
Greenhouse gas (GHG) and the natural carbon cycle

One of the difficulties in auditing greenhouse gases is that the most common GHG other than water vapor is carbon dioxide (CO₂), and this is in the atmosphere both as a result of our burning fossil fuel and as part of the natural carbon cycle. Without some CO₂ in the atmosphere, the earth would be virtually uninhabitable because it would be so cold. It is all very much a balance. Too much CO₂ and we get hot, too little and we get cold.

The assumption in classifying CO₂ from burning fossil fuel as “undesirable” is that the natural carbon cycle provides just the right amount of CO₂ to make us comfortable. You can, of course, challenge this assumption. Maybe it would be better if the earth were a little warmer or a little cooler. In the past, the natural carbon cycle didn’t necessarily get it “right”. During the ice ages the CO₂ content of the atmosphere was low, and although not the main reason for the cooling, the lack of CO₂ didn’t help. Similarly, throughout most of the Mesozoic era, the CO₂ content of the atmosphere was high; the earth was tropical and there were no icecaps anywhere. The dinosaurs liked this, but it’s unlikely we would have, otherwise evolution would not have waited until the Mesozoic was over before seriously thinking about warm-blooded mammals.

If, for the sake of argument, we take the CO₂ of the atmosphere just before the industrial era to be “right”, then the problem in doing a CO₂ audit comes down to distinguishing the CO₂ that would be there anyway, from the CO₂ that we have added as a result of industrial activities.

The natural carbon cycle is essentially the process of absorption of CO₂ by plants (by animals does happen but is extremely rare) during photosynthesis while the plant is alive, and its return to the atmosphere when it dies. This is not the only cycle, but it is by far the most important. CO₂ can be released by volcanoes for example, and it is absorbed back into the earth when carbonate rocks (chalk and limestone) are dragged down into the mantle by subducting tectonic plates, but it takes a large volcano erupting for a long time—much larger and much longer than humans have ever experienced—to make a permanent change to the CO₂ content of the atmosphere.

The natural carbon cycle can be completed in a short time—less than a year—or a long time. An example of a very long time is the release of gas by microbes feeding on the organic matter in shale. Although we don’t have coal on Gabriola, organic material as old as coal—70+ million years—is what makes some of the shale here black. Unseen modern microbes are feeding on this organic-fossil carbon and putting CO₂ into our atmosphere as a result.

In conducting [our audit](#) of GHG emissions from Gabriola, we made what we felt was a fair assumption that all “natural” CO₂ of whatever age, and be it from the burning or rotting of wood, plants, detritus in the soil, or shells, was not a serious contributor to GHG emissions when the complete natural cycle was considered. Some critics will of course argue that the re-growth of forest on the island is contributing to reducing GHG, but this ignores the past contribution made by logging. If you want to include re-forestation in the equation, you also have to include de-forestation, and if there is no loss of forestry land, the net effect is zero. Loss of forestry land to development does of course make a contribution because the natural cycle is interrupted, but this is not an on-going contribution and in the case of Gabriola the area of land involved is generally small.

Carbon stored in peat can have a very long natural cycle—thousands of years—which makes it a borderline case. Is peat a fossil fuel? You can make the case either way, but in my view it

probably does come close to being so and GHG emissions from digging or disturbing peat deserve auditing.

Some people also want to include in the GHG accounting the GHGs other than CO₂ that are emitted when wood is burnt to heat a home; however, this ignores the fact that in our part of the world, forest fires are, or were until recently, perfectly natural. If you want to include GHGs other than CO₂ that are emitted in heating a home by burning wood, you also should give credit for the suppression of wildfires.

Anyone familiar with financial auditing however might spot a flaw in all of this. Our methodology assumes that all such CO₂ emitted on Gabriola will ultimately be re-absorbed by trees and plants growing on the island. Strictly speaking, anyone growing trees off island for firewood to be used on island should receive a CO₂ “credit” because their activities are leading to an overall reduction in CO₂ emissions from the particular land they are using to grow the trees. To balance that CO₂ credit, we should add to Gabriola’s GHG emission the CO₂ when that is burnt here because that CO₂ is not going to be re-absorbed by trees growing on the island. There is still a balanced cycle as far as the atmosphere is concerned, but there is a +/- split as a result of auditing Gabriola separately. The converse also applies of course should it turn out that Gabriola is a net exporter of wood.

The bigger question that applies to disturbing the “natural carbon cycle” is ultimately not, is it right or wrong? It is, given that there will be consequences, do we want to?

Since humans are animals, one could reasonably argue that the burning of fossil fuel is also “natural”. The consequences of returning fossil carbon to the atmosphere however will eventually be the creation of a world quite different from the one we know. That there will be life in such a world is without any doubt—there has been in the past and there is absolutely no reason to suppose that there won’t be in the future. The question is, what place will humans have in it? And is that what we want?

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