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The Economic Impact Of Braidy Industries

Executive Summary

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EXECUTIVE SUMMARY

Braidy Industries' decision to build a $1.6 billion aluminum rolling facility in Ashland, Kentucky is an economic development coup of major significance for the Commonwealth of Kentucky. It is an especially gratifying outcome for the Eastern Kentucky region, which has been challenged in recent years by stagnant economic growth and higher than normal rates of unemployment.

Governor Matt Bevin, along with the Kentucky Senate and House of Representatives, and several divisions within the Commonwealth's government including ThinkKentucky, plus the key efforts of the Ashland Alliance, a variety of public-spirited businesses, and a host of elected officials and city leaders, made decisive, timely decisions in order to bring this development to reality. This committed team outcompeted and outhustled other states in order to capture an enterprise whose total economic impact from construction and first year production (2021) will be an estimated $2.80 billion for Kentucky as a whole and $1.54 billion within the adjacent six-county Eastern Kentucky region. Braidy's impact will be felt beyond Kentucky, leveraging its unique location within 250 miles of 13 auto OEMs and accessing the world's leading technology and science hub in Cambridge, MA through its MIT-backed subsidiary, Veloxint. Veloxint's MIT-developed nanocrystalline alloy technology enables metals that are several times stronger, lighter, and more durable.

This economic impact study utilizes the U.S. Department of Commerce's well-known RIMS-II economic impact model. In essence, RIMS-II shows how economic actions are interconnected --- how expenditures made by Braidy to construct its Atlas mill already are rippling through the regional and state economies and affecting everyone from steel producers and concrete suppliers to automobile dealers and pizza restaurants.

RIMS-II, however, also reveals how increased Braidy's economic activity generates additional employee earnings ($371.6 million in Eastern Kentucky and $793.7 million in the Commonwealth) and jobs (about 12,000 additional job years in Eastern Kentucky and 31,000 incremental job years in the Commonwealth).

These activities result in additional tax payments to state and local governments: $35.3 million in Eastern Kentucky and $75.4 million in Kentucky as a whole.

THE ECONOMIC IMPACT OF BRAIDY INDUSTRIES

Braidy Industries can only be described as an impressive, precedent-shattering economic phenomenon. The company's transformational $1.6 billion, nearly 2 million square feet Atlas aluminum rolling mill project near Ashland, Kentucky is generating an upsurge of welcome economic activity in Boyd and Greenup County, the Commonwealth of Kentucky, and the tristate region consisting of Kentucky, Ohio and West Virginia.

Progress has been rapid. Just after its founding in August 2016, Braidy announced its plan to develop the Ashland site in April 2017. In June 2018, less than a year later, Braidy broke ground on its aluminum rolling mill in the EastPark Industrial Center. This mill is the first Greenfield integrated aluminum rolling mill built in the United States in 35 years. Greenfield construction allows for a healthy balance sheet, near-zero maintenance and environmental remediation costs, lower labor costs, and higher production efficiency for all products. The Braidy Atlas mill is the first mill with a design optimized for automotive-grade production. Planning and construction for the plant is expected to generate in excess of 14,000 job years of employment.

In the interim, Braidy acquired Veloxint,[1] a MIT-incubated firm whose nanocrystalline metal alloys dramatically increase product strength while reducing weight, and NanoAL,[2] a Northwestern University-incubated firm that is a world leader in cost-effective super alloy processes that increase the strength performance of sheet aluminum. The two synergistic acquisitions place Braidy in the enviable position of becoming the newest, most competitive and greenest aluminum sheet producer in not only in North America but also in the world.

There are three major sources of Braidy's competitive advantages. First, Braidy will offset traditionally high costs of production and operation by harnessing the advantages of Greenfield construction and technological advancements of state-of-the-art manufacturing equipment, Further, Braidy's on and off-site propriety technology will lend itself to the future production of high-quality, non-commodity durable and lightweight aluminum sheet efficiently and affordably for its customers.

A second set of advantages focuses on Braidy's central physical location. Eastern Kentucky and Ashland propitiously are located in the nation's epicenter of automotive manufacturing, with 13 automotive OEMs based within 250 miles of Braidy's headquarters. Further, the Atlas mill will have immediate CSX railroad access, while I-64 is only a stone's throw away. When needed, Braidy will also be able to send and receive product via the Ohio River.

