

**The Vapor Industry
Economic Impact Study**

**Methodology and Documentation
Prepared for:**



By



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Executive Summary:

The 2023 Vapor Industry Economic Impact Study estimates the economic contributions made by the vapor industry, which includes E-liquids, coils, box mods and other vape products to the U.S. economy in 2023. John Dunham & Associates conducted this research, which was funded by the Vapor Technology Association. This work used standard econometric models first developed by the U.S. Forest Service, and now maintained by IMPLAN Inc. Data came from industry sources, government publications and Data Axle.¹

The study measures the number of jobs in the vapor industry; the wages paid to employees, the value added and total output. In addition, it measures the economic impact of the suppliers that support the vapor industry, as well as those industries supported by the induced spending of direct and supplier industries.

Industries are linked to each other when one industry buys from another to produce its own products. Each industry in turn makes purchases from a different mix of other industries, and so on. Employees in all industries extend the economic impact when they spend their earnings. Thus, economic activity started by the vapor industry generates output (and jobs) in hundreds of other industries, often in states far removed from the original economic activity. The impact of supplier firms, and the induced impact of the re-spending by employees of industry and supplier firms, is calculated using an input/output model of the United States. The study calculates the impact on a national basis, by state, by Congressional district, and by state legislative districts.

The study also estimates taxes paid by the industry and its employees. Federal taxes include industry-specific excise and sales taxes, business and personal income taxes, FICA, and unemployment insurance. State and local tax systems vary widely. Direct retail taxes include state and local sales taxes, license fees, and applicable gross receipt taxes. Retailers pay real estate and personal property taxes, business income taxes, and other business levies that vary in each state and municipality. All entities engaged in business activity generated by the industry pay similar taxes.

The vapor industry is a dynamic part of the U.S. economy, accounting for about \$17.59 billion in output or about 0.06 percent of GDP. It employs approximately 90,740 Americans who earned wages and benefits of about \$5.47 billion.

Members of the industry and their employees paid \$2.25 billion in federal, state, and local taxes. This does not include state and local sales taxes or excise taxes that may apply for specific retail purchases which are estimated to total \$3.71 billion.

¹ Data Axle is the leading provider of business and consumer data for the top search engines and leading in-car navigation systems in North America. Data Axle gathers data from a variety of sources, by sourcing, refining, matching, appending, filtering, and delivering the best quality data. Data Axle verifies its data at the rate of almost 100,000 phone calls per day to ensure absolute accuracy.

Summary Results

The vapor industry (as defined in this study) includes manufacturers of E-liquids, coils, box mods and other vape products, wholesalers, and retailers that sell vape products such as; vape stores, tobacco shops, convenience stores, supermarkets, gasoline stations, pharmacies and drug stores, warehouse clubs and supercenters. The vapor industry reaches into all corners of the United States, employing 44,639 and generating \$2.09 billion in wages. Vape businesses directly generate \$6.57 billion in economic activity nationally.

Table 1 – Economic Contribution of the Vapor industry

| | Direct | Indirect | Induced | Total |
|-----------------------|-----------------|-----------------|-----------------|------------------|
| Jobs | 44,639 | 20,024 | 26,077 | 90,740 |
| Wages | \$2,088,946,500 | \$1,671,971,400 | \$1,711,832,500 | \$5,472,750,400 |
| Economic Impact | \$6,572,822,900 | \$5,702,801,900 | \$5,311,087,800 | \$17,586,712,600 |
| State and Local Taxes | | | | \$1,266,703,700 |
| Federal Taxes | | | | \$983,597,100 |

Other firms are related to the vapor industry as suppliers. These firms produce and sell a broad range of items including E-liquid, coils, batteries, and all of the merchandise needed to maintain vape businesses. In addition, supplier firms provide a broad range of services, including personnel services, financial services, advertising services, consulting services or transportation services. Finally, a number of people are employed in government enterprises responsible for the regulation of the industry. All told, we estimate that the industry is responsible for 20,024 supplier jobs. These firms generate about \$5.70 billion in economic activity.²

