RegenYield

Incentivizing the Preservation of the Earth Systems

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Foreword

The following paper is structured in an alternative way. This format is known as the Socratic dialogue and allows the reader to be guided through the discussion in an informal and logical manner.

The method used here will allow us to unpack a protocol for making truly regenerative products affordable and more widely available through decentralized and trustless databases (i.e., blockchains).

It unfortunately lacks significant technical details and clarifications. My apologies. This will be added in future versions.

Abstract

This paper aims to describe a new protocol called Regenerative Yield or RegenYield for short. The goal of this technology, governance and incentive model is to crowdfund for planet earth.

One can think of this as tokenizing the commons and adding a proof of production element to keep track of the resources used as inputs and outputs for our manmade system.

Ideally, it will utilize new social contracts between all stakeholders of a product or unit of energy being produced (& utilized in our systems) to incentivize and price the earths common assets.

At worst, it will do nothing significant in terms of re-pricing and re-aligning incentives, but it will still cause you to stop and think about your assumptions.

[1] *looking for a technical partner

Epoch 1 – The Situation.

Amer: Why do you look so sad, my friend?

Rema: It is simply that we live in the 21st century and have the most magical of technologies but still cannot agree on how to treat and interact with the environment. This is leading to devastating climate change.

Amer: Do not fret too deeply about these questions – as you know, we can never fix problems perfectly, but we can and should always try to get closer to the truth and reach a better alternative.

…. a moment of pause ….

So, let us commence to see if we can re-align incentives and come to a new agreement on how to run a more efficient and effective system that allows for a dynamic symbiosis with our natural world.

We shall start with where we have come from to understand the problem at hand.

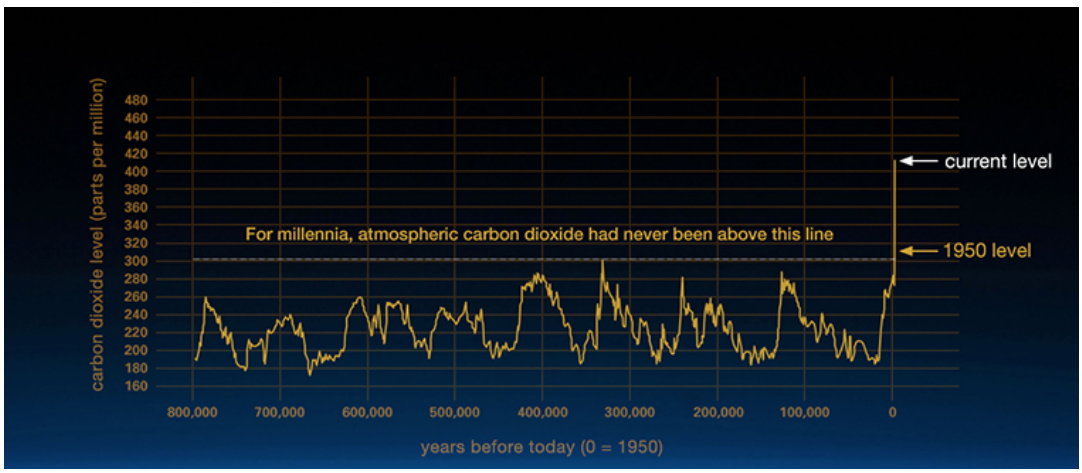
Let me ask you: what exactly is the problem with climate change? Doesn't your weather change every day?

Rema: Yes, surely my weather changes, that is called seasons. With climate change I am referring to the warming of our globe that is causing extreme weather patterns all over the world.

Amer: Why is the planet warming? Does this cause erratic weather patterns as you state?

Rema: Well, you are right, the underlying cause is the spike in Carbon Dioxide (C02) levels in our atmosphere. This causes the weather patterns to go astray from what we humans call normal as more heat is stored in C02 molecules in our atmosphere.

Here I found this graph which shows the C02 levels to clarify:



„As a point of reference, pre-industrial CO2 levels were around 280 parts per million (ppm) and today, we stand near 420 ppm.

Today, we stand on the threshold of a new geologic era, which some term the "Anthropocene", one where the climate is very different to the one our ancestors knew.“[2]

Amer: Fascinating! That graph does help with my understanding indeed. Though, I want to understand is this our only relationship with the environment that is causing an unfavorable outcome? This gas can't be so bad!

Rema: Quite right, the C02 gas is beneficial if kept in a certain range – this after all allows plants and life to thrive. But if unchecked it can cause a so-called runaway greenhouse gas effect. This includes methane, carbon dioxide and more.

Anonymous Student in crowd: So, it is these bad gases! We can use technology and new incentives to keep them in check. Is not a carbon tax what you are looking for?

Rema: I too was like you, young woman! I will hold off on commenting on a carbon tax for now.

You correctly note that these gasses seem to be the enemy and the carbon tax did give us hope… briefly but hope, nonetheless.

We need to be conscious that we are talking about the climate cycle. This system has given us consistent weather patterns which have allowed for life and plants (think food and humans) to thrive and create biodiversity.

Once we realize what this gas does and how it interacts in our environment on a system level, we realize we have gone wrong in so many more ways.

Amer: Now, now, let's not be so pessimistic.

