

# latoga labs

# Carbon Industry Framework

*A reference framework for the Carbon Industry  
to guide investors, business leaders, and entrepreneurs*



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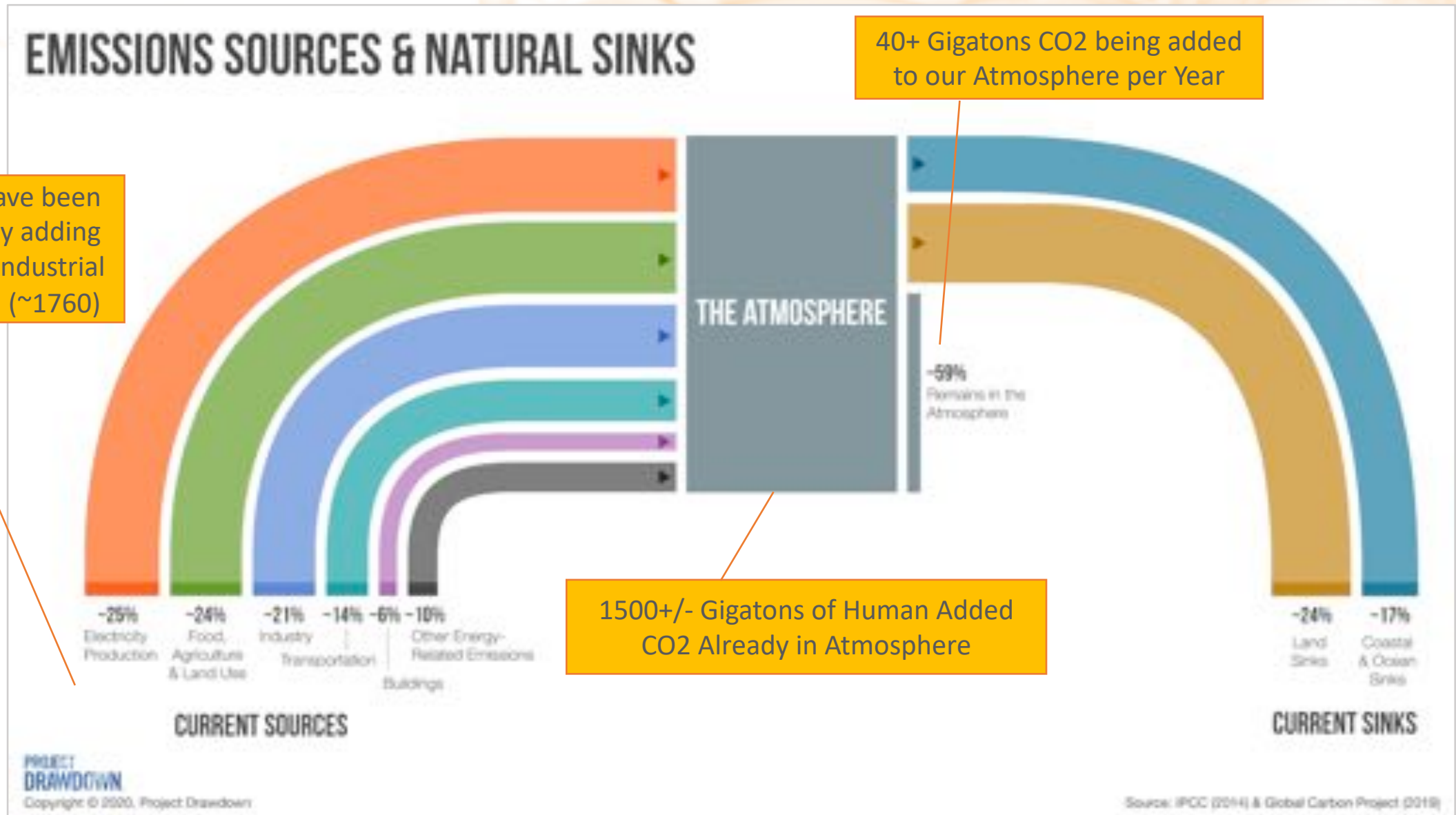


