

Report on the Industrial Hemp Industry Development Work Group

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Chapter 745 of the 2020 Acts of Assembly

Executive Summary

As required by Chapter 745 of the 2020 Acts of Assembly, the Virginia Department of Agriculture and Consumer Services (VDACS) convened the Virginia Industrial Hemp Industry Development Work Group (Work Group) to assess the opportunities for development and manufacturing in the industrial hemp industry. Through several presentations from industry leaders on the national and state level during three meetings, the Work Group considered federal and state requirements; key drivers and challenges; anticipated job growth and wage expectations; talent and skill requirements; site and building needs; and manufacturing companies and supply chain requirements.

As required by Chapter 745 of the 2020 Acts of Assembly, the Virginia Department of Agriculture and Consumer Services (VDACS) convened the Virginia Industrial Hemp Industry Development Work Group (Work Group) to assess the opportunities for development and manufacturing in the industrial hemp industry. Through several presentations from industry leaders on the national and state level during three meetings, the Work Group considered federal and state requirements; key drivers and challenges; anticipated job growth and wage expectations; talent and skill requirements; site and building needs; and manufacturing companies and supply chain requirements. The Work Group consisted of the following members, as required by Chapter 745:

- Ryan Turman, industrial hemp farmer, Virginia Agribusiness Council
- Felix Shapiro, Workforce Policy Analyst, Office of the Chief Workforce Development Advisor
- Robert Mills, industrial hemp farmer, Virginia Farm Bureau Federation
- Christy Morton, Vice President of External Affairs, Virginia Economic Development Partnership
- Delegate Roslyn Tyler, Tobacco Region Revitalization Commission
- Delegate Sam Rasoul, Tobacco Region Revitalization Commission
- Delegate Lashrecse Aird, Tobacco Region Revitalization Commission
- Robert Spiers, Tobacco Region Revitalization Commission
- Sandy Ratliff, Tobacco Region Revitalization Commission
- Gayle Barts, Tobacco Region Revitalization Commission
- Gretchen Clark, Tobacco Region Revitalization Commission

This report summarizes information presented and discussed during the Work Group meetings held on July 14, 2020; July 28, 2020; and August 25, 2020.

Background

Industrial hemp is an agricultural commodity harvested for use in the manufacturing of a variety of products, including foods and beverages, cosmetics and topicals, nutritional supplements, fabrics and textiles, yarns and spun fibers, paper, and construction and insulation materials. Current industry estimates report that U.S. hemp product sales are nearly \$700 million annually, with most of the market being largely dependent on imports from Canada and China. According to Cannabis Reports, states with the highest production levels across the U.S. in 2019 include: Montana, Colorado, Kentucky, North Carolina, Oregon, Minnesota, Oklahoma, North Dakota, New Mexico, and Indiana. Industrial hemp is cultivated in approximately 30 nations worldwide. In the U.S., industrial hemp is primarily produced for one of three markets: hemp fiber, hemp seed, and hemp flower, for the extraction of cannabidiol (CBD).

Since Congress authorized state departments of agriculture to grow industrial hemp for research purposes, under certain conditions, in the 2014 federal Farm Bill, there has been considerable interest in the crop, with many seeing an opportunity for the creation of an entirely new industry in the U.S. Virginia has also experienced substantial interest in the crop, not only from those interested in growing the crop, but also from those interested in creating new businesses to process the crop. Localities across Virginia, particularly in rural areas, see the growing and processing of the crop as an important new economic development opportunity in regions sorely in need of one.

State of hemp industry in Virginia

As of September 30, 2020, there were 1,227 active industrial hemp grower registrations, 355 active industrial hemp processor registrations – 17 of which were operating under VDACS Food Safety inspection—and 228 active industrial hemp dealer registrations across Virginia. According to industrial hemp grower applications, there are 9,141 acres planned for industrial hemp for the 2020 growing season. Another sign of the tremendous interest in the crop has been the formation and success of the Industrial Hemp Summit hosted annually at the Institute for Advanced Learning and Research in Danville. The event is a multi-stakeholder collaboration focused on building the industrial hemp industry in America. The 2020 summit sold out for the third consecutive year, with 400 attendees from 25 states.