Rema: Simply put these gases that we are emitting are excess gases that were not accounted or expected by the natural systems which we rely on. Sticking to C02 for simplicity we see that the carbon sinks cannot process this sheer amount of C02 we are adding to our atmosphere. It was not predicted by nature. We move and change our environments quicker than nature can react to in an equal timely manner.

So, I propose that the real enemy is waste.

If we look at the definition of waste we read: “use or expend carelessly, extravagantly, or to no purpose “.[3]

[2] https://climate.nasa.gov/climate_resources/24/graphic-the-relentless-rise-of-carbon-dioxide/
[3] Google, Oxford Dictionary

I ask you professor, what other thing are humans expending extravagantly or creating for no purpose?

Amer: I see that you have thought about this conversation before.

… quietly thinks …

I agree that waste seems to be the apparent problem. We have gasses that are wasted and released but also energy and materials in creating certain products that are used once (like plastic) or wastewater in yet other processes.

Again, though I want you do bring it back to what mankind is doing – just think about recycling or carbon taxes. There is no reason to be in such sorrow.

Rema: Sure, let us talk about the revered carbon tax as my fellow comrade brought it up as well. I will not claim that we should not have this tax. However, I cannot and do not see an adoption of this tax happening at a quick enough and wide enough scale. This protocol on how we behave with carbon has failed us.

A carbon tax is one tool in the toolbox. And yet this tool is a pretty sh*t one. We have no trustworthy way of tracking the carbon consumption of a product through its lifecycle. Something I have heard being called cradle to cradle tracking.

Amer: I appreciate your passion here, Rema.

Rema: I appreciate you trying to flesh this situation out with me. Note though another waste you forgot to mention is the chemical waste that is created from industry. I believe you will see a pattern from here on out…

The basic assumption of a carbon tax is that cheaper (unsustainable) products will become more expensive with this tax thereby making sustainable options more attractive. My problem here is that no rational profit and growth seeking entity wants to make things more expensive for themselves and their fellows.

This causes a drag on the adoption of this tax. Additionally, the carbon market that prices the cost of 1 ton of carbon seems to be opaque and dictated by a shadow group with unknown motives.

As for recycling – this once again sounded like the knight in shining armor but if we look at the industry, we see it has hardly made a dent in the quantity of waste being created.

My deduction is that it is very difficult to know what exact material composition was used, thereby making the operating expenses of recycling plants higher than feasible. So, this distrust and unverified process means it all lands back at the same place. Do you know what is okay to recycle?

I will spare you from answering. But note again recycling is just another tool in the toolbox not the final judgement.

The last observation I want to make about this is the sheer size of stuff being produced and 'consumed'. Amazon estimates that Small and Medium-size Businesses in the US sell more than 4000 items per minute[4]. And this is only in the US for SMB.

Amer: You are proposing making products and services that are sustainable cheaper rather than unsustainable products more expensive, correct? Is this not a subsidy?

Rema: Yes, I would propose that this would be a nice alternative for businesses that act properly to be rewarded. Again, you are right that it is a sort of subsidy. However, we now venture into governance issues rather than the analysis of the climate problem.

Amer: Quite an astute remark – you are right to question the motives and actors behind the tax and subsidy rules. This would be touching on morality and justice which are far too complex for our schedule to allow.

But I want to keep probing you on the problem before we get hasty and jump to a solution my dear.

Specifically, who would you say benefits from the rising GHG levels? Or more specifically, how does C02 even get into the atmosphere?

Rema: These are complex questions professor, but I will try to answer to the best of my abilities.

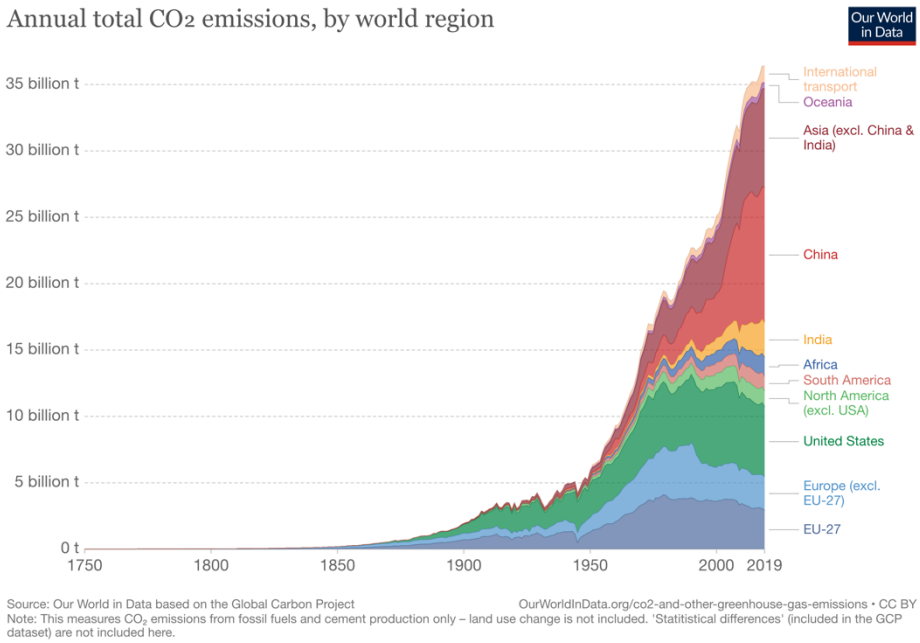
The parties who benefit from this disaster are ultimately no human actor as the climate becomes more unstable and uncertain.