Third, Braidy has access to a unique and robust skilled labor pool in the region, one that already contains many individuals who possess the technical training and experience to contribute immediately. An August 2016 study of the region's workforce – EKY Works by Boyette Advisors – concluded that economic changes in the region have created a reservoir of experienced, compatible skilled labor nearby. Braidy should have little problem fulfilling its workforce needs with highly qualified individuals who will propel the momentum and reach of Braidy's impact.

Production at the Atlas mill will not begin until 2021, but 11,000 individuals have already applied for jobs with Braidy. Ashland Community and Technical College (ACTC) currently has over 110 highly motivated students enrolled in a distinctive Associate Degree program co-designed by the Commonwealth, ACTC, and Braidy that will train students across a range of integrated technology specialties and establish a reliable personnel pipeline to fill Braidy's skilled worker positions at its Atlas plant. The inaugural class is scheduled to graduate in 2020. Those who graduate from ACTC's two-year program are guaranteed a job with Braidy at an annual wage approximating $60,000 – a highly attractive prospect in an area where counties' per capita income ranged between $29,000 and $37,000 in 2016.[3] Braidy is providing significant opportunities for individuals in the region to improve their lives while allowing them to stay in Eastern Kentucky.

Braidy will produce approximately 300,000 tons of production-ready series 3000, 5000 and 6000 aluminum sheet for transportation sector customers, who covet high quality, corrosion resistant, reduced weight aluminum alloys that are

[1] www.veloxint.com

[2] www.nanoal.com

[3] Federal Reserve Bank of St. Louis, "Per Capita Personal Income in Greenup County, Kentucky," https://fred.stlouisfed.org/series/PCPI21089

cost-effective and meet changing regulatory and environmental standards. Historically, it has been difficult for American aluminum firms to satisfy this demanding combination of automotive needs. This is one of the reasons why Braidy Atlas mill is the first new aluminum plant to be constructed in the United States in over thirty years. The result is a 30-50 percent cash conversion cost advantage driven by nearly 20 competitive advantage features including: favorable power rates, very low maintenance costs, flexible, high-efficiency.

manufacturing and logistics processes, no. environmental remediation, lowest Selling, General & Administrative Expenses (SG&A) in the industry, and lowest labor costs/ton.

Braidy enters this market at a promising time. With tariffs and anti-dumping duties making foreign aluminum sources less attractive, customers have been motivated to place orders with Braidy at levels that have pre-sold capacity through the plant's first seven years of production.

