A blockchain-based marketplace for removing carbon dioxide from the atmosphere.

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A BRIEF GUIDE

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Disclaimer

This white paper describes Nori's plans to create a blockchain-based market for carbon removal certificates and a cryptocurrency tied to carbon removal. This paper is intended to stimulate discussion as a means of further refining Nori's business plans, technological approach, and path for improving the efficiency of the market for carbon removal certificates. This white paper is not intended as a complete catalogue of the market, technological, legal and other risks Nori may face. In addition, Nori's proposed issuance of cryptocurrency tokens discussed in this White Paper is subject to the highly uncertain regulatory environment discussed in Legal/Regulatory Risks, below. This white paper is not intended to be a prospectus or offer of or solicitation for investment in Nori or its proposed tokens.

Forward Looking Statements:

These materials contain forward-looking statements concerning trends or anticipated results which are made pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. These forward-looking statements are not guarantees of the Company's performance and are subject to risks and uncertainties related to Company's operations and business plan. These risks and uncertainties include, but are not limited to: the timely availability of financing on acceptable terms, the Company's ability to develop and operate its business and network in a timely and efficient manner, the availability of future purchasers and sellers of carbon removal certificates, and other future events and conditions. These projections are based on a number of assumptions and estimates made by management and Company's actual results or activities, or actual events or conditions, could differ materially from those projected in these materials.

Glossary

Allowance: a government-issued, tradable, and bankable electronic certificate that is stored on a centralized online platform, which represents the holder's entitlement to emit one tonne (in carbon dioxide-equivalents) of greenhouse gases (GHGs) to the earth's atmosphere.

Auditor: a qualified professional who is periodically engaged to review streams of historical CRC issues, to retroactively assess/confirm the previously estimated GHG reduction value of the CRCs as well as the CRC stream-average GHG reduction estimation error.

Baseline Generator: a person or entity qualified to evaluate operating data and other evidence provided by a potential CRC supplier, who has the demonstrated scientific, analytical, and modelling expertise to convert the supplied evidence into a CRC quantity estimate, with associated estimation error ranges.

Blockchain: cryptographic database technology that allows for data (including financial transactions) to be stored in a secure, transparent, and decentralized manner.

Buyer: the name given to a person or entity that uses NORI tokens to purchase CRCs in the Nori marketplace.

Carbon dioxide-equivalents: a metric used to describe the radiative forcing potential of a range of different gaseous compounds which all trap heat, but at different rates and for different lengths of time, when they form and reside in the earth's atmosphere.

Carbon removal: the action of drawing carbon dioxide and other carbon-based

greenhouse gases from the atmosphere, and storing them in the earth's industrial, terrestrial, subsurface and/or aquatic reservoirs.

Carbon Removal Certificate (CRC): a digital asset, or electronic certificate, that is stored on the Ethereum blockchain in the Nori application. One CRC represents one tonne of CO_2-equivalent heat trapping gas that has been removed from the atmosphere and stored in an industrial, terrestrial, subsurface, and/or aquatic reservoir.

Compliance market: a market in which some legal entities (e.g. companies) are assigned, by governments, caps on the amount of greenhouse gases they can emit, and who may be obliged to acquire and/or retire allowances or offset credits to cover any greenhouse gas emissions in excess of the amount assigned to them by the regulator.

Compliance markets typically allow entities who have not been assigned GHG emissions limits to voluntarily offer verified and validated offset credits. The regulated entities may then acquire and retire such credits to achieve compliance with capped limits to their GHG emissions. These markets are often described as "cap and trade" regimes.

CRC Aggregator: an entity that stores data to create CRCs and has been given assignment of Nori projects by a potential CRC supplier.

Cryptocurrency: a cryptographically-secured digital asset in which encryption techniques are used to regulate the generation of units of exchange and verify the transfer of funds or assets, operating independently of a central bank.

Data manager: an individual or entity that supports a supplier to collect data to make decisions to remove carbon dioxide and create CRCs, but does not take assignment of CRCs. In the context of our first methodology, data managers would often be farming consultants.

Data warehouse: an entity that stores data that allow potential CRC suppliers to list supply into the Nori marketplace.

Ethereum: a second-generation blockchain featuring smart contracts and the Ethereum Virtual Machine in order to run decentralized applications (dapps). The project aims to be the backbone of web 3.0 and a decentralized internet.

GHGs: short for "Greenhouse Gases", compounds such as carbon dioxide (CO_2), methane (CH4), nitrous oxide (N_2O), and other gases that absorb heat energy being radiated by the Earth, contributing to the "greenhouse effect".

Methodology: a method applied to quantify and assign estimation error to carbon removal projects. A Nori Methodology includes three components: 1) A process to remove carbon dioxide. 2) A method to list the process on the Nori marketplace. 3) A procedure to verify, audit, and assign a quality rating to CRC estimates.

NORI token vs. Nori: the NORI token is the cryptocurrency that may be traded in secondary cryptocurrency markets. Nori by itself refers to the company, Nori LLC.

Offset credit: an electronic certificate created and issued by a voluntary or compliance market administrator purporting to represent one tonne of CO_2-equivalent heat trapping gas that has been removed from, or an equivalent reduction in GHG trapping gases to the atmosphere.

Supplier: the name given to a person or entity whose actions remove greenhouse gases from the atmosphere, store those elements in a terrestrial, subsurface, or aquatic reserve, and offer CRCs for sale in the Nori marketplace.

tCO_2e: an amount of GHGs expressed as "CO_2 equivalent" whose greenhouse warming potential equals that of one tonne of CO_2 gas. For example, one tonne of methane (CH_4) is 25 tCO_2e and one tonne of nitrous oxide (N_2O) is 298 tCO_2e.

Tonne: one metric tonne ("metric ton" in the US), the standard unit of measurement for carbon removal. 1 metric tonne = 1000 kilograms or 2204.62 pounds.

Verifier: a qualified professional in a position of fiduciary responsibility who can attest to the accuracy of evidence provided, annually, by CRC suppliers, to substantiate their claims that a quantified amount of greenhouse gases has been removed from the atmosphere and stored in an industrial, terrestrial, subsurface or aquatic reservoir.

Voluntary market: a market in which individuals or organizations can trade electronic certificates representing both carbon removals and GHG discharge reductions, in which buyers and sellers participate at their own free will.

SECTION 1

Nori is on a mission to reverse climate change

Nori's goal is to create a new way for anyone in the world to pay to remove excess carbon dioxide from the atmosphere. Nori connects buyers and suppliers in the world's first carbon removal marketplace with a mission to reverse climate change.

The Nori platform:

- ensures easy and more reliable carbon accounting.
- reduces transaction costs for both buyers and sellers in the CO_2 market.
- enables a secure payment process for removing carbon dioxide (and other GHGs) from the atmosphere.

Buyers can pay for a verified carbon removal activity with a simple transaction that doesn't require a broker. Buying through our marketplace provides "best in class" carbon removal certificates, without the time-consuming, costly, complex, and risky processes associated with existing voluntary and compliance CO_2 markets.

Along with providing traditional CO_2 market participants with a new option, this value proposition will attract new entrants—both suppliers and buyers—into the carbon removal marketplace. We expect two different classes of new buyer entrants:

- people and organizations who have long wanted to neutralize their carbon footprints, but do not trust that the CO_2 offset credits offered for sale in traditional markets have actually accounted for avoiding or removing emitted carbon dioxide in the full amount they purport.

- people and organizations who have never before participated in carbon markets, but are enthusiastic about investing in and trading the cryptocurrency asset that Nori is creating to facilitate the transaction process.

Suppliers can create a new revenue stream if they are not currently monetizing their carbon removal activity. This can:

- enable businesses that have the incidental capacity to remove and store carbon dioxide to monetize this form of ecosystem service, including the world's food producers, pasture and forest land managers, developers of direct air capture technologies, and many more.

- help civilization reduce atmospheric concentrations of greenhouse gases back to levels consistent with a stable climate system and healthy ocean chemistry at a sustainably accelerated rate.

For those suppliers who are already monetized, we provide a far simpler set of solutions to offer their valuable services to the market. Currently, suppliers have to do their own business development and find a counterparty to buy their specific carbon credits. With Nori, suppliers can sell their certificates into the marketplace and get paid in tokens as soon as a buyer purchases their credits on a first-in, first-out (FIFO) basis.

The value Nori brings to both buyers and suppliers is the ability to connect in a more

efficient and transparent marketplace. One NORI token will be exchangeable for one Carbon Removal Certificate (CRC) given CRC supply. A CRC represents one tonne of carbon dioxide (or its equivalent warming potential in other greenhouse gases like methane and/or nitrous oxide) removed from the atmosphere and stored in the soil, plants, materials, minerals, the earth's geologic subsurface area, the oceans or other aquatic reserves. The NORI token will freely float in price relative to the dollar, euro, bitcoin, and other currencies. The additional liquidity provided by the cryptocurrency exchanges will attract new investors who would not otherwise have previously been attracted to CO_2 markets.

This means that—for the first time—there will be a truly market-driven price on removing one tonne of carbon dioxide from the atmosphere.

Even allowing for volatility in cryptocurrencies, this market price on CO_2 will make forecasting for suppliers, buyers, and even policymakers significantly less complex and uncertain than it is currently.

In the Nori marketplace, the only projects that will be allowed to exchange CRCs for tokens are those that are verified to have removed greenhouse gases (namely CO_2) from the atmosphere. There is currently no other carbon trading market that is exclusively focused on removing excess carbon and other greenhouse gases from the atmosphere. This is fundamentally different from current CO_2 trading markets that focus in large part on avoidance. Reducing carbon emissions is necessary, but carbon removal is needed to decrease levels of greenhouse gases in the atmosphere back to safer concentrations.

SECTION 2

The Nori philosophy

Life as we know it is carbon-based. Carbon dioxide is not intrinsically bad or immoral. Burning fossil fuels has enabled positive outcomes including lifting billions of people out of poverty, increasing global trade, decreasing global violence, and increasing food production. While we acknowledge the geopolitical, air-polluting, and planet-warming side effects of fossil fuels, we are also aware that many have benefited directly from affordable and widely available fossil carbon-based energy and building products (such as cement, iron, steel, aluminum, glass, and others).

Great and important strides are being made in decarbonization, efficiency, and renewables. However, Nori does not believe it is just, fair, or practical to expect that all existing societies worldwide will completely cease their use of all fossil carbon-based energy and building products; nor entirely eliminate the GHG discharges arising from their use. In addition, it is widely agreed that there are already too many greenhouse gases in the atmosphere. Even halting all emissions from human activity tomorrow would not be enough. Returning CO_2 concentrations to safer levels, such as 300 parts per million, requires the drawing down of many hundreds of billions of tonnes of greenhouse gases from the atmosphere in the coming decades.

To accomplish a drawdown of this scale, we propose that greenhouse gas emissions to the atmosphere should be treated like any other waste stream. Most people accept the fact that living our lives creates waste, such as garbage, and most

people accordingly pay garbage collectors to remove that waste and break it down, recycling what they can, and responsibly storing the parts that can't be recycled.

Most of the greenhouse gas emissions that are pushing the climate system and ocean chemistry out of balance are a waste product from human activity. Considering them as such brings the issue onto an economic—rather than moral—plane. Our hypothesis is that circumventing moral pronouncements on greenhouse gases will enable a vastly more effective and engaging approach to slowing, halting, and ultimately reversing a root cause of anthropogenic climate change. Moreover, because it will be possible for suppliers to make money by providing the service of removing carbon dioxide and other greenhouse gases from the atmosphere, we hope to demonstrate that economic prosperity and stewardship of the earth can work hand in hand.

We also expect—as has been the experience in traditional waste management and recycling markets—that once we launch the Nori carbon removal market, more opportunities for the recycling and productive use of the removed and stored carbon will be developed and commercialized.

SECTION 3

Carbon removal is necessary to reverse climate change

Global atmospheric CO_2 levels have risen from less than 280 parts per million (ppm) in the late 18th century, to present levels of 405-410 parts per million. Nori's aim is to build a platform that makes it possible for the world to collectively reduce those levels to concentrations that are compatible with a sustainable future in which everybody can flourish, i.e. levels below 300 ppm. In order to reach that target, it is not only necessary to reduce our current emissions, but also begin to draw down CO_2 and other greenhouse gases from the atmosphere.

Nori's purpose is to build a marketplace that allows society to deal with legacy emissions. Current carbon offset regimes focus on further reducing present and future emissions reductions. Both approaches are ultimately necessary to reverse climate change.

Climate change carries with it risks of major ecosystem disruptions, sea level rise, more extreme weather events, increased famines, droughts, wars, and general social unrest. Rapid and high-amplitude changes in climate are challenging to all life on earth.

Also known as global warming, present climate change is caused by excess greenhouse gases in the atmosphere. The greater the concentration of greenhouse gases, the greater the "greenhouse effect."

Though concentrations of greenhouse gases have always gone up and down over the earth's history, the rises over the past few centuries are the result of human activity. Sources include: energy production, forestry, farming, construction, transportation, and just about any historic activity that was undertaken to contribute toward improving the human condition.

Reducing and replacing emissions of greenhouse gases into the atmosphere is critical to stabilize the greenhouse effect. However, once such deep reductions and replacements of greenhouse gas emissions have been achieved, a further step is required to avoid runaway climate change: removing greenhouse gases out of the atmosphere (a.k.a. carbon removal). Further, drawing down CO_2 and other greenhouse gases from the atmosphere is fundamentally necessary if society wishes to *decrease* levels of GHGs on timescales shorter than thousands of years.

There are many promising methods and technologies already available that can remove CO_2 from the atmosphere. But the pace and scale at which these strategies are being implemented are too slow and too small to cause even a perceptible slowdown in the growth rate of CO_2 in the atmosphere, let alone to reverse the trend. By creating a fair and transparent marketplace for activities that remove carbon dioxide, Nori will drive the expansion of a brand-new global industry that will restore the carbon balance in the atmosphere.

A note on carbon dioxide and other greenhouse gases

We call Nori a carbon removal marketplace, but carbon dioxide is not the only greenhouse gas that affects climate change. Nor is it the only molecule that can be drawn down out of the atmosphere through a variety of different removal methodologies that we intend to support. An example of another GHG that can be removed is nitrous oxide (N_2O). Traditionally, greenhouse gas markets measure by CO_2-equivalent amounts. We use the abbreviation tCO_2e for "tonne of carbon dioxide equivalent." Throughout this paper we often refer solely to carbon dioxide for ease of communication, but this does not mean we aren't also in some cases supporting removal of N_2O or other greenhouse gases.

SECTION 3

An introduction to existing carbon markets

Compliance vs. voluntary markets

Carbon markets have been created to encourage companies and countries to limit their GHG emissions. There are two broad types of carbon markets: compliance and voluntary markets.

In compliance markets, some (typically larger) industrial emission sources are legally required to comply with annual limits to how much GHGs they can discharge. The sources are also required to retire "carbon" or "CO_2" allowances and/or offset credits ("compliance certificates") equal to their actual, reported GHG emissions.

