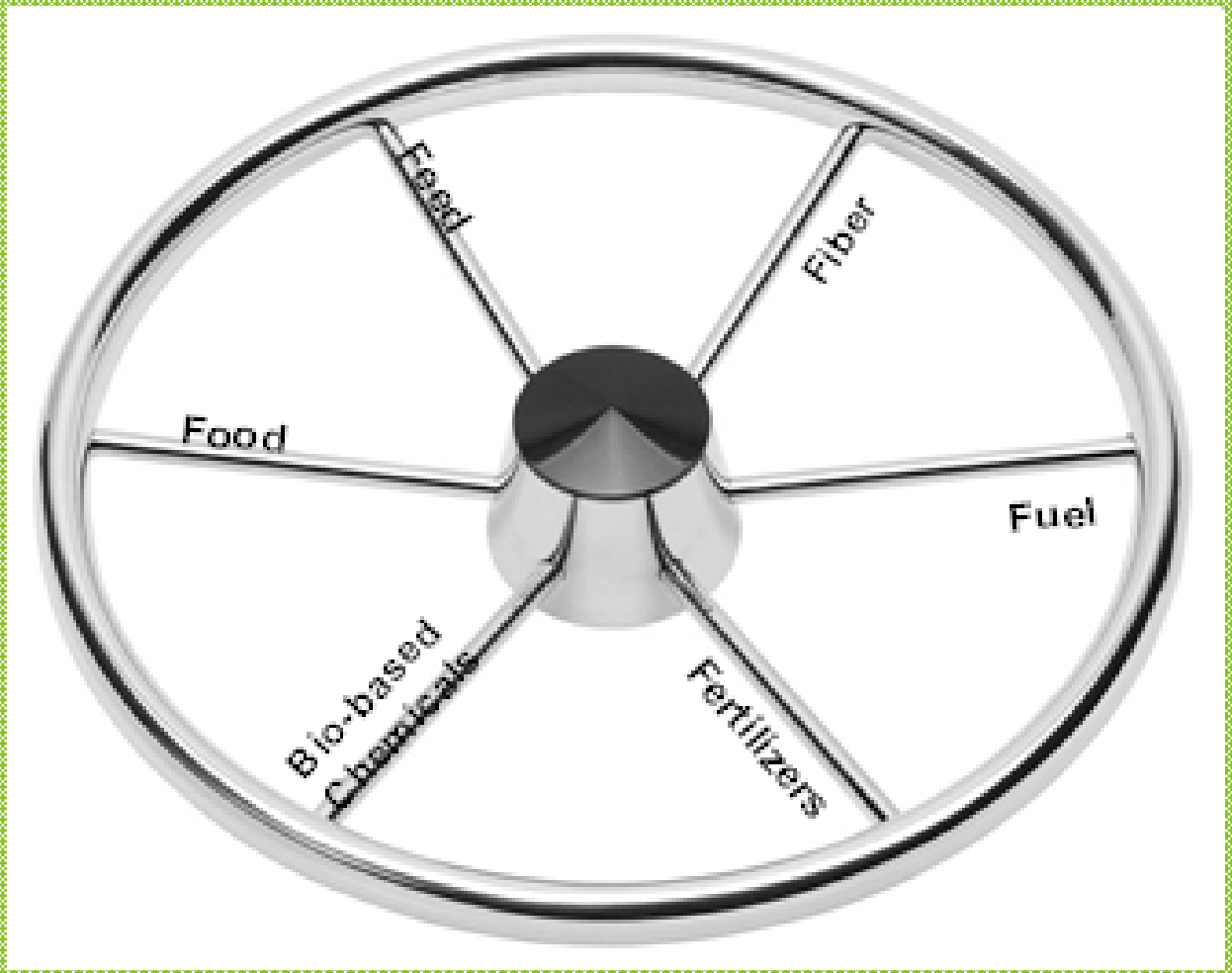
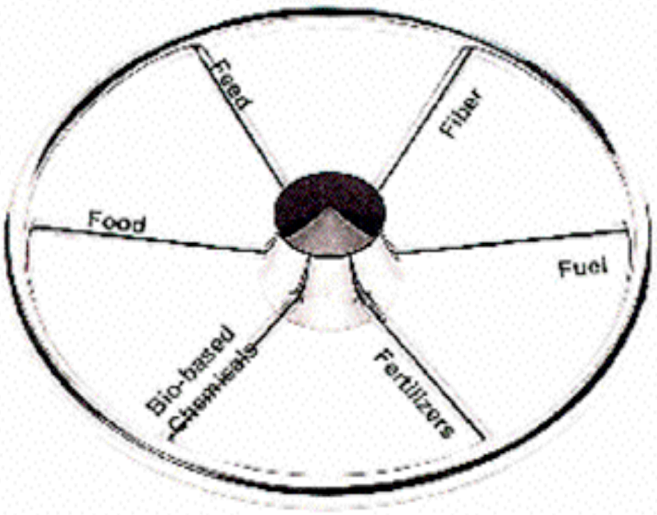
THE MANY USES OF BIOMASS