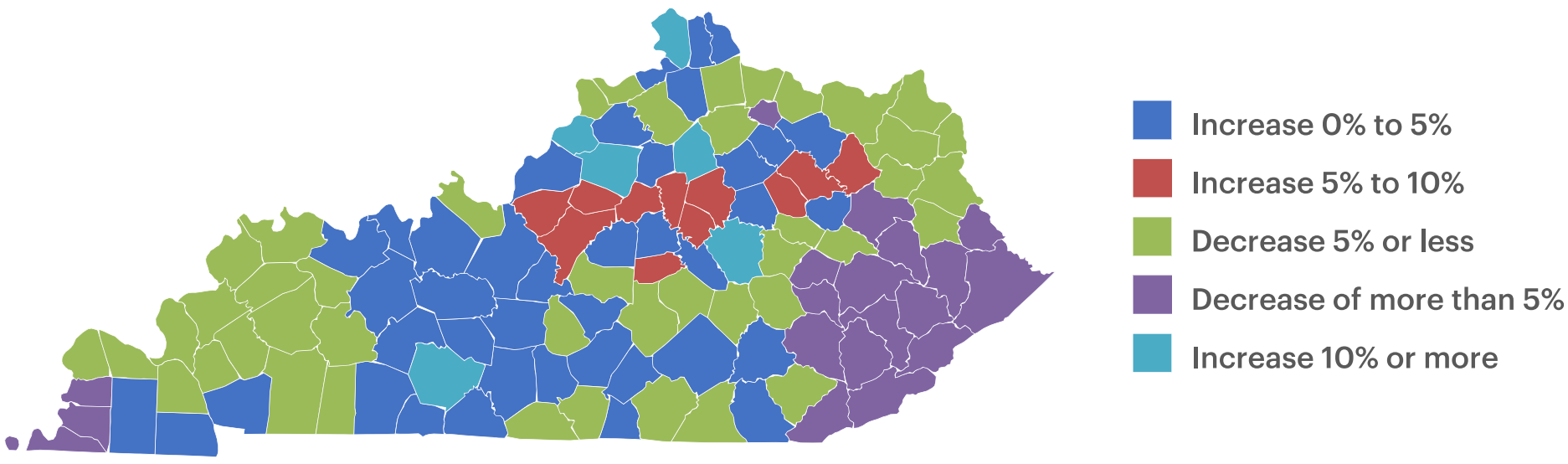
SETTING THE STAGE OF THE REGION

The economic impact of Braidy's aluminum rolling mill project is especially great in the context of Eastern Kentucky's current gross regional product. For comparative purposes, if Braidy chose to build its $1.6 billion expenditure in a large metropolitan region like Atlanta, it would contribute only .13 percent of the Atlanta region's gross regional product over the 2018-20 construction period, but will represent 3.7 percent of the gross regional product of the Huntington-Ashland metropolitan statistical area – 28 times as large.[4]

In recent years, the Eastern Kentucky region has experienced stagnant or declining population. The population of Ashland has declined 14 percent since 1990, while that of neighboring Huntington is down 16 percent over the same period. [5]

Figure 1

Percent Population Change by County in the Commonwealth of Kentucky, 2010 to 2017



Source: United States Census Bureau, 2017 Population Estimates and 2010 Decennial Census, www.census.gov/data/datasets/2017/demo/popest.html.

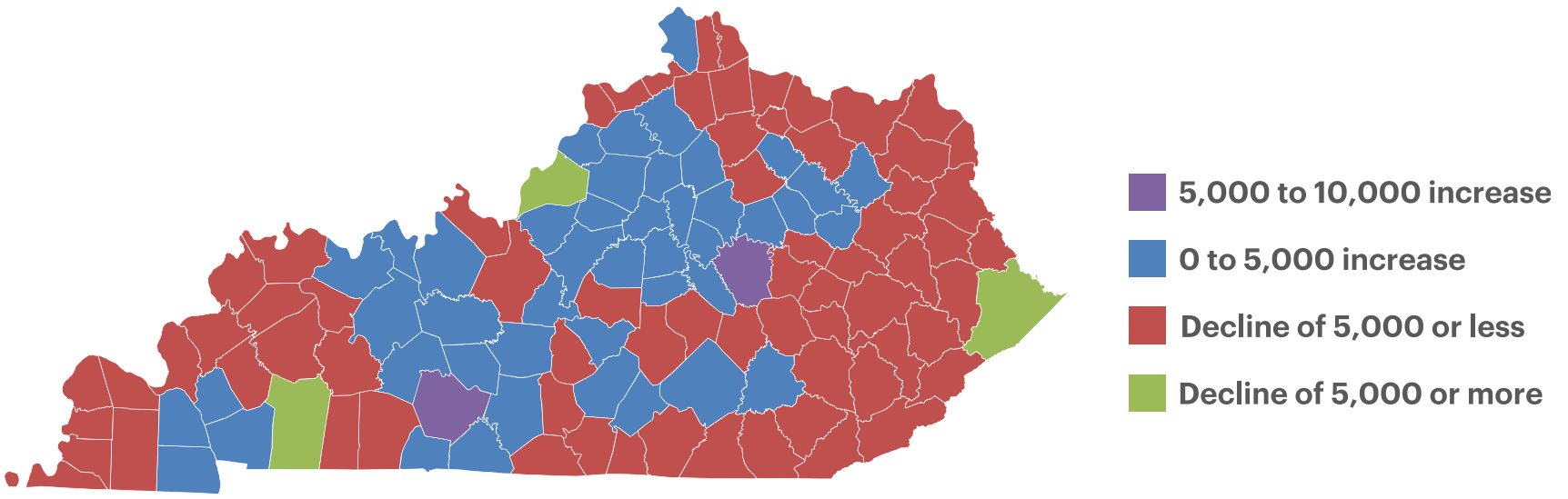
[4] Federal Reserve Bank of St. Louis, https://fred.stlouisfred.org.