An economic analysis of the vapor industry will also take additional linkages into account. While it is inappropriate to claim that suppliers to the industry’s indirect firms are part of the industry being analyzed,³ the spending by employees of the industry, and that of indirect firms whose jobs are directly dependent on the vapor industry, should be included. This spending - on everything from housing, to food, to education and medical care - makes up what is traditionally called the “induced impact,” or multiplier effect, of the vapor industry. For 2023, the induced impact of the industry generates 26,077 jobs and \$5.31 billion in economic impact, for a multiplier of 0.81.⁴

Table 1 presents a summary of the total economic impact of the vapor industry in the United States. Summary tables for the United States, individual states, Congressional districts, and state legislative districts are included in the output model, which is discussed in the following section.

² Throughout this study, the term “firms” refers to physical locations. One manufacturer, for example, may have facilities in 5 or 6 locations throughout the country.

³ These firms would more appropriately be considered as part of the indirect firm’s industries.

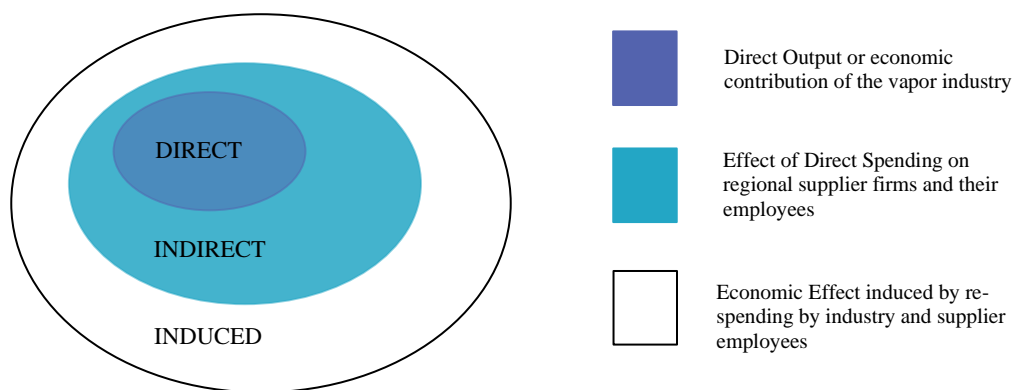
⁴ Often economic impact studies present results with very large multipliers – as high as 4 or 5. These studies invariably include the firms supplying the induced industries as part of the induced impact. John Dunham & Associates believes that this is not an appropriate definition of the induced impact and as such limits this calculation only to the effect of spending by direct and indirect employees.

Table 2 – Fiscal Contribution of the Vapor Industry

| Tax Type | Federal | State/Local | Total |
|------------------------------------|----------------------|------------------------|------------------------|
| Individual Income | \$538,489,000 | \$128,512,500 | \$667,001,500 |
| Social Security/Social Insurance | \$571,791,000 | \$8,502,600 | \$580,293,600 |
| Property | | \$474,040,400 | \$474,040,400 |
| Business/Employee Paid Sales Taxes | | \$528,483,600 | \$528,483,600 |
| Corporate Income | \$96,034,100 | \$33,036,700 | \$129,070,800 |
| Other Personal and Business Taxes | (\$222,717,200) | \$94,127,600 | (\$128,589,600) |
| <hr/> | | | |
| Federal Excise Taxes | | | |
| State Excise Taxes | | \$853,407,600 | \$853,407,600 |
| State Sales Taxes | | \$1,532,620,700 | \$1,532,620,700 |
| Other State and Local Taxes | | \$1,324,830,600 | \$1,324,830,600 |
| Total | \$983,596,900 | \$4,977,562,300 | \$5,961,159,200 |

Another important part of an impact analysis is the calculation of the contribution of the industry to the public finances of the country. In the case of the vapor industry, the taxes paid by firms and their employees provide \$983.60 million to the federal government and \$1.27 billion to state and local governments including income taxes, property taxes, profits taxes, etc. These figures also include state and local sales and excise taxes that are paid by consumers when they purchase vapor products. These sales-based taxes total \$3.71 billion. (See Table 2)