In compliance markets, governments create and distribute allowances through a combination of free allocation and sale. An allowance is typically a tradable and bankable electronic certificate that is created and traded over a centralized ledger. It represents the government's permission—sometimes called an "entitlement"—for the holder to discharge one tCO_2e to the atmosphere.

Facilities that combine to emit low levels of GHGs (regulatory thresholds are typically 50,000 to 100,000 tCO_2e/year), or that are in the agriculture, forestry, or other "land use" sectors, are usually exempt from a legal obligation to reduce GHG emissions or acquire and then surrender CO_2 allowances. But these unregulated GHG sources are often given the option of voluntarily participating in the compliance markets.

When operators of unregulated sources opt into compliance markets, they are called "offset project proponents" and they create and sell "CO_2 offset credits" into the compliance market. This expands the supply of compliance instruments available to the GHG-capped and regulated sources. The compliance market administrators require offset project proponents to demonstrate, through a third-party validation process, that their projects are real, "additional", verifiable, and permanent.

Voluntary markets typically allow unregulated projects to register and offer electronic certificates that purport to represent CO_2 emission reductions. These certificates are offered for sale to the general public, and/or to unregulated entities that have volunteered to reduce or offset their operating or supply chain GHGs.

Voluntary market administrators provide members of the general public some limited assurances that the offset credits offered over their centralized electronic platform are also real, additional, verifiable, and permanent. Sometimes compliance market administrators allow some (but never all) of the offset projects that first list in voluntary markets to withdraw those listings and relist in their compliance market. Most voluntary market administrators charge offset project proponents significant delisting fees when this occurs.

In both compliance and voluntary markets, CO_2 allowances and offset credits typically have "vintages," which is the year in which the allowance was either:

- first issued by its government creator, or;
- the emission reduction/removal the offset credit represents was deemed real and listed for sale.

In compliance markets, governments firmly establish what the free allowance allocations to regulated sources will be for periods that typically range from three to five years, as well as what the total allowances supply will be to reduce uncertainty for market participants. At least initially, allowances are permanently bankable (i.e.

[1] Forest Trends, https://www.forest-trends.org/publications/unlocking-potential/

may be retired to cover emissions in their vintage or any year after their vintage). Sometimes, in compliance markets, offset credits are subject to banking limitations.

In most compliance markets, the regulators limit the extent to which regulated emitters can retire offset credits to cover their GHG emission liabilities. This impairs demand for offset credits in compliance markets, and typically results in offset credits trading at a significant price discount relative to the apparent market price for allowances.

The Ecosystem Marketplace (Forest Trends) estimates that voluntary offset credit transactions representing 48.8 million tCO_2e occurred in 2016. Total offset credit supply is much greater than the volume of offsets that have been traded.

The graph below from their 2017 "State of the Voluntary Carbon Markets" report suggests that offset credit prices covered a significant range, and projects that removed carbon from the atmosphere generally attracted the highest prices in that range.

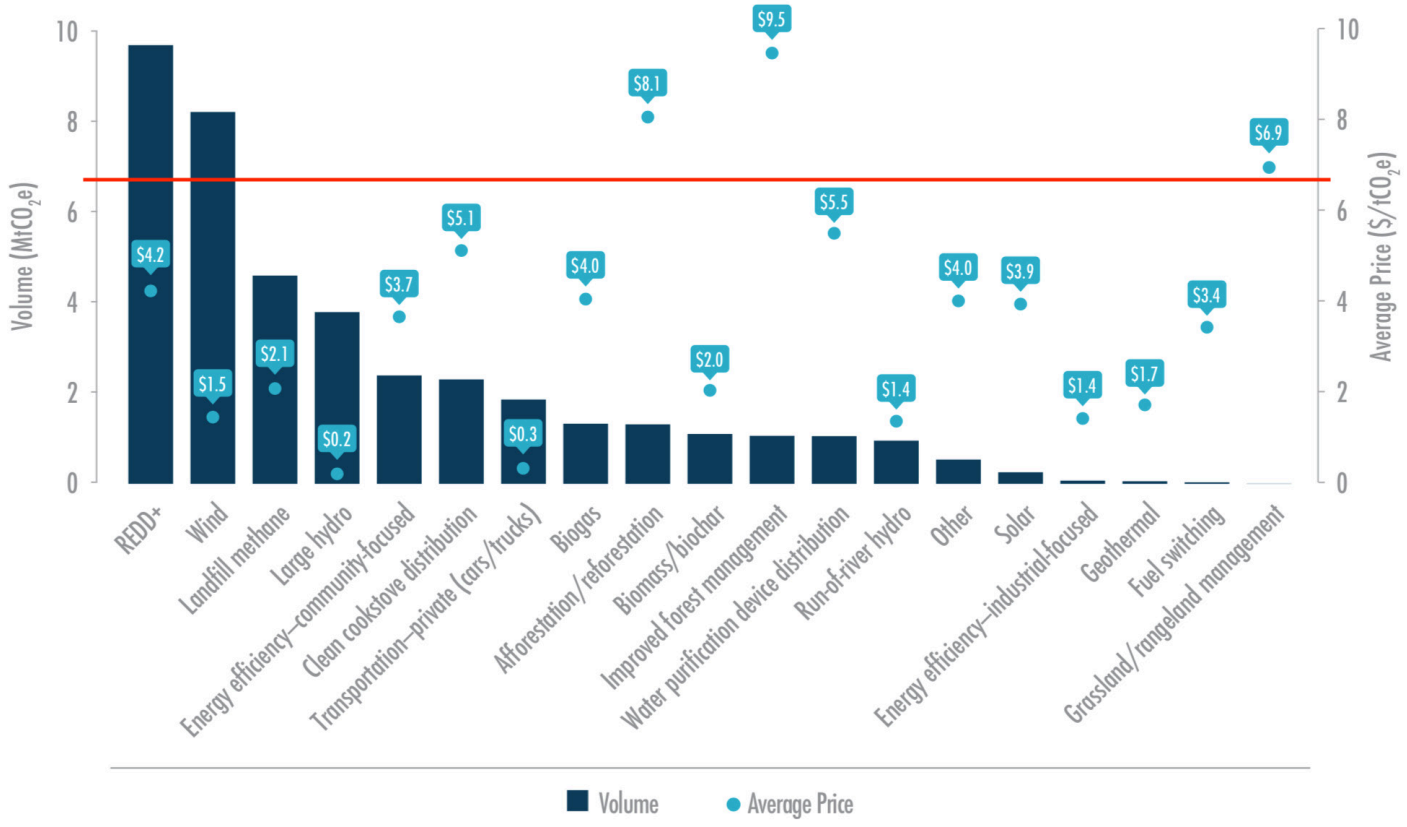

Figure 1: Offset credits that actually removed CO_2 from the atmosphere appear above the red line and deliver the most overall value to buyers.

Nori is building a marketplace that is exclusively voluntary where one CRC actually represents one tCO_2e removed. Our market design will offer the highest possible value in terms of what a CRC represents. Our voluntary approach will enable maximum freedom to adapt and update our methodologies rapidly as new technologies become available, and to serve the greatest possible number of participants around the world with demonstrably real carbon removal certificates.

Lifecycle of a traditional carbon offset project

Nori is proposing a different and far simpler process for suppliers to create and sell carbon removal certificates relative to the existing carbon markets. It is important to clarify how the carbon markets (both voluntary and compliance) function today in order to explain the differences. What follows is the lifecycle of a traditional carbon offset project:

1. project developer initiates concept and raises financing for project.

2. project proposes to register itself under a specific protocol with a registry such as CDM/JI, Verra, CAR, ACR, GS, etc[2]. Proponent is required to prove that the project is not financially viable in the absence of revenues from offset credit sales. If the project is viable without the offset credit sales revenues, the project registration application is rejected.

3. if protocol doesn't exist yet, project developer and registry work together to develop new methods of measurement. The protocol defines, among other things, data and record-keeping requirements with which the project proponent must comply.

4. an independent third party verifier, paid by the project proponent, confirms that the planned project meets criteria set forth by the protocol defined by the registry.

5. project runs.

6. proponent prepares an annual CO_2 offset credit claim.

7. independent verifier completes a review and assessment of the project proponent's claim, and provides assurance that the claim is accurate and the proponent has complied with their data collection and record-keeping requirements.

[2] Details on these carbon markets (and the acronyms!) are available in the appendix.

8. the registry creates and lists a series of numbered electronic certificates (the offset credits) reflecting the proponent's annual CO_2 emission reduction claim, and displays those certificates on the registry's centralized ledger, in an electronic account in the project proponent's name.

9. potential buyers, or brokers representing buyers, approach the project proponent directly to negotiate offset purchase terms. The agreement, which is private and off-ledger, can be limited to the purchase of a fixed number of already-listed offset credits, or to a long-term offset credit purchase agreement that contractually binds the proponent to maintain the project and continue to get offset credits listed for a term (typically seven to ten years). Often, a long-term offset credit purchase agreement is negotiated before the proponent applies for project approval. This is often necessary to enable the proponent to raise the capital required to finance the project approval, emission reduction claim verification, and offset credit listing costs.

10. the offset buyer applies to have an account established on the registry, for which the buyer pays a fee.

11. the seller and buyer both submit instructions to the registry administrator to transfer the offset credits from the supplier's to the buyer's electronic account. A transaction fee applies to each offset credit transfer between accounts.

12. if/when the buyer elects to retire credits to cover a voluntary commitment to offset their GHG emissions, the buyer instructs the registry administrator to remove offset credits from their account and place them in a central "retired" credits account.

13. if/when the supplier or buyer wishes to resell any offset credits to a secondary buyer, the secondary must open an account on the registry.

14. if/when the supplier or first buyer wishes to transfer offset credits to an unlisted buyer in an off-registry transaction, or to a buyer who is listed on a different registry, the offset credit holder instructs the administrator to delist the offset credits. The owner of the account from which the offset credits are delisted pays a delisting fee.

A brief history of CO_2 markets and remaining challenges

Existing CO_2 markets are closely modelled after historical pollution "cap and trade" markets. For example, sulphur dioxide (SO_2), nitrogen oxides (NOx), volatile organic compounds (VOCs), and ozone-depleting substances. The entitlements traded in these markets can be either quota or credits, where:

- allowances are really just government-issued units of quota, or tradable, bankable entitlements to emit pollutants into natural receiving environments, or to extract water from lakes, rivers, and aquifers.

- credits (including but not limited to "offset credits") are certificates representing a person or entity's underutilization of an implied or de facto entitlement to emit pollutants into natural receiving environments.

The first such quota markets were introduced nearly 100 years ago in the US, when governments elected to convert access to public water supplies into private, tradable, sometimes bankable, water quota allocations. Then in the 1960s, many US state governments created and issued quota/allowances to create and allocate limited private rights to discharge wastewater and other pollutants into lakes, rivers, and aquifers.

[3] California Carbon Market Dashboard, a project of the Climate Policy Initiative, http://calcarbondash.org/

The first US cap and trade markets designed to privatize and limit individual or industrial rights to release pollutants into the atmosphere were introduced in 1978, as a component of the US effort to eliminate lead in gasoline. During the 1980s, tradable, bankable pollution quota allocations were first introduced to facilitate the regulated removal of ozone-depleting substances from the refrigerant chemical supply chain.

California's South Coast Air Management District (covering the Los Angeles airshed) was the first jurisdiction in the world to launch a multi-air pollutant, multiple sector cap and trade regime, called RECLAIM, in 1992. The US EPA's Acid Rain Program imposed a federal SO_2 quota trading market on all states in 1995, which covered only utility-owned power generation units. (Non-utility power generation units were exempt from the requirement to retire quota to cover their SO_2 emissions to the atmosphere.) Also under the Acid Rain Program, the US EPA created a framework for interstate trade in NOx quota, which was launched in 1996.

In every precedent, the highest price ever paid for emission or pollution precursor quota was paid by speculators in the year or two ahead of formal quota market launch. This is also true for the most recent iteration: allowance prices in California's CO_2 cap and trade regime has followed a pattern similar to that which we have seen in almost all other historical emissions compliance market precedents.[3]

5-day moving average price and volume of California Carbon Allowance Futures over time from ICE End of Day Reports. Daily trading volume units are 1000 allowance futures. Download data.

Figure 2: The trading price for carbon allowance futures in California was initially high based on speculation and then declined precipitously. It has only increased since then because the mandatory price floor has increased.

California's cap and trade market has legislated primary market allowance price floors. Since 2014, the primary driver of the apparent market price increase for allowances has been the legislated price floor, not market signals. Allowance prices in the secondary market have diverted from the primary market price only a few times, only by a relatively small amount, and only for short periods.

The Nori goal is to create a carbon removal certificate market in which price discovery is reflective of the true market value of removing one tCO_2e from the atmosphere—rather than government-defined price ceilings and floors.

Most governments have included mechanisms from the outset to provide relief from high prices in every air pollution market that has been launched. But the concept of government-defined price floors first appeared in quota market design with the Regional Greenhouse Gas Initiative (RGGI), which formally launched in 9 northeast U.S. states in 2009. Government imposition of price floors is still a relatively new characteristic of compliance emissions markets.

Offset credits are not recognized or traded in every compliance CO_2 market. But in every compliance quota market that recognizes the limited use of offset credits as alternative compliance instruments, offset credits typically trade at a 20% to 50% discount relative to the apparent market price for quota/allowances.

This discount reflects a number of risks the government administrators assign to offset credit buyers in those compliance markets. The heavy price discount buyers tend to assign to all offset credits is a reflection of the risks associated with using those credits in existing compliance markets. We discuss some of those risks, as they relate to Nori market design, below.

SECTION 4

Conceptual problems of carbon markets that Nori intends to solve

Counterparty challenges

There are many interested potential carbon credit buyers (ranging from individuals to large corporations) who have a difficult time finding valid projects that make a meaningful difference. Simultaneously, developers of more 'traditional' offset projects can face huge project development and market entry costs. They often pre-sell their credits, typically at a discount, to a counterparty in order to raise the funds required to get their carbon offset projects to market.

As a result, almost every transaction is custom and unique, and therefore more expensive than necessary.

Nori proposes to address this problem on multiple levels. In the Nori market:

- project approval, registration, and CRC verification costs will be significantly less per tCO_2e than they are in existing compliance and voluntary markets, reducing the suppliers' need to pre-sell CRCs at discount prices to raise capital.

- Nori's marketplace allows for virtually automatic electronic certificate trading, operating more efficiently and swiftly than markets where buyer and seller must match themselves. Nori's market for carbon removal certificates will resemble a simple ecommerce transaction.

Buyer risk and "one tonne is one tonne"

For some classes of offset credit, and credits that remove CO_2 in particular, the estimation error associated with short-term (year-to-year) increases in the amount of carbon removed from the atmosphere or emissions reduced can be large. A project can be highly successful, but year-to-year changes in terrestrial carbon stocks can still be smaller than the error associated with carbon stock and flow estimates. Given current carbon stock and flow measurement and estimation methods, the error associated with year-to-year estimates typically shrinks over time. But there are many good reasons to encourage project proponents to list offset credits for sale each year, rather than wait for five or ten years when their carbon stock enhancements or emissions reductions can be estimated with greater certainty.

