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Carbon Crediting Revisited

Solutions in the Land aims to provide our clients with practicable solutions that benefit all stakeholders, landowners, tenant farmers and to the land itself. With that goal in mind, even though carbon offset credits appear to be an exciting new source of potential income, we **do not** recommend that our clients actively pursue them at this time due to their high verification costs, high potential for risk, and uncertain efficacy. However, as an organization dedicated to finding beneficial revenue streams for agriculture, we are open to the possibility that changing circumstances may bring carbon credits in line with our recommendation criteria and will continue to monitor the carbon market for any updates that may alter this recommendation.

High Verification Costs

Pursuing carbon offset credits comes with a much higher up-front cost than simply implementing regenerative agriculture techniques. According to the Ecosystem Services Market Consortium, pursuing carbon credits for carbon-capturing farming techniques generally costs about four times as much as just implementing those techniques. The reason for this is the verification process - in order to sell credits, a landowner must first have their land and proposed farm practices assessed by a reputable third party. Through physical measurement and mathematical models, they estimate how much carbon is likely to be captured per year and verify one credit for every one metric tonne of carbon dioxide they predict the land can sequester annually (commonly referred to as mt CO_2e). With the cost of this process, the buyer cannot guarantee that the selling price of the credits would recoup the initial costs to the landowner. In fact, based on data from the USDA and University of Illinois, it is almost certain that the seller will not be able to break even, let alone profit, unless some or all of these initial costs are subsidized. Some of this deficit may be filled by the better quality and higher yield of crops often associated with regenerative farming practices. However, practices that specifically focus on carbon capture were found by the USDA to decrease soil productivity for the first two years before yielding those types of benefits, meaning a seller would likely be operating at a loss of three or more years after starting the process.

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Risk Potential

Aside from the associated costs, relying on carbon credits comes with a variety of risks. The largest of these is the volatile nature of the voluntary carbon market. While some major players are offering $15-$20/mt CO2e, carbon credits are trading on the open market for an average of $3-$6. Although the higher prices are widely touted and seem promising, the trading price is a more accurate reflection of how buyers actually value carbon credits and are closer to the amount that a seller is likely able to earn. As carbon offsets become more mainstream and more projects seek to sell them, it is likely that they will oversaturate the market and cause prices to drop even further.

A second layer of risk comes with the fact that the voluntary market is currently unregulated, so buyers and sellers are all using different protocols for sampling, measurement, and pricing. Unless a seller starts the verification process with a specific buyer in mind, it is possible that the seller's verification will not be accepted by all potential purchasers. A prime example can be seen in Microsoft's recent purchase of farm-based carbon credits: despite seeking 1.3 million credits and receiving over 5 million bids, the organization deemed that only 200,000 of the credits had carbon capture claims which were adequately verified. Moreover, if the USDA or another entity were to enforce a singular standard for measurement, sellers may be expected to re-verify their credits at their own expense.

Finally, the lengthy nature of carbon offset contracts poses a potentially significant risk to the seller. Some contracts can be as short as 20 years, although most are 100 years or more, as that is the length of time scientists estimate that carbon must remain sequestered in order to have a meaningful environmental impact. These lengthy contracts could impact the value of the land, as they must be written into the deed as a restriction to deed if the land is sold. They can also stipulate certain practices, denying a farmer some flexibility to do what they believe is best for the farm, like forgoing a cover crop in a year where it is likely to fail. Beyond that, these contracts can stipulate that the full amount won't actually be paid until true carbon capture can be verified after a few years, resulting in a land sale complication. Some of these risks may be mitigated by hiring a lawyer to advocate for the landowner, but this may also add significant fees to the already high price point associated with the endeavor.

Uncertain Efficacy

On top of all these potential obstacles, we have reason to believe that these credits do not benefit the planet in the way they claim. Research consistently shows that, in almost all forms of nature-based carbon capture, mathematical models overestimate the actual amount of carbon being sequestered. If most carbon credits represent less carbon than they claim, that means that companies purchasing these credits have higher net emissions than they report and a lowered incentive to reduce their emissions. Additionally, any projects which involve carbon capture have a high risk of "leakage"—release of the sequestered carbon—through weather events, failed crops, operator error, or anything else that might disturb the soil.

Even more concerning is the fact that some carbon capture practices may release higher levels of nitrous oxide (N_2O). According to the EPA, nitrous oxide has 298 times the atmospheric impact as carbon, meaning that even slight leakage of N_2O could negate the climate benefits of these practices. Nitrous oxide may also pose a risk to local watersheds if it leeches into groundwater or

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runoff. Since it is not clear which farm-based practices increase release of nitrous oxide or to what extent, much more research must be completed.

Recognizing the shortcomings of the current knowledge base and deficiencies in available programs should help move forward funding and research interest to shore up programs and practices to move carbon crediting into a legitimate revenue stream for farm owners and operators.