Economic Impact Modeling – Summary



The Economic Impact Study begins with an accounting of the direct employment in the vapor industry. The data comes from a variety of government and private sources. It is sometimes mistakenly thought that initial spending accounts for all of the impact of an economic activity or a product. For example, at first glance it may appear that consumer expenditures for a product are the sum total of the impact on the local economy. However, a single economic activity leads to a ripple effect wherein other sectors and industries benefit from this initial spending. This inter-industry effect of an economic activity can be assessed using multipliers from regional input-output modeling.

The economic activities of events are linked to other industries in the state and national economies. Activities related to vape represent the direct effects on the economy. Indirect impacts occur when these activities require purchases of goods and services such as advertising services or merchandising material from local or regional indirect firms. Additional induced impacts occur when workers involved in direct and indirect activities spend their wages. The ratio between induced output and direct output is termed the multiplier.

This method of analysis allows the impact of local production activities to be quantified in terms of final demand, earnings, and employment in the states and the nation as a whole. Once the direct impact of the industry has been calculated, the input-output methodology discussed below is used to calculate the contribution of the indirect sector and of the re-spending in the economy by employees in the industry and its indirect firms. This induced impact is the most controversial part of economic impact studies and is often quite inflated. In the case of the vape model, only the most conservative estimate of the induced impact has been used.

Model Description and Data

This economic impact analysis was developed by JDA based on data provided by the Vapor Technology Association, Data Axle, the Food and Drug Administration, and Federal and state governments. The analysis utilizes the IMPLAN model in order to quantify the economic impact of the vapor industry on the economy of the United States, as well as individual states, Congressional districts, and state legislative districts.⁵ The model adopts an accounting framework through which the relationships between different inputs and outputs across industries and sectors are computed. This model can show the impact of a given economic decision – such as a factory opening or operating a sports facility – on a pre-defined, geographic region. It is based on the national income accounts generated by the US Department of Commerce, Bureau of Economic Analysis (BEA).⁶

Every economic impact analysis begins with a description of the industry being examined. In the case of the vapor industry, it is defined as the three components of the United States' vapor industry. These are further broken out by business type.

This will incorporate firms in the following economic sectors:

- ❖ **Manufacturers:** E-Liquid, coils, and component manufacturers (which includes box mods, batteries, and other vapor products).
- ❖ **Wholesalers:** Includes firms involved in the distribution and storage of vapor products.
- ❖ **Retailers:** Includes firms involved in the sale of vapor products. This sector includes retail establishments (e.g., tobacco stores, convenience stores, gas stations, vape stores, etc.)
- ❖ **Data on vape shops that make their own liquid** has been split to reflect a portion of the employees as manufacturers and a portion as retailers.

⁵ The model uses 2021 input/output accounts.

⁶ The IMPLAN model is based on a series of national input-output accounts known as RIMS II. These data are developed and maintained by the U.S. Department of Commerce, Bureau of Economic Analysis as a policy and economic decision analysis tool.

Data was compiled at the facility level for manufacturing businesses, including vape shops which blend their own e-liquids, as well as some of the major distributors. This facility list includes 948 blending vape shops, 118 dedicated e-liquid manufacturers, 31 component and/or coil manufacturers, and 6 distribution locations. (Table 3) To supplement the facility-level data, retail and wholesale locations were estimated based on aggregated zipcode data. We estimate there to be another 6,294 vape shops when including those reflected in the zipcode-level data. Additionally, vapor products constitute a portion of sales at thousands of retail locations from convenience stores to supermarkets.