Different compliance markets address the estimation error risk in different ways:

- the EU and the UN-administered international offset market administrators create "temporary certified emission reductions" or tCERs. When the short-term emission reduction claims are later validated by third parties, the buyers can trade the tCERs in for CERs. The buyers bear the full risk that short-term carbon removal or emission reduction estimates may prove overstated in the validation process and not all of the tCERs will convert into CERs.

- the California cap and trade market (and some others) obliges suppliers of these hard to estimate year-to-year carbon removals and emission reductions to hold 20% to 30% of their electronic certificates in a "buffer account." Those certificates cannot be traded until the whole stream of offset credits is verified. If/when buyers

have acquired offset credits which are not fully validated, the buyers are legally obligated to go to the market to buy replacement compliance instruments. In this case, the supplier is forced to keep a significant part of their offset credit supply off the market for long periods. The offset credits that are held in the buffer account are not deemed to be suppliers' assets (for securitization or other purposes). And the buyers are asked to bear significant risk that they could end up with a liability—the obligation to go to the market to purchase replacement offset credits or allowances.

- despite all of these cumbersome procedures and additionality tests (addressed below), it is still the case that a disproportionate share of offset credits validated in compliance and voluntary markets have underlying values that are significantly less than one tCO_2e.

Due to the issues outlined above, most compliance instrument buyers typically and arbitrarily assign large discounts when determining what price they are willing to pay for offset credits. These can be up to 20% to 50%, relative to the apparent price for government-issued allowances.

The complexity and difficulty of current processes have other unintended consequences. Few buyers in compliance markets do the work to identify which offset credits meet a higher short-term verification standard (less estimation error), or have a higher potential underlying carbon removal or GHG reduction value. The heavy discount is born by most offset credit suppliers. There is no real incentive for them to invest in measurement techniques, new technologies, or processes that will improve the quality of short-term estimates.

Nori will provide CRC buyers with a guarantee that when they exchange one NORI for one CRC they have acquired and retired real interest in one tCO_2e (+/- 10%).

Nori proposes to self-insure this guarantee. In the event that post-sale validation suggests that some CRCs that have previously been sold for NORI, in fact, represent less than one tCO_2e (+/- 10%), Nori will purchase different high-quality CRCs from the queue and assign their ownership to the original buyers. For the buyer's reporting purposes, they will remain whole.

Nori's approaches to project baseline and CRC quantification will be more reliable, more transparent than current carbon markets, and will also incorporate incentives

for suppliers to develop and invest in cost-effective methods to reduce short-term estimation error rates.

Nori's market design ensures that one CRC accurately represents one tCO_2e using two different approaches:

1. since we are a voluntary-only marketplace, there is no concept of allowances or emissions targets. Suppliers of CRCs are simply selling certificates of carbon dioxide that they have actually removed from the atmosphere.

2. our verification system and the transparency and security of data on the blockchain ensure that the accounting balances out correctly as the CRC transfers ownership from the supplier to the buyer.

Proprietary methodologies

As suggested above, one of the largest challenges with carbon removal is measuring how much CO_2 was removed from the atmosphere and how much increase in terrestrial carbon stocks has occurred. Suppliers of offsets (or CRCs) need to understand how the results of their projects will be quantified. Buyers need to be able to look at the rules for the methodology and trust that what they're purchasing represents actual CO_2 removed. These rulesets are known as a protocol.

Most current carbon registries, and many accredited carbon offset credit verifiers, earn revenue by developing protocols; and/or converting protocols into proprietary models to quantify CO_2 removals for specific projects. The registries typically charge suppliers one-time offset quantification protocol approval, project approval, consulting assistance and project registration fees. These one-time project costs can range from $35,000 to well over $250,000 per project, depending on whether or not a quantification protocol relevant to the specific project has already been approved.

Listing, transaction, and delisting fees are typically added on top of those up-front transaction costs. Offset credits have to be verified before they can be listed for sale. Often, the verifiers will charge suppliers a premium to use the verifiers' proprietary models that convert complex protocols and project reports into offset credit estimates. Because much of the modeling on which the existing offset markets rely is proprietary

and not open-source, opportunities for exploiting or gaming the market systems abound as the rules are enforced by well-connected parties.

So the project listing and offset credit verification processes in existing markets are coincidentally expensive, opaque, and sometimes even mysterious. But they still tend to produce emission reduction certificates with an underlying value of much less than their tonnes of CO_2 equivalent (tCO_2e) face value.

Here is one credible summary of transaction costs for a sample of projects that removed carbon from the atmosphere through reforestation and afforestation[4].

[4] Galik, Chistopher et al., "Transaction costs and forest management carbon offset potential: Working Paper", Nicholas Institute/Duke University Climate Change Policy Partnership, July 2009, page 5, https://nicholasinstitute.duke.edu/ecosystem/land/transaction-costs-and-forest-management-carbon-offset-potential

Project Size	247 ac (100 ha)		2,470 ac (1,000 ha)		24,700 ac (10,000 ha)		
	Low	High	Low	High	Low	High	Reference; Notes
Project Establishment (timber and carbon)							
Site Preparation (acre^{-1})	$0.00	$200.00	$0.00	$200.00	$0.00	$200.00	A
Inventory (acre^{-1})	$5.00	$35.00	$5.00	$10.00	$3.00	$8.00	B
Management Plan Preparation (acre^{-1})	$0.00	$30.00	$0.00	$15.00	$0.00	$3.00	B
Planting Costs (acre^{-1})	$0.00	$250.00	$0.00	$250.00	$0.00	$250.00	A (low); C (high)
Project Establishment (carbon only)							
Carbon Project Development (acre^{-1})	$0.00	$20.00	$0.00	$5.00	$0.00	$0.65	B; Includes scoping fees, planning, project documentation
Pre-project calculations, analyses (acre^{-1})	$0.00	$5.00	$0.00	$2.50	$0.00	$0.75	B; Includes analysis of risk, leakage, social impacts, regional baselines
Conversion of inventory to carbon baseline							Includes historic calculation of baselines
Lookup Tables (acre^{-1})	$0.00	$3.00	$0.00	$1.10	$0.00	$0.35	B
From sampling (acre^{-1})	$0.00	$6.50	$0.00	$2.00	$0.00	$0.45	B
Growth modeling- first year(s) storage							Includes calculation of previous vintage credits
Lookup Tables (acre^{-1})	$0.00	$1.75	$0.00	$0.30	$0.00	$0.10	B
From sampling (automated) (acre^{-1})	$0.00	$1.75	$0.00	$0.30	$0.00	$0.10	B
Calculation of LLWP Carbon (all ytd)	$0.00	$3.00	$0.00	$0.50	$0.00	$0.10	B; Includes retroactive crediting up to allowable cutoffs
Initial Verification Fees (acre^{-1})	$8.00	$12.00	$1.50	$2.60	$0.25	$0.40	B
Ongoing Project Implementation (timber and carbon)							
Site Maintenance (acre^{-1})	$0.00	$5.00	$0.00	$5.00	$0.00	$5.00	A
Mark/Administer Harvests (acre^{-1} harvested)	$5.00	$120.00	$5.00	$110.00	$5.00	$95.00	B
Ongoing Project Implementation (carbon only)							
Measurement/Monitoring							
Modeling, Lookup Tables (acre^{-1})	$0.00	$0.84	$0.00	$0.13	$0.00	$0.03	B
Field Sampling/Monitoring (event $^{-1}$ acre^{-1})	$9.60	$26.85	$1.33	$3.15	$0.13	$0.36	D
Annual Verification Report (event^{-1} acre^{-1})	$6.00	$8.00	$1.00	$1.50	$0.12	$0.18	B
Growth Modeling-annual storage							
Lookup Tables (acre^{-1})	$0.00	$1.50	$0.00	$0.20	$0.00	$0.05	B
From sampling (automated) (acre^{-1})	$0.00	$1.50	$0.00	$0.20	$0.00	$0.05	B
Calculation of LLWP Carbon (acre^{-1})	$0.00	$0.75	$0.00	$0.50	$0.00	$0.15	B
Aggregation Fee (net project revenue^{-1})	10.00%	12.00%	10.00%	10.00%	8.00%	10.00%	B; Sometimes include verification for smaller landowners

A. South Carolina SFI Committee 2003
B. Pers. comm., M. Smith, Forecon, Inc., January 6, 2009.
C. Brown and Kadyszewski 2005.
D. Mooney et al. 2004.

Figure 3: In this report, afforestation projects faced additional fees ranging from $30–$750/acre plus 10% of the project revenue just to sell their generated credits.

Given the high cost of development, some registries understandably treat the protocols as their proprietary intellectual property.

Nori will make all carbon removal quantification methodology protocols we develop open-source and transparent. We will not charge listing fees to suppliers. We hope to eliminate, as much as possible, the barriers to entry that suppliers face so that more suppliers will be incentivized to participate in our market. And our one CRC = one Tonne guarantee to buyers eliminates the significant buyer risk that characterizes existing compliance markets.

Many one-tonne offsets do not represent one tonne

As noted, a significant share of the electronic compliance instruments (allowances

and offset credits) traded in traditional markets represent far less than one tCO_2e either removed from or not emitted to the atmosphere. So the underlying environmental value of many of the e-certificates that trade on those carbon market platforms have underlying value that is significantly less than their face value.

This has significant implications for at least two populations of market participants: regulated/compliance buyers and offset credit sellers.

As depicted in Figure 1, offset credits issued to large hydro were available for sale in 2016 at prices that are a fraction of the market price for offset credits that derive from carbon removal projects (all above the red line that we have inserted into the original graph on page 19).

Reducing the atmospheric concentrations of heat-trapping gases is achieved through two means that work together:

preventing the release of further greenhouse gas releases that might otherwise occur.
removing greenhouse gases from the atmosphere, and storing them in industrial, terrestrial, geologic, aquatic, or other reservoirs.

In traditional voluntary and compliance markets, it is simply assumed that if a hydro dam is built and it produces electricity, then some volume of fossil carbon—embedded in coal, natural gas or petroleum—is no longer being released to the atmosphere. Traditional market protocols issue credits that reflect this assumption, and those credits are deemed to represent emission reductions that are real, verified, and permanent.

The offset credits that are issued to "emission reduction projects" are deemed real, verified, and permanent. This is the norm even when it can be demonstrated that no incremental fossil fuel has been, even temporarily (let alone permanently), held in any earth-based reserve as a result of the successful execution of the project.

Simultaneously, the picture is complicated for suppliers who are drawing down GHGs from the atmosphere. When, for example, a farmer, rancher, or forest manager demonstrably removes a unit of carbon and/or nitrogen-based greenhouse gases from the atmosphere, and holds that element in a terrestrial reserve, traditional GHG market rules dictate that the project proponent must:

- prove the resulting increase in terrestrial carbon and/or nitrogen stocks.

- place a covenant on their land requiring themselves and any future owners to hold that incremental carbon or nitrogen in storage, sometimes for up to 100 years.

Thus, in the conventional GHG markets, a large population of emission reduction projects are deemed to have held in storage GHGs that would otherwise have been released. This is despite a lack of strong evidence that this outcome has occurred. In addition, even if they could prove such an outcome on a temporary basis, they face no obligations to ensure that any resulting incremental carbon or nitrogen retention in terrestrial reserves will be permanent.

Such an inconsistent application of the definitions of the terms "real," "verifiable," and "permanent" means that traditional GHG markets are inherently biased against carbon removal projects.

This is ironic, when in many cases the only offset projects that truly have a positive impact on atmospheric concentrations of heat-trapping gases are projects which draw down GHGs from the atmosphere. It is simply not possible for suppliers of carbon removal to compete in markets with these structures.

The Nori marketplace supports only real, verifiable removal of CO_2 and its equivalents from the atmosphere, and the longer-term storage of those greenhouse gases in reservoirs that don't warm the climate or acidify the oceans. In the Nori marketplace, carbon removal suppliers won't have to compete with emissions reductions or avoidances projects.

In addition, Nori CRC creation and verification methodologies will deliberately not oblige proponents to commit to retain CO_2 in storage for periods that are many multiples of the period over which they may secure payments for maintaining those services. A much shorter time period is still appropriate for the global goal, however, as we discuss below.

The question of "permanence"

Nori CRC quantification methodologies will rely on the construction of dynamic project "baselines." Each project baseline will reflect a reasonable estimate of the amount of carbon and any equivalents that would be stored in the absence of the CRC-generating project. This enables us to verify and validate truly incremental therefore additional CO_2 removals from the atmosphere.

Carbon removal suppliers will be required to maintain land management and other practices that remove the heat trapping elements from the atmosphere for at least 10 years. For the first methodology on our platform—soil carbon removal—the term over which Nori CRC suppliers must maintain carbon and nitrogen stocks in storage will more closely match with the period over which they will be receiving payments for providing that service. Nori's dynamic baseline-setting strategy will be more transparent, predictable, open to community input, and likely to achieve the desired result of incremental CO_2 removal than most of the more subjective and opaque "additionality" tests that are normally applied in traditional offset credit markets.

At the end of the first term of a Nori-approved project, Nori will publish the final year carbon baseline estimate for that project. If the supplier wishes to continue to offer CRCs for sale on the Nori platform, they will reapply for a new project approval. Any CRCs arising from the second project approval phase will be calculated relative to a new dynamic carbon or nitrogen stock baseline that starts where the first project left off.

By publishing the last baseline for every project in the Nori platform, Nori ensures all other carbon market administrators will have access to the information and the ability to apply that baseline to any projects that attempt to list on their registries. This Nori procedure can not obligate, but will position, all other carbon market administrators to ensure that one-time CRC suppliers cannot generate revenues by releasing carbon stocks to the atmosphere and starting all over again, with no net environmental gain over the longer term.

Market crashes and low liquidity

At this time, and for the foreseeable future, there is a glut of offset credits in existing markets. There are many reasons for this, including but not limited to: (1) compliance market administrators introducing declining limits on the rights of covered emitters to use offset credits as compliance instruments, and (2) eroding confidence in the validity of emission reduction and carbon removal claims in existing markets. The current low volume of offsets purchased, relative to supply on offer, results in a thin and highly variable market with unpredictable prices. These circumstances have also historically been vulnerable to market manipulation which in turn erodes buyer confidence.

Governments have consistently created allowance oversupplies for their compliance markets, and then typically sold allowances for far below the marginal cost of reducing emissions or removing incremental CO_2 from the atmosphere. The same governments then intervene by setting allowance (but not offset credit) price floors, and reducing competition for their allowances by cutting covered entities' rights to use offset credits as compliance instruments. Many offset credit markets have crashed as a result. This leads to an oversupply, and to underperformance in action on one of the gravest threats faced by civilization at the present time.

In markets that do not have price support or government-set minimum floor prices, the highest prices buyers typically pay tend to be in the first one or two years after market launch. Due to the oversupply of compliance instruments and offset credits, apparent market prices tend to crash within five to seven years of initial market launch. Because the true marginal cost of cutting GHGs tends to go up over time, most market-generated carbon price signals fail to cover the costs of cutting GHGs.