# Genesis of this Framework

- After 2 Decades working in Technology I naturally think in frameworks to be able to describe and discuss complex ecosystems
- As I talked with more companies and entrepreneurs, I noticed them struggling to describe themselves by the Industry areas where their work could be applied (versus their scientific research areas)
- As I talked to investors, I saw them struggling to compare and contrast where companies impact was in the Climate Change ecosystem
- To date I haven't found a framework that addresses the above for Climate Change solutions...so I formalized my thinking in this first draft of my framework and now sharing it with the wider community



# Simplifying the Problem Space







# Defining the Opportunity Areas

## EMISSIONS SOURCES & NATURAL SINKS

\* Possible more CO<sub>2</sub> would need to be removed due to Le Chatelier's Principle applied to Atmosphere-Ocean equilibrium

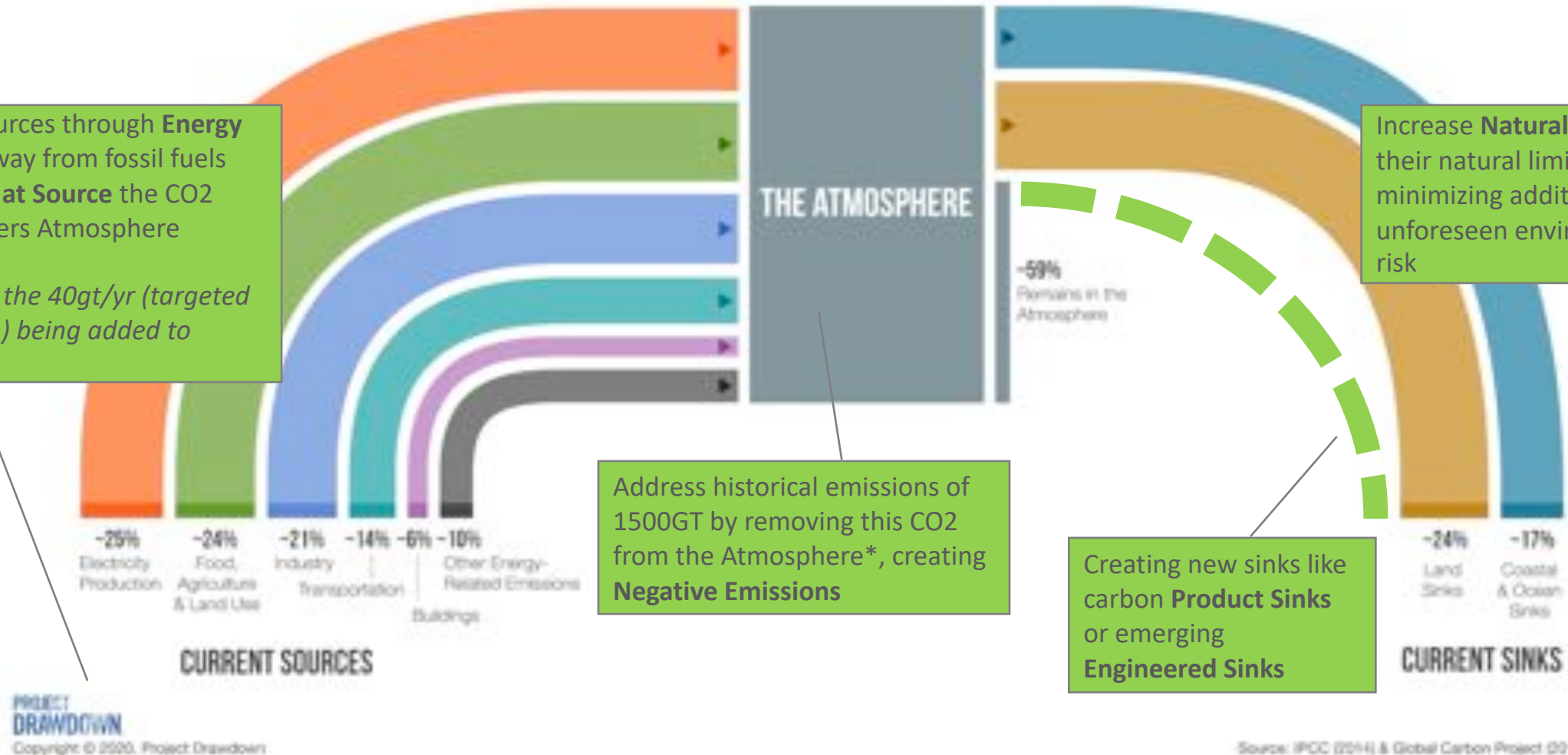
Eliminate sources through **Energy Transition** away from fossil fuels and **Capture at Source** the CO<sub>2</sub> before it enters Atmosphere

