The Direction of US Forest Carbon Offset Markets and their Potential as a Long-term Climate Solution

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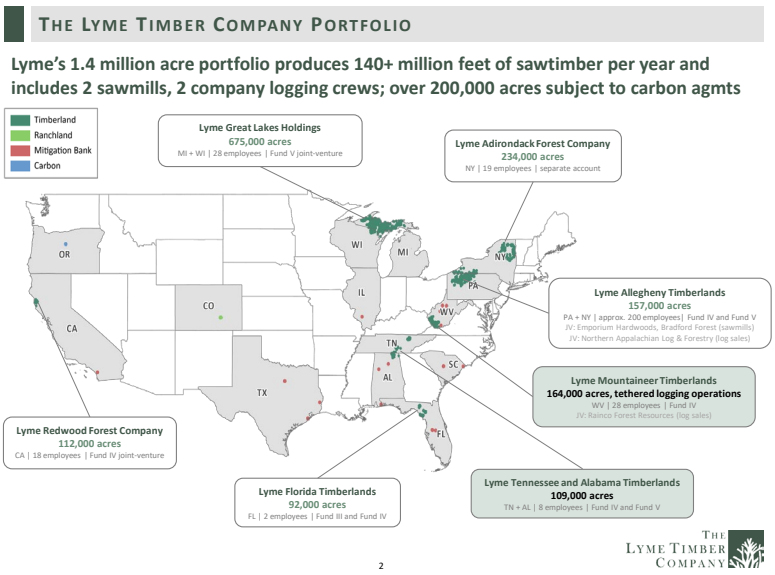
Address to World Bioeconomy Forum
September 8, 2022

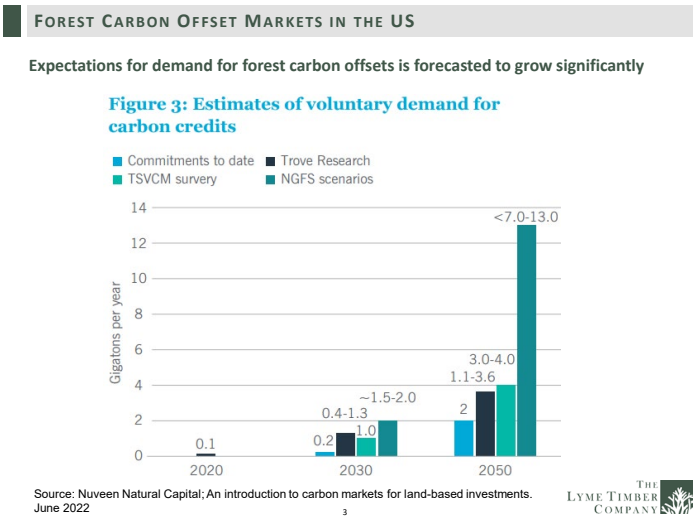
I'm going to talk about the direction of Forest Carbon Offset Markets and their potential as a long-term climate solution. But before I begin, I'd like to stipulate that my experience is largely limited to carbon markets in the US, which to date have been dominated by Improved Forest Management (IFM) projects under the regulated California Air Resources Board (ARB) protocol. More recently, we've begun exploring the voluntary markets, which many believe will experience significant growth over the next few years. As I will discuss, I am less confident that these markets are delivering real climate value. This makes me skeptical of some of the more aggressive growth projections, especially with respect to improved forest management projects on existing working forestlands. However, these doubts do not extend to carbon offset markets more generally, as my experience is limited to IFM projects and I have no experience with carbon projects outside the US. And I certainly appreciate the potential for offset markets to help conserve threatened forests and to finance afforestation and reforestation in the tropics and other regions that have experienced forest loss in recent decades.