However, for the moment I would argue and entertain the idea that the governments and companies that produce without being accountable for their emissions are benefiting as their cost of production is lower than it should be.

As we see the largest emitters by country[5] are China, US, and Europe. But more alarming we see a sudden spike in C02 emissions that started around 1860.

From my understanding this coincides very closely with the onset of the industrial revolutions. During the second industrial revolution we invented petroleum refining, electricity, and of course mass production for all our needs and desires.

[4] https://d39w7f4ix9f5s9.cloudfront.net/61/3b/1f0c2cd24f37bd0e3794c284cd2f/2019-amazon-smb-impact-report.pdf -> page 7
[5] https://ourworldindata.org/co2-emissions



During the late 1800s and early 1900s we had rapid advancements in steel production, chemicals, electricity, and weapons. It became easier to get around on trains, cars, and planes. We got the radio, telegraph, and newspapers. Briefly put it was the technological magic of yesteryear.

Ultimately, our life used to depend on seasonal changes, not so much anymore – think about your work schedule, does it change depending on the weather or season?

No. We became the ultimate wielders of the environment for a short time. Slowly but surely it is showing us its true force and repercussions from our unrestrained and wasteful behavior.

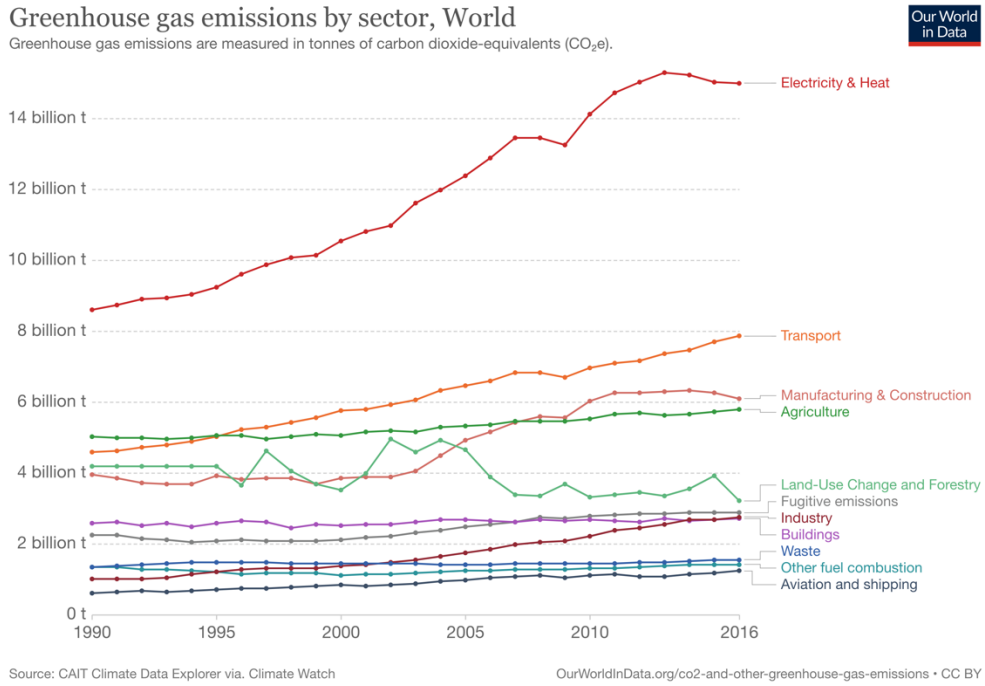
Coming back to what you inquire about – namely who puts this waste in our air, land, and water. But you also ask about the why and how.

Amer: Yes, my question pertains to the governance of such horror and what incentives (economic) were at play. As the saying goes: 'follow the money'.

Rema: If I may say it is a sensible and thoughtful question but unfortunately with an unclear answer.

And yet we continue… with the purpose of striving to be closer to the truth, even if by a small margin.

In fact, if we look at the next graph[6], we see the split of C02 emissions by sector. It shows the majority of emissions stem from energy production, transport, and manufacturing.



So, we may be right to assume that the entitles behind these industries were the benefactors of the pollution.

Again, we may probe further and ask who governs these industries? Surely just governments, businesses, and individuals. Since much of the share is accounted for by governments and businesses, we can again ask who governs these organizations?

Anonymous Student in crowd: It is surely us! We live in a democracy and the businesses are owned by the shareholders.

… the student proclaims …

Rema: Ah! I see we have an idealist or a gullible brainwashed child in the audience!

You are right to say we live in a democracy, but it is a representative one which supports lobbying, remember that.

Shareholders are indeed the owners of businesses but are you a shareholder – with significant say – in the biggest emitters globally? And if so, have you tried to stop them from polluting?

It simply is not in their economic interest to do so.

[6] https://ourworldindata.org/emissions-by-sector

Amer: How would a business or government price the cost of 1 ton of C02 or a liter of wastewater dumped into the local lake?

Rema: Once again, you hit the nail on the head. It is a question of pricing and specifically, who sets the price.

We now encounter the situation called: 'the tragedy of the commons".

The essence is that if something is commonly owned (i.e., everyone has access to it) it will be destroyed through the selfish and uncoordinated interests of the individuals that make up the whole.