Virginia higher education research with industrial hemp

Research centers at various institutions of higher education, including Virginia Tech, Virginia State University (VSU), the University of Virginia (UVA), and James Madison University (JMU), and the Institute of Advanced Learning and Research (IALR) have been experimenting with industrial hemp since 2016. UVA is conducting genetic engineering work with a long-term goal of developing regionally-adapted, high-value hemp cultivars and has looked into new applications for the crop, including planting hemp on contaminated mining land to explore capabilities for waste cleanup. Virginia Tech and VSU provide research support to existing growers. JMU recently received a grant through GO Virginia Region 8 to study impacts and opportunities for the Shenandoah Valley, including assets and industry resources within the region. As a part of the study, participants will (i) analyze the current state of the market, (ii) solicit feedback from regional growers and processors, and (iii) develop a web-based information sharing portal to connect industry professionals. Seven localities have partnered with JMU to complete the study. IALR offers testing of hemp crops for growers in addition to conducting its own research growing the plant in various conditions to monitor CBD content and other variables.

Federal crop insurance pilot program

The U.S. Department of Agriculture announced new risk management programs for industrial hemp growers in December 2019; however, participants in the Work Group suggested that the programs are overpriced for the limited amount of protection provided. The program includes the Multi-Peril Crop Insurance Pilot Program (MPCI) and the Noninsured Crop Disaster Assistance Program (NAP). In order to be eligible for MCPI, a hemp producer must grow hemp in an eligible county, have at least one year of experience growing the crop, grow at least five acres for CBD or 20 acres for grain and fiber, and have an executed contract for the sale of the insured hemp. The NAP program provides coverage against loss for industrial hemp grown in 2020 where no permanent federal crop insurance program is available. NAP coverage is available at 55 percent of the average market price for crop losses exceeding 50 percent of expected production. Producers in some states may be able to purchase additional coverage. NAP service fees are \$325 per crop or \$825 per producer per county, not to exceed \$1,950 per producer with acreage in multiple counties. Data on the program's usage is not yet available.

U.S. Food and Drug Administration (FDA) regulation of CBD

Currently, the FDA has approved only one CBD product, a prescription drug to treat two rare, severe forms of childhood epilepsy. According to FDA, it is illegal to market CBD by adding it to a food or labeling it as a dietary supplement. FDA has advised that it is currently exploring potential pathways for various types of CBD products to be lawfully marketed. However, no timeframe for such determination

has been established. Despite FDA's current position with respect to CBD and other cannabis-derived products, CBD products comprise the largest segment of the U.S. hemp product market.

Governor announced economic development projects in Virginia

Since the General Assembly enacted the Virginia Industrial Hemp Law in 2015, there have been two Governor's incentives awarded to industrial hemp processing companies and several more projects are in various stages of development. In addition to creating new jobs and tax revenues for the communities in which they locate, these facilities play a crucial role in the development of the industry in Virginia by creating local markets for Virginia growers.

Appalachian Biomass Processing, whose award was announced in October 2019, is a value-added processor of industrial hemp fiber in Wythe County. The company uses customized decorticator machinery to break down hemp stalk into hurd and bast fiber, which are sold to textile manufacturers in North Carolina or used in animal bedding. This project represented \$894,000 of capital expenditure; 13 new jobs paying an average wage of \$39,098, which is above the local average; and an estimated \$1,053,125 purchase of Virginia-grown industrial hemp, approximately 6,025 tons, over the next three years. The founder of the company has been a leader in Virginia's industrial hemp industry for several years and has served as a valuable resource for entrepreneurs interested in growing and processing industrial hemp across the Commonwealth.

Golden Piedmont Labs, whose award was announced in June 2020, is a food-grade hemp extraction facility in Halifax County. The company contracts with industrial hemp farmers within a 50-mile radius to source dried hemp flowers. The majority of such farmers have a history of growing, drying, and curing tobacco, which requires the same infrastructure as floral varieties of industrial hemp. Golden Piedmont Labs will extract CBD from the plant to produce crude oil and will sell the oil to a secondary manufacturer of consumer products, including supplements and cosmetics. This project represented \$3.36 million of capital expenditure; 22 new jobs paying an average wage of \$47,891, which is above the local average; and an estimated \$71,675,123 purchase of Virginia-grown industrial hemp, approximately 3,079,415 pounds, over the next three years. The founders of Golden Piedmont Labs are native to Halifax County and established the company in an effort to bring new job and market opportunities to local tobacco farmers.

