**Statement on forest bioenergy emissions**

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Most policy makers know that it is critical to halt the release of carbon dioxide and other heat trapping gases into the atmosphere in order to turn around the accelerating warming of the planet and the multiple associated adverse climate, ocean acidification and sea level consequences that accompany it. The focus is understandably on fossil fuels that are the largest source of these emissions. People seem eager to replace oil, coal and natural gas with “renewable energy.” But few recognize that not all renewable energy is sustainable or low carbon.

When discussing energy, most people use the terms “renewable,” “sustainable and ”low carbon” interchangeably. The vague term “green energy” has no precise meaning at all. In its special report on renewable energy and climate change, the Intergovernmental Panel on Climate Change (IPCC) recognized the difference among the energy that is renewable, that which is sustainable and that which is low carbon. Renewable energy refers to natural flows of energy that are replaced within a short period of time of their use. Sustainable means that use of the resource does not diminish the source. Low carbon requires that the source release little or no carbon dioxide or other heat trapping gases. Solar and wind and some forms of ocean generated energy meet all three of these criteria. They are natural sources of energy that are not diminished in any way by our use of them, and they do not release carbon dioxide or other heat trapping gases. Hydro and geothermal energy can be utilized at a greater rate than natural flows can replace them. Some forms of hydro power release heat trapping methane. Large-scale bioenergy production from forests diminishes the carbon stock for decades to centuries and is therefore unsustainable, and it is not low carbon.

Burning trees for electricity generation immediately releases the carbon they contain into the atmosphere, and it takes decades to centuries for it to be removed by natural processes. Forests and other terrestrial ecosystems currently remove from the atmospheric stock an amount of CO2 equal to about 30% of annual emissions from all sources. Oceans remove an amount equal to an additional 25% of emissions. Hence the annual net increase of carbon dioxide in the atmosphere is only 45% of what is released each year. Carbon neutrality will occur only when all emissions are reduced to a level that equals the rate of removal from the atmosphere by land and ocean processes. Current concentrations have already altered the climate system sufficiently to create weather events that are threatening agriculture, ocean fisheries and the lives of people. It has set in motion irreversible sea level rise and the loss of Arctic sea ice and permafrost thawing that is releasing more heat trapping gases that may create irreversible future climate changes.

Reducing greenhouse gas emissions over the next decades is about keeping carbon stored in the forests and soils. It is incorrect to claim that regrowing forests will pay back the carbon debt because forests are decades to centuries old when they are cut, and it will take at least that much time to gain back the carbon they lost to the atmosphere when burned for energy. Furthermore, there is the even slower process of restoring the loss of centuries old soil organic carbon from harvest disturbance. Young trees grow faster than old trees, but it is the storage of carbon by forests and soils in the near term that is important for controlling the concentrations of CO2 in the atmosphere, and hence global warming.  The carbon is either in the atmosphere or it is in the forests and soils or in the ocean. Forests are a major solution to the carbon storage question.

It is essential that we rapidly reduce our emissions from both fossil and bioenergy. In addition, an important way to reduce climate risks is to protect existing forest stocks and restore lost and degraded forests and soils to increase CO2 storage and lower the concentration of atmospheric carbon. Forest bioenergy undermines one of the most effective tools that we have to reduce atmospheric concentrations.

Arguments that regrowing forests will pay back the carbon debt over 100 years and be carbon neutral are incorrect and irrelevant; the most harmful effects of rapid global climate change will be “locked in” within that time frame. Slowly replacing trees that have been burned for fuel will not refreeze glaciers and ice sheets, nor will it lower the rise in sea level or reduce the acidity of the oceans.

Even were it true, carbon neutrality through regrowth is insufficient and a moot point. Harvested trees will not return to their preharvest state soon enough to remove the carbon before the climate system is irreversibly damaged. Recent research demonstrates that the peak temperature reached before concentrations of carbon dioxide stabilizes remain for a thousand years or more. This means that carbon emitted to the atmosphere now commits the next 40 generations to whatever climate we leave them. It is irreversible on any meaningful time frame.

The IPCC Fifth Assessment Report after evaluating many research articles found that,

“The combustion of biomass generates gross GHG emissions roughly equivalent to the combustion of fossil fuels. If bioenergy production is to generate a net reduction in emissions, it must do so by offsetting those emissions through increased net carbon uptake of biota and soils.”

The report further noted, “…bioenergy systems have often been assessed under the assumption that the CO2 emitted from biomass combustion is climate neutral because the carbon that was previously sequestered from the atmosphere will be re-sequestered if the bioenergy system is managed sustainably. The shortcomings of this assumption have been extensively discussed. …in the specific case of existing forests that may continue to grow if not used for bioenergy, some studies … show that forest bioenergy systems can temporarily have higher cumulative CO2 emissions than a fossil reference system (for a time period ranging from a few decades up to several centuries.”

Here is a summary of points about forest bioenergy for electricity generation.

1. When forest bioenergy is used to generate electricity from the heat of combustion, the efficiency is relatively low. Wood fueled electricity generation typically releases 50% more carbon dioxide than does coal per unit of electricity.
2. On average only about one-quarter of one percent of solar energy is converted into electrical energy by burning wood. Solar photovoltaic panels are about 20% efficient in converting the energy of sunlight into electricity with no emissions at all. Hence, burning wood to produce electricity requires about 80 times the area required by solar panels to produce the same amount of electricity on a sustained basis. It takes an enormous forest area to keep even a small wood burning power plant functioning over time.
3. Wood burning also releases more particulate matter than coal and concern that it causes increased asthma and other respiratory diseases has lead the American Lung Association to recommend that wood not be used for commercial scale heating or electricity production.
4. Burning wood to make electricity requires very large subsidies to make it economically viable. The United Kingdom currently spends over one billion dollars annually to import wood pellets from the United States to replace coal for one-half of a single power station. The state of Maine is considering providing subsidies of $50 million annually to support current bioenergy electric power facilities.

Despite these scientific and economic facts about forest bioenergy, national and state governments continue to claim that bioenergy is “carbon neutral” and a solution to climate change, when in fact, it is making the problem worse.

Oregon should let the science speak on forests and bioenergy as it did in setting in motion the regulation of chemicals that deplete the stratospheric ozone layer in the 1970s. That action has saved millions from devastating skin cancer and agricultural losses. All carbon and related emissions from bioenergy need to be reported in a transparent manner and reflect the actual workings of the atmosphere and forests. Accounting tricks will not fool the atmosphere nor alter the course of a rapidly changing climate.

Oregon can pioneer ways to pay for the many ecosystem services supplied by forests. In addition to valuable timber, standing forests provide carbon storage, water quality and flood control, wildlife protection and recreation. Maintaining and expanding forests to meet both non-extractive and extractive resources and benefits to society should be a top priority of a great forest state like Oregon.