We see this pricing failure from deforestation, animal extinction, monoculture farming and of course in the examples we spoke about earlier (air and water pollution).

Fundamentally, it is a governance / accountability problem that leads to an economic problem of how to value these newly accounted for assets.

Amer: What does that mean? That government and businesses are not capable and rational price setters?

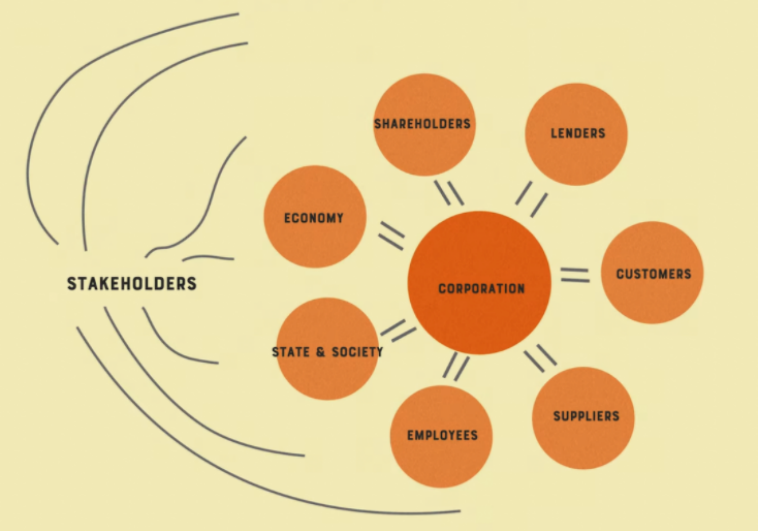
Rema: Actually, the opposite! Businesses and governments are acting rationally and in line with the incentives in place.

And do not get me wrong. I am not blaming any party of the past generation as I will give them the benefit of the doubt that they did not do this on purpose.

But now we know better and therefore must do better.

Getting back to the question on governance we see alternative models being proposed which you may be aware of.

Moving from shareholder capitalism to stakeholder capitalism would create a more holistic approach which we can see on the right[7]:



[7] https://www.linkedin.com/pulse/systems-thinking-alternative-economic-system-amer-gujral/

These are clear steps in the right direction just as a carbon tax, recycling and b-corporations are. But as you may guess, these tools are not the full solution.

Amer: My dear, Rema, can you please relate this to what hangs heavy in the air – namely the question of what value really is? I will start by saying that price is just an abstraction of value.

Rema: Some may say that value lies in the eye of the beholder just as beauty does, but we will try to go further.

We may say value is anything that provides hope to the owner(s). A more analytical answer would claim that value is if the benefit of the product/service was reached at cost. That being not for 3x the price…

I will relate this back to the question of governance – this is because if no one oversees pricing the assets (rationally) then no one will which leads to a market failure.

No prices, no problem!

Or if I may: no prices, no value…

Economists call this a negative externality. These misaligned incentives of the private cost vs social cost create a deadweight area which is not valued.

From our analysis we have termed this deadweight to be waste. Think wastewater, chemicals, excess materials, overproduced units or even simply C02.

Governments (and businesses with lobbying) try to quantity and price the market failure with taxes (negative externality) and subsidies (positive externality)[8].

Amer: What are the consequences of that statement?

Rema: Well, in my opinion, transparent, active (many participants) and liquid markets should be pricing our commons.

Not governments that can be lobbied by the organizations that have a rational and even legal obligation (fiduciary duty) to keep costs down.

Quantification is tough but a type of crowdfunded model assisted by technology would work to price these assets. Assuming that the new power holders have the right data, facts and education to make decisions on this.

Amer: Aha! It may then be a better assumption to fix climate change with an education model rather than technology, governance, and incentives.

[8] https://www.economicshelp.org/micro-economic-essays/marketfailure/negative-externality/

Rema: Yes, education is surely a component of the solution, but we need to act swiftly with the climate problem. Education can take years if not decades to ripple through.

What we are seemingly getting to, is a system that would be more democratic as my peer suggested. It may even be a way of conducting stakeholder capitalism.

Theoretically, these markets could replace the old incentive mechanism to price the costs of waste accurately and efficiently.

Angela (Student in crowd): Tokenize the commons!

Epoch 2 – The Solution.

Amer: Tokenize the commons… is this how technology can help?

… deep in thought …

My friend if I may - I agree with your following assumptions:

- Waste is a major culprit in stopping true regenerative systems to thrive. Afterall regenerative simply means re-birth.
- More specifically, waste tracking (e.g., C02) is poorly executed in our current system.
- Externalities and taxation from a few in charge are creating a market failure which is causing an unnecessary burden on the commons and generally misaligned incentives.
- Carbon taxation and recycling are baby steps in the right direction where we need leaps.
- Cradle to cradle (holistic system) thinking is needed to align all actors towards the same goal.
- We should look at reforming the subsidy system for alternative methods and processes to make the regenerative options cheaper rather than making the wasteful options more expensive, exclusively.

It seems like the problem and governance questions are clear. However, the economic umbrellas of value and what the commons are still seems to lead me astray.

Can one not claim that we humans are the commons, and we solely assign value to them as the only actors?

