

## Saving the Planet: What is the Role of Biomass?

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Scientists predict continuing increases in average global temperatures. Consequences include sea level rise, shifts in agriculture, and severe stress on many species, including our own. Can biomass be used to mitigate climate change? It is proposed in this essay that the answer is “yes, but”. Yes, trees and other plants will continue to serve as “the lungs of the planet,” converting CO<sub>2</sub> to O<sub>2</sub> by photosynthesis. But saving the world will not be easy. Biomass scientists will not be able to solve the problems alone. Rather, mitigation of problems related to climate change will require parallel efforts. We will need to get energy also from the sun, from wind, from water, from improvements in efficiency, and from societies learning to live peaceably, while showing restraint regarding jet travel.

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### Climate Change

The focus of the journal *BioResources* is on the science of plant-based materials and how those materials and related chemicals can be used to address a wide variety of needs. So what about saving the planet? What about using biomass to slow down or reverse climate change?

As an editor, I repeatedly get reminded that the progress of science requires competition between different ideas, different theories, and the development of evidence to support those theories. An increasing body of evidence is pointing to human-produced greenhouse gases, including carbon dioxide and methane, as primary causes of progressive increases in the average temperature of the Earth’s surface (Romm 2018; Frame *et al.* 2019). The predicted long-term consequences include accelerated sea-level rise, extinction of many species, and disruption of agriculture. In response to predicted consequences of climate change, it might seem reasonable for different branches of science to be competing with each other to present prospective solutions. For example, it has been proposed to replace a substantial fraction of fossil fuels, as an energy source, by burning biomass (Tursi 2019). The argument has been made that such practices can be carried out in a sustainable manner (Szulecka 2019). Trees used as fuel can regrow, assuming that a healthy forest system is maintained.

Imagine, if you will, a hypothetical competition in which other branches of science and technology compete against biomass scientists for leadership in a hypothetical overarching project to deal with climate change. Imagine the arguments that advocates of some of the different “teams” would use to convince the rest of us that they should be given the lead role in this most critical challenge that is facing us all.

- **Solar energy:** Tap into the essentially infinite energy coming directly from the sun, bypassing the need to burn fossil fuels.

- **Wind:** Use the electrical grid wisely to make use of a highly reliable and simple-to-collect energy source.
- **Hydro-electric:** Years of experience have shown hydro power to be highly reliable; and the lakes behind the dams can provide recreational benefits.
- **Nuclear:** Huge amounts of energy can be produced with only minor production of CO<sub>2</sub>.
- **Give up jet transportation:** Now that the world is connected with electronic media and high-definition graphics, who really needs to travel? Stopping jet travel might be the quickest single measure to significantly cut CO<sub>2</sub> generation.
- **Efficiency:** Look around and you can see lots of examples. LED lightbulbs being installed. Hybrid and electric cars. Advances in electronics that save energy. Even improvements in the efficient use of energy within the paper industry.
- **CO<sub>2</sub> capture technology:** I'll believe this item only when I see firm evidence of its success. For the time being, I prefer trees and other plants to serve this role.
- **World peace:** Huge amounts of fossil fuel are being used every day by peacetime navies, air forces, and armies. Environmental consequences of war are far worse.

### A Contrarian View

I do not want to play the hypothetical game, as outlined above. I do not regard biomass alone as a prospective salvation of the planet. Think what it would really mean if humans attempted to cut trees at such a rate as to replace fossil fuels. Forests in such places as Canada, Russia, Brazil, the Congo, and Indonesia would become harvested at greatly accelerated rates. Though wood-fueled automobiles existed in the distant past, it is not clear that they are the best idea in the future. Smoke from wood-burning fires used to darken cities and the build-up of creosote from wood fires caused a lot of chimney fires in the era before use of coal, oil, and natural gas became prominent for home heating.

My proposed path forward is to select *all of the bullet points* in the list above, with the possible exception of nuclear energy, due to its high danger and its susceptibility for misuse. Saving the planet will not be easy. This is a task that will take many hands and many minds working together. And maybe some healthy competition too. Rather than competing *against* other scientific and technological disciplines, I envision biomass scientists and others working on parallel contributing efforts. This is a grand project that scientists the world around can unite in, since all of us in this world share a common goal.

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