Interest in seizing industrial hemp's economic opportunities

As demonstrated by the overwhelming number of industrial hemp grower, processor, and dealer registrations, in addition to the estimated number of acres to be planted in 2020, Virginia's farmers and entrepreneurs have a vested interest in and enthusiasm for industrial hemp opportunities. The hemp growers who participated in the Work Group suggested the Commonwealth could capitalize on that enthusiasm to create high-paying jobs and substantial capital investment in a number of ways, including through reconsideration of existing policies on hemp sampling procedures, changing Virginia law to allow a higher tetrahydrocannabinol (THC) content in industrial hemp, and positioning Virginia as a producer of quality industrial hemp. Many rural localities have made recruiting and supporting new hemp processing companies a priority for their economic development efforts. These localities see an opportunity to position themselves as leaders in this new and fast-growing industry, with the hopes of bringing in additional related development.

Assessing the opportunities for development and manufacturing in the industrial hemp industry

When assessing the opportunities for development and manufacturing in the industrial hemp industry, it is helpful to consider each of the major uses or products of the crop, as each is distinct in how it is grown, harvested, processed, and used. The three major categories of industrial hemp use are: fiber, floral, and seed.

Hemp Fiber

- Growing/product/markets

When industrial hemp is grown for fiber, special varieties are planted that generally produce tall, thin stalks that seek to maximize the two primary outputs of the crop, hurd and bast fiber, which are mechanically harvested and separated post-harvest by specialized equipment known as a decorticator. Hurd, the plant's woody core, is currently most often used in Virginia for animal bedding but has other potential applications, such as an absorbent for environmental remediation applications and paper making. Bast fibers are the long, extremely strong fibers that have traditionally been used to make rope. The material is also used in industrial applications to make fiberboard or hempcrete or used by fiber companies that degum and "cottonize" the fiber for use in textiles.

- Manufacturing opportunities

There are no large-scale hemp fiber processors in the U.S.; therefore, most users of hemp fiber and hurd rely on imports. However, it is expected that industry demand for hemp fiber will continue to grow as research is conducted to develop more efficient processing and viable commercial applications in addition to the current limited markets that include animal bedding and textiles. Although a modern hemp fiber industry has been operating in Canada, China, and Europe, an opportunity for a successful U.S. industry exists, as limited worldwide demand for hemp fiber products has kept these countries from developing an overwhelming technological advantage. Additionally, because hemp fiber is, among all the hemp crops, the heaviest, bulkiest, lowest value, and therefore, most costly to transport, it is, as a raw commodity, the least susceptible to competition from imports.

- Virginia's value proposition

Virginia has a good climate for hemp fiber production, good markets for animal bedding, and because of the state's history as a leader in the textile industry and the presence of premier agriculture research centers, there is opportunity for innovation that could create important new markets for hemp fiber products. Lastly, the success Appalachian Biomass Processing has had in creating an efficient, automated processing facility could give Virginia important "first mover" status in this fast growing industry.

- Key challenges

Production of industrial hemp for fiber is substantially more affordable than for CBD; however, fiber-derived products currently have lower market value than CBD products. Challenges for production include a dearth of cultivars optimized for the regions' climate. Current growers have had positive experiences purchasing seed from suppliers in Ukraine, Poland, and China despite international shipping issues, specifically since the eruption of COVID-19. The Commonwealth currently only has one commercial industrial hemp fiber processor, which may make some farmers hesitant to grow due to lack

of processing infrastructure and fear of being able to successfully market their product. Additionally, the fact that the hemp fiber industry has been operating for decades outside the U.S. and still is relatively small and undeveloped casts doubt on when and if significant industrial scale demand for the products will materialize.

Industrial hemp fiber crops include both male and female plants, while a successful floral hemp crop will have no males, as the presence of male plants in a crop stunt the crop's cannabinoid production. This dichotomy can create friction between producers of industrial hemp for fiber and those for floral who grow in close proximity to each other.

Hemp flower

- Growing/product/markets

Industrial hemp plants grown for CBD oil production focus on growing large, resinous flowers or buds that contain high levels of the cannabinoids and terpenes and from which CBD crude oil is extracted. Growing and harvesting these hemp flowers is a labor-intensive process that uses much of the same equipment, facilities, and labor that are used for tobacco production. The majority of the floral varieties of industrial hemp are processed at an extraction facility to produce crude oil, which can be further refined into a wide variety of consumer products, including supplements, cosmetics, and topicals. This is currently the largest industry segment for industrial hemp in the U.S.