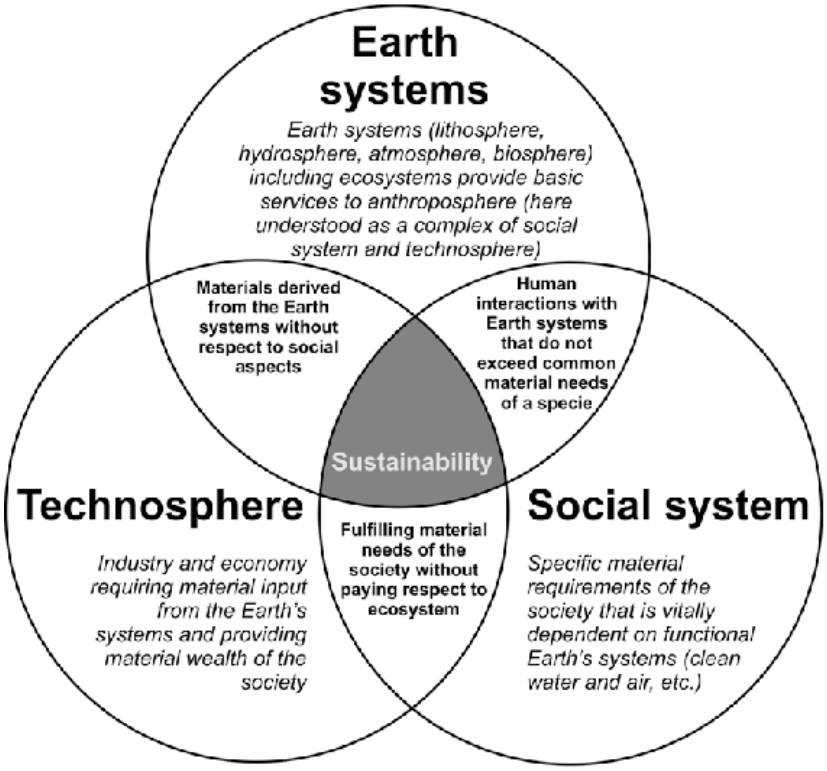
Rema: Indeed, let us explore the questions of value and commons deeper before discussing how technology may aid us in this endeavor. As we have heard tokenization may be a path worth exploring. We will return to this shortly.

Your hunch is not far off. In fact, to a certain extent we are part of the commons.

The question of value can either be understood as a mispricing or in some cases no pricing of the assets - that is the assets we are wasting are thereby turned into a liability.

More broadly though I would explain this question with three prongs that we must weigh a decision on. If we hold all value chain stakeholder (or simply stakeholders of an entity) accountable for their actions in relation to these three scopes and align our incentives to them we have made significant progress.

See the three circles below[9] as the earth systems (lithosphere, hydrosphere, atmosphere, & biosphere), our economic engine and of course society and us. The sphere named earth systems is what we can abstract as the commons. If we are able to balance these three forces, we just may be able to have temporary sustainability.



It will be up to the next generations to judge our actions and iterate as necessary.

Amer: I understand more clearly now, young man. This is quite a change indeed.

It may be more appropriate to ask Angela to help us be guided to a solution as she proposed the tokenization of the commons that you found intriguing.

Rema: Yes, that would be great. I am open to being shown the true light at the end of this illusion of a cave.

[9] https://www.researchgate.net/figure/Relationship-between-Earth-systems-and-anthroposphere-here-depicted-as-two-mutually_fig1_298070425

Angela: Thank you for the analysis and I sympathize with why you are discouraged with the facts. But I have always found looking and constructing a solution to be the quickest way out of misery.

As I understand so far, businesses, governments and individuals are not held accountable for how they interact with the earth systems. Yet, fundamentally, individuals oversee these resources but are not provided with the necessary tools to truly act responsibly.

I propose that we use transparent tokenization, distributed databases, and the power of the crowds to re-align incentives in an efficient and effective way.

It may allow us to truly have the whole ecosystem be responsible for the value creation (cradle to cradle) of what we collectively need and utilize.

Amer: This sounds intriguing.

Let us focus on a specific example to understand our assumptions but also grasp how such a technology could impact it.

I personally know the fashion industry and the devastating effects it can have on our earth systems.

Angela: This makes sense. Let's talk about the fashion industry.

Amer: First to grasp the sheer size of the industry. We learn that the "number of garments produced annually has doubled since 2000 and exceeded 100 billion for the first time in 2014".[10]

Waste is common in the fashion industry.

Regarding, C02 we learn that 10% of global emissions[11] stem from the fashion industry which is equivalent to the EU or all international flights and maritime shipping combined.

As for recycling… around "85% of all textiles thrown away in the US (…) are either dumped into (a) landfill or burned (…) equivalent to a rubbish truck full of clothes ends up on landfill sites every second."[12]

Globally, just "Globally just 12% of the material used for clothing ends up being recycled."[13]

[10] https://www.mckinsey.com/business-functions/sustainability/our-insights/style-thats-sustainable-a-new-fast-fashion-formula

[11] https://earth.org/fast-fashions-detrimental-effect-on-the-environment/

[12] https://www.bbc.com/future/article/20200710-why-clothes-are-so-hard-to-recycle

[13] https://www.bbc.com/future/article/20200710-why-clothes-are-so-hard-to-recycle

Other large waste items include wastewater – the industry is responsible for 20%[14] of the global share

Amer: What about the incentives to curb these market failures?

