



Hemp Derived Cannabinoids
An Economics Impact Analysis of Cannabinoid Retail in Virginia.
Beau Whitney, Chief Economist, Whitney Economics
February 2023

Contents

Executive Summary2
Introduction.....4
Objective of the Report 11
Data and Findings 12
Observations and Policy Related Issues 14
Conclusion 18
Appendix: Methodology..... 20
Appendix: Survey Questions..... 22
Appendix: About the Author / Statement of Conflicts..... 23
Appendix: Sources 24



Executive Summary

In February 2023, the Virginia legislature passed a bill to ban the sale of converted, or synthesized, cannabinoids to consumers in Virginia. There is currently a debate in the Commonwealth as to whether or not hemp-derived cannabinoid manufacturing is legal within the state.

In adult-use and medical cannabis, there has been very little data collected at the federal level. This is beginning to change and some data is being published by state regulatory agencies. Despite its legality, hemp has been caught up in the debate and politics around cannabis data collections. Standardized tools and systems for data collections in both sectors are simply not in place.

To date, there has only been speculation as to the extent of the hemp-derived cannabinoid market. No study had been conducted to ascertain the size and impact of this industry on the overall Virginian economy. As such, Whitney Economics has combined its expertise and extensive data set for the cannabis and hemp industries, with a survey of leading retailers of hemp-based cannabinoids that are based in Virginia.

An analysis of the Virginia hemp-derived cannabinoid retail sector was conducted during a 2-week period in February 2023. ***The objective of this report is to ascertain the total economic impact the hemp-derived cannabinoid retail industry is having on the Virginia economy and to understand the implications that a ban on sales would have on the state and the industry.***

Key Findings contained in this report:

1) Hemp-derived Cannabinoid Retailers are a Major Industry in Virginia

The total sales from these businesses in 2022 is estimated to be \$1.2 billion, of which \$562.2 million was derived from CBD and converted cannabinoid sales. The industry employs approximately 4,263 workers, paying in excess of \$161 million in annual wages.

2) The Supply Chain Supporting the Cannabinoid Retail Industry Extends Throughout the U.S.

Supply chain to support Virginia cannabinoid retailers extends throughout the United States and cannot currently be supported solely by Virginia farmers. With an economic impact estimated to be between \$2.5 and \$3.3 billion, the deployment of the hemp-derived cannabinoid retail sector appears to be a major success. This success was the intention of the 2018 Farm Bill: to create economic opportunities for U.S. hemp farmers, manufacturers and retailers.

3) Proposed Ban Would be a Net Loss for Virginia with National and International Ramifications

The proposed legislation to ban the sales of hemp-derived converted or synthetic cannabinoid products would be a net loss for the state of Virginia. It would have a negative economic impact on the state, displace workers, close 371 businesses, and essentially transfer and additional 64 businesses out of Virginia and into other states. Any change in Virginia policy will impact supply chains across the country and beyond its borders. Virginia cannabinoid retailers are supplied by operators in all 50 states and they sell products both in state, to other U.S. state and even internationally.



The proposed ban on cannabinoid sales is not recommended by Whitney Economics for several reasons, chief among them:

- The economic damage to Virginia would be too great
- There would be a shift of economic activities away from the state without addressing some of the underlying public safety concerns
- A statewide ban would displace thousands of workers during a time of economic uncertainty
- A statewide ban would disrupt the hemp supply chain throughout the U.S.

The trade-off between working to address gaps in the regulatory process, versus an outright ban, is too large to be economically justifiable. Supporting the transition from a self-regulated industry to one that is regulated at the product level appears to be a good middle ground, when compared to a complete ban of the industry.



Introduction

CBD is a bi-product of the Extraction of Hemp Biomass

CBD and converted cannabinoid products are derived from the extracts from the hemp plant. The plant's flower and leaves are first extracted to produce an oil. The oil is then refined in order to separate the cannabinoids from the plant matter, lipids and water that make up the extracted oil. Technicians have the ability to further refine the oils in order to isolate certain compounds. CBD can then be productized into vaporizers, edibles (ex. gummies), balms, tincture and other wellness products. CBD also serves as a base for further refinement and conversions into other THC and cannabinoid products.

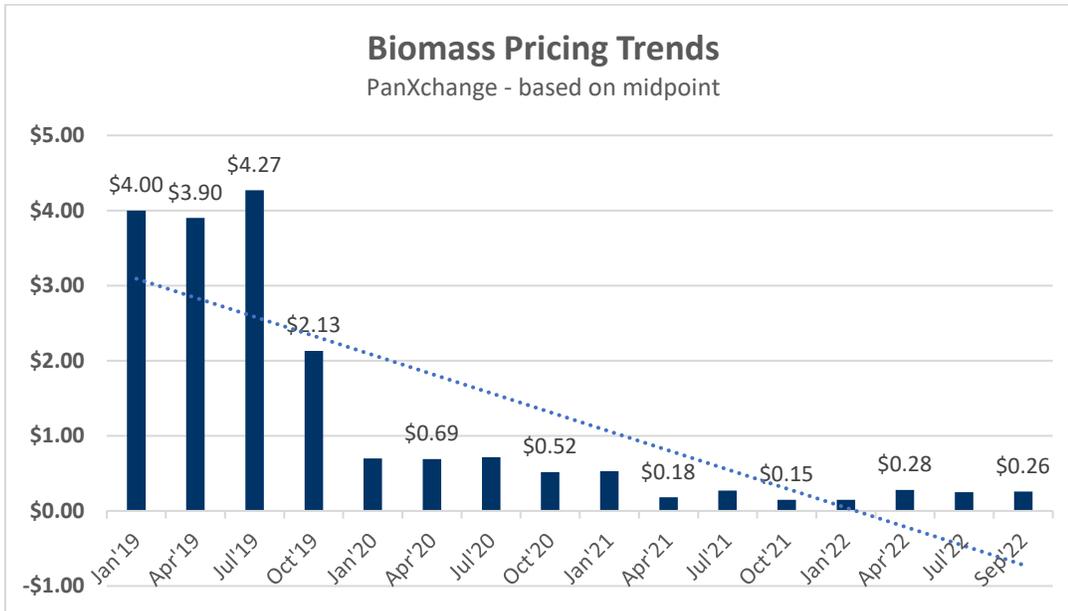
Little known by consumers even 10 years ago, CBD has increased in popularity in recent years, particularly after the passage of the 2018 Farm Bill which legalized hemp and hemp derived products. Converted cannabinoid products evolved as did the market and consumer demand for these products surged in 2019 - 2020. A lot has happened since 2018.