[5] U.S. Census Bureau, www.census.gov

Net domestic migration is a measure that captures the magnetic effect that jobs have upon where people choose to live. It quantifies the number of individuals who migrate between areas inside the United States. Figure 2 reports that net domestic migration typically has been negative, meaning more people are leaving than coming, in every county in Eastern Kentucky over the past decade. However, the job growth and economic revitalization Braidy is projected to bring to region will not only incentivize those already living in the area to stay but be a catalyst for positive migration.

Figure 2

Net Domestic Migration by County:
Commonwealth of Kentucky, 2010 to 2017



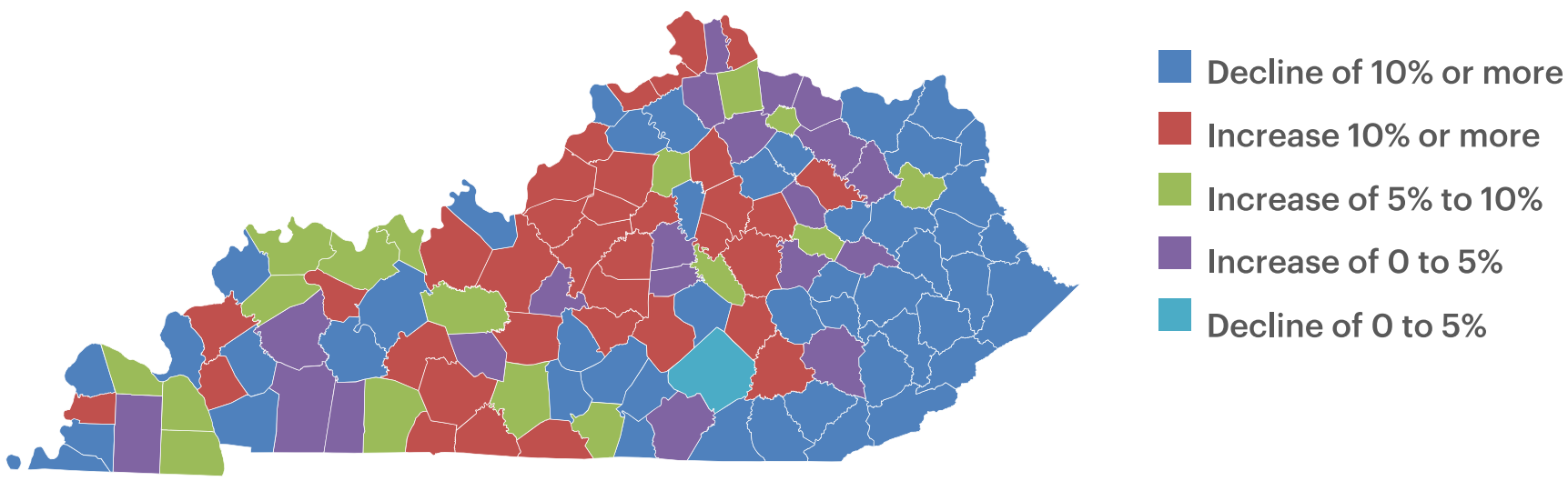
Source: United States Census Bureau, 2017 Population Estimates and 2010 Decennial Census, www.census.gov/data/datasets/2017/demo/popest.html.

Figure 3 illustrates the decline in "covered employment"[6] that has occurred in many counties in Kentucky, but uniformly in Eastern Kentucky between 2010 and 2017. Most counties witnessed declines in employment that exceeded 20,000 over this period. Once again, the Atlas aluminum rolling mill project, contributing an estimated 1,000 construction and 600+ full time jobs to the region, will likely guide this trend in a positive direction.

More than 95 percent of all jobs in the United States are "covered" in the QCEW's "covered employment" estimates.