- Manufacturing opportunities

The high market value of floral varieties of hemp and the production similarities between it and marijuana mean that processing technologies are relatively advanced and continue to see improvement. Many producers of CBD oil are currently or are considering adding additional processing capacity so they can produce further refined CBD oil products. The recent announcement by Golden Piedmont Labs as well as the presence of several other smaller hemp extraction facilities in Virginia demonstrate an interest by the private sector in providing processing services to this industry. Additionally, as of September 30, 2020, 17 Registered Industrial Hemp Processors have successfully completed inspection by VDACS's Food Safety Program and may manufacture hemp-derived extracts intended for human consumption.

- Virginia's value proposition

Virginia's history as a top producer of tobacco positions the state to be a leader in the CBD industry. The labor and equipment needed for planting, harvesting, and drying of floral varieties of industrial hemp match that of the infrastructure and labor requirements of tobacco production. Additionally, Virginia's strong food and beverage manufacturing industry presence, including its robust supply chain and business ecosystem, benefit local CBD oil producers selling into that market, which many see as the future driver of demand. Because of the value of CBD biomass, industry players are interested in pursuing indoor growing opportunities to address concerns surrounding crop theft and provide a controlled environment, which would work well in Virginia because of the strong presence of greenhouse and indoor growing operations in the state.

- Key challenges

Because CBD biomass is so valuable and its production costs largely driven by labor, domestic production is especially vulnerable to imports. Also, as the production and processing of hemp fiber and seed increase, technologies allowing the efficient extraction of CBD from the by-products of that industry could also lead to a flood of inexpensive product in the market.

Work Group members shared that additional challenges to floral hemp growers include the current federal and state THC limit of 0.3 percent and current sampling practices. VDACS hemp sampling protocol directs that sample cuttings be made just underneath flowering material, meaning inflorescence (the flower or bud of a plant), located at the top one-third (1/3) of the plant. This portion of the plant is the most mature and generally contains the highest levels of THC in the plant, so growers would prefer samples also be taken from other parts of the plant to provide a more comprehensive sample of the plant's THC concentration.

Virginia's Industrial Hemp Law adopts the federal THC limit for industrial hemp by reference, and according to growers who participated in the Work Group, this THC limit prohibits the plant from reaching its highest CBD potential. It has been suggested that, if the limit was increased to 0.6 percent THC, a plant's CBD content could reach the 13-16 percent level required for a grower to be profitable. It is also important to consider that if a plant is harvested at 0.3 percent THC, after it is dried and processed, the THC content is likely below that threshold.

Hemp seed

- Growing/product/markets

The production of hemp seed or grain relies on mechanized farming equipment like that used for row crops. Cultivars used for hemp seed production produce tall plants with an abundance of seeds. Advocates for industrial hemp estimate that industrial hemp grown for hemp seed will have the most impact on the industry. Three hemp seed-derived food ingredients —hempseed oil, hemp hearts, and hemp protein powder—have received a “Generally Recognized As Safe” (GRAS) determination from FDA. Ultimately, it is expected that large food companies such as Kellogg, Nestle, and General Mills will use these ingredients as an alternative to soy in their products because of these ingredients' higher nutritional value and better flavor profile and in response to growing plant-based diet trends.

- Manufacturing opportunities

The majority of hemp seed production in North America is taking place in Canada and the Northern Plains states where oil seed production is already well established. The handling, processing, and storage of the seed relies on facilities like those used for other agricultural commodities.

- Virginia's value proposition

Virginia's strength in the food and beverage industry could lead to strong local demand for hemp seed and its institutions of higher education could provide valuable assistance to those around the state interested in growing the crop.

- Key challenges

As perhaps the most established and accepted industrial hemp product in the U.S., much of the supply chain for hemp seed is already established and favors parts of the country already well suited for oil seed production, which does not include Virginia. Additionally, hemp seed crops include both male and

female plants, while a successful floral hemp crop will have no males, as the presence of male plants in a crop stunt the crop's cannabinoid production. This dichotomy can create friction between producers of industrial hemp for seed and those for floral hemp who grow in close proximity to each other.

Summary of areas for consideration

Chapter 745 of the 2020 Acts of Assembly specifically directs the Work Group to consider the following six areas in its assessment of opportunities for development and manufacturing in the industrial hemp industry. Each item and a summary of the Work Group's discussion is below.