U.S. Hemp Production Capacity and Acres Licensed Increased Dramatically in 2019

The U.S. hemp industry has evolved in the short period after the 2018 farm bill. Hemp cultivation and production for cannabinoids, while a niche market prior to 2018, burst onto the scene in a big way after 2018. Previously, hemp for fiber and grain encompassed a majority of the acres licensed under the 2014 farm bill, acre allocations in favor of cannabinoid cultivation surged to nearly 82% of the nation's acres licensed. <source: Whitney Economics U.S. Hemp Cultivator Survey (2019, 2020, 2021) >

Excess Cannabinoid Inventories Led to Collapsing Prices from 2019 through 2021

With the surge in supply, the infrastructure required to handle the volume output of the farms became a limiting factor in the ability to bring the cultivated output to market. As a result, there was more supply of cultivated output than the processors could handle. With supply greater than demand, prices for cannabinoid materials collapsed, as did prices further down the value chain, including that for cannabinoid crude, distillate and isolate.



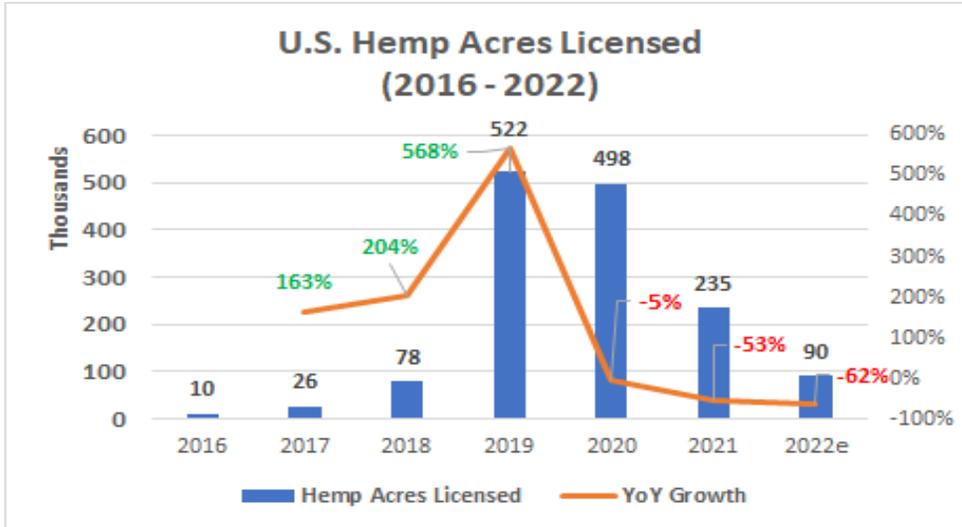
Source: PanXchange

Since 2018, Federal Regulatory Murkiness Has Created Uncertainty and Impacted Growth

Uncertainty at the federal level has also influenced the opportunities for cultivators and operators in the cannabinoid space. With the deployment of Epidiolex, a marijuana-based CBD seizure medication, in the U.S. market, the FDA determined that CBD is a drug. This guidance meant that marijuana-derived CBD could not be used as an ingredient for food or as a supplement, and created enough ambiguity that product manufacturers and investors pulled back. They were not interested in investing into and deploying products into a potentially illegal market. As a result, market growth has been inhibited despite significant demand for hemp-based cannabinoid products. Regulatory ambiguity at the federal level has presented too much risk for investors and manufacturers to absorb and has inhibited the growth of the market.

Uncertainty Has Driven Out Operators and Constricted the Market Since 2020

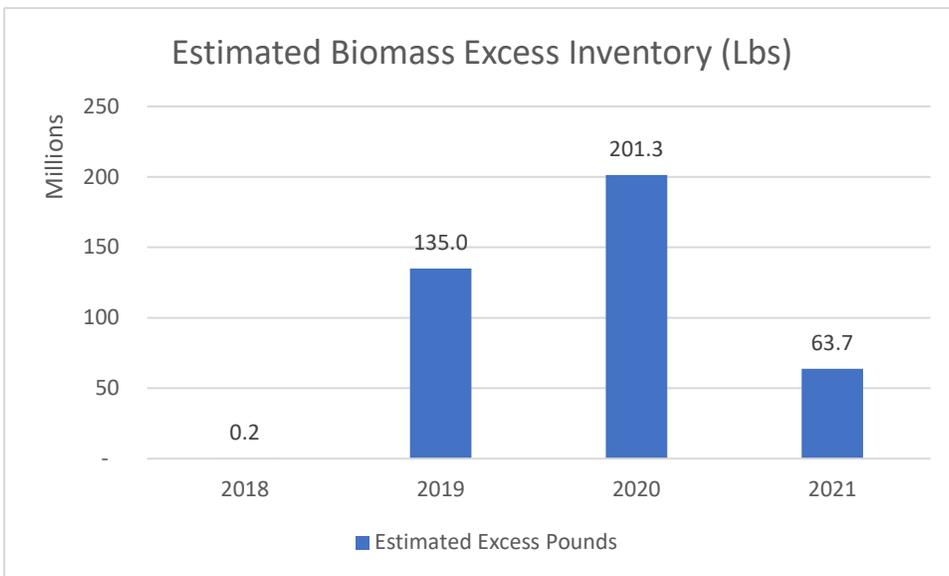
Uncertainties have consistently dogged hemp operators across the country. The combination of collapsing prices, a lack of regulatory certainty, a lack of legal certainty, a shortage of product development and not enough access to markets was too much to bear for many hemp operators. There has been a major pullback in the number of acres licensed as well as the number of processors in the U.S.



Source: Vote Hemp (2016 – 2018) Whitney Economics (2019 – 2022), Randall Lusson (2021)

Fewer Suppliers and Reduced Hemp Biomass and CBD Inventories Since Peaking in 2020

With a lack of consistent orders from product manufacturers, regulatory murkiness at the federal level, and dramatically falling prices, U.S. hemp cultivators and cannabinoid processors saw their inventories increase significantly in 2019 and again in 2020. At its peak there were approximately 201 million pounds of excess hemp biomass in the U.S. marketplace and in excess of 1.6 million kilos of processed cannabinoids.



Source: Whitney Economics Hemp Cultivation Surveys (2019, 2020, 2021)



Economic Stress Drives Innovation and Opens New Market Opportunities in 2020

With little economic value left in the inventories of excess biomass and processed cannabinoids, farmers and processors looked for innovative ways to monetize their inventory. Many sold their inventory below their costs of production, resulting in continued downward pressure on prices. This unabated decline in pricing put many operators out of business. Others found ways to monetize their inventory through process innovations. This led to a significant increase in processed materials that were further refined or converted into products, beyond the original CBD content. These products included gummies, vapes and other derivative products containing minor cannabinoids such as CBG and CBN, as well as products containing other forms of THC beyond the traditional THC delta-9 such as delta-8, delta-9, delta-10 and further refined products, such as HHC.