*This impacts the 40gt/yr (targeted for reduction) being added to Atmosphere*

Increase **Natural Sinks** up to their natural limits while minimizing additional unforeseen environmental risk

Address historical emissions of 1500GT by removing this CO<sub>2</sub> from the Atmosphere\*, creating **Negative Emissions**

Creating new sinks like carbon **Product Sinks** or emerging **Engineered Sinks**





# The Formula

<b>Human Emissions</b>	<b>+</b>	<b>Historic Emissions</b>	<b>=</b>	<b>Capture &amp; Sequestration Target</b>
<b>40+ GT / year</b>		<b>1500+ GT</b>		

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Decreases as  
Energy Transition  
Occurs

Largest Amount  
of CO2 Needing  
to be Captured

Increasing  
Every Year...



# The 3 Walls of the Carbon Industry House...

The Carbon Industry includes the orange boxes below which directly capture or sequesters the excess carbon (CO<sub>2</sub>) that humankind has added to the environment.

## Energy Transition

We got here due to the usage of fossil fuels, the ultimate long term fix includes transitioning away from all fossil fuels. Energy Transition investments are generally well known (solar, wind, electrification of transportation, etc.). This removes the 40GT of CO<sub>2</sub> being added to the atmosphere each year.

Colored Green due to generally being a different investment area tangential to the Carbon Industry. Mentioned but not directly covered by framework.

## 1. Capture at Source

Capturing CO<sub>2</sub> from existing Fossil Fuel based sources. This augments Energy Transition to addresses the CO<sub>2</sub> released by legacy sources during energy transition and any long tail fossil fuel use cases. This removes the eventually shrinking 40GT of CO<sub>2</sub> added to the atmosphere each year,

## 2. Negative Emissions

All methods of man made systems that capture CO<sub>2</sub> directly from the atmosphere with the goal of reducing the 1500+ GT of human added CO<sub>2</sub> in the Atmosphere.

## 3. CO<sub>2</sub> Sequestration

### A. Natural Sinks:

Augmenting or accelerating natural process which sequester CO<sub>2</sub>. Some of these process are being (or could be) disrupted by Climate Change. Others are naturally limiting. Risk of unforeseen impact to the ecosystem.

### B. Product Sinks:

Either creating long lived new products that are largely made from carbon or using CO<sub>2</sub> as a component of existing long lived products. The **goal being long term sequestration**.

### C. Engineered Sinks:

Combining nature and human engineering for long term sequestration (emerging area, unknown risks)



# ...and Their Foundation & Roof

## Governance [Audit, Certification, & Enablement]

Governance model(s) with audit and certification of both CO2 removal and CO2 Sequestration amounts.  
Enables Carbon Credits quality ratings.

1. Capture at Source



3. CO2 Sequestration

A. Natural Sinks

B. Product Sinks

2. Negative Emissions



C. Engineered Sinks

## Financial & Regulator Model

Government involvement is needed to price Carbon and create price points for carbon pollution and carbon removal from atmosphere (Carbon Credits)



# Not All Investment Areas are Equal...

- Typical investment looks only at the Financial ROI of a project
- Original Objective of Carbon Industry is to remove the excess CO2 from our environment that is creating global change and global risk
  - Amount of Carbon Removal & Sequestration Duration needs to be considered
  - This is generally referred to as ESG ROI  
(Environmental, Social, and Governance Return on Investment)

Financial ROI and ESG ROI  
need to be considered in investment decisions





# The latoga labs Carbon Industry Framework

## 1. Governance [Audit, Certification, & Enablement]

Financial ROI:

ESG ROI:

## Energy Transition

Financial ROI:

ESG ROI:

## 1. Capture at Source

Financial ROI:

ESG ROI:

## 2. Negative Emissions

Financial ROI:

ESG ROI:

## CO2 Sequestration

### 3. Natural Sinks

Financial ROI:

ESG ROI:

### 4. Product Sinks

Financial ROI:

ESG ROI:

### 5. Engineered Sinks

Financial ROI:

ESG ROI:

## 2. Financial & Regulator Model

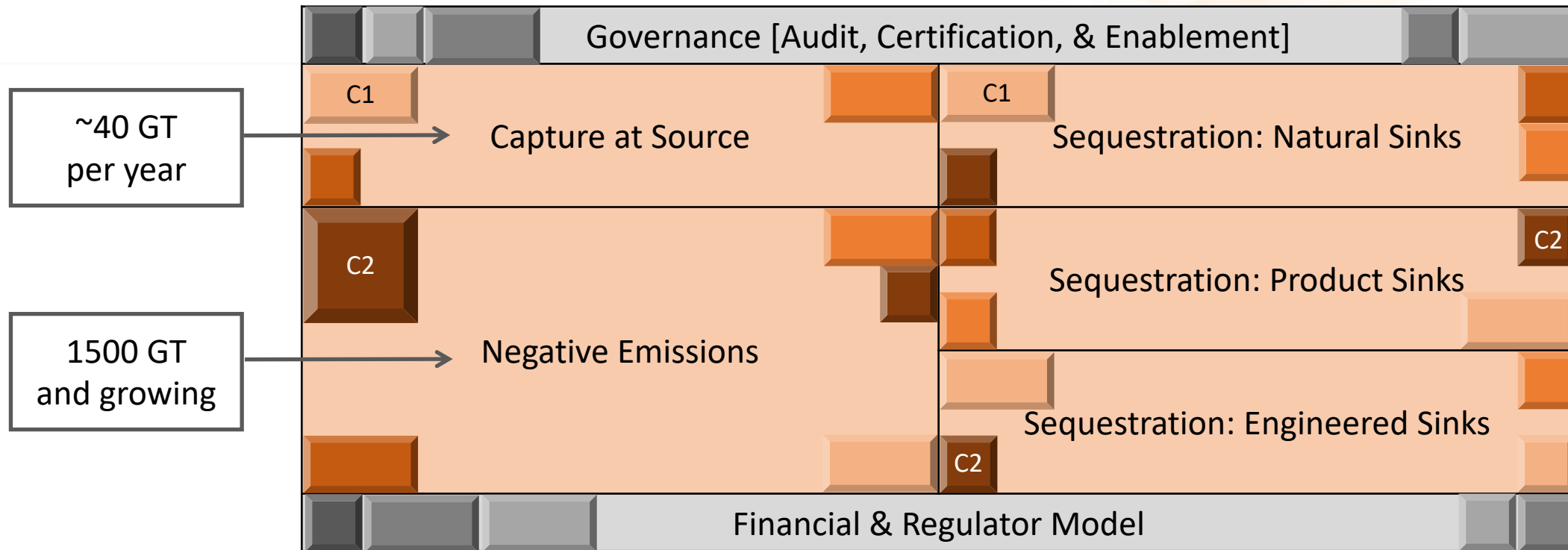
Financial ROI:

ESG ROI:



# Solving climate change will take a mosaic of solutions

Multiple Solutions across each **Sector** of the Carbon Industry...



Each Sector will contain multiple **Areas** sharing common underlying aspects...

**Companies** will need to touch on multiple Areas across Sectors,  
either directly or through partnerships.



# Moving Forward...

- Please share your thoughts on this Carbon Industry Framework, the agreeable and the disagreeable...
- ...specifically how would you rate the ROI of each of the 7 Sectors of the Carbon Industry
- Contact me if you're interesting in creating a Carbon Industry Map of the companies that are currently working on solutions within these Sectors.

[airminers.org](http://airminers.org)

[latogalabs.com](http://latogalabs.com)



**Greg A. Lato**

**Additional Thoughts & Discussions**

latoga labs: [Carbon Lab](#)

Air Miners Community: [business-model-lab](#)