(i) Federal and state requirements

A challenge faced in the market for hemp flower and products thereof is the lack of federal guidance and regulation, particularly as it pertains to food-grade products. This is a barrier of entry to the market for processors who hesitate to invest money in a facility that may ultimately fail future federal manufacturing requirements. Other companies, such as Golden Piedmont Labs, spent additional capital to establish a food-grade extraction facility per VDACS's guidelines but have decided against producing consumer products until further guidance is provided by FDA.

Members of the Work Group recommend that the Commonwealth consider increasing the THC limit to 0.6 percent. This will make the industry more profitable for growers of the CBD variety in particular by allowing them to produce hemp flowers with a greater CBD concentration than that produced by hemp with no more than 0.3 percent THC, will make testing and sampling protocols more reasonable, and may ultimately drive additional processors to establish facilities in Virginia.

Since the passage of the federal Farm Bill in 2018, states with an industrial hemp program are regulating hemp-derived products differently, if at all. Currently, VDACS's Food Safety program requires a separate application for companies to manufacture hemp-derived extracts intended for human consumption, either as a food or a dietary supplement, both of which require different inspection processes. To date, FDA has only approved CBD as a drug. However, if FDA was to approve CBD as a dietary supplement and not a food additive, any hemp extract manufacturers in Virginia who are inspected under the requirements for producing a food additive will likely have to meet the more stringent requirements for producing a dietary supplement.

(ii) Key drivers and challenges

Virginia is well-suited to advance in the industry because of the research facilities at higher education institutions across the state. Technological advancements for processing equipment and new applications for end products will help expand markets for hemp fiber, CBD from hemp flower, and hemp seed products. Partnerships with such research facilities are positive value-propositions for new processors and other players in the supply chain to locate in Virginia.

The key drivers for growing the industrial hemp industry in Virginia are (i) the presence of stable and accessible markets for industrial hemp products and (ii) industrial hemp processing infrastructure located in proximity to industrial hemp growers. Many growers are enthusiastic about the crop but also hesitant because of market uncertainty and a lack of accessible processing infrastructure. In addition, industry representatives participating in the Work Group offered that, currently, hemp crop insurance is unreasonably expensive for a mediocre policy and support from banks is extremely limited.

(iii) Anticipated job growth and wage expectations

Job growth will be a function of the overall development of the industry in Virginia. At the farm level, new job growth may be limited, as new hemp production will likely come at the expense of other crops, with farmers shifting their acreage and labor between industrial hemp and other crops. However, the presence of a new market opportunity for growers will allow them to diversify their production, to increase their profitability, and to maintain and grow their overall farming operations, bringing significant benefit to the Commonwealth. Both the hemp fiber processing and CBD extraction companies that presented to the working group believe there is room for several more industrial hemp processing facilities to be located in the Commonwealth, indicating room for industry growth if markets materialize.

For industrial hemp processors, based on the Virginia experience, total job creation of approximately 10 to 25 per facility seems typical. Wage expectations are a reflection of the existing labor market and the skills required for the position. Overall wage levels in CBD production will likely be higher than in fiber production, as those employees are more akin to those in food and beverage manufacturing, while hemp fiber processing is more akin to agricultural commodity processing. Importantly, in both projects the companies will be paying an average wage higher than the average prevailing wage in the locality where they are located.

(iv) Talent and skill requirements

Workforce requirements vary between the three different types of industrial hemp processing.

According to Golden Piedmont Labs, CBD processing largely requires chemists, equipment operators, and maintenance positions. The Virginia Economic Development Partnership’s (VEDP) Research Team compiled the following information using CBD processing companies nationwide to evaluate workforce requirements for the industry, workforce availability in the Commonwealth, and average wages for those positions.