“Unlike adult-use and medical cannabis, hemp-based products can be sold in all traditional distribution channels and retail outlets.”

Converted Products Were Creating Consistent Demand for Hemp by 2021

The deployment of products beyond traditional THC delta-9 and CBD have been a lifeline for farmers and processors in the hemp-based cannabinoid industry. **Given that all products derived from hemp are considered hemp, converted hemp-based cannabinoid products found new market opportunities that have not been available to medical or adult-use cannabis operators.** Hemp-based operators were also able to conduct interstate commerce, rather than being restricted only to the markets where the products were grown and processed (which is required of adult-use and medical cannabis products).

Consumers Are Seeing the Benefits of CBD and other Cannabinoid-based Products

Consumer demand has been steadily increasing as the potential benefits of hemp and hemp derived products became more widely known. Consumers began substituting hemp, hemp-based oil and oil derivative products for opioid and pharmaceutical medicines, particularly for pain management, anti-inflammatory, anxiety and diet issues. Seeing an opportunity to expand revenues in small businesses, hemp operators started offering more products. In many states, hemp is the only source of cannabinoids allowed, so the consumer demand has steadily increased, while regulatory oversight was limited to hemp at the farm gate. **From the period from 2019 through 2022, sales of hemp-based cannabinoids exploded and is estimated to be between \$5.5 - \$6.5 billion in the U.S. alone.** Unlike adult-use and medical cannabis, hemp-based products can be sold in all traditional distribution channels and retail outlets. This has given the U.S. consumer unprecedented access to cannabinoid products.

In 2022, a Nimble Industry Continues to Outpace Product Safety Regulations

Similar to the early days of adult-use and medical cannabis, the pace of expansion in the hemp market has surpassed the ability or federal willingness to regulate it. As a result, some products that have been tested have shown discrepancies in labeling, cannabinoid content, the levels of THC, CBD and other ingredients and have shown indications of other “unknown substances”. These issues will require further regulations, as the current environment is self-regulated, and federal regulation stops at the farmgate. Regulatory ambiguity could be solved with greater clarity at the FDA and other federal agency levels. That reform has so far been elusive to date.

Adult-use and Medical Operators Have Pushed Back Against Hemp-Based Cannabinoids

As the sales of hemp-based cannabinoids increased from 2019 – 2022, adult-use and medical cannabis operators have cried foul. Many companies highlighted the lack of regulations have led to a “public safety crisis”, while others have cited the competition hemp cannabinoids represents and threatens their revenues derived from intoxicating cannabis. **Most claims regarding a public safety crisis have gone unsubstantiated, in terms of what specific data they are citing, and what specific risks they are concerned about.** Most public safety issues discussed were associated with youth access and usage by consumers who lack any knowledge of what they are ingesting. Many of these concerns can be addressed through basic regulations, yet it seems that adult-use and medical operators are calling for a complete and total ban on sales of hemp products, or for hemp to be regulated in a similar manner as a Schedule One narcotic. The trade-off between working to address gaps in the regulatory process, versus an outright ban, is too large to be economically justifiable. While it is appropriate to regulate cannabinoids, it seems unnecessary to force a dramatic change from ‘unregulated’ to ‘schedule one narcotic.’ The negative economic impact appears to exceed the justification.

FDA Issued a 2022 Update on Hemp-Derived Delta-8 Products

The FDA has issued an update specifically about Delta-8 which provided consumers with a good overview for consumer awareness. The FDA has stated that *“These products have not been evaluated or approved by the FDA for safe use in any context.”* Precisely the same thing can be said for almost all adult-use and medical cannabis products. One might ask, if hemp derived cannabinoid products are a risk to public safety, how are adult-use and medical products not a similar risk? The difference, adult-use operators would say, is that cannabis for adult-use and medical purposes is tightly regulated while hemp is not. Further, regulation for hemp products stops at the farmgate and does not extend to the product levels. **A lack of product regulation of hemp-derived products creates a competitive advantage for the hemp industry, and it may allow for the opportunities to sell potentially harmful products to unsuspecting consumers.**

“One might ask, if hemp-derived cannabinoid products are a risk to public safety, how are adult-use and medical products not a similar risk?”

Since 2018, State Legislatures Have Stepped in to Fill the Regulatory Void

With continued regulatory murkiness around hemp at the federal level, pressure has mounted on state legislators to take action. State legislatures have been compelled to address issues surrounding hemp cultivation and product manufacturing on their own. The result is an inconsistent patchwork of regulations, from state to state. So far, 36 states allow for the sales of hemp-based cannabinoids and converted cannabinoids in either a regulated or loosely regulated manner. Other approaches by states include:

- Prohibiting the sales of products that compete with cannabis products until a tax program has been developed and implemented
- Implementing moratoria on the cultivation of hemp
- Proposing the ban on sales of hemp-based cannabinoids within the state but allow for manufacturing and processing for out-of-state export

Since 2020, State Legislative Actions Have Impacted the Hemp Industry at the National Level



With the regulatory uncertainty already high due to federal inaction, additional uncertainty around state regulations has negatively impacted the national hemp industry. Within this dynamic and changing environment, many operators cannot formulate meaningful long-term plans, or even short-term operational strategies, as they are not sure what the rules will be in three months, six months or a year. The market is understandably seizing up, with investments planned for hemp projects now allocated elsewhere. At a time where, in order to accelerate the growth of the market, supportive policies are necessary, more restrictive measure are being put in place that are doing just the opposite. Data show that these policies are suppressing the growth and expansion of the industry,

What are the Impacts of this Environment of Uncertainty?

- The lack of investment and deployment of the hemp infrastructure impacted the economic potential of U.S. hemp industry by \$20 - \$25 billion in 2021 alone. This is as large as the entire legal U.S. sales of the adult-use and medical cannabis retail industry.
- Uncertainty at the state level has reduced acreage and business licenses.

State Bans and Regulatory Actions have Resulted in Unintended Consequences

Multiple states have attempted to enact legislation that would re-criminalize hemp derived cannabinoids or to ban it altogether, however this has led to many unintended consequences and legal battles. For example, the state of Oregon has enacted moratorium in some counties on hemp cultivation. While this was mainly an attempt to address illicit adult-use cannabis production, the legislation unintentionally impacted the supply chain of CBD for many states and impacted CBD processor revenues by \$50 million to \$75 million per year. It also impacted opportunities for hemp-based grains and fiber and reduced opportunities for farmers to take part in carbon offset programs. Legislation in Colorado intended to ban production of converted cannabinoids was proposed not realizing that this would have a direct economic impact of over \$500 million per year in product manufacturing sales and an overall impact in 2023 in excess of \$2 billion. Most manufacturers in Colorado surveyed indicated that they would simply move their entire operation to another state rather than close down operations. The Colorado legislature has since reconsidered this proposed legislation.