At the time of writing, the highest prices paid for allowances or offset credits in every US and EU cap and trade market precedent to date have been paid in the first year or two of trading. Often these prices are paid by speculators in the year before the market is formally launched. This has been true for the EU ETS as well as the US lead phaseout, ODS, SO_2, NOx, SCAQMD RECLAIM, RGGI, and California CO_2 markets. In every one of these precedents, the market price for compliance instruments has crashed to the regulated floor (when there has been a floor in the regulation at which prices can come to a stop). These lower prices have been well below the marginal cost of cutting emissions, and have more or less remained at the same levels until the cap and trade market was shut down or replaced by another regulation. Nori's aim is to leverage the liquidity and adaptability of cryptocurrency markets to engage in true price discovery for the removal of a tonne of CO_2.

Lack of accurate price disclosure and true market signals

In government-administered markets, governments attempt to ward off these market failures by introducing compliance instrument auctions with compliance instrument floor prices. Nonetheless, GHG allowances and CO_2 offset credits still rarely sell for more than the government-dictated floor price. So there is still no true price disclosure.

In compliance markets, governments' tendencies to create large GHG allowance surpluses tend to be the primary drivers of the apparent market price crashes. But in almost every precedent, rather than cutting their allowance surpluses, the first thing governments do to address crashing prices for compliance instruments is to terminate the rights of offset credit generators to continue to supply the compliance market.

This has happened in a majority of European Union member states in the EU ETS, the RECLAIM market (which operated in the Los Angeles airshed from 1992 to 2017), and has already happened in the California CO_2 market. There, an excess of government-issued allowances is the primary cause of compliance instrument surpluses.

From day one, the California cap and trade rule—drawing upon learnings from other jurisdictions that limited offset use after the market had been working for a while—limited those covered emitters' rights to use offset credits. However, covered emitters are hesitant to buy offset credits, even at a discount to allowance prices, due to their previous experiences in the California cap and trade markets. In fact, covered emitters in the California market have never used even 50% of their allowed offset credit limit, and there is a large backlog of unsold offset credits in all of the CAR, ACR, and Verra markets.

There are two reasons for this surplus. First, as introduced above, the California rules impose significant risk on emitters who elect to use offset credits as compliance instruments. Buyers are liable for ensuring their suppliers comply with the offset credit permanence tests that are associated only with carbon removal projects. There are no permanence tests for emission reduction projects and buyers are not accountable if an allowance proves to have no real underlying GHG reduction value.

Second, because most buyers are very familiar with this pattern of government response, in most compliance markets, buyers tend to peg the price they are willing to pay for offset credits at 50% or less than the apparent market (or floor) price for government-issued allowances. This is ironic, because—provided the offset's carbon

removal is verifiable and real—it is the only instrument that really helps in meeting emissions reductions goals.

Financial additionality tests

Traditional voluntary and compliance offset credit markets also apply "additionality" tests to offset projects before they are listed for approval. To qualify for credits in most incumbent markets, projects must show their actions to be beyond what the suppliers must do anyway to comply with local regulations. Often the projects must also involve adoption of technologies or processes that are not common practice at the time.

Finally, the projects often have to meet a "financial additionality" test. This test requires potential offset credit suppliers to prove that in the absences of offset credit sales revenues, the action they are undertaking to reduce emissions or remove CO_2 from the atmosphere ("the project") would not be profitable. For example, say a polymer company developed a material that sequesters removed CO_2 and it became a profitable business model. In many conventional carbon markets, the company perversely wouldn't be able to also sell the service of storing carbon as a credit into the market because they already generate a profit.

The application of the financial additionality test in existing carbon markets is deemed important because it is expected to ensure that activities that would have happened anyway do not get funded. However, when it comes to carbon removal, this test removes any motivation for food producers, miners, and major manufactures to adopt practices and processes that might utilize removed carbon dioxide as an input. The financial additionality test dictates that only unprofitable projects will be approved to earn incremental revenues by delivering important ecosystem services. This makes little sense.

While additionality tests are important to incentivize proper emissions reductions, a test for un-profitability is counter to the goal of maximizing the amount of CO_2 removed from the atmosphere. Our aim is to deliver the market infrastructure for carbon removal as a service.

We want carbon sequestration to enable strong profits, and to attract as many new entrants to the market as necessary to draw atmospheric CO_2 concentrations down to safer levels.

In time, carbon prices will then reach a sustainable balance between between the supply of and demand for ways of drawing down carbon from the atmosphere. In sum, additionality tests keep good people out of bad markets.

We are growing a marketplace for people who are doing good, and want to do it well.

SECTION 5

Blockchain is needed to solve the existing carbon markets' failures

Ensuring transparency over who owns the carbon removal certificate

In order to keep track of the amount of CO_2 removed, Nori will verify the creation and sale of carbon removal certificates. A CRC is a certificate that represents one tonne of CO_2 that has been removed from the atmosphere and stored in a stable state. The bookkeeping of who owns a CRC at what period of time is critical to establishing a fair and transparent marketplace.

With Nori, the lifecycle of a carbon removal certificate is as follows:

1. a project lists itself in the Nori platform by uploading information defining project location and boundaries as well as historical operating data.
2. the project submits a carbon removal claim report. Annual operating data updates must be verified before Nori can issue CRCs.
3. a verifier confirms that the supplier's data is valid and that the CO_2 has been removed and measured correctly. This verification is attributed in the smart contract.
4. the CRC is listed for sale in the Nori market queue in a first-in, first-out basis.
5. once at the front of the queue, the next buyer purchases the CRCs by sending NORI tokens to the smart contract acting as market operator for the CRC.
6. the CRC owner immediately changes to the sending address of the NORI tokens in step 5. The CRC smart contract record is now "retired" and no longer allows a change of ownership.

Each of these steps occurs on the public blockchain. Through our application, an outside observer can easily trace the history of who removed the CO_2, how it was verified to be removed, who purchased the CRCs, and when the transaction took place. The transparency of the blockchain—meaning, the cryptographic proof that what is on the blockchain is what actually occurred in the digital world—ensures easy auditability of the lifecycle of the Carbon Removal Certificate.

Nori will provide an increasingly transparent way to audit and verify CRCs

Markets that allow for transacting in carbon have a critical imperative to ensure to all parties involved that the reductions or removal of CO_2 have actually taken place. To participate in the current offset markets, a supplier has to submit to a series of manual audits to verify the efficacy of their project before it is even allowed to be registered. These audits are completed according to the rules laid out in a particular methodology for that specific activity. Auditing and legal compliance adds significant costs to providing assets.

Our long-term vision is to automate this process wherever possible in a fully transparent way. Yet-to-be-created sensors and devices will reduce the amount of manual human involvement necessary to measure and verify how much CO_2 has been removed by a supplier. Such automation will lower costs for verification, and make it even easier to scale a market that removes carbon dioxide.

Tokenization via a cryptocurrency enables a new method of financing carbon removal

Suppliers of offsets currently have to find one or more counterparties to purchase their produced offsets. This is a time-consuming and unfamiliar process for people who might be, say, agricultural experts. The same is true for buyers, who have to work with a broker or consultant to find a project that meets their criteria and is available for purchase. Counterparty matching is a barrier to entry that prevents new buyers or suppliers from participating in the carbon removal industry. Our system eliminates that barrier.

Our NORI token will be minted before launching the market platform. One NORI token will always be able to purchase one tonne of CO_2 in the form of a CRC (assuming requisite CRC supply). A buyer wishing to pay for the removal of 10,000 tonnes of CO_2 would purchase 10,000 CRCs for the price of 10,000 NORI, plus a transaction fee (which is Nori's source of revenue).

Using the token as the method of payment reduces the amount of friction that exists when a supplier and buyer transact with each other. It also enables the buyer to purchase CRCs from multiple suppliers in a single transaction. If a buyer wishes to purchase more CRCs than are for sale from the next supplier in the queue, then the

platform will automatically batch together multiple suppliers at the front of the queue to provide the needed CRCs to the buyer. The system will pay out the NORI tokens proportionally to all the suppliers involved in that transaction. On the other end of the spectrum, the NORI token can also be used to pay for microtransactions of CRCs.

SECTION 6

Carbon removal is measurable

Ultimately, reversing climate change will require permanent removal and storage of excess carbon dioxide from the atmosphere. Additionally, carbon dioxide removal needs to be done on a large, global scale—equivalent to the scale of human activities. In order to facilitate scaling this, Nori is creating methodologies for the measuring and accounting of carbon dioxide removal. Transparency is at the heart of what Nori does, so these methodologies will be open and crowdsourced, ensuring a collaborative and cooperative advancement of solutions to the urgent problem of climate change.

A Nori carbon removal methodology is a set of accounting rules that will provide proof that carbon dioxide has actually been removed. The Nori methodologies Github repository is used to allow contributors to collaborate on improvements to proposed methodologies in an open, transparent, and versioned manner. The outcome of each methodology is a step-by-step process for accounting a verifiable amount of carbon dioxide removed. This amount is accounted for in the form of carbon removal certificates (CRCs). Each CRC will represent one metric tonne of carbon dioxide physically removed and stored.

There are many different ways to remove carbon dioxide from the atmosphere. The readiness of the different approaches ranges from practices that have been observed for many thousands of years, like tree planting and storing carbon in soils, to early-stage demonstration of industrial plants that can remove CO_2 from the atmosphere. Each way to remove CO_2 can be considered a methodology. Each comes with different levels of technology/system readiness, risks, co-benefits, and permanence of the carbon dioxide removed.

Method of carbon removal	Practices (examples)	Implementation costs	Measurement options	Readiness Levels
Soil Carbon Removal	No-till, cover crops, rotating crops, rotational grazing, compost, biochar	Low to Medium	Operating data reporting, soil sampling and analysis, sensor data, IFR imaging	Mature
Forestry	Tree planting, agroforestry	Medium	Seeding, planting, management & clearing activity reporting, IFR imaging (satellite, drone), soil sampling and analysis, tree mass analysis	Mature
Carbon removal in the built environment	Biological and chemical materials	Medium	Documenting, tracking and reporting CO_2 absorption processes, reporting material weights, densities and end-uses	Early stage / in development
Wetland restoration, Blue Carbon	Mangroves, salt marshes, algae	Medium to High	Imagery, weight	Early stage / in development
Enhanced weathering	Direct/indirect mining	Medium to High	Imagery, gas analyzers	In development
Bio-energy with Carbon Capture and Storage	Land/water based bio-harvesting with CSS	High	Volumetric, gas analyzers	In development
Direct Air Capture (DAC)	Heat, pressure, and moisture driven CO_2 extraction devices	High	Volumetric, gas analyzers	In development

SECTION 7

Nori methodologies

Nori's goal is to enable large-scale carbon dioxide removal and storage through incentivizing a suite of carbon removal processes. In order to incentivize these processes, it must be possible to quantify the amount of carbon dioxide removed in a credible fashion. While the details of each methodology will be outlined in separate documentation and can be found in Nori's Github repository, below we outline the general process for verifying a carbon removal project across all methodologies. Each methodology will consist of three components:

1. a process to remove carbon dioxide.

2. a process to list the project.

3. a procedure to verify, maintain, audit, and rate the CRCs.

A process to remove carbon dioxide

To have a project considered for listing it has to be able to remove carbon from the atmosphere or ocean. This means that on net, more carbon dioxide and/or other equivalent greenhouse gases are removed than are put into the atmosphere. If any excess GHGs are emitted in the process of doing the carbon removal activity, then those emissions are counted against the total amount of CRCs which can be

generated. The first methodology Nori is launching will be for farmers in the United States who can change cropping practices to add more carbon to their soils.

A process to list the project

The estimation of carbon removal potential represented by CRCs over time depends on the information provided by the supplier (project developer). Hence, after an initial CRC estimate is determined for a project, a supplier can see their expected payout from CRCs. Here is a user flow diagram to illustrate this process for our first methodology.

A procedure to verify, maintain, audit, and rate the CRCs

Initial verification

Once the project information is used to estimate the potential CRCs over a period of time, the supplier will need to contact a third-party verifier who will conduct the aforementioned verification attestations. Before these CRCs can be listed into the Nori queue, a verifier must attest three things to be true. 1) The supplier (project developer) has the right to list the project. 2) The data provided by the supplier is accurate. 3) The project is not listed on other registries or carbon markets. Here is a user flow diagram to illustrate this process.

Maintenance of project verification status

Suppliers will need to maintain project data and have that data verified over a given period of time (as outlined in each Nori methodology's verification protocol) in order to maintain project listings. Here is a user flow diagram to illustrate periodic verification. Here is a user flow diagram to illustrate project maintenance.

> *Ex: In carbon sequestration in croplands, there will be a yearly requirement to provide accurate data on that year's land management practices. In order to list the CRCs for increased carbon stocks in the land over that year, the supplier would have to pay a verifier to conduct the off-site verification of data once again.*

Random auditing

There is a final audit at the end of the 10 year CRC contract. For our first methodology, the audit includes comprehensive soil sampling. Here is a user diagram to illustrate the process.

To mitigate risk of collusion or incompetence, verifiers will be audited by a second verifier. If collusion or cheating is discovered, the original supplier and verifier will be blacklisted from the Nori marketplace, and their CRCs will be pulled from listing.

CRC score

Each CRC will be assigned a quality score. The CRC quality score is determined by the quality of data provided by the project that can decrease the estimation error around quantification of carbon dioxide removed. The quality score is what determines how many NORI tokens can be immediately tradable, versus held in a reserve account that will be released after the 10-year audit. The purpose of the quality score is to create a market incentive to drive better measurement technologies, and also incentivize the supplier to pay for more forms of verification so that they could have more NORI tokens immediately tradable. Once a CRC has been assigned a quality score, the score cannot change, but quality scores for projects can improve over time.

SECTION 8

Token economics

The NORI token will function as the medium of exchange for purchasing Carbon Removal Certificates (CRCs). One NORI purchases one CRC. Each CRC represents one tonne of CO_2 (or warming equivalent of another greenhouse gas) removed from the atmosphere. That exchange rate will be fixed throughout the life of the Nori marketplace.

Nori is planning to create a total of 500 million tokens. 350 million of these will be sold in both a private securities offering and an ongoing public sale after the Nori market has launched. 100 million tokens will be set aside for an insurance fund to cover faulty carbon removal certificates. 50 million tokens will be held by the Nori team.

Token Allocation	Percentage	# of Tokens
Regulation D (Class A + Class B)	18.8%	94,000,000
Regulation CF	1.2%	6,000,000
Public sale (Class R)	50%	250,000,000
Insurance reserve	20%	100,000,000
Nori founders/employees/advisors	10%	50,000,000
Total		**500,000,000**

Our mission is to create a decentralized network of activity where suppliers of CRCs are getting paid via NORI by buyers. To that end, Nori has two goals in selling tokens:

1. raise funds for the continued growth and operation of the business, in order to launch a marketplace successfully.