Figure 3

Changed in Covered Employment in the
Commonwealth of Kentucky, 2010 to 2017



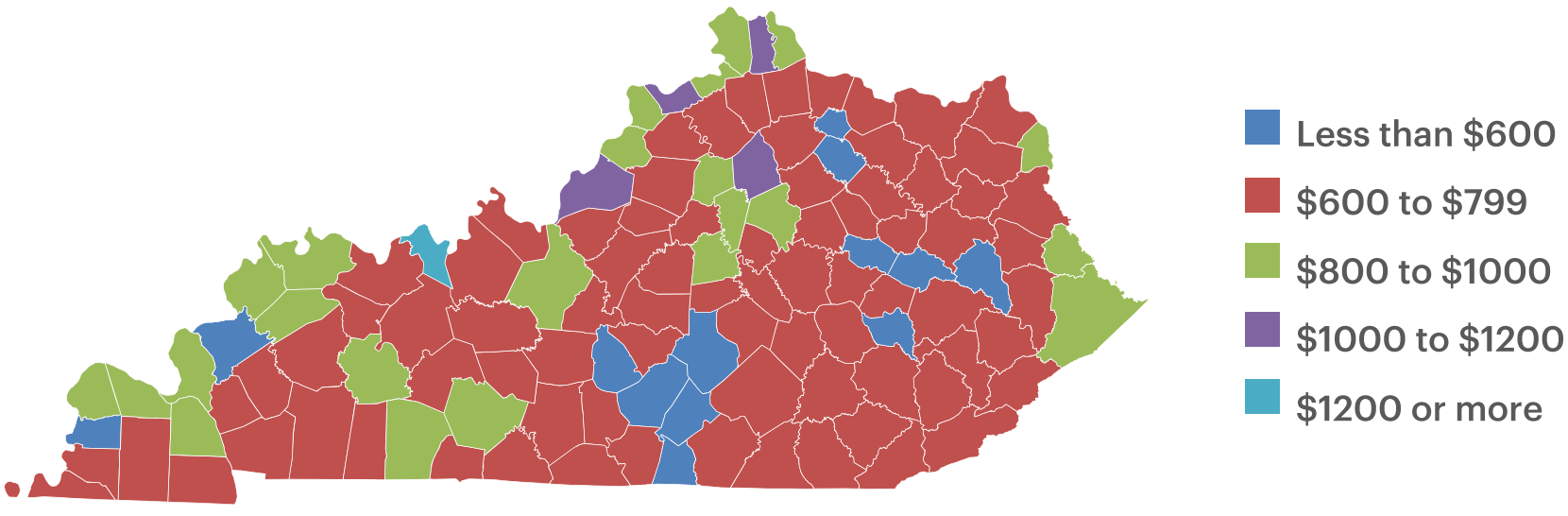
Source: United States Census Bureau, 2017 Population Estimates and 2010 Decennial Census, www.census.gov/data/datasets/2017/demo/popest.html.

6. More than 95 percent of all jobs in the United States are "covered" in the QCEW's "covered employment" estimates.

Wage rates constitute another useful barometer of economic conditions. Figure 4 reports average weekly wages for employees in the counties of Kentucky in 2017. When translated to annual incomes and evaluated against Braidy employees' average wages when production begins in 2021, Braidy's role in making Eastern Kentucky a competitive economy becomes immediately clear.

Figure 4

Average Weekly Wages for Covered Employees, Counties in the Commonwealth of Kentucky, 2017



Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2017, www.bls.gov/cew/data.htm.