Hemp and Hemp Derived Products are Deemed Legal in U.S. 9th Circuit Court Ruling

Hemp Derived products are hemp by definition and are therefore legal to sell and productize, according to the U.S. 9th Circuit. As such, they do not require as much regulation as does the federally illegal adult-use and medical cannabis. While the adult-use and medical industry is crying foul and attempting to paint hemp derived products in a negative light, the fact remains that until policy changes are made at a federal level, hemp derive products will remain legal.

DEA Reaffirms the Legality of Delta-8 THC, Delta-10 THC, HHC

On or about February 13, the DEA responded to an inquiry from Attorney Rod Knight regarding the legal status of THCO (only). The DEA stated that THCO is a schedule 1 controlled substance applying the Analogue Act. The DEA letter was solely about THCO, specifically delta-8 THCO and delta-9 THCO. It did not in any way address delta-8 THC or any other compound. **The legal status of delta-8 THC was not impacted in any way by the DEA's letter, except to the extent that its lawful status as "hemp" was reinforced.** The DEA could have said that



Delta-8-THC was unlawful or was synthetic; it did not. Instead, previously, the 9th Circuit Court of appeals had indicated that Delta-8 ‘fits comfortably’ within the hemp definition of the Farm Bill.

In 2023, A Lack of Data has Led to Greater Uncertainty

Due to the federal illegality of cannabis at the federal level, most federal agencies are not allowed to collect data on the economics of cannabis. There are a handful of NAICS codes (North American Industrial Classification System) that are used to track the flow of goods and services throughout an economy, but there is currently only a very limited ability to track such things as revenues, employment, economic impact, taxes and the flow of cannabis goods and services throughout the economy. As a result, most of the data gathering has been in the form of meticulous manual data collection: compiling data from state regulators, parsing together point of sale data, and conducting business and consumer surveys. With the lack of centralized data in the marketplace, it is understandably tough to be able to ascertain risks felt by operators, investors and stakeholders participating in the hemp industry. This lack of basic economic measurements has led to even greater uncertainty.

Access to Data is Limited and Some States Report Better than Others

In adult-use and medical cannabis, there has been very little data collected at the federal level. This is beginning to change and some data is being published by state regulatory agencies. Because hemp is a federally legal agricultural crop, the ability to analyze the market is limited to the data that is collected by the USDA. This data is recent and not comprehensive, as it only goes back to 2021, the whole industry has very few NAICS codes and, unfortunately, despite its legality, hemp has been caught up in the debate and politics around cannabis data collection. A few teams of analysts, like the one at Whitney Economics, have been manually collecting data at the state level since 2019. Published data is largely limited, however, to the higher aggregated levels, and it does not include sales data at the product manufacturing or retail levels. This manual collection of regulatory and economic data is further supplemented by regular surveys of cannabis operators and stakeholders. This ongoing research is inspired by the lack of available, accessible data. The lack of data has hindered the ability to analyze the hemp market, and has limited the ability to provide useful, timely insights to regulators and policy makers on key issues, including the impacts of policy changes on the industry.

Virginia Passes Ban on the Sale of Hemp-derived, Converted Cannabinoids in 2023

The Virginia legislature has passed legislation that bans the sale of Converted CBD Cannabinoid products. The legislation made assumptions about the public safety and health implications of cannabinoid products and also assumed that the health and safety issues outweighed the economic impacts of the sales bans. In examining the potential impact, it appears that the legislature may have underestimated the impact that such a ban would have on the Virginia economy.

Lack Of Data Is Leading to Poor Policy Decisions and Misunderstandings

The data suggest that the proposed ban has the potential to do far more economic harm than good, while still not meaningfully addressing the public safety and regulatory concerns that drove the initial legislation. We should point out that much of the narrative associated with this conversation has been qualitative in nature, but not supported by data. Depending upon their source, qualitative inputs can lead to the development of uninformed policies that do not support larger public safety goals or regulatory objectives.



The Intention of this Report is to Fill the Void with Data

This project was born as a result of the lack of data on the hemp-based cannabinoid market in Virginia. Most estimates have vastly underestimated the amount of revenue being derived from Virginia's hemp retail industry. To date, there has only been speculation as to the extent of the hemp-derived cannabinoid market. No study had been conducted to ascertain the size and impact of this industry on the overall Virginia economy. As such, Whitney Economics has combined its expertise and extensive data set for the cannabis and hemp industries, with a survey of retailers of hemp-based cannabinoids that are based in Virginia.

Objective of the Report

The objective of this report is to ascertain the total economic impact the hemp-derived cannabinoid retail industry is having on the Virginia economy and to understand the implications that a ban on sales would have on the state and the industry. In addition, the objective was also to assess the amount of employment, wages, and revenue derived from these products, to identify key issues facing the Hemp, CBD and converted cannabinoid industry and to then summarize and articulate the quantitative and qualitative results for educational purposes.

Limitations in scope

The quantitative economic impact research from our fact finding was limited to the following items:

- Types of business
- Annual revenues
- Percentage of revenues derived from CBD and Cannabinoid based
- Total labor demand
- Total wages paid
- In-state versus out of state sales
- Sources of supply (states)
- Sources of risk to the business operators
- Checking identification
- Possible reaction to legislation if bans are passed and signed into law

In addition to the above mentioned specific quantitative data points, some qualitative data were gathered from interviews. These data include:

- Key regulatory and strategic issues facing operators,
- General comments about the industry or regulations

Qualitative data has revealed some useful insights into the mindset of Virginia hemp-derived cannabinoid operators.



Data and Findings

Virginia’s Hemp-derived Cannabinoid Retail Sector by the Numbers

Key data and insights can be gleaned from the results of the February 2023 survey of cannabinoid retailers conducted by Whitney Economics. When combined with additional analysis of state hemp-cannabinoid, consumables and converted markets, the following data describes the hemp-derived cannabinoid market in Virginia. The data reveal two starkly different futures for hemp cannabinoid retail and cannabinoid companies in Virginia. If converted cannabinoids are no longer legal to sell in the state, the data show a significant decline in the industry. Conversely, if converted cannabinoids are allowed to remain in the state, then there is the potential for significant and sustained growth.

The Profile of a CBD and Cannabinoid Business

Based on the survey results, a typical business that sells CBD and other cannabinoid products has an average of 7.75 employees, pays employees \$37,960 wages per year or \$294,190 per store and generates sales of \$1,022,188 per year from CBD and Cannabinoids only. Total sales for all products average \$2,125,950 each year.