The "Six F's":

- **Food**
- **Feed**
- **Fiber**
- **Fuels**
- **Fertilizers**
- **Feedstocks for chemicals**

The Biomass Wheel to the Rescue



The advance of the wheel is supported by all the renewable technologies (solar, wind, geothermal, hydro/water power, and renewable hydrogen) and the "spokes" below.

Biomass's 6Fs— Food, Feed, Fiber, Fuel, Fertilizers, and Feedstocks for chemicals— comprise one of the biggest engines driving the world's economies. Add fossil transportation fuels and the engines they power, and we have the most powerful economic machine in the world, and it begs redirection. This will only be accomplished by collaboration among the "spokes."

Biomass is ubiquitous, particularly in the lower latitudes. It's everywhere: in the soils, in water, and even in the deserts. Biomass is egalitarian. Anyone with the right set of tools and access to the land or the water can share in the value added benefits of a good business and aspire to ownership in that business. Biomass offers great opportunities to deal with poverty throughout the world. These are the challenges for the developed nations. The success of this resource depends on the assurance that all actions include a focus on sustainability of biomass and the resources used to grow it.

Two additional major spokes are: Hybrid Electric Plug-ins with Multi fuel Engines (32); and Project Development and Financing (35).

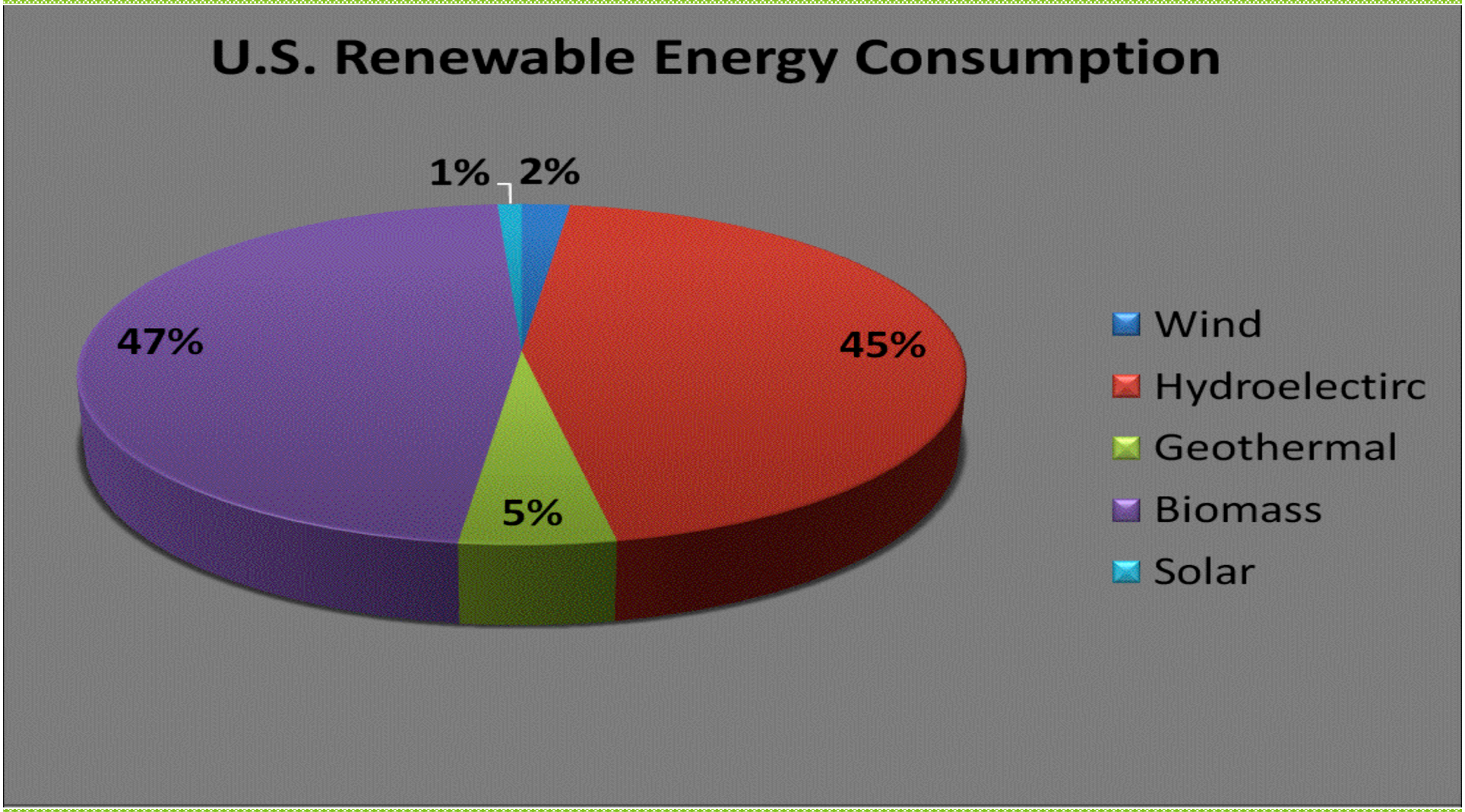
The hub of the "wheel" is Energy Efficiency and Sustainable Energy and National Security. The "spokes" are:

1. 25 x '25 RE goals for agriculture sector
2. Agrotourism and ecotourism
3. Algae for food, feed and fuel
4. Anaerobic digesters
5. Backyard and schoolyard gardens
6. Biobased products (feedstocks for chemicals)
7. Biochar and mineralized compost