Let me start with a little background on The Lyme Timber Company. Our 1.4 million-acre forestland portfolio is built around six businesses, all of which include significant naturally re-generating forests. Although we've owned natural forests in California and the Pacific Northwest, our current portfolio is spread across the Eastern US, and includes plantations in Florida, oak forests in the Appalachian region, and northern hardwoods in the Northeastern and Lake States regions. Because our portfolio includes forests that are important for

conservation, we are active in both traditional land conservation efforts (principally working forest conservation easements) and forest carbon offset markets. In just the last three years, we've sold over $50 million of compliance offsets from five different projects on 200,000 acres of our portfolio.

The conventional wisdom is that forest carbon offset markets will experience tremendous growth over the next several years. While no one expects offsets to be the primary source of climate mitigation, many believe that natured-based solutions will be a critical component and near-term bridge solution for companies that cannot achieve net zero through emission reductions alone. Some studies estimate that over one third of climate mitigation will come from land-based projects, and forestry projects have accounted for the vast majority of land-based offsets to date. The volume and value of voluntary market offsets more than doubled from 2020 to 2021, and several analysts have forecast that the market could accelerate from here, resulting in higher offset prices and potentially transforming forestry investment in the US and beyond.



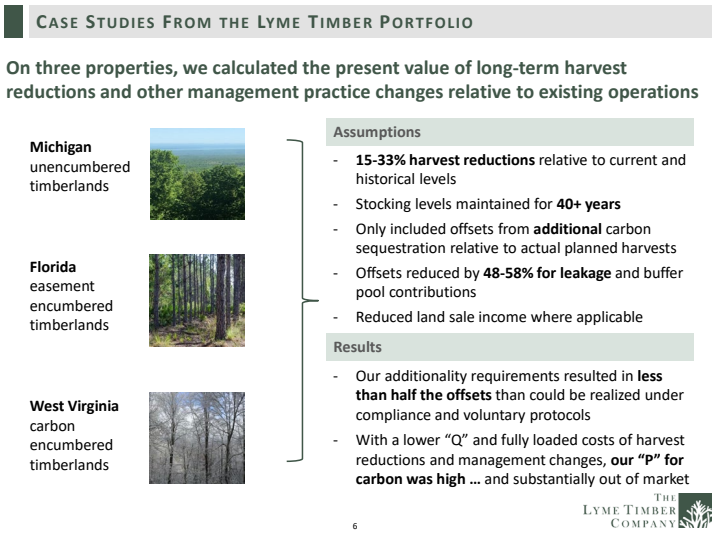
At the same time and despite what appears to be growing interest in investing in forestland as a natural climate solution, there have recently been several high-profile criticisms of forest carbon offsets. Articles in science journals and the popular press have questioned whether compliance and voluntary transactions have accomplished their purpose to take carbon dioxide out of the air and thereby offset carbon dioxide emissions elsewhere. A Bloomberg article pointed to The Nature Conservancy's selling of offsets on lands that were unlikely to be harvested due to their conservation status.

Just a few weeks ago, the comedian John Oliver ran a segment that took the entire carbon offset industry to task, pointing out its many inconsistencies and highlighting projects that delivered little or no climate benefit. Much of this criticism questioned the "additionality" of offset projects and whether the projects required real changes in behavior, rather than simply quantifying theoretical carbon sequestration gains against hypothetical scenarios that are unlikely to occur.

And an honest assessment of many other carbon projects, including some that Lyme has developed, is that while legal and fully compliant with the protocols, they may not have required the forestland manager to reduce near-term harvest levels relative to historical harvests or change management practices to increase carbon sequestration.

Historically, we approached carbon the way most landowners have: carbon developers came to us with carbon assessments, then we considered the tradeoff between the upfront initial issuance payments and the ongoing obligations under the proposed project. In some cases where the upfront payment was large and the impact future harvest levels relatively small, we decided to proceed with the project; in other cases, the economics simply did not work, and we decided to pass.