2. create a liquid market where third-party exchanging of the NORI token establishes a price incentive for suppliers to remove CO_2 and generate CRCs and get paid in NORI.

We are planning to sell our tokens in three different ways:

1. a private securities offering of Simple Agreements for Future Tokens (SAFTs) conducted under the Regulation D 506(c) exemption to accredited investors.

2. a crowdfunded securities offering conducted under Regulation CF.

3. public sale of tokens to anyone so that they can use them to purchase CRCs.

We anticipate conducting the private sale of SAFTs and the crowdfunded offering of debt payable by assets in summer/fall 2018. The public sale of tokens will begin after the Nori marketplace has launched, when there are CRCs available for purchase.

SAFT Regulation D Offering

All presale tokens issuable under the SAFTs will be sold as securities, and thus require a one-year lockup before they are allowed to be transferred. There are two classes of tokens to be issuable under the SAFTs: Class A and Class B. Buyers of either Class A or Class B SAFTs must be accredited. There is a $5,000 minimum purchase requirement. For both Class A and Class B SAFTs, no individual buyer (or their subsidiaries) will be allowed to purchase more than 20% of the SAFTs in that class. This is on par with the maximum limits that the compliance carbon markets place on certificate purchasers in order to ensure robust and fair market activity. If after filling all existing orders for SAFTs there exist unsold SAFTs, then Nori will allow existing buyers to purchase beyond the 20% limit on a case-by-case basis.

All SAFTs will be sold on a first-come, first-served basis. If the Class B SAFTs become oversubscribed, we will give priority to any Class B buyers who also purchase Class A SAFTs.

Class A SAFTS

Price: $0.075 per Class A Token issuable under the Class A SAFTs
Total Offered: 19,000,000 Class A SAFTs
Total Offering Amount: $1,425,000
Maximum individual purchase: $285,000 (SAFTs representing 3,800,000 Class A tokens)

Class A tokens are meant to be sold to future buyers of CRCs. To that end, all Class A tokens will have a contractual requirement to be used for purchasing CRCs before they can enter public exchanges. After the one-year lockup ends, owners of Class A tokens will only be able to use them inside the Nori application.

The purpose of this class of tokens is to establish pre-existing demand for CRCs. 19 million tokens in circulation that can only be used to purchase CRCs indicates to the suppliers that there will be buyers for their CO_2 removed.

Class B SAFTS

Price: $0.15 per Class B Token issuable under the Class B SAFTs
Total Offered: 75,000,000 Class B SAFTs
Total Offering Amount: $11,250,000
Maximum individual purchase: $2,250,000 (SAFTs representing 15,000,000 Class B tokens)

Class B tokens have the same one year lockup requirement as Class A tokens, but there is no requirement that they be used to purchase CRCs.

Regulation CF Offering

Before or during the Regulation D SAFT offering, Nori intends to conduct a separate offering under federal Regulation CF during Q3-4, 2018. Please go to the www.republic.co/nori crowdfunding platform for the details of this offering.

Public Sale (Class R)

Price: Beginning at $1.00/token, variable over time
Amount of tokens for sale: 250,000,000

After the Nori marketplace has launched, Nori intends to offer an additional tranche of tokens in what we are calling Class R (R for "retail"), to be sold in a metered distribution. Each Class R sale of tokens will last for a period of time less than four weeks in length. If at the end of that particular sale period there are any unsold tokens for that batch, then those remaining batch tokens will be burned. Nori expects to offer these tokens at the time of the launch of the Nori marketplace, and then two more sales in the first year of operation. After the first year, we expect a sale of a Class R batch of tokens each quarter thereafter until we have sold or burned all 250 million tokens.

It is intended that buyers purchase these tokens for the purpose of buying CRCs, however there are no restrictions on the transferability of these tokens. The method of this sale is still being determined. It is Nori's hope that this sale of tokens will be classified as non-securities by the SEC, but if that is not possible, then we will be filing for approval to sell these tokens under the Regulation A+ exemption of the Securities Acts.

We currently intend to sell Class R tokens in batches every quarter. Both the volume and the price of each round of Class R token offering will be "metered," according to a pre-published formula that we have not yet completed. The purpose of pre-publishing the formula for relating the Class R token supply and offering price is to provide market participants confidence that Nori will never construct a Class R token release that will disrupt true market-driven price discovery for the token. The goal with this metered system is to ensure that the price of the NORI token matches—as closely as possible—the true value the market places on removing one tonne of CO_2.

Insurance Reserve

Amount of tokens in reserve: 100,000,000

Part of Nori's unique value offering to the market is that we will guarantee to buyers that when they pay for one tonne of CO_2 removal, they will be made whole in the event the particular CRC they purchased is found to have not actually removed one tonne. In that case, Nori will purchase new CRCs in the necessary amount using a reserve of tokens and assign ownership of those CRCs to the buyer.

As the Nori market operates over a period of time, we will evaluate the rate at which insurance payouts are required to be made. If time reveals that we do not need such a substantial reserve of tokens, then Nori will publicly announce a planned date for burning excess reserve tokens.

SECTION 9

Forward contract auctions

In commodity market terms, the Nori marketplace as described in this white paper is a spot market for CRCs. To facilitate faster and more accurate price discovery, we also intend to hold regular forward contract auctions for CRCs. This will be a blind single-price auction format. CRC suppliers and potential buyers submit confidential bids disclosing the prices (denominated in US dollar-equivalent) at which they are willing to trade CRCs for NORI tokens on a designated future date.

This auction format provides some certainty around future prices paid, as well as firming up some demand for CRCs. The forward contracts resulting from successful auctions will still be over-the-counter bilateral transactions, which means that the parties to the contracts will still bear all delivery and settlement risk.

Throughout these auctions, the price peg of one NORI token to one CRC will be maintained. If, on the forward contract settlement date, the price of the NORI token in USD terms is lower than the CRC price agreed to in the contract, then the buyer of the CRCs will be required to pay one NORI token, plus the remaining USD balance, in a currency to be determined (e.g. USD, ETH, BTC, etc.).

Example:
Supplier A delivers 10,000 CRCs to Buyer B. The forward contract price is $3.80. At the time of the delivery of CRCs, the NORI token is trading at $3.10 in the reference third-party exchange(s). The buyer pays the supplier one NORI token plus $0.70 (in a currency that is agreed in the contract) per CRC for a total of 10,000 NORI plus $7,000.

If, on the settlement date, the price of the NORI token in USD terms is higher than the contracted CRC price, then the seller of the CRCs will receive one NORI token per CRC sold, and will refund the buyer half of the difference between the contract price and the NORI token market price. This is so that the CRC buyer and seller share in the benefits of NORI token price increases in the third-party markets.

Example:
Supplier A delivers 10,000 CRCs to Buyer B. The contract price is $3.80. At the time of the delivery of CRCs, the NORI token is trading at $5.80 in the third-party exchanges. The buyer pays the supplier one NORI token per CRC, and the supplier pays the buyer $1.00 per CRC. The supplier receives 10,000 NORI, and the buyer receives $10,000.

SECTION 10

The market

We split our market into two segments:

- **Buyers:** emitters who are adding CO_2 into the atmosphere and paying for its management. These could be individuals or businesses with a strong sense of environmental responsibility and commitment to reducing their carbon footprint who would ultimately participate in the market to reverse the carbon footprint of their projects. The most proactive of them are interested in having a net-positive footprint—removing more CO_2 from the atmosphere than they emit.

- **Suppliers:** individuals, aggregators, or businesses that would be doing the work of removing carbon dioxide and thus driving the creation of carbon removal certificates (CRCs). For example, these are practitioners of regenerative agriculture, large landowners, agroforestry operators, managers of mine tailings, operators of direct air capture technology, etc.

We further identify the actual market of the total possible buyers and suppliers as well as the necessary market of buyers and suppliers that would be required of a healthy planet. The necessary market would not only negate the total scope of the world's annual emissions, but also reduce excess CO_2 to a degree that enables the world to meet and exceed internationally agreed climate change targets.

Nori's mission is to see a world returned to 300 ppm of atmospheric CO_2. Returning to this concentration requires the removal of 1.5 trillion tonnes of CO_2. This number increases every year as we globally emit the equivalent of 53 billion tonnes of CO_2 and in spite of efficiency gains and low carbon sources of energy, continues to rise. We

recognize that Nori cannot possibly be solely responsible for this massive undertaking, but we anticipate having significant impact in two ways:

1. we will account for a significant percentage of the CO_2 that gets removed.

2. we will spur the development of an entirely new carbon removal industry, whose actors will compete with each other on the most efficient and value-providing methods for removing GHGs.

Buyers

Voluntary Carbon Offset Buyers

"As companies and organizations begin to adopt carbon negative goals, like Interface's mission to create a climate fit for life, we need platforms and mechanisms to help us achieve these commitments. A platform focused on connecting, and providing valid carbon removal offsets is a positive step forward.

I'm excited about the potential for a platform that helps us with our goal to reverse global warming by connecting disconnected players from the agriculture and business sectors through the mechanism of offsets to help companies achieve their goals and incent those in the agriculture and farming world to continue to work in ways that protect the planet."
(4/4/18, Email)

Erin Meezan

VP and Chief Sustainability Officer, Interface, Inc.

The first category of buyers that Nori is working with are highly motivated to help create better tools to address climate change, and have expressed a willingness to be "guinea pigs" in the Nori marketplace.

Voluntary buyers of carbon offsets tend to value the public relations/advertising benefits of such acts, and/or feel compelled to compensate for their carbon emissions. They are often daunted by complexity, opacity and the amount of money spent on auditing and compliance in the current market. The most important factor in their evaluation of a carbon removal tool is how well they can trust that the carbon was actually sequestered.

Actors in the corporate social responsibility realm represent the biggest buyers of voluntary carbon offset markets. They often seek novel ways of demonstrating their environmental attitudes, such as Airbnb initiating an offset program for their employees' commutes.

Events

"As someone who is pretty good at finding things on the internet, I couldn't easily find the best way to offset the 40,000 tonnes generated by our conference." (9/21/17, Phone Call)

Peter Gilmer
Executive Director & Head of Sustainability of the
Web Summit tech conference

Prospective Buyers

As Nori continues from the presale to the retail sale, we have identified a number of other prospective buyers.

Airlines

"We are interested in frictionless ways to immediately offset flights, and our customers are beginning to demand that we do this."
(9/20/17, Climate Week NYC)

Sophia Mendelsohn
Head of Sustainability, JetBlue Airways

Because airlines currently have to burn fossil fuels to fly, there is presently no way to directly neutralize the carbon footprint of air travel. Airlines can offer passengers the option to offset travel, but oftentimes passengers are unsure whether this actually reduces their footprint. Corporations also give flyers the option to offset their carbon footprint. It carries the benefit of their emissions being more easily traceable through the use of a simple API.

Individual Buyers

Individual buyers are primarily motivated by environmental leanings to offset their emissions. Buyers could also be interested in buying a gift on behalf of someone else. One of the biggest concerns is whether what they buy is actually creating an impact. The process is daunting; we aim to simplify it. We will use our software platform to create the framework for plug-ins to easily negate an individual's carbon footprint.

Cities/Governments

Cities and governments can use the Nori platform to meet and motivate commitments to rapidly reduce/negate carbon emissions. Under increasing political pressure, mayors and government officials will be held accountable to meet their carbon reduction goals and can buy and use Nori tokens to meet those goals.

Suppliers

One of the main aims of this project is to reward and incentivize the growth of existing providers of carbon-removing products and services not already selling their CRCs on an existing market. Suppliers who earn tokens will receive an extra income stream and be able to expand their businesses—all the while encouraging other suppliers to enter the space because of competitive pressures.

We define suppliers as any project developer or entrepreneur capable of deploying solutions that can remove carbon dioxide from the atmosphere. Through a mixture of market research and interviews of members of the following subgroups, we have determined—and will alleviate—the following pain points.

Our approach is two-fold: (1) Attract those who are removing carbon from the atmosphere (through products or other means) who are not currently monetizing their carbon sequestration, and (2) convince those who are currently monetizing carbon removal to use our market.

Non-monetized and already in production

Farmers and growers are already practicing regenerative agriculture techniques that return carbon to their land. By offering them the opportunity to earn tokens, we provide a new income stream to support the practice, and incentivize new entrants to the market, thus accelerating carbon removal activity. We must make sure that their carbon is not already being counted elsewhere in the process.

There are also businesses considering ways to sink carbon into products like wooden i-joists (for wooden skyscrapers) for building construction, and food, fibers, materials, and textiles made with carbon taken out of the atmosphere. Currently, the majority of these emerging ventures are not jointly measuring and monetizing the carbon removal service they are providing.

Non-monetized and not profitable

Products that are not currently profitable—or are right on the margin—may enter the space knowing that they have an income stream in the form of valuable cryptocurrency tokens. Some of these projects may be profitable, but within current carbon offset regimes the costs of verification and creating a new verification protocol exceeds the immediate benefit.

Monetized and in production, but inefficient

Through the use of new drone technology, the costs of sequestering carbon through managed forests will go down, and our token may offer better value relative to conventional offsetting markets.

SECTION 11

Go-to-market strategy

Nori is able to go to market by connecting an unmet supply (the ability to remove carbon dioxide from the atmosphere) with an unmet demand (the desire to pay for removing excess carbon dioxide from the atmosphere). Central to this effort is building a community that is committed to supplying, verifying, and buying CRCs. Supply comes from individuals and CRC aggregators who are involved with projects that can remove carbon dioxide from the atmosphere.

We must create a product that integrates with our first baseline generator to verify CRCs. Demand for CRCs and the NORI token comes from the token launch, third-party exchange markets, forward contracts, and over-the-counter exchanges. To go to market, each of these four tracks must advance in parallel.

The responsible approach to this challenge is to begin operating the market with a whitelisted group of suppliers, verifiers, and buyers. To build a thriving marketplace, it is imperative that we onboard our early adopters and grow the network in a healthy, sustainable way.

Supply

After conducting a broad technology review of all the different methods to remove carbon dioxide from the atmosphere, we determined that the initial supply for the Nori

marketplace should come from the agricultural sector in the United States who would be incentivized by the Nori marketplace to increase carbon dioxide sequestration in soils.

Nori has prioritized the methodology for carbon removal through soils because of its immense carbon storage potential. The top 30 cm of soil throughout the globe stores twice as much carbon as the atmosphere[5].

Additionally, focusing on increasing the carbon content of soil has an added benefit of increasing the fertility of soil. Soil erosion has been steadily increasing over the last century, and soil restoration through regenerative farming practices such as no-till, cover-cropping, and crop rotations ensures soils and lands will remain productive—or become more productive—for agriculture.

Using this methodology is a win-win situation because it serves as both (1) carbon drawdown mechanism, and (2) means of making farmland more sustainable over the long-term. This is an opportunity for two industries—environmental technology and agriculture—to each meet their respective goals while simultaneously making a significant impact on the global issues of soil erosion and climate change.