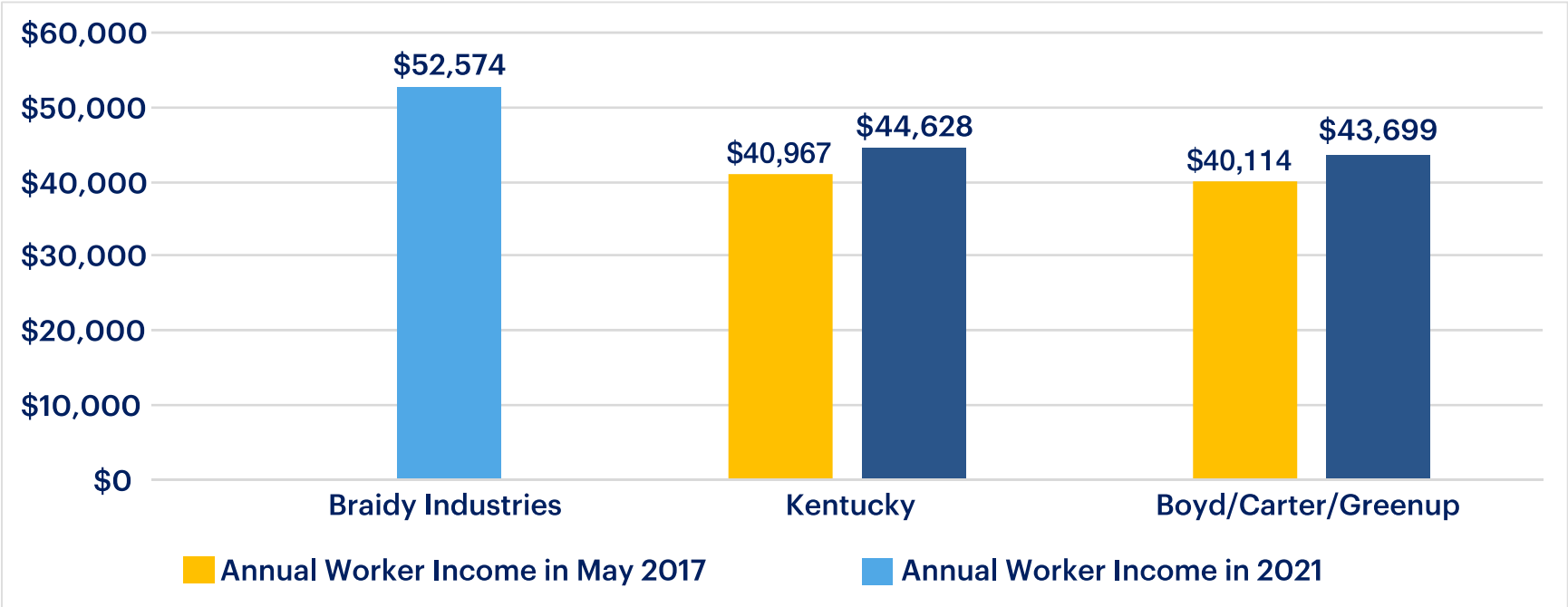
Figure 5 reveals that in May 2017, the average annual income of a worker in Kentucky was $42,410, while it was $41,330 in the Ashland-Huntington metropolitan region and $38,100 in Carter County. Let's assume a 2.0 percent annual increase in wages between 2017 and 2010. In Kentucky, for example, this means that its average worker income of $42,410 in 2017 will increase to $45,906 in 2021.

In 2021, Braidy's first year of production, the average annual income earned by its 600+ employees will be $52,574 (see Table 1). Thus, in 2021, the typical income of a Braidy worker will be 31.1 percent higher than the median income of a worker in Boyd, Carter and Greenup counties, and 28.3 percent higher than the median income of a Kentuckian.

Federal Reserve Bank of St. Louis, https://fred.stlouisfred.org.
U.S. Census Bureau, www.census.gov

Figure 5

Comparing Average Employee Incomes at Braidy to others in the Region: 2017 and Estimated 2021



Source: Bureau of Labor Statistics, "Occupational Employment Statistics," www.bls.gov/oes.

Table 1

Worker Classifications and Estimated Annual Incomes of these Workers at Braidy Industries, 2021

Type of Employment	Number of Workers	Average Annual Braidy Salary
Officials and Managers	10	$100,000
Professional	24	$77,500
Technicians/Team Leaders	26	$65,000
Sales	3	$47,500
Office and Clerical	7	$45,100
Craft and Skilled	40	$55,000
Semi-Skilled Operators	292	$45,000
Laborers	164	$42,500
Service Workers	40	$18,500
	602 Total	**$52,574 Average**

THE RIMS-II ECONOMIC IMPACT MODEL

All economic impact estimates reported in the next section were generated by the U.S. Department of Commerce's well-regarded and frequently used RIMS-II economic impact model. RIMS-II is a local and regional input-output estimating tool that assumes that every part of a local or regional economy is interrelated. Thus, RIMS-II assumes that any expenditure made by consumers, business firms, non-profit organizations, or governments has an economic impact, creating a wave that ripples throughout the economy. RIMS-II measures the total economic impact of that wave until it disappears. The U.S. Department of Commerce has developed a set of "multipliers" that show how various parts of local and regional economies are interconnected. These multipliers measure the ultimate size of the economic wave.