In 2021 we decided to approach carbon offsets from a different angle. Instead of thinking about how to maximize offsets under the rules of a given carbon protocol, we focused on how we could significantly increase carbon storage on properties we own. Essentially, we modeled harvest reductions and rotation extensions relative to our existing, planned operations – our own, internal baselines. We then calculated the financial impact of implementing those changes over a 40+ year compliance period in the voluntary market, and translated this cost into a price per ton for carbon removal and emission reductions. We conducted this analysis on our lands in Michigan, Florida, and West Virginia.



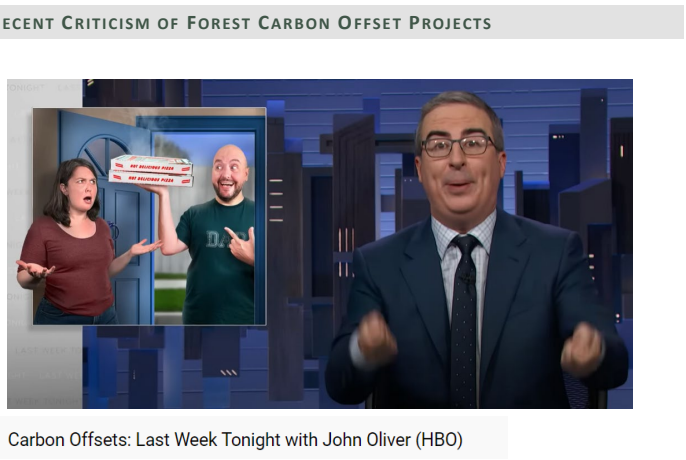
Our conclusions – which I presented at the annual Who Will Own the Forest conference on forestland investment last year, and which were reported in the Bloomberg article that Mark referenced – were that the current price of carbon does not compensate for, or incentivize, immediate behavior changes that would result in greater carbon storage on commercial timberland in the US. Our assessment is that many forest carbon offset projects in the US have probably delivered relatively little carbon storage and climate benefit. While our commercial forests do store a lot of carbon, and some have and will continue to accrete carbon (because growth is greater than removals), these climate benefits are likely to be realized whether or not the property is enrolled in a carbon offset project. In the US, it can be argued that carbon markets have paid landowners to "not do what they were not going to do".

Based on our calculations, the price of carbon would need to be much higher – between $30 and $60 per ton – to incentivize the kinds of management changes that could result in actual carbon removals and greater carbon storage relative to realistic baseline scenarios. This wide range of carbon prices is dictated by individual property features, including the value of wood products, demand for land sales, and any encumbrances on the property, such as a conservation easement, that may have already extinguished certain option values.

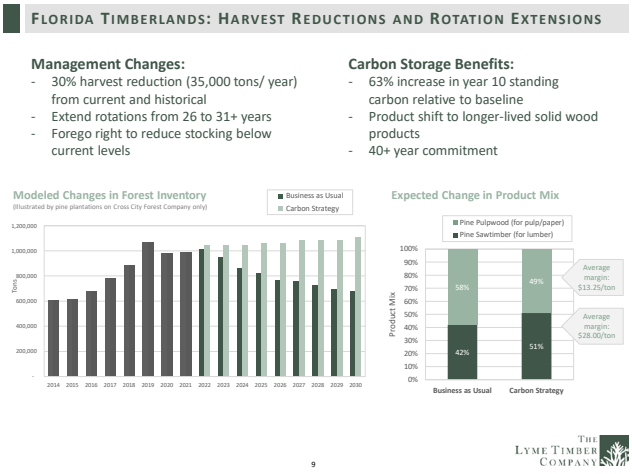
I noted that although they have not had to change near term management practices to sequester and store more carbon, the landowners who have enrolled properties in carbon projects have, by and large, not extracted rents from the market. Instead, they have been compensated for encumbering their properties with 40 and 100 year agreements that do protect the land and result in several biodiversity and climate benefits. On the properties we have enrolled in carbon projects, we have had to reduce the

size of clearcuts, maintain third party forest certification, and given up the right to sell off retail land parcels. These obligations represent real costs and they result in real conservation benefits, even if they don't result in greater carbon sequestration and carbon storage.