Sample occupations, wages, and available workforce for CBD Oil Extraction

Virginia Statewide						
CBD Oil Extraction Occupations						
Source: Emsi						
SOC	Description	2019 Jobs	2019 Resident Workers	Pct. 25 Hourly Earnings	Median Hourly Earnings	Pct. 75 Hourly Earnings
19-2031	Chemists	1,517	1,735	\$32.71	\$45.74	\$59.78
19-4011	Agricultural and Food Science Technicians	474	448	\$15.86	\$19.95	\$23.71
19-4031	Chemical Technicians	1,284	1,316	\$17.29	\$22.13	\$27.84
51-9011	Chemical Equipment Operators and Tenders	1,593	1,628	\$15.18	\$18.59	\$24.90
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	1,193	1,192	\$15.14	\$18.12	\$24.38
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	751	654	\$14.03	\$16.89	\$19.54

Sample occupations, wages, and available workforce for Fiber Harvesting and Textile Manufacturing

Workforce requirements for industrial hemp fiber processing closely resemble those for textile manufacturing and therefore are more generic than those for CBD. Appalachian Biomass Processing employees primarily include equipment operators and maintenance technicians. VEDP's Research Team assembled the following information to evaluate workforce requirements associated with industrial hemp fiber and textile manufacturing companies. Data below includes current workforce available in the Commonwealth and average wages for those positions.

Virginia Statewide						
Industrial Hemp Harvesting and Textile Manufacturing Occupations						
Source: Emsi						
SOC	Description	2019 Jobs	2019 Resident Workers	Pct. 25 Hourly Earnings	Median Hourly Earnings	Pct. 75 Hourly Earnings
11-9013	Farmers, Ranchers, and other Agricultural Managers	8,168	8,141	\$6.79	\$17.62	\$41.30
45-2091	Agricultural Equipment Operators	751	650	\$14.60	\$16.93	\$19.29
45-2092	Farmworkers and Laborers, Crop, Nursery and Greenhouse	6,383	6,596	\$10.47	\$12.68	\$15.25
45-2093	Farmworkers, Farm, Ranch and Aquacultural Animals	2,601	2,570	\$9.06	\$12.79	\$17.00
49-3041	Farm Equipment Mechanics and Service Technicians	504	426	\$15.44	\$18.89	\$22.76
51-6061	Textile Bleaching and Dyeing Machine Operators and Tenders	265	263	\$12.02	\$14.77	\$17.87
51-6063	Textile Knitting and Weaving Machine Setters, Operators and Tenders	601	634	\$12.26	\$13.71	\$15.38
51-6064	Textile Winding, Twisting, and Drawing Out Machine Setters, Operators and Tenders	1,392	1,470	\$13.76	\$16.07	\$20.14
51-6099	Textile, Apparel, and Furnishings Workers, All Other	444	446	\$13.72	\$16.68	\$21.89

(v) Site and building needs

Industry members in the Work Group suggested that the most important aspect of site selection for both fiber processing and CBD extraction facilities is proximity to growers. Both Appalachian Biomass Processing and Golden Piedmont Labs source product largely from within a 50-mile radius of the processing facility. This is especially important in fiber processing because transportation of raw product is costly.

According to research and business investment staff at VEDP, site and building needs will vary depending on the type of processing – CBD vs. industrial fiber. CBD processing typically requires a food-grade building. Currently in Virginia, there are no food-grade buildings outfitted with refrigeration available; all existing food-grade buildings available in the Commonwealth are likely too small for CBD processing companies' needs. There are several build-to-suit options and virtual buildings that are permit-ready for this sort of industry. However, for new construction, it costs an additional \$120-\$140 per square foot for a food-grade building. To upfit an existing building to food-grade, it costs an

additional \$40-\$60 per square foot. For fiber processing, most existing industrial buildings could be sufficient, and there is also opportunity for on-farm processing using agricultural buildings.

(vi) Manufacturing companies and supply chain requirements

Manufacturing companies using industrial hemp-derived products are essential to the expansion of the industry. Currently, Europe is a leader in the manufacture of industrial products using industrial hemp. Development of strong industrial hemp production and processing infrastructure is an important first step in attracting major manufacturers of industrial hemp products.

Members of the Work Group recommend that the Commonwealth market the state as a quality grower of industrial hemp to attract not only initial processors (i.e., CBD extraction facilities and fiber processors) but also the secondary manufacturers of consumer products. It is possible that initial processors will eventually vertically integrate operations to include secondary manufacturing, but that is unlikely to occur in the near term.

(vii) Market opportunities

At this time, both past and active industrial hemp prospects in the Commonwealth are limited to initial processors of either hemp or CBD products. These prospects—including both Appalachian Biomass Processing and Golden Piedmont Labs—expect to sell end product for use in cosmetics, food products, paper, packaging, animal bedding, textiles and clothing, auto parts, and construction materials.