8. Biodiesel
9. Biofertilizers including microbes and enzymes
10. Biofuels and biobased products in marine, locomotive, and aviation operations
11. Biofuel vehicles, engines, and turbines
12. Bioheat and wood pellets for heat and co-firing
13. Biomass cofiring & cogasification with coal
14. Biopower cogeneration, bulk power storage, and back up for wind and solar
15. Blender pumps for biofuels and other alternative fuels
16. Climate change
17. Communications, bloggers, wikis, websites, etc.
18. Conservation and sustainability for all biorefineries
19. Desalinization, soil, and water
20. Starch and sugar based ethanol
21. Farmers markets and community-based agriculture
22. Fast-growing trees
23. Feed
24. Fertilizers
25. Fiber and construction materials
26. Food and beverage processing industries
27. Forests , forest gardens, and woodlots
28. Future farmers of America and the 4H program
29. Grass-fed beef and other ruminants
30. Harvesting, transporting, and storage of cellulosic and woody biomass
31. Hydrocarbons from biomass
32. Hybrid electric plug-ins with multi-fuel engines
33. Organic farming
34. Planet's carrying capacity
35. Project Development and Financing
36. Reclamation following mining operations
37. Recycled energy
38. Riparian buffer zones
39. Salt-tolerant crops and trees
40. Second generation biofuels from biomass
41. Selected and trained prisoners in forests
42. Supportive oil, coal, and gas companies
43. The people factor
44. University and vocational education
45. Waste feedstocks and organic residues
46. Water and heat recovery
47. Water resources, low-head and in-stream hydro
48. Watershed enhancement
49. Wetland enhancement
50. Wildlife diversification and habitat
51. Wind, Solar and Geothermal support systems
52. Window boxes, greenhouses, and rooftop gardens