I have said that purchasing carbon offsets is like walking into a beer hall for a pint of beer, but being served a fine meal instead. Not surprisingly, John Oliver came up with a better analogy: it's like if you ask your husband to pick up the kids at school and he comes home childless, but with a pizza. You're not mad at the pizza, but he didn't do what you asked him to do. In the world of improved forest management offsets, I think we've conflated climate benefits with pizza and beer. Conservation NGOs, policy makers, and many in the carbon offset industry have given forestry projects a pass on meaningful carbon removal and climate mitigation because the projects have protected forests and delivered so many important conservation benefits.



Since my Who Will Own the Forest talk and the Bloomberg article, we have continued our work to evaluate the true cost of increasing carbon storage on existing commercial forestlands. On our Florida plantation timberlands, for example, we modeled spatially explicit harvest deferrals and rotation extensions that would increase standing carbon stocks by 60% over a 10 year period. This more detailed work supported our earlier analyses – that the price of carbon needs to be well above its current levels to both incentivize project enrollment and on-the-ground management changes.



Importantly, our more recent work has also pointed to some additional challenges facing Improved Forest Management (IFM) projects on commercial forestland, which I'd like to briefly describe. I've grouped these challenges into three categories:

1) The leakage problem
2) The significance problem
3) The capital efficiency problem

Leakage is the concept of harvest reductions on one property resulting in increased harvests somewhere else, with the result that there is no net increase in carbon storage. The compliance and voluntary market protocols have adjustments for leakage – 20% in the compliance market protocol and 30-40% in

the voluntary markets. But critics have argued that leakage rates may be much higher – potentially as high as 95-100%. Wood fiber and wood products are global commodities and harvest reductions in the US may well increase harvesting in other parts of the world, potentially in regions with fewer regulations and environmental protections. On a more micro, localized level, we know that pulp mills and sawmills are fixed cost businesses with large procurement zones, and over the short term, they are not going to change their consumption patterns in response to harvest reductions on any one land base.

The second problem is what I call the "significance problem", and by this I mean the absolute amount of additional carbon storage that results when you utilize an appropriate baseline and properly account for leakage. On our Florida property, we modeled a 60% increase in standing carbon over a 10 year period, but despite this significant management change, after accounting for leakage and our realistic business as usual baseline, we generated less then 0.5 offsets per acre per year over the first 20 years of the project. By my rough calculations, it takes management changes on over 400 acres of our land to equal the carbon removal benefits that would result from installing solar panels on just one acre. In short, it's hard to see how management changes that increase carbon storage on current industrial timberlands – when properly accounted for - are going to move the needle on climate.

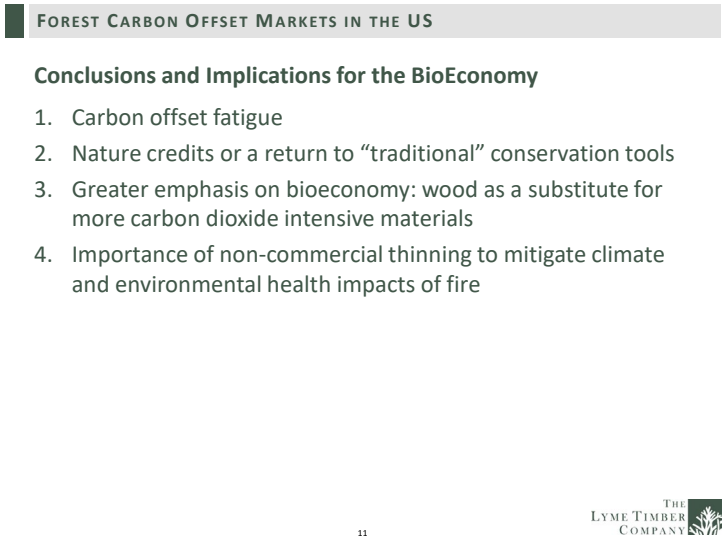
The third problem is a little less exciting and follows from the first two: it's the idea that it's not particularly efficient from a capital allocation standpoint to invest in carbon sequestration on commercial timberlands. if you are going to buy the land and timber, the amount of climate benefit per dollar of investment just isn't that great, unless you make unrealistic assumptions about what would have happened to the forest in the absence of the carbon project. Investing in commercial timberland for the sole purpose of sequestering more carbon is like buying a skyscraper so that you can put a few solar panels on the roof.