Total Sales - All Products	
Survey Respondents	\$2,125,950
Total Stores (550)	\$1,169,272,500

Source: Whitney Economics Survey of Virginia CBD and Cannabinoid Operators

A Majority of the Total Demand is from Converted Cannabinoid Products

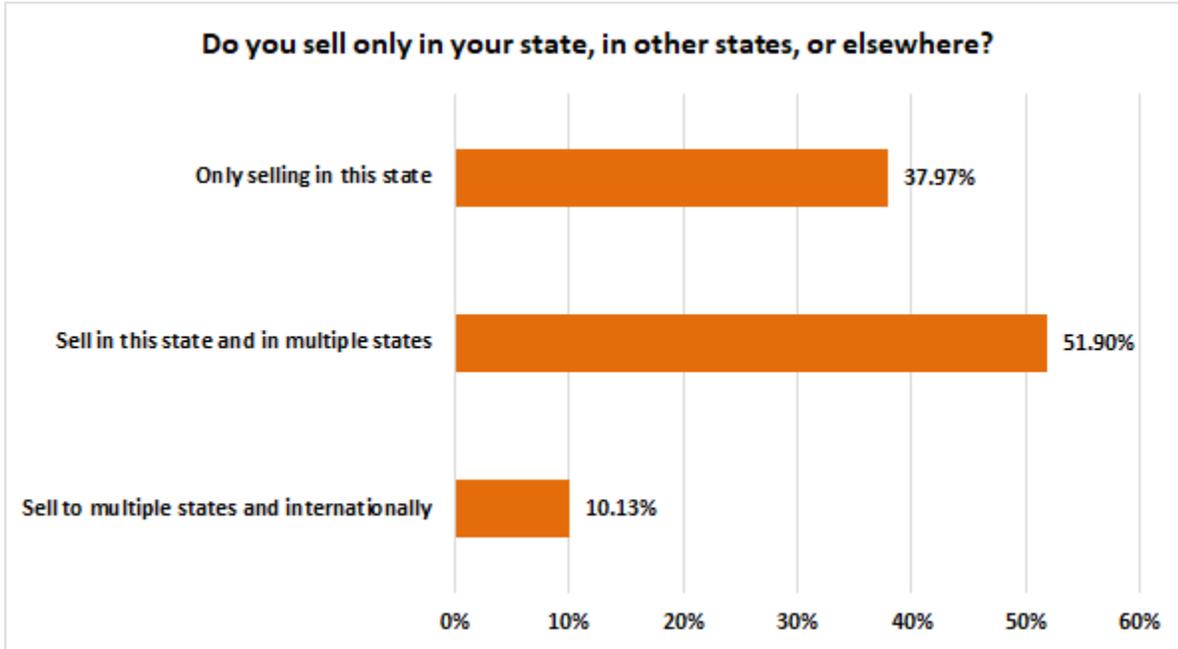
Survey respondents indicated that over 84.9% of cannabinoid sales were from converted products while 15.1% of sales were CBD only. This shows a strong consumer preference for converted cannabinoid products. And that a ban on sales of these products would have a profound impact on the businesses.

Sales - Survey Respondents	Total	Average
CBD Only	\$ 8,357,585	\$ 154,770
Converted Cannabinoids	\$ 44,238,327	\$ 867,418
Total From Survey	\$ 52,595,912	\$ 1,022,188
Total Based on 550 Operators		
CBD Only		\$ 85,123,500
Converted Cannabinoids		\$ 477,079,900
Total Cannabinoid Sales Virginia		\$ 562,203,400

Source: Whitney Economics Survey of Virginia CBD and Cannabinoid Operators

Virginia Retailers Sell in Multiple Markets, Domestic and international

Virginia Cannabinoid Retailers have customers that extend beyond the borders of the state. In fact, over 10% of respondents indicated that in addition to selling to Virginia consumers, they also had international customers. The impact of a ban on retail sales of converted cannabinoids would extend to other markets.



Source: Whitney Economics Survey of Virginia CBD and Cannabinoid Operators

Total Sector Jobs and Wages

Overall market size based on the estimated 550 smoke shops, vape stores, and CBD stores indicate that the CBD and Cannabinoid market is a job creator that pays livable wages. Based upon the total number of stores in this sector (550) the total employment in this industry is estimated to be 4,263 jobs, earning \$161.8 million in wages.

Item	Data
Total Stores in VA	550
Average Employees in Survey	7.75
Average Wages / Hour	\$18.25
Annualized Wages Survey	\$37,960
Total Wages per Store	\$294,190
Total Employment Stores	4,263
Total Wages in VA	\$161,804,500

Source: Whitney Economics Survey of Virginia CBD and Cannabinoid Operators

The Virginia Hemp-based Cannabinoid Market is Already Worth Billions

There is a multiplier effect for revenues derived from the retail sales of products containing hemp-derived cannabinoids. Similar to adult-use and medical cannabis, the multiplier factor is 2.8x. This means that for every



dollar of revenue derived by this sector, there is an additional \$2.8 dollars that follows through the Virginian economy. For example, the \$1.2 billion in revenue in 2022 results in an overall economic impact of \$3.3 billion. This simple calculation shows that the Virginia hemp-derived cannabinoid industry is already a multi-billion-dollar market.

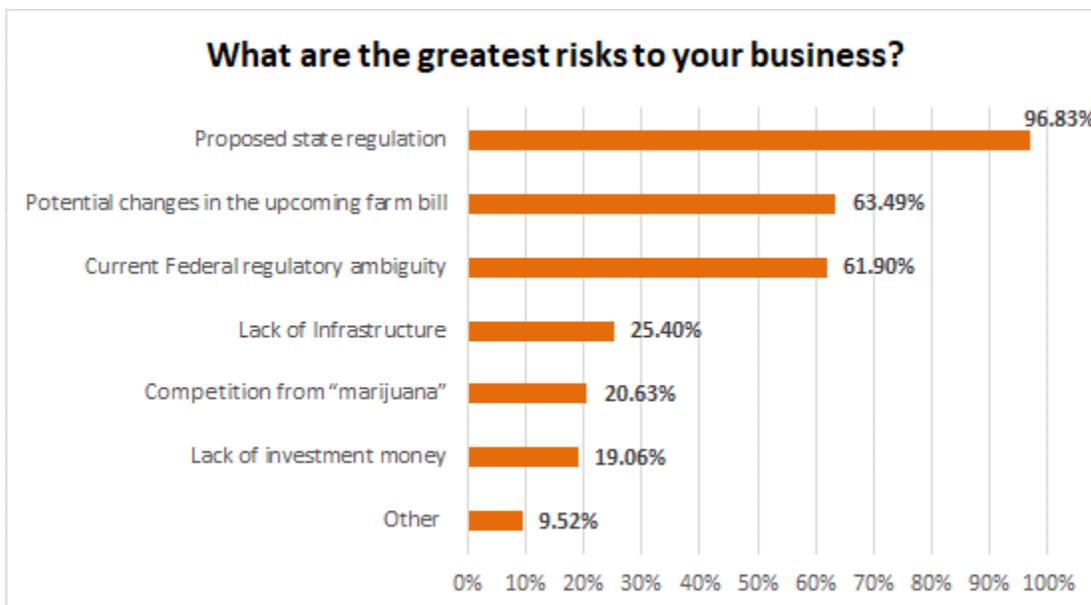
Multiplier Effect 2.8x	
Total Store Sales	\$1,169,272,500
Total Economic Impact	\$3,273,963,000