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Appendix A

Table 1. Breakeven Prices for Crop Farm Practices used for Carbon Sequestration[1]

Practice	Crop Type	Breakeven Price (2010 $/mt CO_2-eq)	Emissions Reduction Potential (mt CO_2-eq/acre)
Tillage Practices			
Reduced till to no-till	Corn	$30	0.42
Conventional till to no-till	Corn	$34	0.65
Conventional till to reduced till	Corn	$43	0.22
Conventional till to no-till	Soybeans	$32	0.13
Reduced till to no-till	Soybeans	$77	0.13
Conventional till to reduced till	Soybeans	Negligible emissions reduction	
Fertilizer Practices			
10% reduction in nitrogen fertilizer application rate[2]	Corn	$174	0.03
Use of an inhibitor with nitrogen application[2]	Corn	$63	0.12
Switch to VRT nitrogen application[2,4]	Corn	< $0	N/A
10% reduction in nitrogen fertilizer application rate[3]	Corn	$32	0.16
Use of an inhibitor with nitrogen application[3]	Corn	$60	0.12
Switch to VRT nitrogen application[3, 4]	Corn	< $0	N/A
Switching from fall to spring nitrogen application	Corn	$167	0.08
Land Retirement Practices			
Retiring cultivated organic soils to permanent grassland[5,7]		$11	14.28
Retiring marginal soils to permanent grassland[5]		$24	1.09
Restoring forested wetlands[5]		$24	5.178
Restoring grassy wetlands[5]		$63	1.998
Establishment of wind breaks[5]		$17	1.4
Restoring riparian forest buffers[5]		$49	2.79
Retiring cultivated organic soils to permanent grassland[6,7]		$16	14.28
Retiring marginal soils to permanent grassland[6]		$144	1.09
Restoring forested wetlands[6]		$36	5.178
Restoring grassy wetlands[6]		$94	1.998
Establishment of wind breaks[6]		$97	1.4
Restoring riparian forest buffers[6]		$72	2.79

Source: IFC International, 2013

[1]Data are for Corn Belt states

[2]Low nitrous oxide (N_2O) emissions reduction scenario assumed

[3]High nitrous oxide (N_2O) emissions reduction scenario assumed

[4]Assumes a 1,000-acre farm and adoption of Greenseeker™ technology

[5]Assumes a low-cost scenario

[6]Assumes a high-cost scenario

[7]Organic soils are soils with high organic carbon content from decaying materials (also known as histosols or muck)

[8]Annual average sequestration over 30 years

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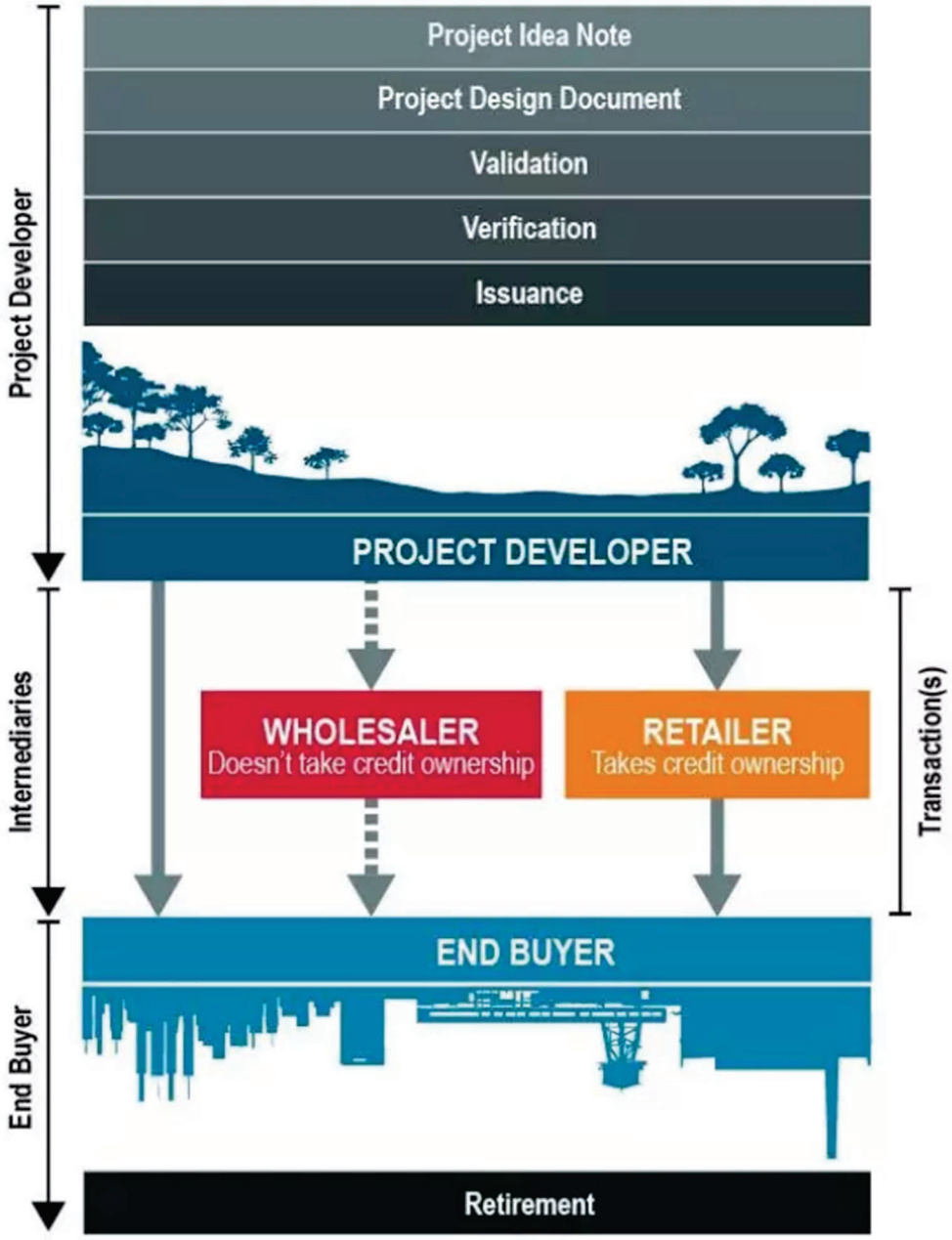
Appendix B

Figure 1: The Offset Cycle, from Project Development to Retirement



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