Table 3 – Firms by Type, facility level data

| | Number of Firms | % of Total Firms |
|-----------------------------|------------------------|-------------------------|
| Blending Vape Shop | 948 | 85.95% |
| E-liquid Manufacturer | 118 | 10.70% |
| Wholesaler | 6 | 0.54% |
| Component/Coil manufacturer | 31 | 2.81% |
| Total | 1,103 | 100.00% |

The IMPLAN model is designed to run based on the input of specific direct economic factors. It uses a detailed methodology (see IMPLAN Methodology section) to generate estimates of the other direct impacts, tax impacts and indirect and induced impacts based on these entries. In the case of the vape model, direct employment in the vapor industry is a starting point for the analysis. Direct employment is based on data provided to John Dunham & Associates by Data Axle, the Vapor Technology Association and the Food and Drug Administration as of November 2023. Data Axle data are recognized nationally as a premier source of micro industry data. Data Axle is the leading provider of business and consumer data for the top search engines and leading in-car navigation systems in North America. Data Axle gathers data from a variety of sources, by sourcing, refining, matching, appending, filtering, and delivering the best quality data. Data Axle verifies its data at the rate of almost 100,000 phone calls per day to ensure absolute accuracy.

Table 4 – Direct Jobs by Industry Sector

| Product Category | Direct Jobs | % of Total Jobs |
|-----------------------------|--------------------|------------------------|
| Retail Vape | 36,308 | 81.34% |
| E-liquid Manufacturer | 3,221 | 7.22% |
| Wholesaler | 2,865 | 6.42% |
| Component/Coil Manufacturer | 2,241 | 5.02% |
| Total: | 44,636 | 100.00% |

Once the initial direct employment figures have been established, they are entered into a model linked to the IMPLAN database. The IMPLAN data are used to generate estimates of direct wages and output. Wages are derived from data from the U.S. Department of Labor’s ES-202 reports that are used by IMPLAN to provide annual average wage and salary establishment counts, employment counts and payrolls at the county level. Since this data only covers payroll employees, it is modified to add information on independent workers, agricultural employees, construction workers, and certain government employees. Data are then adjusted to account for

counties where non-disclosure rules apply. Wage data include not only cash wages, but health and life insurance payments, retirement payments and other non-cash compensation. It includes all income paid to workers by employers.

Total output is the value of production by industry in a given state. It is estimated by IMPLAN from sources similar to those used by the BEA in its RIMS II series. Where no Census or government surveys are available, IMPLAN uses models such as the Bureau of Labor Statistics' growth model to estimate the missing output.

The model also includes information on income received by the Federal, state, and local governments, and produces estimates for the following taxes at the Federal level: Corporate income, payroll, personal income, estate and gift, excise taxes, customs duties, and fines, fees, etc. State and local tax revenues include estimates of: Corporate profits, property, sales, severance, estate and gift and personal income taxes; licenses and fees and certain payroll taxes.

While IMPLAN is used to calculate the state level impacts, Data Axle data provide the basis for legislative district level estimates. Publicly available data at the county and Legislative district level is limited by disclosure restrictions, especially for smaller sectors of the economy. Our model therefore uses actual physical location data provided by Data Axle in order to allocate jobs – and the resulting economic activity – by physical address or, when that is not available, zip code. For zips entirely contained in a single congressional district, jobs are allocated based on the percentage of total sector jobs in each zip. For zips that are broken by congressional districts, allocations are based on the percentage of total jobs physically located in each segment of the zip. Physical locations are based on either the actual address of the facility, or the zip code of the facility, with facilities placed randomly throughout the zip code area.

IMPLAN Methodology⁷

Francoise Quesnay one of the fathers of modern economics, first developed the analytical concept of inter-industry relationships in 1758. The concept was actualized into input-output analysis by Wassily Leontief during the Second World War, an accomplishment for which he received the 1973 Nobel Prize in Economics.

Input-Output analysis is an econometric technique used to examine the relationships within an economy. It captures all monetary market transactions for consumption in a given period and for a specific geography. The IMPLAN model uses data from many different sources – as published government data series, unpublished data, sets of relationships, ratios, or as estimates. The Minnesota IMPLAN group gathers this data, converts it into a consistent format, and estimates the missing components.