BIOMASS IS EVERYWHERE

It is ubiquitous, egalitarian and can be used by anyone who can learn important basics and obtain the right set of tools.

Think Biomass throughout the world



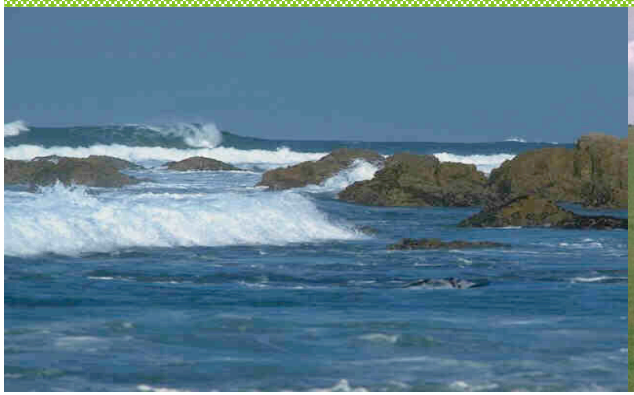
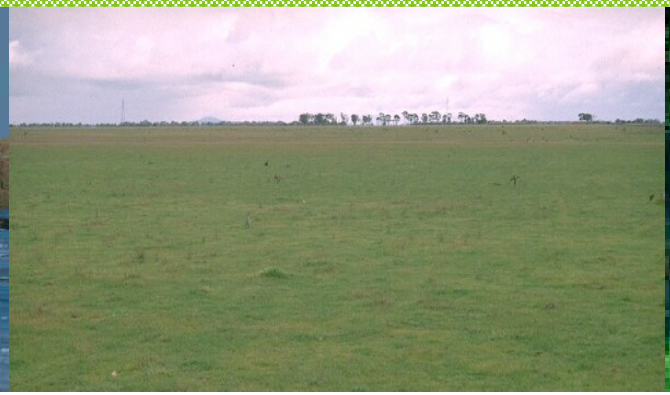
About 80% World Wide, Much of Which Goes For Heating and Cooking