Phase 1: Alpha Launch with early adopters and CRC aggregators

Early adopters in Nori will come from two initial channels:

First, farmers will have the ability to enter their data into COMET-Farm with whom we have established a data layer connection. Second will be with data management software that is used by farmers. If the farmers choose to engage with Nori directly they will be suppliers; if they assign CRCs to the Data Managers, we will collect data from COMET-Farm.

We are pursuing a short-tail and long-tail strategy. The short-tail strategy will whitelist farm management software that collects data required to generate carbon removal claims. This approach will network us into tools that farmers are using to provide data needed to generate supply. This will dramatically reduce the administrative friction for

[5] 2017 Zomer, Bossio, Sommer, Verchot: Global Sequestration Potential of Increased Organic Carbon in Cropland Soils https://www.nature.com/articles/s41598-017-15794-8

farmers to participate in a new marketplace and network in Nori to over 200 million potential yearly CRCs (in terms of the total amount of acres under management using farm management software). This approach also has the advantage of integrating into agronomic decision-making tools that can include an additional revenue stream from increasing carbon content in soils. The long-tail approach will bring on individual farmers to list supply on the Nori platform without the use of farm management software. This will initially be possible through our first baseline generator, COMET-Farm.

Phase 2: Increase supply through channel activation

As we open up the market, we will actively build channels to increase the CRC supply for our first methodologies. To this end, there are several channels where we have been cultivating relationships, including:

- Data Managers: we will build new partnerships with partners who are working with farmers to make agronomic decisions and are able to standardize a data schema to generate CRCs through farmers using their software.

- CRC Aggregators: we will engage groups who have the capacity to aggregate potential CRC supply, whether through directly purchasing farmland, or through lowering the administrative burden of individual farms to submit data.

- Brands: working with brands committed to adopting regenerative practices, we will enable companies' supply chains to measure and monetize carbon removal in their soils, which will increase brand value.

- Government offices: connecting with state Farm Bureaus and local offices of the National Resource Conservation Services, we will present our system as a new opportunity for farmers to access a private market.

- Enabling Technologies: we will engage companies and organizations that have solutions to increase carbon content in soils (i.e., microbial crop treatments, biologic fertilizers, or cover crops).

- Agricultural Networks: we will participate in grower meetings, continue our participation in networks like Carbon Farming Innovation Network, and other consortia to spread the word about Nori and engage new market participants.

- Referrals: This is a way for early Suppliers and Data managers to contribute to adding new CRCs into the Nori marketplace. We will build functionality for early participants and people who are aware of Nori to refer potential CRC suppliers to our platform and earn referral fees.

Phase 4: Build system for anyone to propose new methodologies

Our long-term goal is to create the software infrastructure for the community to generate and improve new methodologies. Our platform will create a transparent process for proposing, validating, and versioning all of the methodologies.

Verification

As Nori launches, it is critical that the system in which we verify improves over time and is more efficient than traditional carbon offset markets, both in terms of costs and trust.

Phase 1: Establish infrastructure for functioning first methodology

Working alongside leading academics in the soil-carbon field, we have been able to advance 25 years worth of models estimating carbon removal in soils, in order to establish a functioning methodology.

Key milestones of Phase 1 to date have included:

- establish integration with first baseline generator, COMET-Farm.
- production of strawman methodology data requirements for CRC quality scoring.
- establish mechanism for stakeholder feedback through a public webinar series.

Future milestones include:

- publish peer-reviewed methodology.
- operational market infrastructure.

Phase 2: Iterate and improve

After launch, we will be actively working to improve the first methodology from the input we gather from alpha users. We will establish a dynamic feedback loop to the baseline generator partner to ensure that the model improves as more verified data goes through the system in order to reduce estimation errors. We will work to standardize a data schema and integrate with Internet-of-Things (IoT) devices to improve data streams and quality ratings. We will also actively seek out new baseline generators and work with new data sets to expand the cropping methodology beyond the United States.

Phase 3: Launch verification infrastructure for new methodologies

In this phase, we will be actively launching new methodologies which we will have begun developing in phase 2. Learning from our first methodology, we will build the capacity for the verification and baseline generation of the new methodologies.

Phase 4: Automate verification, improve capacity to generate baselines

To scale the platform and the carbon removal market, we look toward ways to remove human costs so that more of the removal activity can occur. Integrating with IoT devices, we will seek to automate verification where possible. Similarly, we will use Artificial Intelligence (AI) to improve baseline generation and reduce uncertainty costs around specific carbon removal processes.

Demand

Phase 1: Sell NORI through the SAFT sale

Music festivals and large conferences have indicated serious interest in our customer discovery meetings; there exists a strong desire to completely negate the emissions of their events. Visionary companies with missions aligned to our own of reversing climate change have expressed a willingness to stand-up this new marketplace and re-route a portion of their carbon offsetting budget to purchasing Nori CRCs.

Phase 2: Retail Sale

Once the market is operational and buyers have successfully purchased CRCs from suppliers, our next step is to ensure we have secured enough inventory of CRCs available for sale that we are comfortable that we won't face inventory shortages immediately. Forward contract auctions should help those who really desire CRCs to get them while supply is less than demand may be. We will therefore sell the rest of the available NORI tokens (250 million) in a metered retail sale that will occur quarterly. NORI will be sold based on how much available CRC supply there is in the queue.

Phase 3: Open market, improved buyer functionality

During and after the sale of all 350 million tokens to the public, Nori will be actively taking steps to increase the velocity of CRC purchases with Nori tokens. We will do this through improving the buyer functionality on the platform and expanding partnerships.

Phase 4: Embed carbon removal in everyday life

Blockchain technology is often compared to the technologies that underpin the world wide web and internet (e.g. TCP/IP, HTTP, SMTP, DNS, etc.). The important takeaway is that most people do not need to know how those protocols work in order to interact with a web app. We envision a similar future for removing CO_2 in the Nori marketplace.

There are myriad ways that small actions by consumers could trigger automatic purchases of CRCs in the background:

- the gasoline pump asking if you want to make your purchase carbon-neutral.
- corporations offering to offset the emissions of your rideshare ride in exchange for viewing a short advertisement.
- mobile game in-app purchases that promise to the user some real-world environmental restoration will take place.

In this way, Nori is building an API to reverse climate change. Many people who ultimately take some action that results in buying a CRC might not even be aware of it. This large-scale adoption of carbon removal is what will enable Nori and the world to make a real and significant impact on climate change.

Building a movement

Establishing a new voluntary marketplace with innovative mechanisms to quantify, estimate, pay for, and get paid to remove carbon can only occur in a widely collaborative and transparent way. The community we are fostering is one that is committed to collective action to draw down carbon dioxide from the atmosphere. To socialize our approach, Nori has been actively participating in relevant events, connecting with the broader network, publishing articles on our blog, producing a weekly newsletter, and gaining exposure through media outlets including:

- Fast Company
- Clean Technica
- The New Food Economy
- GreenBiz
- Virgin Unite: Earth Unscrewed Podcast
- and more.

Webinar series

Central to our approach is the ability to be transparent and open about the state of development of our product while engaging market participants in a credible way. We launched a webinar series to be able to provide updates, gather feedback, and dive into specific topics around our market design. Here is a link to past and future webinars.

Reversing Climate Change Podcast

Part of our go-to-market strategy includes producing a regular podcast discussing carbon removal with the people who are doing the work to remove carbon as well as potential buyers in our marketplace. Guests hail from JetBlue, Newlight Technologies, Project Drawdown, the Center for Carbon Removal, Arizona State University, and more. In episode 13, we explained what Nori is and how the project began, and it is an excellent starting point. The podcast is available for streaming at https://nori.com/podcast as well as on iTunes, Google Play, and Stitcher.

Collaborations

Nori is actively engaging with several groups.
Baseline generators:
COMET-Farm—Colorado State University

Supply:
Regen Network
Soil4Climate
Main Street Project
Delta Institute

Industry Groups

Nori has joined the Enterprise Ethereum Alliance and the Climate Chain Coalition to work with fellow travelers in the standardization of blockchain architecture, and align with blockchain-related climate change efforts. Nori is also a member of Green America's Carbon Farming Innovation Network where we provide insight from our new process to the broader food and agriculture community.

Measuring success

The mission of Nori is to reverse climate change. Humans have emitted too much carbon into the atmosphere, and our application's function is to incentivize the sequestration of already-emitted carbon dioxide and other greenhouse gases. For us, impact is easily and directly measured by how much carbon dioxide has been sequestered via the marketplace.

When a buyer spends a token to buy a Carbon Removal Certificate, we can account for that tonne of CO_2 being sequestered and paid for. As the marketplace is in operation over time, it will be simple to measure how much CO_2 has been sequestered on account of our project. Our impact will be very tangible by definition of how the system operates.

We also plan to track how well-retained our market participants are. It's crucial to the performance of the marketplace that we balance growth of buyers with growth of suppliers. To that end, we'll be measuring number of participants and how often they interact with our marketplace.

To summarize, our key metrics are:

- number of tonnes of CO_2 paid to be removed.
- unique number of CRC buyers, and the change over time.
- unique number of CRC suppliers, and the change over time.
- frequency of buyers returning for additional purchases.
- frequency of suppliers returning to sell additional CRCs.

SECTION 11

Nori Marketplace technical components

Nori Improvement Proposals

Nori is committed to not only ensuring that carbon dioxide removed is accurately measured and verified, but also that everything about that process is done in the most transparent way possible. To that end, we are implementing a process whereby the community at large can create, comment, and give feedback on new methodologies. Additionally, all architecture designs for our marketplace will be done in the same fashion. We call each of these discussions a Nori Improvement Proposal (NIP).

An NIP is a design document providing information to the Nori community, or describing a new feature for Nori or its processes or environment. The NIP should provide a concise technical specification of the feature and a rationale for the feature. The Nori community can work with a designated NIP author, who is responsible

for building consensus within the community and documenting dissenting opinions, to propose modifications to the operation of the Nori platform. For more information see: https://github.com/nori-dot-eco/NIPs/

Marketplace Components

Commodity Components

Carbon Removal Certificates (CRC)

A carbon removal certificate is an asset representing one tonne of CO_2 removed. It is initially owned by the supplier and eventually sold to a buyer. When a supplier creates new CRCs, a collection of CRCs is created that contains any number of CRCs.

By following the rationale defined within NIP-4 and NIP-5 we came up with a way to tokenize a CRC. The CRC is created from a modified version of the ERC-721 non-fungible token standard in combination with the ERC-777 advanced token standard. Each CRC has non-fungible qualities that can be leveraged to distinguish one certificate from another. A CRC collection, when created, can represent any number of tonnes of CO_2 removed, and can be divided into smaller amounts of tCO_2e at the point of sale.

For more information, see the CRC formalization NIP-8.

Each CRC is generated by a methodology specific to a process of removing carbon dioxide from the atmosphere. Each CRC methodology is assigned a quality score. The score will determine how much NORI goes into a restricted versus unrestricted account. Quality scores for CRCs can improve over time as a result of better data and of systems of carbon removal quantification that result in lower uncertainties.

NORI Token

Nori is leveraging the ERC-777 advanced token standard to create our NORI token. The smart contract for the NORI token simply maintains a ledger of user balances. Creating our own token offers the ability to meet the needs of a medium of exchange for the CRCs being sold.

Participant Components

We will be creating a registry that maintains a list of all network participants who are whitelisted to interact with smart contracts in the platform. Participants in the Nori network are given certain levels of permissions. By default, participants are defined by their public keys and have a read-only permission on smart contract functions defined in Commodity and Market Component types.

The additional permissions granted to users are defined by their user type:

- **Buyers.** Buyers can invoke functions within the market contract that allow for the purchasing of CRCs with NORI

- **Suppliers.** Suppliers can invoke functions to mint and sell CRCs

- **Verifiers.** Verifiers are independent third parties who are required to approve the creation of a CRC before it can be listed for sale.

  There exists a sub-type called **Auditor** who functions the same as a verifier, but is required to be a different person than the original verifier. When an auditor updates the certainty of CO_2 having been removed, they can leverage their signature to upgrade the CRC's certainty estimation tier.

Market Components

The FIFO Marketplace

When a supplier generates a verified collection of CRCs, they can list their CRCs for sale in the Nori marketplace. The marketplace currently only enables first-in, first-out (FIFO) purchases and sales. When the supplier lists their CRCs, the smart contract holding the CRC collection enters the back of the for-sale queue. In doing this, the FIFO market updates its array of sales, appending that particular CRC collection at the end of the list.

When a buyer chooses to purchase CRCs using their NORI, a purchase is initiated for the CRCs at the front of the queue. This process is similar to the listing of the CRCs by the supplier in that the FIFO contract array is updated and removes the oldest entry.

Our FIFO market contract acts as an operator in the ERC-777 advanced token standard. This operator has special permission to take multiple actions in a single blockchain transaction. The NORI tokens are transferred from the buyer's public key to the supplier's public key, and the CRC is transferred from the supplier's public key to the buyer's public key, all in one transaction. This is called an atomic swap.

A collection of CRCs can contain any number of tonnes of CO_2 removed. If a buyer wishes to purchase a number of CRCs that are either more or less than the total number of CRCs in the next for-sale collection, then the operator contract will split a collection into two so that the buyer can purchase their exact desired number of CRCs.

CO_2 Accuracy Risk Mitigation

Nori is making a guarantee to buyers that their purchases of CRCs will be made whole if it is ever discovered that the particular CRCs they purchased cannot be linked to specific and verifiable reductions of GHG. Our approach is that Nori and the supplier should share the risk of future verification finding that fewer tonnes of CO_2 were removed than originally stated.

To accommodate this guarantee, we are building out a Risk Mitigation Balance. This insurance pool of NORI tokens will be used to automatically purchase new, well-verified CRCs on behalf of the buyer. The discussion around this is in NIP-7.

SECTION 12

Marketplace lifecycle

Step 1: Listing a project and establishing its baseline

A project developer applies to list their carbon removal project on the Nori platform. The project developer provides certain historical (pre-project implementation) data to a Nori whitelisted baseline generator, along with proof of project ownership. A whitelisted verifier provides independent third-party assurance that the information provided in the project listing application is reasonable and verifiable. A dynamic carbon stock baseline for the project is derived from the verified historical data, where that baseline is the background soil, biomass, mineral and/or built environment carbon stock estimate that will be used to calculate annual incremental carbon stock growth (atmospheric carbon removals) over project's minimum ten-year listing (the "project life", from a Nori market perspective). A preliminary CRC score is assigned to the project, reflecting project-specific carbon stock estimation error and project risk scores provided by the baseline generator and verifier. The project developer may appeal the preliminary CRC score. On acceptance of a preliminary CRC score the project developer elects to list the project, and becomes a supplier.

Step 2: Maintaining the Nori project listing

The supplier must provide annual post-project implementation data updates to maintain their Nori project listing. A supplier that fails to submit annual data updates is in breach of their listing agreement with Nori. Cumulative annual updates must

be verified at least once every three years, but may be verified more frequently at the sole discretion of the supplier. Suppliers who submit more data/evidence of incremental carbon removal and carbon stock growth in terrestrial reserves than the minimum prescribed in the Nori methodologies may earn higher CRC scores as a result.