Angela: I would also see the bright side – recycling is picking up with clothes donations and secondary marketplaces. This is in essence cradle to cradle just quite inefficient.

Rema: It remains bleak when we look at how effective the incentives have been. Simply said "according to the UN Framework Convention on Climate Change emissions from textile manufacturing alone are projected to skyrocket by 60% by 2030."[15]

Donations too "are being used as a way of simply passing on the textile waste problem to others."[16] And the secondary markets are currently inefficient at best.

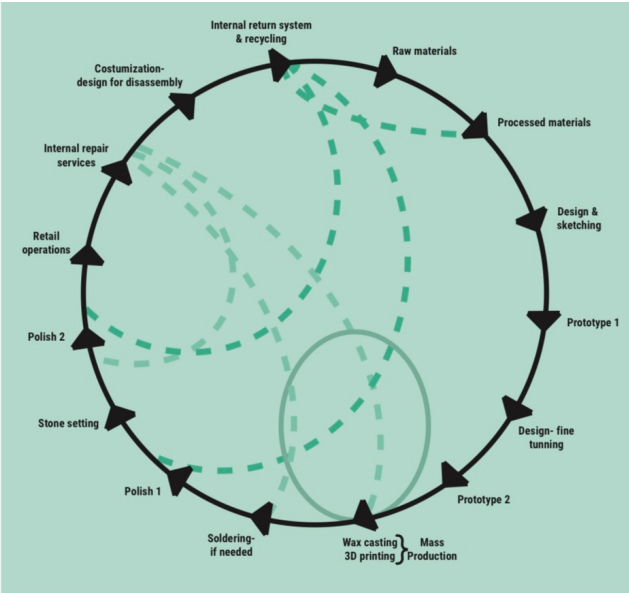
For true recycling efforts to work we need clothes and fabrics "to be designed in ways that make them easier to recover and recycle."[17]

Anonymous Student in crowd: The labor practices[18] are a market failure as well! Just think about the history of the cotton industry…

Rema: Spot on.

Back to your comment about circular models appearing in the industry, Angela, we do in fact see this. Though, slowly.

Here we see how it would work to create true circularity in the jewelry industry[19]:



[14] https://www.bbc.com/future/article/20200710-why-clothes-are-so-hard-to-recycle
[15] https://earth.org/fast-fashions-detrimental-effect-on-the-environment/
[16] https://www.bbc.com/future/article/20200710-why-clothes-are-so-hard-to-recycle
[17] https://www.bbc.com/future/article/20200710-why-clothes-are-so-hard-to-recycle
[18] https://www.bbc.com/news/world-asia-china-56535822
[19] https://www.daniellekeller.net/m-a-thesis

Even with these efforts the problem remains on how to create and enforce an incentive model that takes the earth systems into consideration. Not just the economy and consumer.

Within the pockets of sustainability driven change, we see unclear standards and transparency on what this really means and how it is being agreed on.

Would tokenizing the commons really relate to this?

Angela: Before we focus on the comment about tokenization, I would like to take the liberty to move a bit further out namely closer to what type of technology we need.

In essence a technology is just a tool to accomplish our goal. In this case we are using technology to drive down the cost of certain practices that are deemed to be more conscious of the three large stakeholders (earth systems, economy, and society) through distributed accountability. This is counter to the traditional models of driving down the cost through scale and centralized accountability. We also want to stay away from representative democracy governments leveraging the tools of taxation and subsidies inefficiently.

Our goals are as follows:

- Capture proof of 'Provenance' of products and meta data about manufacturing practices / standards (including C02 emissions, water consumption and hours of labor used to name a few)
- Codify business logic to enable a trustless and frictionless transaction economy through digitized (smart) contracts (including giving automatic rewards for the right practices)
- Trustworthy data sources that are shared openly (creating free, open, and liquid markets)
- Consensus on regenerative metrics to focus on and decision on how / where to price the commons
- Security of data and transactions given the nature of users (individuals, businesses, and governments)
- Immutability / finality just like the real world is when we use x units they are used for good and cannot usually be rewound

To me this sounds quite a lot like a distributed database structure that allows us to crowdfund stakeholder decisions on pricing and incentives – or in simple terms a blockchain.

The goal would be to tokenize any material, service, and resource and create an alternative consensus model called 'Proof of Production'.

A physical product produced also generates a digital clone (NFT[20]) to it so that its lifecycle can be measured. All the meta-data will now be captured around the

[20] Is it possible to recycle NFTs? I.e., when a product is recycled can the NFT be re-used?

sustainability metrics that the governing body has agreed on. This NFT could not only help in provenance and data sources but also in codifying business logic.

Think of the proof of production model generating a unique code for each item similar to ISO codes or bar codes. If X units of raw material are used to produce Y the NFT of Y will note that in its meta data. One could investigate the technicality of fusing NFTs and recycling as well.

This is where things get fascinating.

Rema: Let me stop you here and firstly give you kudos as it seems like you too have thought about this.

But I am worried you forget one thing. We need SCALE! These industries are massive. The fashion industry produces over 100 billion items a year and this does not include the supply chain steps in between and all the resource usage and accounting that you are proposing.