Source: Whitney Economics

Observations and Policy Related Issues

Virginia Cannabinoid Operations View State Bans as the Biggest Risk to their Business

Virginia operators view the proposed state regulatory changes as the biggest risk to their business. So, the ban is prominently in the minds of these business owners. Similar to state legislators, there are also concerns about the level of federal ambiguity and the potential impact that will have on the industry and how the federal government will respond. Changes to the upcoming Farm Bill could also significantly impact their business or it may actually help to clarify the role cannabinoids play in the industry.



Source: Whitney Economics Survey of Virginia CBD and Cannabinoid Operators

CBD and Converted Cannabinoid Suppliers and Retailers Take Public Safety Seriously

Most of the cannabinoid suppliers that have provided inputs into the Whitney Economics studies on this topic are self-regulated and very focused on consumer safety. In many ways, they want some form of regulatory

oversight just as long as it does not recriminalize the hemp derived products or regulate them as though they are schedule one drugs. The same holds true for the respondents from Virginia.

Hemp Cannabinoid Manufacturers Test Frequently and are Calling for Regulation

Based on a survey of Colorado cannabinoid manufacturers in 2022, data has consistently suggested that public safety issues largely originate from illicit and unregulated sources. From a public safety point of view, the major converted cannabinoid producers in Colorado, for example, test their products and materials an average of 3.9 times before sale into retail channels.

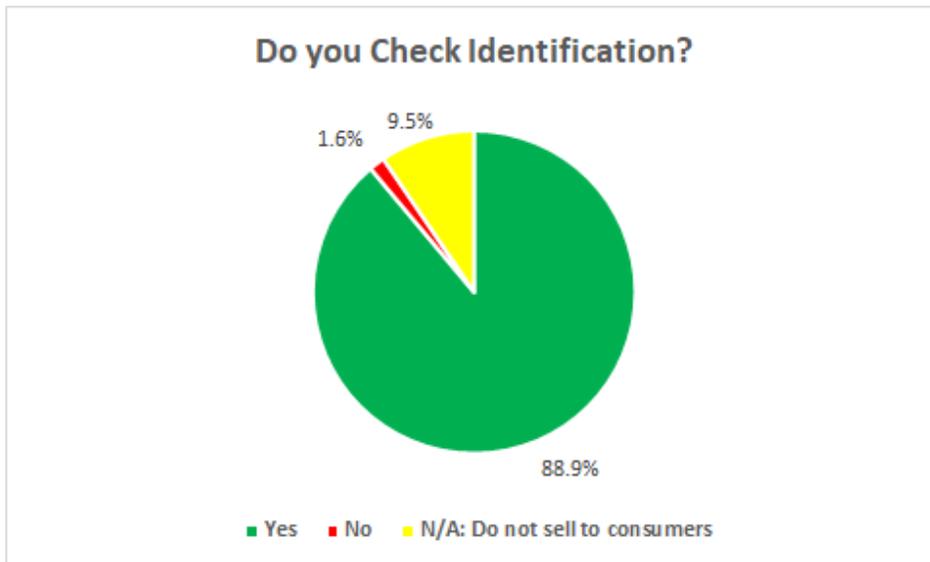
Average Times Tested Before Consumer	3.90
--------------------------------------	------

Hemp Operators Want Regulations, Just Not Recriminalization

The hemp cannabinoid industry is also calling for restricting access to minors and for greater truth-in-labeling rules. This would indicate that a transition from self-regulation to some form of greater oversight would be both welcome and orderly. Given that hemp processing and manufacturing is a viable agricultural commodity that generates billions in economic activity each year, **re-criminalizing hemp and regulating it similarly to a schedule one drug would not be economically justifiable.**

Retailers are Check Identification Reducing Access to Minors

As an example of the Virginian retailers taking a responsible approach to their business, 89% of the respondents reported that they check ID’s and of those who did not, they were either product manufacturers or suppliers. Only one retailer responded that they do not check identification when selling the products. This run contrary to much of the narrative about CBD and converted cannabinoids that the products are unsafe and getting into the hands of children.



Source: Whitney Economics Survey of Virginia CBD and Cannabinoid Operators



Virginia Cannabinoid Retail Sector has an Extended Supply Chain Throughout the U.S.

The cannabinoid retailers receive supply from nearly every state in the U.S. While a majority of respondents indicated that they receive products from Virginia (54.43%), they also received products from other states as well.

Top Supplying States

State	% of Responses by State
Virginia	54.43%
Colorado	46.84%
Florida	45.57%
California	40.51%
North Carolina	24.05%
Oregon	22.78%
Texas	20.25%
Maryland	15.19%
Nevada	12.66%
New York	12.66%
Washington	12.66%

Source: Whitney Economics Survey of Virginia CBD and Cannabinoid Operators

This chart shows that while cannabis policy is contained within a particular state boundary, the supply chain for hemp, CBD and Converted cannabinoids extends domestically and internationally. Many policy makers do not realize that the policies they are adopting in one state will impact employment, wages and people in other states. This is what differentiates hemp-based products from other cannabis products and why state policies may have unintended consequences that do not necessarily address the policy objectives that the legislation was intending to address.

Regulators and Legislators are Viewing the Industry as the Same as Adult-use and Medical Cannabis: A siloed market

Policy makers appear to view the hemp derived cannabinoid manufacturing as a siloed market with the supply chain as though it is contained within the state, similar to how cannabis is regulated in Virginia and other states. In fact, the hemp supply chain extends throughout the U.S., which means that a significant change in policy in Virginia would have ramifications for hemp cultivators and processors far beyond the borders of the state.