Existing domestic market opportunities at this time are somewhat limited, as all industrial hemp programs across the U.S. are new, processing techniques are being developed, and new applications are being discovered. However, as processed industrial hemp fiber in particular becomes more readily available, clothing and textile companies will likely begin using industrial hemp in consumer products in an effort to be more environmentally friendly. The same can be said for food and beverage manufacturing companies, who are expected to begin using CBD in their products once hemp-derived extracts are regulated as a dietary supplement or food additive by the FDA.

Virginia resources for seizing opportunities for development and manufacturing in the industrial hemp industry

- Virginia Tobacco Region Revitalization Commission

The Tobacco Region Revitalization Commission (Commission) has a long history of supporting agribusiness in southern and southwest Virginia. As the regulatory environment has evolved to permit the growing and processing of industrial hemp for fiber and oil, the Commission has supported projects in this new and emerging industry. In 2019, with support from the Commission, the Institute for Advanced Learning and Research (IALR) in Danville created an ISO-certified analytical testing facility that supports the marketability and safety testing needed for industrial hemp producers and processors. The facility utilizes specialized equipment that allows local farmers to affordably test their crops for contaminants as well as THC levels. The Commission also funded two industrial hemp CBD oil processing facilities in 2020—one in southern Virginia (Halifax County) and one in southwest Virginia (Russell County). Additionally, a second southern Virginia (Pittsylvania County) processing facility, focused on fiber production, also received support. All facilities will support local and regional Virginia hemp growers by providing regional access to processing facilities. Virginia Tech's Southern Piedmont Agricultural Research and Extension Center will utilize a grant provided to Halifax County to perform research on hemp growing best practices for farmers.

The Commission remains interested in investing in industrial hemp and other agribusiness projects through its Southern Virginia and Southwest Virginia grants programs and its forthcoming community and business lending program. Industrial hemp processing facilities and initiatives that support hemp producers and processors with better marketing and testing of their crops are among those that may apply to the Commission for grants and loans. The Southern and Southwest Committees issue calls for applications twice each year. Once fully operational, the Commission's community and business lending program will accept applications on a rolling basis.

- Virginia Economic Development Partnership

With dedicated and knowledgeable professionals committed to Virginia's economic success, VEDP works with economic development partners and business prospects to secure new jobs throughout Virginia. Specifically, VEDP works closely with Virginia companies considering expansions and with businesses across the globe considering Virginia for a new location. In collaboration with local, regional, and state partners, VEDP develops and presents a strong data-driven business case for Virginia. Some of the services provided include talent solutions to train workers specifically for the new jobs, identify potential sites for the best location in the Commonwealth, and assess the eligibility of the project for various state programs and incentives.

VEDP strategically focuses on various targeted sectors. Among those, advanced materials manufacturing, food and beverage, life sciences, wood products, and others could have a direct link to the emerging opportunities developing within the hemp industry. Virginia's location provides strategic access to domestic and international customers through an advanced road, rail, and seaport network. Additionally, VEDP has International Trade programs that provide direct support to Virginia companies to increase their sales overseas and volume of international business.

- Virginia Department of Agriculture and Consumer Services (VDACS)

VDACS can support the development of the industrial hemp industry through the Office of Planning, Policy, and Research; the Division of Marketing and Development; and the Office of Dairy and Foods. The Office of Planning, Policy, and Research has been instrumental in the development of the Commonwealth's Industrial Hemp Program. Representatives in this office are responsible for issuing grower, processor, and dealer registrations.

In the Division of Marketing and Development, the Office of Agriculture and Forestry Development currently works to recruit new processors and secondary manufacturers to generate new markets for industrial hemp farmers. This support includes lead generation; site selection assistance; navigation of local, state, and federal assistance programs, including the Agriculture and Forestry Industries Development (AFID) Fund; and marketing the Commonwealth as a producer of quality industrial hemp products. The Office of Domestic Marketing currently works to connect hemp growers with buyers and ancillary services, as needed. As the industrial hemp industry grows and new processors and secondary manufacturers establish business in the Commonwealth, the industry will also benefit from services available through the Office of International Marketing and the Office of Domestic Marketing. Finally, the Office of Dairy and Foods currently works to inspect any processing facilities producing hemp extracts intended for human consumption in the Commonwealth.