Transactions, database entries and requests need to be quick and cheap while also being all the things you mentioned above.

Angela: Thank you for bringing this point up!

Scale is a very real and current problem with blockchains. Let's not forget the soaring gas prices on Ethereum.

The more stuff that we want to push through Ethereum the more expensive and slow it will get.

However, we have innovations bubbling up left and right from Optimism to ZK rollups that are dubbed Layer 2 solutions.

These will allow us to move from tens of transaction per second to thousands or even hundreds of thousands.

The Zero Knowledge Proof work allows the business, government and individual entitles to still transact with a maximum privacy focus.

I recommend using IPFS and the work from Filecoin (Protocol Labs) to manage the large number of NFTs you are proposing having on chain.

Since we also do not want to keep the pricing of the commons private and in an opaque market, we could easily leverage the Graph and Chainlink for sub-graphs (APIs) and oracle prices to share the value of the network and market we are talking about globally.

We are discussing a tool that will allow us to check the identification, authenticity, and metrics of a certain asset anywhere, anytime and by anyone. Now with truly unique digital assets we can do just that.

Blockchains enable us to trace the number of hours worked by whom where and the impact of a production method on the biosphere and atmosphere to name a few of the earth systems. We clearly understand how to grow the economic pie and satisfy the human needs – just look around us.

What has failed so far is the symbiosis between humans and nature. I call for action to stop pushing and controlling nature and rather analyze and work with it by leveraging technology. This in my mind is the genesis of a cradle-to-cradle mindset.

We are talking about reducing the fake production markets and easing the inefficiency in custom clearance. We are also talking about democratically rewarding the network participants that act in accordance with the protocol and best practices whereas possibly punishing the actors who do not.

We can truly create a transparent, open, and liquid market for the commons using this technology. Specifically, Ethereum with its focus on smart contracts, distributed databases. Decentralized Autonomous Organizations (DAOs) will allow for new tools that are unimaginable to our generation to be developed.

Rema: What exactly do you mean by smart contracts? How could this assist in the incentivize mechanism for the preservation of the commons on a practical level?

Angela: A smart contract is very simply put an 'if then' statement usually with a monetary value being exchanged.

These contracts execute automatically if the pre-agreed upon criteria occurs. No politics, no back office, and no foul play. We enable a frictionless human coordination system to flourish without any trust in the other human participant in the network!

Examples include:

- If users join the network early and build out the protocol, then they will get rewarded
- If you validate the transactions and run servers then you will get rewarded[21]
- If x units of waste are generated, then a portion of the token locked inside the NFT will be burned
- If you produce more diverse products and follow the regenerative metrics set by the community then you will get rewarded (the earlier, you do this the better -> diminishing return as the network grows)
- If you put attention and effort into building a truly sustainable protocol (i.e., what metrics are to be focused on) with your governance and vote then you will get rewarded

[21] if the validators are too strongly concentrated in a few hands the network gets punished

- If you catch fakes in the marketplace then you will get rewarded, and the fake producer will get punished
- If you recycle your assets and resources, then you will get rewarded -> in fact all actors that assisted in creating a circular supply chain will get rewarded with part of the locked token (from the NFT)
- If you collect more of the metrics requested (e.g., water usage, labor and materials, energy usage or even C02 emissions) using trustworthy data feeds on the NFT then you will get a larger portion of the reward
- If x units of C02 are produced, then Y number of trees are planted[22] across the world and if the trees get over Z years old your reward will increase yearly (using technology like superfluid)
- If a copyright is created and enforced, then less reward is attributed to this party for being anti opensource….

The possibilities are truly endless!

Rema: Now let's not get ahead of ourselves again. You seem very energetic which I admire but are there no exceptions to this expect scale which is being solved as you claim?

Who even governs and decides on these contract rules?

Angela: Quite right, I am energetic about this solution for a problem you proposed!

Ultimately it is a trustless system only so far as the code that these rules are written in are trusted.

The fundamental idea of rewarding distributed and different (non-identified) participants for working together to say create a closed loop economy and thereby eliminating waste can be done. If all actors simultaneously work together then each participant earns a share of the token that is locked in the NFT.

The other expectation of this working out smoothly is that the transition from physical world of atoms to digital world of bits (data transfer) occurs without error.

See, if a factory claims that there are no negative labor practices this would have to be checked on site, physically. One could certify production methods with randomized quality inspections. These individuals (quality inspectors, another type of validator) who provide this service to the network would surely be rewarded as well.

Yet, a distributed Internet of Things infrastructure[23] could be leveraged here too. Imagine the inspectors are given IoT devices that measure the water waste, production quantity and even the all too familiar C02 emissions. Once these tamper proof sensors are installed, they automatically feed the data back to the relevant NFT.

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[22] Or services like Siliva Terra can be used to manage and track the carbon credit distribution.
[23] https://www.helium.com/

Essentially the network if it chooses could use other technologies with the blockchain to support the creation of performance, stability, and reliability.

Even with the quality inspectors, sensors, and validators it would be critical to have a diversified board or counsel.

The DAO[24] would function as a primary filter for metrics to use (and weight differently if there is interest[25]), what functions to develop and even what to do with the funds generated from fees. The network could choose to fund a certain number of projects and brands that are built around the new regenerative protocol and take the commons and earth systems into account. One may even create a truly decentralized DeFi protocol to invest in projects that are preserving the earth (think a green ETF[26]).