So what does all this mean for nature-based solutions, land conservation, and the future of forest carbon offsets in the US? One observation is that there appears to be a growing fatigue within the conservation and scientific community with forest carbon offsets. I attended the Trillion Trees US chapter conference earlier this year, and heard several conservation leaders lamenting the fact that efforts to increase biodiversity, water quality, and land rights all need to be framed through the lens of carbon offsets as "co-benefits" if they are to garner corporate funds that are dedicated to net zero commitments.

Perhaps we need to move away from carbon offsets to something much broader – a nature credit, one that makes fewer claims about carbon removal and better incorporates the many co-benefits of conserving land.

Alternatively, we could renew our commitment to regulations and legal instruments that conserve land. In the US, we have for decades utilized working forest conservation easements to secure multiple public benefits – water quality, biodiversity, public recreational access, older forests, and even carbon storage

– from forests. The recently passed Inflation Reduction Act adds a record amount of federal funding – over $700 million over the next 5 years – for the Federal Forest Legacy program, a well-established funding scheme for conservation easements that already provides $90 million per year for forestland conservation. My hope is that these sources of funding for land conservation will enable the conservation community to be more clear headed about the real climate benefits of improved forest management projects in the US.



Now let me turn to what all this could mean for the bio-economy: this is an area where managed forests – specifically continued intensive and responsible management of forests – can really contribute to climate. Mass timber, new uses of wood for packaging, insulation, and other materials – alongside traditional uses of wood for furniture, flooring, and buildings – all present opportunities for carbon storage and for the displacement of more CO2 intensive materials. Where applicable and based on sound science, wood industries need to do a better job documenting – but not overstating - the climate benefits of wood relative to alternative materials. At Lyme Timber, we've been supporting research, including research at Michigan Tech, into hardwood cross laminated timber, and we're excited that some of the leading companies who have made climate pledges – including Microsoft, Walmart, and Amazon – are exploring how they can utilize and incentivize greater use of wood in construction.

While it's exciting to think about commercial markets for wood, we also need to think about thinning forests to reduce fire risk, even when we don't have markets for the harvested wood products. The need for biochar and biomass markets have gotten a lot of attention, but in many regions these may not be scalable businesses, and their carbon footprint may not be particularly good. We've been working with a group of researchers from the Yale Carbon Containment lab to explore ways to harvest dead or fire-prone trees and then bury them or pile them on site in ways that minimize decomposition and thereby maximize carbon storage. Developing harvesting systems and a workforce to perform this work will be critical to long-term success in mitigating the climate and environmental health impacts of fire on forests in the western US and beyond.

And that brings me to the end of my remarks. To summarize, I remain skeptical that forest carbon offset markets will live up to the expectations that many have set for them – the price is way too low to drive real behavior change, leakage is a real issue, and when you set realistic baselines, it turns out that harvest reductions and changes to forest management practices on commercial timberland in the US may not be the most efficient way to mitigate climate change. A better solution – and one that is at the heart of what many of you are doing – is to figure out ways to substitute wood products for products and materials whose production is more CO2 intensive while also investing in forest restoration activities that can reduce fire risk and potentially increase carbon storage. I thank you for your time and will look forward to answering any questions during the upcoming panel discussion. [End]