Conclusion

A review of activity and investment in the three major categories of industrial hemp production in Virginia (hemp flower, hemp fiber, and hemp seed) shows that, like the U.S. more broadly, hemp flower for CBD is where farmers and investors are focused. This is a reflection of the high prices CBD once garnered. While CBD prices continue to drop, that market remains the primary driver of Virginia's industrial hemp industry and is the lens through which most view opportunities for growth and development of the industry in Virginia. Hemp fiber production and processing, which currently has far fewer growers as compared to hemp flower production, may eventually outpace acreage of floral hemp production in Virginia, provided commercial markets for hemp fiber develop. Serious interest from Virginia commercial grain farmers in producing hemp seed has been minimal, in part reflecting high opportunity costs for them switching to an entirely new grain crop.

Members of the Work Group suggest that the largest obstacles to growing the industrial hemp industry in the Commonwealth are lack of processing facilities, current testing and sampling practices, and the existing federal and state THC threshold limitations. The Work Group also presented several areas of concern about the novelty of the industry and increasing competition between states.

Despite a lack of processors, members of the Work Group project that Virginia hemp growers will finish the year with higher production than last year and with higher production than some neighboring states. In comparison to last year, growers this year were more intentional about securing sales contracts for their crop prior to planting. The Work Group stated that along the Route 58 corridor in southern Virginia, there is significant potential for increased production of hemp grown for CBD. However, many growers are taking a wait and see approach, assessing potential contracts with processing facilities or waiting until FDA provides additional guidance that gives growers the confidence they need in order to commit to growing the crop.

During its final meeting, participants of the Work Group suggested that there is little that can be done within the Commonwealth's control to address the major impediment to growing hemp for CBD production, the current 0.3 percent federal THC limit for industrial hemp. However, one area where the Commonwealth could enact policy to benefit the industry is adjusting protocols for crop testing. Members of the Work Group suggest that instead of collecting samples from the top six inches of the plant, growers would benefit from a protocol that calls for collection of a sample from a cross-section of the entire plant, top-to-bottom.

Members of the Work Group also presented several areas of concern about the future viability of the industry and increasing competition between states. With over 20 states interested in or currently pursuing industrial hemp, the Work Group questioned if there is enough demand to support all the industrial hemp being produced and if there are enough secondary manufacturers of processed industrial hemp to keep the initial processors in business. This industry poses a high risk of failure, as all processors are technically start-up companies. Kentucky has one of the largest concentrations of acres planted and cluster of processing facilities; however, at least four of those processors have sought federal bankruptcy protection since the state passed legislation allowing industrial hemp processing.

Members of the Work Group suggested that potential industry players are waiting to gauge the success of the existing commercial-scale processors prior to entering the market. The Work Group believes there may be an opportunity to build an industry cluster around hemp flower and hemp fiber production, provided a strong market for these products. Members of the Work Group speculate that as the uncertainty of the industry diminishes and growers and processors are more intentional about executing

purchase contracts, additional growers will begin planting. Consistent amounts of available raw product is important in recruiting additional processors and secondary manufacturers.

Members of the Work Group suggested that one of the Commonwealth's most valuable assets in developing the industrial hemp industry is expertise and knowledge available through VDACS's Industrial Hemp Program leadership. Through its distribution of all grower, dealer, and processor registrations, VDACS is able to monitor some aspects of industrial hemp activity statewide, answer regulatory questions, and potentially connect hemp growers to processors. Considerations to further develop the industry include the Commonwealth's support of regional efforts to establish industrial hemp processing facilities, potentially in partnership with GO Virginia. Members of the Work Group also recommended that the Commonwealth's research community continue to monitor and uncover best practices for both growing and processing nationwide, including studying crop conversion opportunities and possibilities for new product applications.

Using the value-proposition details and site and workforce requirements identified by participants of the Work Group, the Commonwealth's economic development and agriculture development partners are better equipped to position Virginia as a producer of quality industrial hemp in an effort to build a strong industry cluster. This includes working together to identify key target companies (e.g., existing processors looking to expand, secondary manufacturers of consumer products, and supply chain companies necessary to the success of the industry). The Commonwealth's economic development and agriculture development partners will continue to support industrial hemp companies and recruit new processors to support hemp growers using state economic development incentives, such as the Agriculture and Forestry Industries Development Fund, which supported both Appalachian Biomass Processing and Golden Piedmont Labs. Virginia is well positioned to market its strong food and beverage cluster, history in textile manufacturing and tobacco production, and premier institutions of higher education and research facilities.