The counsel on the other hand would be composed of a select (odd) number of scientists, philosophers, and educators. They would oversee keeping the network safe from bribery, collusion, and voting insecurities. They would also be granted the unique right to push certain votes to the DAO regardless of other circumstances.

New council members would be added through a governance vote and each member would have a maximum time to serve of 6 years.

Rema: Does this make sense? What about the economics and incentives of such a system?

Is there any evidence to support this could work?

Angela: It would be a great time to talk about crypto- economics.

But the short answer is that yes it could work to leverage new technologies to make regenerative practices that incentivize the preservation of the earth systems efficient, effective & ultimately cheaper, globally.

Think of humans as master communicators. We can communicate ideas (real or fake) and with these stories get other people to join us in our common goals. A blockchain based database does just this regarding communicating data amongst a much larger group of people without trust being a necessary ingredient.

We can also see that there is evidence of such systems working and evolving in pockets of the industry.

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[24] If any individual wallet has more than 1% of the share, they are obliged to take part in training and development courses run by the counsel to make sure they are making educated and balanced decisions based on facts

[25] The more a metric deviates from ‚healthy' or recommended levels the more weight it receives to incentivize safeguarding

[26] Investing in companies determined through certain metrics like carbon neutrality, no waste, local, chemical usage, diversity or small-scale etc.

In terms of proof of provenance in supply chains we see companies like Provenance[27] or Circularise[28]. As for markets being created through crowdfunding, we see market making liquidity pools, file storage systems[29], video streaming services[30] and even NGOs[31].

The added layer of complexity comes from tokenizing physical resources and assets while also agreeing on and enforcing certain standards and practices within supply chains through crypto incentives.

These tokenomic mechanisms are fascinating and are transferable from what we see out there to what we discuss here. Simply said though, if you spend time in building a valuable network, you get rewarded.

Rema: Okay, but the economics still seem quite unclear. You have my hopes up though regardless.

Angela: Well, keep them up as we need you to help build this out!

The economics really focus on a governance token and a utility token. The utility token is not capped and is used for minting the NFTs and generally transacting in the eco-system.

The governance token on the other hand is capped to a maximum supply[32] and can only be earned from doing an activity that increases the value of the network. This can include but is not limited to the example of smart contract functions (e.g., meeting more criteria and metrics while producing goods) and counsel seat distributions.

Core to this concept is that every minted NFT locks a certain number of governance tokens which only unlock and get distributed to the individuals who interacted with that exact token in question. A larger share of the governance token unlocks and gets distributed depending on what extent of the value was generated (e.g., more metrics fulfilled). Less governance tokens are locked and distributed as the network grows in scale.

The DAO which is comprised of all of the governance token holders can now decide on the future of the protocol or even on how to spend the funds accumulated in the treasury[33].

The specific token distribution and inflation model are still tbd.

I will leave you with the goal.

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[27] https://www.provenance.org/technology
[28] https://www.circularise.com/
[29] Filecoin
[30] Theta Labs
[31] Popcorn
[32] Based on first x number of users, x number of NFTs, x tones of GHG suppression… up for debate really.
[33] Dividends to token holders, R&D or re-invest in ecosystem

We want to incentivize the elimination of waste and preservation of the earth systems (commons) using technology. We believe that making regenerative products cheaper instead of unsustainable products more expensive through a democratic and distributed taxation/subsidy governance model is the future.

Epoch 3 – The future of RegenYield.

Rema: Wow!

It is like yield that keeps on giving - Regenerative yield!

I see how you captured my idealist fantasies, Angela. But then again it has instilled me with hope to create a market and re-align incentives to preserve nature.

You have clearly presented an idea that sits at the intersection of sustainability, NFTs, and blockchains. If the scaling solutions really work then we can aim to make regenerative products cheaper.

If I may indulge myself, where do you see this going beyond what you mention?

Angela: It could go in a multitude of directions.

I imagine a world where accounting is reformed through more transparent and trustworthy data (& sharing). I see a world where certifications for say carbon neutrality will be backed by society and not an opaque organization.

It could be taken even further with on-chain vs off-chain computations (L1 and L2). I am sure you are aware certain businesses are not keen on opening all transactions and details to the public.

This data could be used for new supply chain and consumption insurance plans. If your good is delivered then your insurance plan is deactivated.

Or sticking with the legal issues one can create new databases of patents and copyrights.

In the business realms groups could form new marketplaces that are based on the metrics from what I call RegenYield. Secondary marketplaces would increase in trust given that fakes would be hemorrhaged.

Wealth management could create strategies around certain certifications, business practices or metrics.

It all comes down to those beautiful smart contracts. If value is created, then x happens. If value is destroyed, then y happens.

The emergence that arises from the magic of today is that we can collectively price the public goods / commons that have been so poorly priced till today.

It has a multi-industry application. We can apply this to food, beverages, FMCG, retail, materials, construction, manufacturing, cross-border/governmental work and energy.

The request I want to leave you with is that we should always foster the best practices being shared throughout the community. Maybe incentivize open-source methods, lessons and tricks to preserve planet earth?

If you believe that we can move from a hellish Anthropocene to a paradise Anthroposphere, maybe, just maybe you are right.

Good luck