There are three different levels of data generally available in the United States: Federal, state and county. Most of the detailed data are available at the county level, but there are many issues with disclosure – especially in the case of smaller industries. IMPLAN overcomes these disclosure problems by combining a large number of datasets and by estimating those variables that are not found from any of them. The data is then converted into national input-output matrices (Use,

⁷ IMPLAN® model, 2021 Data, using inputs provided by the user and IMPLAN Group LLC, IMPLAN System (2023), 16905 Northcross Dr., Suite 120, Huntersville, NC 28078, www.IMPLAN.com.

Make, By-products, Absorption and Market Shares) as well as national tables for deflators, regional purchase coefficients and margins.

The IMPLAN Make matrix represents the production of commodities by industry. The Bureau of Economic Analysis (BEA) Benchmark I/O Study of the US Make Table forms the bases of the IMPLAN model. The Benchmark Make Table is updated to current year prices and rearranged into the IMPLAN sector format. The IMPLAN Use matrix is based on estimates of final demand, value-added by sector and total industry and commodity output data as provided by government statistics or estimated by IMPLAN. The BEA Benchmark Use Table is then bridged to the IMPLAN sectors. Once the re-sectoring is complete, the Use Tables can be updated based on the other data and model calculations of interstate and international trade.

In the IMPLAN model, as with any input-output framework, all expenditures are in terms of producer prices. This allocates all expenditures to the industries that produce goods and services. As a result, all data not received in producer prices is converted using margins which are derived from the BEA Input-Output model. Margins represent the difference between producer and consumer prices. As such, the margins for any good add to one.

Deflators, which account for relative price changes during different time periods, are derived from the Bureau of Labor Statistics (BLS) Growth Model. The 224 sector BLS model is mapped to the 536 sectors of the IMPLAN model. Where data are missing, deflators from BEA's Survey of Current Businesses are used.

Finally, the Regional Purchase Coefficients (RPCs) – essential to the IMPLAN model – must be derived. IMPLAN is derived from a national model, which represents the “average” condition for a particular industry. Since national production functions do not necessarily represent particular regional differences, adjustments need to be made. Regional trade flows are estimated based on the Multi-Regional Input-Output Accounts, a cross-sectional database with consistent cross interstate trade flows developed in 1977. These data are updated and bridged to the 536 sector IMPLAN model.

Once the databases and matrices are created, they go through an extensive validation process. IMPLAN builds separate state and county models and evaluates them, checking to ensure that no ratios are outside of recognized bounds. The final datasets and matrices are not released until extensive testing takes place.



What Do We Mean by Economic Output? FAQ's

Where do the Data Come From?

The data gathered for this model came from Data Axle, VTA, and federal and state government sources. Data Axle is the leading provider of business and consumer data, which includes addresses, business titles and job totals. Since the Data Axle data are adjusted on a continual basis, staff from John Dunham & Associates scanned the data for discrepancies, verifying individual facilities using Google Maps, web searches, and any available online government documents. Each office or facility has its own employee count; therefore, a company with a separate manufacturing plant, a warehouse and an office location would have three facilities, each with separate employment counts. In addition, for cases where employment data were available, Data Axle employment figures were replaced with industry sources.

What Model is Used?

These employment totals are entered into the IMPLAN Model. The IMPLAN model is based on the input-output accounts published by the US Department of Commerce, Bureau of Economic Analysis and is one of the standard models used to calculate economic impact figures. Input-Output tables representing the economy in 2021 were used in this analysis. The IMPLAN model is designed to run based on the input of specific direct economic factors, like direct jobs, and generates estimates of direct wages and outputs.

Explanation of Economic Impact Terms

Direct Impact Categories:

The direct impacts of this study were divided up into the categories of the vapor industry. The vapor industry (as defined in this study) includes manufacturers of E-liquids, coils, box mods and other vape products, wholesalers, and retailers that sell vapor products such as; vape shops, convenience stores, supermarkets, gasoline stations, pharmacies and drug stores, warehouse clubs and supercenters, and discount tobacco stores.

What is Meant by the Term Direct Impact?