CARBON SINKS

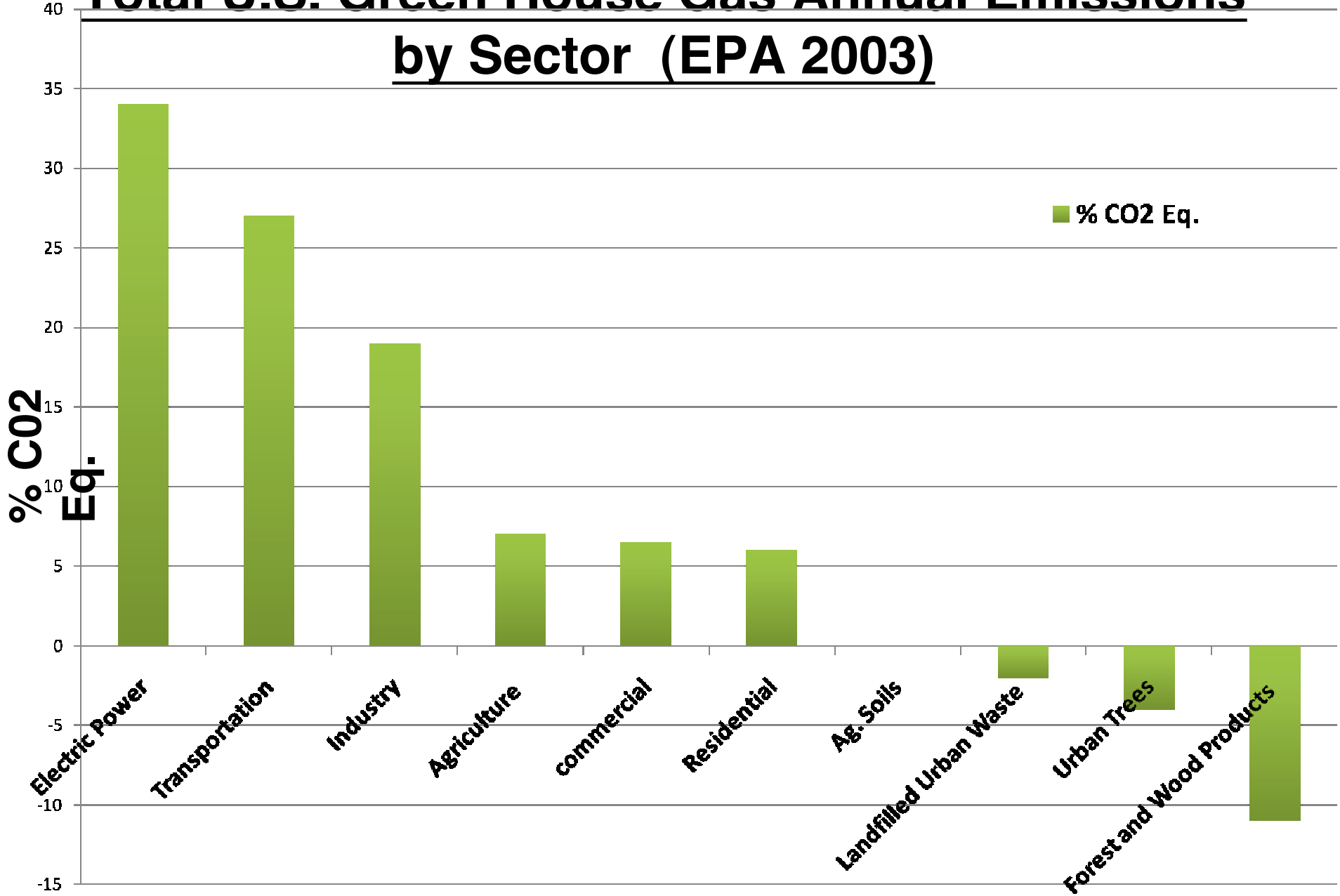
The world's three major carbon sinks include:

- **Trees and plants**
- **Soil**
- **Ocean**

Biomass plays a major role in all three


Total U.S. Green House Gas Annual Emissions by Sector (EPA 2003)



All biomass industries are inseparable.

They are all dependant on optimized land use, vitalized soil and adequate water resources.

Range of Biomass applications:

- Backyard, school yard, and roof top gardens;
- Grass-fed cattle and free range chickens;
- Municipal waste for compost and/or energy;
- Landfill gas and animal waste to biogas and power;
- Fuel pellets, forest residues, and other biomass waste for combined heat and power generation;

More Biomass Applications:

- Feed grains, vegetable oils and waste oils/greases to biofuels; cellulosic biomass and algae to biofuels including conventional gasoline and diesel made from biomass;
- A wide range of bio-based products from car parts to pharmaceuticals- essentially everything in between that isn't glass or metal.
- A total of 52 spokes in the Biomass Wheel -- all needing sustainable biomass feedstocks.

Promote the growth of biomass with:

- Fast-growing trees
- Mineralized compost
- Biochar
- Biobased fertilizers
- Optimized land use and sustainability
- Every plot of land put to good use in benefiting all living things
- End deforestation and speed reforestation.