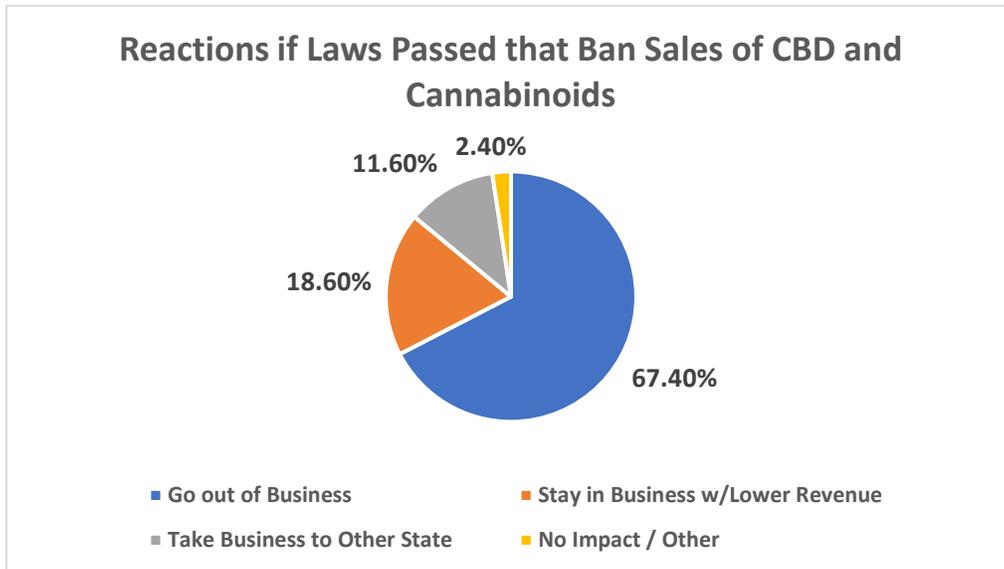
Will a Cannabinoid Manufacturing Ban Increase Public Safety?

Given that respondents overwhelmingly stated that they will supply the U.S. from other jurisdictions, it does not appear that the banning of retail cannabinoid sales in Virginia would increase public safety. However, efforts to limit access to minors, and holding suppliers accountable to labeling and product content would be a more

effective path to increase public safety and would have the support of the major manufacturers who were interviewed for this report.

A Ban on the Sales of Cannabinoids would have a Profound Impact on the Retail Sector

When asked if laws were passed in Virginia prohibiting the sale of CBD or cannabinoid products, what would the business owner do in response, 67.4% of responders said that they would go out of business, 18.6% said they would remain in business, just with lower revenue and 11.6% said they would move the business to another state. Extrapolating this to the entire market, would imply that 371 businesses would fail, 64 business would leave and only 115 businesses would remain.



Source: Whitney Economics Survey of Virginia CBD and Cannabinoid Operators

Prohibition Would Impact Employment and Wages

Current unemployment rate in Virginia is 3.0%. Enacting laws that prohibit the sales of CBD and Cannabinoids would result in a job loss of **4,263** workers. This would increase the unemployment rate from the current 3.0% to 3.1%. The ban would also impact employment in the cultivation and product manufacturing sectors in Virginia. (Not included above)

Virginia

Data Series	Back Data	July 2022	Aug 2022	Sept 2022	Oct 2022	Nov 2022	Dec 2022
Labor Force Data							
Civilian Labor Force(1)		4,354.0	4,346.8	4,346.9	4,348.1	4,347.7	(P) 4,357.3
Employment(1)		4,237.9	4,232.7	4,233.7	4,231.2	4,223.9	(P) 4,228.4
Unemployment(1)		116.1	114.1	113.2	116.9	123.8	(P) 128.9
Unemployment Rate(2)		2.7	2.6	2.6	2.7	2.8	(P) 3.0

Source: <https://www.bls.gov/eag/eag.va.htm>

In Virginia, the Hemp Industry Is Meeting the Intention of the 2018 Farm Bill: to Create Economic Opportunities for U.S. Hemp Farmers and Operators

With a major market supporting thousands of jobs, a supply chain throughout the U.S. and consumer support, it appears that the U.S. hemp-based cannabinoid retail industry is meeting the intention of the 2018 Farm Bill. By banning the retail sales of these products in Virginia, state lawmakers are either preventing or severely limiting opportunities for farmers, manufacturers and retailers. Therefore, it appears that state policies are conflicting with federal policy.

Solutions to State Issues will Be Made at the Federal level

While there have been some regulatory gaps in federal policy as a result of the 2018 Farm Bill, states may be better off by allowing the federal government to address them instead of developing a patchwork of rules and regulations at the state level that makes hemp operators uncertain on how to conduct interstate commerce. The 2023 Farm Bill is currently being negotiated in Congress. States have been clear in the fact they hemp and hemp related laws need to address several issues and gaps in policy that came about in 2018. Negotiations are already underway on a variety of issues including changing the definition of hemp, providing exemptions on testing, addressing product remediation and potentially extending the regulatory purview beyond the farmgate and more at the product level. If states enact legislation in early 2023, they may have to readdress these again once the 2023 Farm Bill becomes law.

Conclusion

Cannabinoid Retail Is Viable in Virginia

Despite the federal regulatory uncertainty and the dynamic market conditions, falling prices and uncertainty from regulators and policy makers, the Virginia hemp-derived cannabinoid retail sector has quickly evolved into an economically viable and sustainable industry. With a national supply chain, this sector has had a positive economic contribution to the state of Virginia.

Economic Impact of Hemp Cannabinoid Processing and Manufacturing on Virginia



In addition to employing over 4,263 workers, generating \$161 million in wages in Virginia, the influence of this industry is felt beyond state borders. The \$3.3 billion economic impact of hemp to Virginia's economy is significant enough to justify more favorable policies, not less favorable ones.

Near-Unanimous Concerns from Virginia Hemp Cannabinoid Retailers

When asked, nearly 80% of respondents said that a ban on cannabinoid retail sales would result in them either going out of business or completely exiting the state, taking with it the jobs, taxes and economic contributions with them.

Public safety is a concern of every company contributing to this report.

The proposed ban on manufacturing is not recommended by Whitney Economics for several reasons, chief among them:

- The economic damage to Virginia would be too great
- There would be a shift of economic activities away from the state without addressing some of the underlying public safety concerns,
- A statewide ban would displace thousands of workers during a time of economic uncertainty
- A statewide ban would disrupt the hemp supply chain throughout the U.S.

The trade-off between working to address gaps in the regulatory process, versus an outright ban, is too large to be economically justifiable. Supporting the transition from a self-regulated industry to one that is regulated at the product level appears to be a good middle ground, when compared to a complete ban of the industry.



Appendix: Methodology

Whitney Economics was selected to provide a report on the economic impact of the Hemp-based cannabinoid industry in the state Virginia. With a demonstrated track record of creating unbiased economic reports in the cannabis and hemp for industry groups and officials at every level of government, Whitney Economics is uniquely positioned to assess the market from an operational and policy perspective. Whitney Economics has dedicated resources for the ongoing collection and analysis of the cannabis and hemp industries, both in the U.S. and internationally. As such, we have an extensive database upon which to draw.