Direct Impacts are those jobs, wages or economic output solely attributable to the industry defined for the study; in this case manufacturers of E-liquids, coils, box mods and other vape products, wholesalers, and retailers that sell vapor products such as; vape shops, convenience stores, supermarkets, gasoline stations, pharmacies and drug stores, warehouse clubs and supercenters, and discount tobacco stores. These are the jobs that one can count. If one were to go to a manufacturing facility and count the number of people working there, that would be the direct employment (although there may be many more people working than there are jobs since many people work only part time). JDA uses direct employment at manufacturing facilities, offices, retail locations and other sites that are defined to be part of the industry to calculate all of the other effects presented in the study. For example, if a company facility employs 500 people, JDA then uses the IMPLAN model to calculate how much in wages and output those 500 employees create.

What is Meant by the Term Indirect?

Indirect is the term used in economic impact studies to define those effects that result from firms in the defined (or Direct) industry purchasing goods and services from other industries. JDA defines these as Supplier Impacts in its models. For example, when an e-liquid manufacturer pays rent on its warehouse to their landlord, or when they hire a trucking company to deliver products, or purchasing vapor products from a lab or warehouse, they are creating indirect effects in the real estate sector or trucking sector of the economy.

In the case of wholesalers, retailers and others that handle products through a supply chain, the value of the goods moving through a warehouse, or a store are not counted as indirect impacts; only those goods and services used to provide the wholesale or retail service are included. When a wholesaler pays an electric bill for its facility, or a retailer buys paper for its store, indirect impact is created. Whereas, when a vapor product wholesaler buys e-liquid from a manufacturer, this transaction is not considered in the supplier impact.

What is Meant by the Term Induced?

Induced effects are the response by the economy that occur through re-spending of income received by payments made to employees and business owners measured in the direct and supplier parts of the economy. When people work for a retail location selling vapor products or for firms that supply goods and services to the industry, they receive wages and other payments. This money is recirculated through their household spending inducing further local economic activity. Economists call these induced impacts the multiplier effect of an activity or industry.

Examples of induced effects are the jobs created in a diner located outside of a vape component factory or retail store where people purchase sandwiches for lunch, or at the gas station where they purchase fuel for their commute, or even in neighborhoods, where workers purchase houses, go to restaurants, or visit the movie theater.

What Specifically Do You Mean When You Say a Job?

Jobs are a measure of the annual average of monthly jobs in each industry as defined by the Quarterly Census of Employment and Wages put out by the Bureau of Labor Statistics. Jobs in our models are derived independently and do not match jobs reported by government entities in that the model defines the industry differently, and because it includes proprietors and other employees not eligible for unemployment benefits, and data from more firms and facilities than are surveyed by the government. Jobs are measured in full-time equivalent units.

What is Meant by The Term Economic Output or Economic Impact?

JDA uses output in its models as a general measurement of economic impact because it is the broadest and most comparative measure. Output can basically be considered similar to final sales; however, it differs due to the fact that it also includes adjustments in inventories and does not include certain taxes. In general, output represents the value of industry production for the model year calculated in terms of producer prices. Output differs depending on the industry being measured. In the case of the vapor industry, output is similar to gross sales for vapor product manufacturers. For retailers and wholesalers, output does not represent sales, but rather is similar to the accounting measure of gross margin. Simply put, output in the case of retailing can be seen as total sales revenue minus the cost of goods sold. This is similar to the wholesale or retail markup on a product.

What is Meant by the Term Taxes Paid?

This economic impact study measures the Vapor Industry's total tax contributions. The model includes information on income received by the Federal, state, and local governments, and produces estimates for the following taxes at the Federal level: Corporate income; payroll, personal income, estate and gift, and excise taxes, customs duties; and fines, fees, etc. State and local tax revenues include estimates of: Corporate profits, property, sales, severance, estate and gift and personal income taxes; licenses and fees and certain payroll taxes.

In addition, the model includes data on federal and state excise taxes as well as state and local sales taxes paid by vapor product consumers.

The model was built prior to the enactment of the Tax Cuts and Jobs Act, and represents taxes paid during the model year.