More Land For Biomass

Assist in recovering despoiled lands and growing biomass in some form on misused and underutilized lands to dispel forever the indirect land use issue. We have to address Lester Browns warning – "Could Food Shortages Bring Down Civilization?" And, I could add water!

Biomass Leading The Way

- Community Development, “New Wealth Industries” and quality jobs
- Leveling the playing field
- Quantifying the externalities
- Giving investors long-term options
- Giving Consumers enlightened choices

New Opportunities for Biomass

- Work collaboratively with EPA, other governmental agencies and states on EPA's determination to limit greenhouse gas emissions by reducing full fuel cycle carbon footprints and demonstrating progress .
- In the transportation sector, air toxic

These actions are essential in gaining public support

Biomass in Service to the Planet

Biomass, in all forms, is uniquely positioned to address several of the world's greatest challenges

- Advancing national, energy homeland, economic, and environmental security – including reductions in greenhouse gas emissions.
- Slowing the depletion of natural resources
- Ameliorating religious conflicts by using biomass to visibly help preserve and protect God's creation

Community Based Solutions to Planetary Sustainability Needs

- Appreciate the power of biomass and it's "Home-Grown" and "Bottom-Up" approach to new industries, quality jobs, reducing poverty, environmental enhancement and greenhouse gas stabilization.
- Greater collaboration among all the Spokes in the Biomass Wheel
- The "Greening of the Americas"
- Aggressively promote LAC CORE (Latin America and Caribbean Council On Renewable Energy),

Make Biomass CLEAR:

- Trees and plants are attractive, efficient and low-cost solar collectors
- All biomass industries, working collaboratively and wisely, are carbon-negative and are becoming more so with new research and development
- Biomass industries are the best bet in creating value-added, home-grown jobs and industries
- Biomass industries invite a broad and rapidly growing spectrum of engineers, scientists and technicians

We need to communicate to all citizens of the planet that biomass is essential in improving their quality of life and in developing and sustaining their nation.

Make Biomass EASY:

- Make technology, resources and expertise more accessible to local communities.
- Mobilize the private sector by encouraging needed investment
- Engage educational institutions around the world to support biomass
- Minimize bureaucratic delays and speed the allocation of government funds for biomass industries
- Greatly simplify and standardize the definition of Biomass worldwide

Make Biomass POPULAR:

- Utilize influential support at all levels of society
- Use the media and the internet more effectively
- Engage youth and communities in the full range of biomass industries
- Educate, Educate, Educate

Making biomass goals
CLEAR, EASY and POPULAR
will spur the advance of
the full range of biomass
industries from window
boxes to the most
sophisticated biorefineries
throughout the world.
Team work is essential.

Action Needed

- Experiential Education involving Biomass from pre-school to the PhD level with mathematics as the foundation
- Collaboration among all spokes of the Biomass Wheel
- Fully support the goals of the International Renewable Energy Agency, the World Biomass Association, LAC CORE, and the Biomass Coordinating Council.
- Greening the America's with biomass leading the way.

Sustainable biomass goes hand in hand with sustainable societies .

Important Next Steps

- Recognize that 2010 is the "Year of Biomass".
- Appreciate that Sustainable New Wealth Industries will play a major role in vitalizing the economy and protecting the environment in President Obama's Partnership for the Americas with Biomass leading the way.
- Participate in ACORE's RETECH 2010 and support the Biomass Pavilion

Sustainable and Healthy Biomass is an essential part of a Sustainable Society supported by common sense and cost-effective government programs

Ask what you should do for yourself and your country!

Take action identified in the "Blessings of Biomass": www.bioenergywiki.org.

Investigate ACORE and the Biomass Coordinating Council: www.acore.org.

Participate in the "Greening of the Americas" and LAC CORE as a beginning – then the Hemisphere. www. lac-core.org

Thank you on behalf of our planet!