NOTES ON DATASET

- As part of this report, the data was gathered with a targeted survey of Hemp operators as well as smoke shops, vape shops and CBD stores. Emails were sent directly to the operators and reminders were sent to drive more participation.
- Whitney Economics conducted a 16-question survey of leading hemp-based cannabinoid companies in Virginia. This survey was conducted during a two-week period during in February 2023.
- The survey was sent to 311 (60%) of the estimated 550 Hemp, CBD and Cannabinoid retailers in Virginia.
- The data does not include assessments of the revenues derived by CBD and cannabinoid products sold at grocery stores or gas stations. ***As a result, Whitney Economics feels that the total revenues and economic impact is understated.***
- There was a response rate of 20.3% which is high. This enables statistically extrapolation to the extent the results and projections have a 90% confidence level with a margin of error of +/- 10%
- Separate research was conducted to ascertain the number of smoke shops, vape shops, hemp operators, and CBD stores there were in the state.
- Whitney Economics also supplemented the data with observations and data from other markets both on the adult-use and medical industries as well as with the industrial hemp industry, much of which came directly from state and federal regulators.

NOTES ON DATA FROM SURVEYS

- All data from surveys was self-reported: some data was independently verified, while some was unable to be verified.
- The data was self-reported and was not validated for accuracy, although data in the responses was triangulated for accuracy based on other survey responses.
- Data was then aggregated and then included in economic models to determine impacts
- Once the data was reviewed and tabulated, there were certain averages that stood out in the report and those averages were then extrapolated to the rest of the industry.
- Whitney Economics compiled confidential information from these surveys and the information is tightly restricted in its use and confidentiality.
- No specific company or data is mentioned in this report as a condition of the survey.

NOTES ON CALCULATION OF ECONOMIC IMPACT



- Economic impact relates in part to employment, revenues of operators, the amounts of suppliers into the market. It also examines the direct and indirect effects from the industry, such as ancillary services.
- Whitney Economics also applied a multiplier effect to the revenues derived from the hemp cannabinoid retail sector.
- Whitney Economics has previously calculated the multiplier effect for cannabis. This established cannabis multiplier (2.8x) was applied to the hemp revenues to ascertain the direct and indirect effects of the proposed legislation.
 - *For comparison's sake, the multiplier effect of the construction industry is 1x and the multiplier effect of a national park relative to the local economy is 6x.*



Appendix: Survey Questions

This is a sample list of questions for the survey of CBD and Cannabinoids Retailers. These questions helped form the basis for the data and impacts presented in the report.

General:

- Does your company sell or product CBD or Cannabinoid products?
- In what state is your company doing business in?
- What type of business are you?

Sales:

- How much revenue do you generate from the sales each year related to the following:
 - CBD Only
 - Converted Cannabinoids (Delta-8, Delta-10, HHC etc.)
- What is your total revenue each year for all products?
- What percentage of sales is CBD / Converted cannabinoid related?
- Do you sell only in your state, in other states, or elsewhere?

Employment:

- How many employees does your business have?
- What is the average hourly wage paid?

Supply Chain

- What states do you RECEIVE your products from? (Check all that apply)

Other:

- What are the greatest risks to your business? (Check all that apply)
- Do you check ID's? (Y/N)
- If laws are passed prohibiting sales of CBD or cannabinoid products, what will you do?
- Any comments you would like to add about this industry or regulatory environment?



Appendix: About the Author / Statement of Conflicts

Beau Whitney, Cannabis Economics, Operations and Supply Chain Expert

Beau Whitney is the founder and Chief Economist at Whitney Economics, a global leader in cannabis and hemp business consulting, data, and economic research. Whitney Economics is based in Portland, Oregon.

Serving an international clientele, Beau is considered one of the leading cannabis economists in the U.S. and globally. His applications of economic principles to create actionable operational and policy recommendations has been recognized by governments, and throughout the economic, investment, business communities. Beau recently spoke about cannabis economics at the United Nations.

His white papers analyzing the adult-use, medical and industrial cannabis markets have been referenced in the Wall Street Journal, Washington Post, New York Times, USA Today, the Associated Press, as well as in leading cannabis industry publications.

Beau Whitney is a member of the American Economic Association, the Oregon chapter president of the National Association for Business Economics, is a member of multiple regulatory advisory committees throughout the U.S. and participates on the Oregon Governor's Council of Economic Advisors.

Beau has provided policy recommendations at the state, national and international levels and is considered an authority on cannabis economics and the supply chain.

Statement Of Conflicts

Whitney Economics does not take a position on this issue of cannabis legalization, however there are potential conflicts while presenting economic and market analysis.

- Whitney Economics receives compensation for business and economic analysis of the cannabis industry.
- Mr. Whitney has previously held positions and licenses within the legal regulated cannabis industry.
- Mr. Whitney currently has investments in a cannabis investment fund, Mantis Growth Investments, and he is a member of the fund's Board of Directors.
- Mr. Whitney serves in an unpaid role as Chief Economist for the National Industrial Hemp Council.
- Mr. Whitney serves in an unpaid role as Chief Economist for the National Cannabis Industry Association
- Whitney Economics is a member of the European Industrial Hemp Association.
- Mr. Whitney is a founder of Every Day Hemp Company, an Oregon-based manufacturer of hemp based plastic products.



Appendix: Sources

Hemp Acres Nationally

[https://newfrontierdata.com/cannabis-insights/midterm-review-a-2022-u-s-hemp-production-outlook/#:~:text=51%2C016%20acres%20licensed%20\(down%2053%25%20from%20107%2C702%20in%202021\).](https://newfrontierdata.com/cannabis-insights/midterm-review-a-2022-u-s-hemp-production-outlook/#:~:text=51%2C016%20acres%20licensed%20(down%2053%25%20from%20107%2C702%20in%202021).)

FDA

<https://www.fda.gov/consumers/consumer-updates/5-things-know-about-delta-8-tetrahydrocannabinol-delta-8-thc#:~:text=1.,sold%20online%20and%20in%20stores.>

<https://www.fda.gov/news-events/public-health-focus/fda-and-cannabis-research-and-drug-approval-process>

Legal Overview – Delta-8

<https://cbdthinker.com/is-delta-8-thc-legal/#:~:text=Delta%2D8%20is%20currently%20legal,%2C%20Tennessee%2C%20Texas%2C%20Virginia%2C>

DEA – Only THCO is Illegal

<https://cannabusiness.law/is-d8-from-hemp-a-controlled-substance-dea-says-no/>

Virginia

<https://www.bls.gov/eag/eag.va.htm>

Hemp Surveys (Whitney Economics)

Whitney Economics U.S. Hemp Cultivator and Processing Surveys (2019, 2020, 2021, 2022)