Step 3: Listing CRCs for sale

When a verified carbon removal claim is submitted to and accepted by Nori, Nori deposits CRCs into the supplier's Nori account. The CRCs may have the same score that was originally assigned at project listing, or an improved CRC score. The CRCs are immediately assigned to one of: (1) the first-in, first-out (FIFO) Nori spot market; or (2) a forward contract reserve account, where they might accumulate to fill any Nori forward contract delivery commitments the supplier has made. The supplier may not place more CRCs in reserve than are required to cover the current sum of their outstanding forward contract delivery commitments.

Step 4: Purchasing CRCs and ownership transfer

A buyer selects the number of CRCs they wish to purchase on the Nori FIFO/ spot market, and/or enters into Nori forward contract(s) through the Nori forward contract auction process. In the FIFO market, the buyer releases a number of NORI tokens to purchase CRCs. The Nori platform operator smart contract directs the released NORI tokens into supplier accounts according to the FIFO line-up, and simultaneously transfers ownership of CRCs to the buyer. If the buyer has obligations under outstanding forward contracts, the buyer will transfer NORI tokens to the supplier on the forward contract delivery date, and the operator smart contract will simultaneously transfer CRCs—first from the supplier's forward contract reserve account and then from any CRC supply that is currently listed for sale in the FIFO market—to match the supplier's forward contract CRC delivery obligation. There may also be a related off-platform (over-the-counter) cash and/or cryptocurrency settlement between buyer and supplier, reflecting terms and conditions outlined in their forward contract.

The purchased CRCs become non-transferable, and are locked in the buyer's account. The buyer has Nori's guarantee that the underlying value of any CRCs locked in their account will be one tCO_2e, +/- 10%. The NORI tokens that are transferred to the supplier are separated into two sub-accounts: (1) unrestricted tokens, and (2) restricted tokens. The distribution of NORI tokens between the two supplier sub-accounts will reflect the CRC-generating Project's current CRC score. The supplier can

bank or convert unrestricted Tokens into other currencies at any time, at their sole discretion.

Step 5: Final project audit

In year 10, the last year of the project listing, the supplier must submit a comprehensive project audit to the Nori platform. The audit will conform to public Nori audit guidance, and must be performed by a Nori whitelisted verifier who did not perform any of the project listing application or carbon removal claim verifications over the project listing life to date. It is anticipated that the audit will reduce net project life carbon removal estimation error to +/-10%.

If the audit shows the project removed and is holding in storage, in year 10, more incremental carbon than is reflected in CRCs issued to and sold by the supplier over the 10-year term, the Nori platform will immediately issue additional CRCs to the supplier. If the audit shows the project removed and/or is holding in storage less incremental carbon than is reflected in the supply issued to and sold by the supplier to date, the platform will remove NORI up to the suggested carbon removal deficit from the supplier's restricted sub-account and transfer those NORI to the Nori insurance reserve. If there are insufficient NORI in the supplier's restricted NORI sub-account to cover any carbon removal deficit found in the audit, the operator will use tokens in the Nori insurance reserve account to buy incremental, fully-audited CRCs to fulfill the commitment to buyers that the underlying environmental value of every CRC they have bought or will buy will be one incremental tCO_2e removed from the atmosphere and held in terrestrial storage for at least ten years.

Any project that was previously approved for listing on the Nori platform may renew for at least one more 10-year listing if it is reasonable to project that the project could continue to remove incremental carbon from the atmosphere over the second project listing lifecycle.

SECTION 13

Team

Paul Gambill

Chief Executive Officer

In 2015, Paul Gambill established the first-ever community dedicated to carbon removal, called Carbon Removal Seattle. He has six years of experience in managing mobile and web application projects for clients including Nike, Showtime, Target, and Starbucks, and has shipped well over a dozen different apps to the public. He earned his Bachelor of Science in Engineering degree from Arizona State University, and his Master of Engineering Management degree from Duke University.

Christophe Jospe

Chief Development Officer

Christophe Jospe is an analyst, storyteller, marketer, and fundraiser for any solution that can remove carbon dioxide from the atmosphere. He started his first company, Carbon A List in 2016 as a consultancy to provide investor research, carbon offsets, and fundraising support. Prior to that, he was chief strategist for the Center for Negative Carbon Emissions at Arizona State University.

Paul Carudner

Chief Technical Officer

Paul Carduner has been writing software since the age of fourteen. After deciding to "take a break" from college, Paul moved to Silicon Valley where he helped get two startups off the ground. After selling his second startup to Facebook, Paul spent five years building Facebook's photo and video teams. Recently, Paul has taken an interest in software for social good, working with Code.org to improve access to computer science education. He is thrilled at the opportunity to improve climate change through software.

Aldyen Donnelly

Director of Carbon Economics

Aldyen Donnelly has been a small business developer and consultant for over forty years. In the mid-1990s, Aldyen started to work on market-driven strategies to reduce atmospheric carbon concentrations. Having gathered together an "emission reduction credit" or "ERC" buyers group, Aldyen developed and executed the world's first major forward ERC purchase agreement to finance carbon sequestration in agricultural soils, as well as the first ERC sales-financed carbon capture and storage project.

Alexsandra Guerra

Director of Strategic Planning

Alexsandra is a clean energy and sustainability crusader with a career in the energy and tech space. She is an engineer by study, and worked for three years at Southern California Edison (SCE) as a renewable energy integration engineer. While at SCE, she worked on data-driven projects focused on increasing distributed energy resources and grid modernization. Alexsandra believes that the environment-technology nexus should be used to not only better the lives of humanity, but also to the benefit and protection of the environments surrounding us.

Michael Leggett

Director of Product

Michael Leggett has built and led design teams at Google and Facebook for the last 13 years. At Google, Michael led design for Google Finance, Gmail, Google Inbox, Project Kennedy (the Google-wide redesign in 2011), all of Android's communication apps, Project Fi, and vision work for the intersection of machine learning and Android. At Facebook, Michael led part of the Messenger design team and vision work for the Facebook Ads platform. Michael has a degree in Computer Science from Rice University.

Jaycen Horton

Principal Blockchain Architect

Coming from a background focusing on peer-to-peer and distributed technical architectures, Jaycen Horton has worked as a Lead Software Engineer for Dell, ASU Decision Theater, and MapStory. Additionally, he worked as an Information Security Engineer for companies including Wells Fargo and other smaller start-up companies. He is also currently the co-organizer of the largest blockchain meetup in Arizona.

Ross Kenyon

Lead Growth Strategist

Ross Kenyon is Nori's cross-functional wildcard. In the blockchain space he has worked with Tezos, Sweetbridge, ZenCash, Indiegogo, and Blue Frontiers. He focuses on strategy, securities and commodities compliance, writing, editing, and video production, podcasting, customer support infrastructure, business development, as well as in-state and federal regulation of the blockchain & cryptocurrency sector. He has a background in academia, filmmaking, and entrepreneurship. He is the co-editor of Social Class and State Power: Exploring an Alternative Radical Tradition, as well as seven volumes of the texts of the English Levellers. Ross completed a year of PhD work in political philosophy at the University of Arizona before deciding that he preferred entrepreneurship and the creative arts. He is the cohost of the Reversing Climate Change podcast and holds Series 3, Series 30, and Certified Bitcoin Professional licenses.

Jacob Farny

Principal Product Designer

Jacob is a designer with consulting experience in a variety of industries such as health care, retail, and big data. He's worked with big and small brands alike including Starbucks and Eddie Bauer. His educational background is in human computer interaction with an emphasis on interaction design and user research.

Richard Farman

Software Engineer

Richard is a recent graduate as the first Computer Science major from Whitman College. With experience in Full Stack development and a background in liberal arts, he has developed a passion for designing and developing simple solutions for complex problems, and changing the way we think about our world. Richard has also produced multiple public health and safety multimedia campaigns, and successfully crowdfunded a microbiome research project as an undergraduate

SECTION 14

Advisors

David Addison

David Addison works for the Virgin Group where he manages the Virgin Earth Challenge: Sir Richard Branson's USD $25 million innovation prize for scalable and sustainable ways of removing greenhouse gases from the atmosphere and permanently sequestering them. He is also an advisor to the Center for Carbon Removal; part of the community of advisors to Project Drawdown; a member of the jury of the German Energy Agency's Startup Energy Transition Award; served as a member of the review panel for the UK Government's £8.3 million Greenhouse Gas Removal research initiative; and was formerly Vice Chair of the Board of Directors for Student Energy: a global charity inspiring the next generation of leaders to unlock a sustainable energy future. David has a BSc in Geography from the University of Sussex, and an MSc in Environmental Technology from Imperial College London.

Klaus Lacker

Dr. Klaus Lackner is the director of Center for Negative Carbon Emissions and professor at the School of Sustainable Engineering and the Built Environment of the Ira A. Fulton Schools of Engineering, Arizona State University. Trained as a theoretical physicist, Lackner's work has spanned modular energy systems, automation, direct air capture, carbon sequestration, numerical algorithms and innovative carbon financing. Notably, he is a founder and inventor of the world's first commercially demonstrated direct air capture units. He has held senior positions at Los Alamos National Laboratory and Columbia University, where he was director of the Lenfest Center for Sustainable Energy. His work has recently been featured in the New Yorker, Scientific American, and the Washington Post.

Bob Beth

Bob Beth is a lifelong tech startup guy and integrative visionary as well as an adventurer and South Pacific sailor. His pioneering involvement with software began in 1974, and he has led the invention of several software products in advanced computing environments. Bob received his degree in Economics from UC Berkeley with an emphasis on market formation. Several of his advanced computing customers have been change makers in the financial markets, including at the outset of program trading and derivatives. Through his involvement with the World Business Academy, an early climate change think tank and action incubator, Bob acts as a Special Advisor to the Academy's bold Clean Energy Moonshot for California. He collaborates globally with thought leaders exploring backing cryptocurrencies with improvements in our planet's natural capital. Bob is currently the co-founder of the Impact Procurement Network.

Ramez Naam

Ramez Naam is a computer scientist, investor, and award-winning author of five books, including The Infinite Resource: The Power of Ideas on a Finite Planet, which charts a path to innovating our way beyond the challenges of climate change, ocean destruction, food, water, energy, population, and more. Ramez is the Co-Chair for Energy and Environment at Singularity University at NASA Ames. He speaks around the world on innovation, exponential technology, solving environmental challenges, and disruptive energy technologies. Ramez's seminal 2011 Scientific American article, "Smaller, Cheaper, Faster" observed that the price of solar power was dropping exponentially and would eventually be lower than that of any other energy source. He's since detailed the exponential trends in wind power, energy storage, and electric vehicles. His observations have been quoted by Nobel laureate Paul Krugman and by energy, climate, and financial analysts around the world. Ramez's work has appeared in or been quoted in The New York Times, The Wall Street Journal, The Economist, The Atlantic, Slate, Business Week, Discover, Wired, and Scientific American. In addition to his energy analysis, Ramez is an angel investor in numerous clean energy startups, a board member of E8 Angels, and the founder and leader of the first AngelList syndicate devoted to clean technology.

SECTION 15

Risks and mitigation

Technical risks

Smart contract vulnerability

There have been several high-profile losses of funds from smart contracts in the past year. It will be critical that we have our smart contracts audited as thoroughly as possible to avoid any risk to funds generated by the token sale or to the transparently recorded data of CRCs as they move from seller to buyer.

Off-the-record exchange of keys

Participant identity private key exchange

Such a case might happen where participants registered in their respective participant smart contract might trade private keys, meaning that the party who is invoking a function with a participant function modifier might not have undergone the requirements to perform such an action. We can at least mitigate some of this risk by allowing for the removal of public key identities from respective participant contracts. Such would only be allowed by a Nori account or other multi-signature, controlled identity contract.

Off-chain exchange of private keys

There might exist a case where owners of CRCs circumvent the on-chain locking mechanism that occurs after a CRC has been transferred by buying or selling private keys associated with public keys which have balances.

Transparency/Verification

In order for buyers to have confidence in the token marketplace, there must be full transparency in the verification of the CO_2 sequestration. While transactional transparency is a feature of blockchain transactions, the verification of CO_2 sequestration is currently an off-chain event, which in some cases—forestry and land-use sequestration projects—is human-labor intensive. Our approach to incentivize high quality verification work is to allocate a fractional share of tokens issued to the carbon sequestration project to the verifiers themselves. In this case, existing verification infrastructure can be leveraged for more rapid scaling. To ensure independence, the verifiers will be audited regularly by yet another verifier.

Part of this is enforced by leveraging IPFS for storing data associated with each claim. When a supplier creates a new CRC the process requires them to upload data associated with that claim. The sum of that data is hashed and hosted both by Nori and anyone else wanting to contribute to the persistence of that data. Cryptographic hashes guarantee a level of "collision resistance" that prevent the possibility of a supplier claiming that a data set different than the one submitted at the time of the CRCs creation is valid.

The primary value that we provide to buyers is verification of the CRCs they are purchasing. Because suppliers will earn tokens for sequestration equivalent to how many tonnes of CO_2 they sequester, there is financial incentive to cheat and report more sequestered than was actually removed. This risk will always exist, and can never be fully mitigated. Our approach will be to, in the majority of cases, make cheating not financially worth it. As much as possible, we will automate the recording of carbon sequestration with sensors and IoT devices. As we develop new methodologies for accounting for new types of sequestration, this will have to be a major consideration.

Market-based risks

Depth of platform use among different parties

In any two-sided platform, it's critical that both sides are grown at roughly the same rate so that supply of the good being sold meets the demand. It is the same case in this marketplace, as suppliers provide a finite supply of CRCs, and buyers can only purchase what has been made available for sale.

There are two risks here: suppliers do not grow fast enough to meet the demand of buyers, or there is a glut of CRCs with no buyers ready to take them. If there are not enough CRCs available for sale, then we risk losing potential buyers to a competing carbon offsets market or they might not buy any sort of carbon credit. If there are too many CRCs, then suppliers will be waiting too long to get paid in tokens and risk their own business livelihood. Additionally, suppliers may distrust the volatility of the entire cryptocurrency space and allowing trading in tokens by purchasers and sellers who are not producers or end-users of CRCs for the purpose of price discovery. These actors do not all share the same incentives for interacting with Nori.

Though as old as the earth system, carbon removal is a new concept to human civilization, even to many who have been participating in environmental conservation efforts. There is a risk that buyers will not show up to our marketplace, instead preferring the carbon reduction markets that are regulated by governments. Larger customers especially might not be interested in buying something so novel from a young startup.

Financial risks

Early-stage funding

Early-stage financial risk primarily involves securing sufficient capital to execute the business development plan and launch the platform. Employing a transaction fee on the purchase of CRCs by buyers should provide sufficient revenue once sustainable scale has been attained since run-rate costs remain low regardless of scale due to the nature of distributed ledgers.

Upfront legal, business development, sales/marketing, and labor costs, however, will likely far outstrip early-stage revenues. To address this concern, a properly-sized SAFT sale is being employed to address initial funding needs to the extent permissible under relevant statutes and regulations. It is anticipated that these tokens will be made available to accredited investors and CRC buyers alike.

Operational liquidity

While the marketplace will be the source of tokens exchanged for CRCs and therefore any illiquidity in the token market can be remedied by releasing additional tokens as additional CO_2 is sequestered and verified, the operational costs of validating any token issuance above and beyond forecast will negatively impact the firm's capital position. It is essential then, in early growth stages, that the firm have reasonably accurate and reliable forecasts of the amount of tokens to be issued and the amount of validation work to be certified in order to predict operational liquidity quarter-to-quarter.

Legal/regulatory risks

The regulatory treatment of cryptocurrency offerings, including both coin and token offerings, is rapidly evolving and extremely uncertain. In the United States, the Securities and Exchange Commission ("SEC") has recently ramped up activity in this area, and has, for example, determined that The DAO's initial coin offering ("ICO") constituted an offering of securities requiring compliance with U.S. securities laws and regulations. Similarly, the SEC recently concluded that tokens offered on the Munchee smart phone application constitute securities requiring compliance with those laws and regulations, and has issued subpoenas to a large number of firms involved in cryptocurrency, suggesting that additional regulatory action may be in the offing.

The U.S. Commodity Futures Trading Commission ("CFTC") has also become more active in this area, and has concluded that cryptocurrency is a "commodity" subject to CFTC regulation, and has suggested that pollution reduction credits, including carbon credits, are subject to commodity regulation where instruments do not call for physical delivery. The CFTC recently also issued guidance regarding regulation of cryptocurrency futures markets. The U.S. Internal Revenue Service has concluded that investments of cryptocurrency are investments in "property" that are

subject to taxation upon realization of taxable gains. And the U.S. Financial Crimes Enforcement Network ("FinCEN") has issued guidance indicating that firms involved in cryptocurrency mustto comply with "Know Your Customer" and anti-money laundering provisions of the Bank Secrecy Act.

In light of this rapidly evolving legal and regulatory landscape, Nori has retained qualified counsel to provide it with guidance regarding compliance with U.S. laws. Nori will continue to monitor changes in the legal and regulatory landscape and to develop a legal compliance strategy in response. However, there is no assurance that Nori will be able to issue its proposed cryptocurrency tokens using the structure described in this white paper and Nori can offer no assurances at this time concerning the legal or regulatory risks associated with its proposed business.

SECTION 16

Appendices

Carbon Removal Methodologies

Soil carbon removal

State of the market

Carbon farming refers to a broad range of practices that can increase the amount of carbon stored in the soil. The world's soils have lost between 50-70% of their carbon from land use and degradation.

Opportunity

Through the practices of ecologically rotating cattle, crops, planting cover crops, using no-till agriculture, and adding soil amendments, it is possible to dramatically improve the average soil carbon content between 3.5-11 billion tonnes of CO_2 per year.

There is an increasing awareness around soil health and the direct relationship between more carbon—i.e., soil organic matter—and healthier soils. Farm management software gathers data which can be valuable to quantify carbon removal, and new methods that use internet of things (IoT) devices produce a better resolution for farm level data to verify that carbon has been stored.

Observations

- Current methods to count the amount of carbon in the soil are cumbersome, requiring burning a section of the soil to determine carbon content.

- A transparent baseline does not exist for many projects.

- Many farmers are practicing techniques to increase carbon in soils anyway because it produces greater yields, and saves money by eliminating the need for fertilizers.

- Rotational grazing is a subsector of carbon farming and is a land management technique that strives to mimic the movement of cattle or other large animals across grasslands formerly roamed by wild herds of grazing animals. The change in rotation is designed so that the livestock eat the grass much closer to the optimum rate that the grass evolved to be eaten. In the United States alone, approximately 1.056 billion tonnes of CO_2[6] could be sequestered annually through this process in the soil carbon pool.

Forestry

State of the market

The forest carbon certification process is the most robust carbon offset market in the world today. A number of forest-related applications are bundled into offsets that can be sold in both the voluntary and compliance markets. These applications allow project developers to sell credits for avoided deforestation as well as tree planting. While deforestation is a major driver of human-related greenhouse gases to the atmosphere, entities who deforest (e.g. slash-and-burn farmers in Brazil) are not held accountable for releasing the carbon dioxide into the atmosphere. Nor are they currently offered stronger economic incentives to preserve or restore the forest ecosystems under their stewardship.

Therefore, carbon offset developers seek to monetize trees for their ecosystem services, and also pay indigenous populations to maintain the health of the forest. The carbon credits that are sold oftentimes pay for local industries, e.g. ecotourism, to create a buffer against deforestation.

Suppliers of these credits must possess the knowledge of which native trees to plant; previous large scale tree planting efforts have failed due to non-native species or poor site selection. They are also currently required to include a buffer of additional

[6] 2016 Chambers, Lal, Paustian: Soil carbon sequestration potential of US croplands and grasslands: Implementing the 4 per Thousand Initiative http://www.jswconline.org/content/71/1/20A.extract

credits to insure against forest fires (which re-release previously stored carbon dioxide to the atmosphere), invasive species (e.g. the California pine beetle), and human development.

Opportunity

New approaches have presented a number of growth opportunities in this sector. First, there are a number of entrepreneurs branching out into agroforestry, which refers to the use of trees interspersed within livestock and produce farming. This allows for effective land-management techniques for greater carbon sequestration as well as market-ready products. Research in genetically modified trees has yielded positive results, indicating trees are able to remove 3-5x as much carbon as their non-modified counterparts. Furthermore, new drone technologies have also opened up more efficient ways to automate the process of planting, monitoring and managing biomass.

Observations

- Current methodologies exist and have been in place for almost 30 years.
- Politically, forestry has actively fought against other carbon sinks entering the marketplace based on fear of competition.
- It is a very manual process to quantify carbon stored in trees. Requires observation by walking through trees to observe baseline and growth.

Blue carbon

State of the market

Blue carbon refers to the carbon reservoir stored in marine and coastal ecosystems. This includes the protection of mangroves, seagrass, and intercoastal tidal marshes. Their methodologies are most similar to forestry—i.e. protecting existing carbon sinks from being removed, as well as adding new pools and seeking ways to valorize impacts.

Opportunity

There is a large opportunity to work with coastal development communities in the production of blue carbon assets, and tracking the deposition of carbon into sediments.

Observations

- Current practitioners are actively focused on demonstrating blue carbon's impact on human well-being.
- Blue carbon is on the decline with 1-5% loss each year along coastal ecosystems.
- Blue carbon can also participate in REDD protocol for voluntary offset markets.

Bio-based carbon sink products

State of the market

Bio-based carbon sink products refers to a broad range of products which used biological processes (i.e. photosynthesis) to absorb carbon and then through modified processes generate an end product. This can include production of materials through mycelium, hemp, and biobased materials for households.

Opportunity

Biobased carbon sink products, when distributed, store on average 0.1 to 15 tonnes of carbon dioxide per household. For instance, Hempcrete can store 0.one tonnes of CO_2 per cubic meter. The typical small project (e.g. residential house) is between 50-70 cubic meters. Hempcrete has advantages as an insulator by being lighter, more durable, and a better fire retardant. Biobased materials can include carpets, drywall, and furniture.

Observations

- Tonnage is generally small.
- Without clear policy support, hemp is unlikely to take off in the United States.
- These products are more expensive to produce than conventional hydrocarbon feedstocks, but once produced can become long-term carbon sinks.

Bio-Energy with Carbon Capture and Storage (BECCS)

State of the market

BECCS refers to the production of energy through combusting biomass, capturing the carbon dioxide from the emissions of that energy, and storing the carbon dioxide into saline aquifers. Currently, BECCS operations are being pursued at the commercial demonstration level and are using corn-based ethanol as a feedstock.

Opportunity

Current companies pursuing BECCS are seeking to deploy power plants that would sequester 1 million tonnes of CO_2 per year at approximately $40/tonne.

Observations

- BECCS is used as the reference case by the Intergovernmental Panel on Climate Change as the most promising negative emissions technology to scale.

- BECCS presents significant challenges at scale by competing for land: to meet the scope of world's emissions would require a land mass three times the size of the country of India.

Biochar

State of the market

Biochar is produced from pyrolysis (heating and breaking down a feedstock material in the absence of oxygen) of woody biomass. This yields charcoals with different properties depending on what is pyrolyzed, and how. Once created, biochar can be used as a soil amendment to increase carbon stocks; improved soil nutrients, moisture and microbes are often co-benefits. Some chars can also serve as a feedstock for other carbon negative products.

Opportunity

At scale, biochar could consume biowaste and convert it into a carbon negative residue. This has a local advantage of creating sources of heat energy with a potentially carbon negative lifecycle. Much of the literature calculated is a theoretical maximum of around 1 billion tons of CO_2 removed per year from this process in a diverse, distributed global biochar sector of the future.

Observations

- American carbon registry cancelled an accepted methodology for biochar due to concerns about consistency.

- Biochar is used extensively by farmers for the value in soil fertility.

- There is significant potential for biochar to scale

Chemical carbon sinks

State of the market

Chemical carbon sinks refer to synthetic products (i.e. foams, plastics) that store carbon in a permanent sink and use carbon dioxide in a concentrated form as a feedstock. Polyols can be used to make plastics and foams. Filaments refer to the inputs that could be used for 3D printing that can store carbon. Graphene can also store carbon in materials that can be a replacement for steel - i.e. in cars of infrastructures.

Opportunity

While relatively small in terms of total market size with less than 100 million total tons per year, as these new technologies come onto the market they will likely be able to leverage the product price to drive demand. The key question from the carbon perspective is whether the feedstock of CO_2 comes from the atmosphere or fossil-based emissions.

Observations

- These processes are being closely observed by the fossil carbon emitters as a potential revenue pathway to valorize waste emissions, and without a market signal to encourage of feedstock of carbon dioxide from the atmosphere, will more naturally pair with fossil sources to make the emitter carbon neutral.

- The energy intensity to manufacture these applications is high, particularly for graphene, and must account for a full life cycle.

Carbonates

State of the market

By using direct air capture (DAC) to generate a concentrated feedstock of carbon dioxide from the atmosphere, there are enough minerals in the world to permanently store all of the world's emissions. Carbon dioxide can be stored in carbonates, which is a permanent form of carbon dioxide that can be considered a true sink. There are four major carbonate market opportunities listed in increasing size.

1. Carbonate slag from a steel plant which you can carbonate again (millions of tonnes per year). This process makes steel with limestone and uses carbon dioxide to control the acidity.

2. Curing cement and CO_2. This is a small fraction of the cost, but is limited in that it has to happen in a facility—a few millions of tonnes per year.

3. Mine tailings, which inserts carbon dioxide into leftover mining material.

4. Mineral carbonation explicit for negative carbon emissions. This includes in situ and ex situ storage—(i.e., mineral carbonation in saline aquifers).

There are a number of approaches suggested, but all use ultramafic rock and store carbon dioxide in magnesium or silica. Capture costs of carbon dioxide via DAC depend on a variety of factors with several early stage companies still in the developmental phases.

Opportunity

Carbonates can theoretically scale to meet the scope of negating the world's emissions.

Observations

- Nascent technology.

- Variations on life-cycle depending on emissions factors from project activities.

- Deprioritized as carbon removal technology with preference given to fossil sources of carbon.

Carbon offset ecosystem

Project Originators

The Project Originators are those who are actually initiating projects that sequester carbon dioxide from the atmosphere. They are farmers and landowners who are looking for ways to help the environments, while simultaneously expanding their revenue potential.

Retailers

The Retailers refer to an entity where an individual or business can purchase a carbon offset. Project originators are involved with the creation of project offset projects, as well as auditing and verifying it. Oftentimes, project developers are also selling directly to end buyers, and are actively engaged with the validation and verification steps.

Validators

The validator verifies an existing methodology who sets the state for the verifiers who can confirm that the credits are happening. This is what green lights the project and ensures the plan. They play close attention to the baseline to ensure that the assumptions are accurate.

Verifiers

The verifiers are the team that check against the same methodology and verify that the project occurs. They also re-check the assumptions that the verifiers made valid claims.

Registries

There are four main registries. These registries are being used to address the problem by creating a mechanism for emitters to go above what is required to reduce their emissions to buy offsets to meet certain shareholder or corporate social responsibility targets. Registries are responsible for setting the standards that can be used to verify and monitor various carbon offsets.

Climate Action Reserve

http://www.climateactionreserve.org/

Overview: Registry of projects that includes verification and compliance for both sequestration and reducing of carbon emissions:

Sequestering: Forest, Grassland, Urban Tree Planting

Reduction: Coal Mine Methane, Mexico Boiler Efficiency, Mexico Forest, Mexico Landfill, Mexico Livestock, Mexico Ozone Depleting Substances, Nitric Acid Production, Nitrogen Management, Organic Waste Composting, Organic Waste Digestion, Ozone Depleting Substances, Rice Cultivation, Urban Forest Management, U.S Landfill, U.S. Livestock. (ERTs, California Registry Offset Credits and California Early Action Offset Credits)

Observations:

- Only registry that does not require a validation report
- Creates training for verification and auditing
- Releases updates on protocols
- Also offers trainings to participate in California's compliance market
- Allows pathway for projects to satisfy both voluntary and compliance standards

Verra (Formerly Verified Carbon Standard)

http://verra.org

Overview: Verra establishes the standards, verification, and accounting methods and lists projects that meet those criteria in a registry. The Project Database is the central storehouse of information on all Verra, CCB and California projects managed by Verra. Every project can be tracked through its lifecycle and every credit can be tracked from issuance to retirement/cancellation in the database.

Observations:

- Certified the most (58%) of all offsets of the voluntary registries in 2016 (the rest was Gold Standard 17%, Climate Action Reserve 8%, Clean Development Mechanism 8%, American Carbon Registry 3%).

- Includes co-benefits

American Carbon Registry

http://americancarbonregistry.org

Overview: The American Carbon Registry is the first private voluntary greenhouse gas registry - publishes voluntary offsets that are also available for the ARB (Air Resources Board) Carbon Offset Compliance market. Types of offsets available are: Afforestation / Reforestation (A/R), Improved Forest Management (IFM), Reduced Emissions from Deforestation and Degradation (REDD), Wetland Restoration, Fertilizer Management, Avoided Conversion of Grasslands & Rangelands, Rice Production, Livestock Waste Management, Improved Cookstoves, Water Purification, Destruction of Ozone Depleting Substances (ODS), Fugitive Methane Emissions, Transport / Fleet Efficiency, Landfill Gas Capture & Combustion, Renewable Energy and Energy Efficiency

Observations:

- Very active in the California market

- Has issued separate Green-E climate standard

Gold Standard

https://www.goldstandard.org/

Projects include renewable energy certificates, emissions reductions, and carbon sequestration and are aligned with the United Nations Sustainable Development goals. This includes ways to monetize multiple impacts from improved health, access clean water, gender equality

Observations:

- Established by the World Wildlife Foundation
- In line with the Sustainable Development Goals; accounting methodologies for co-benefits
- Includes California's offset registry