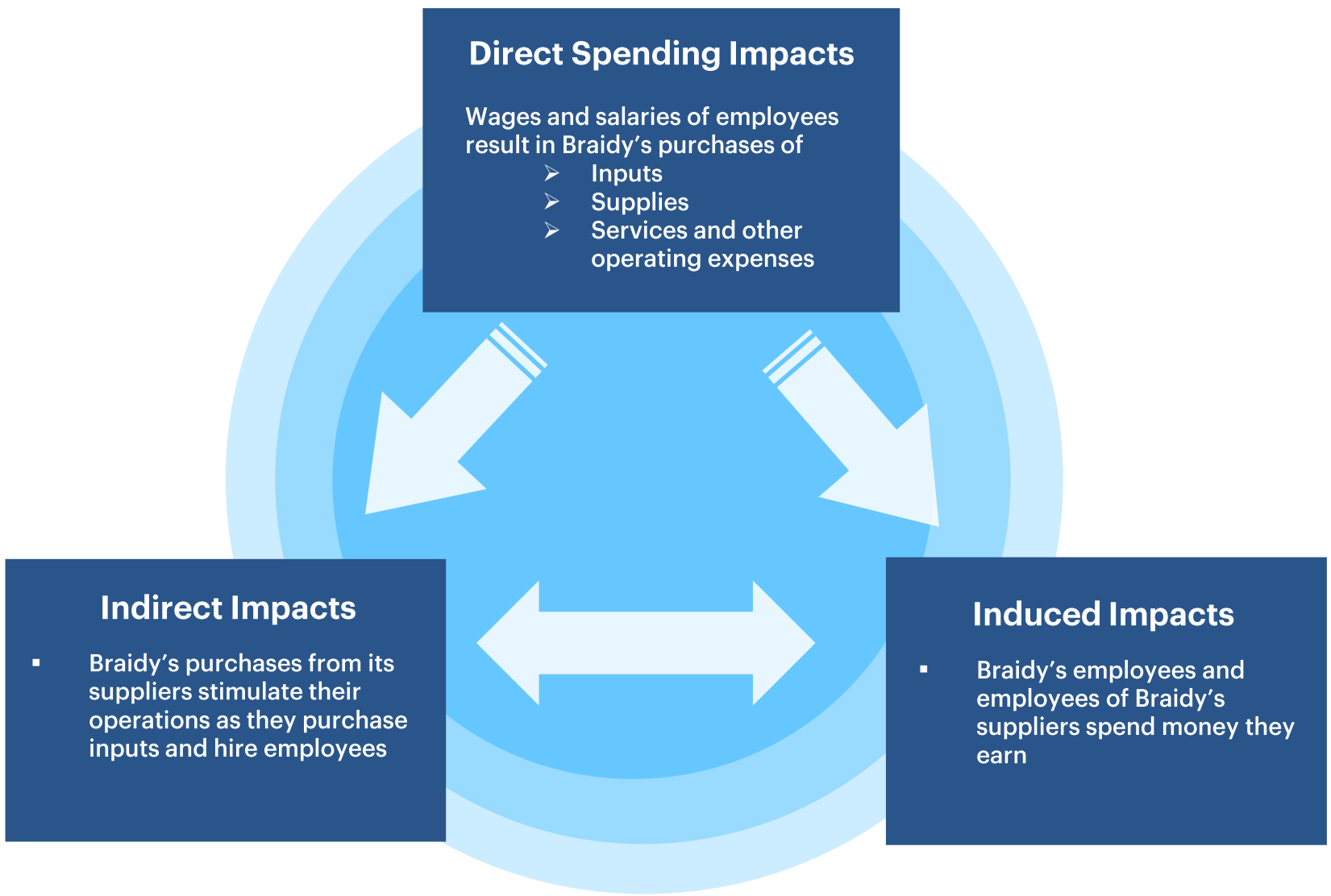
In the event that the Social Security Administration increases the Cost-of-Living Adjustment (COLA) then RIMS-II multipliers, based upon past behavior, will predict how and where the additional dollars associated with the cost-of-living increase will be spent. Further, nearly always there are economic ripples associated with an expenditure. Dollars spent usually are re-spent and hence an economic wave is created that flows throughout the economy. Benefitting from this economic wave will be car dealers, pizza parlors, colleges, grocery stores, homebuilders, churches, and governments as taxes are paid.

The employees of these groups benefit as well. Businesses ranging from Wal-Mart and Costco to restaurants and cable television providers will need to attract and retain employees to service the increased demand for their services. Service providers such as attorneys, hair stylists and athletic teams experience the same surge. RIMS-II measures the size of these reactions and estimates the number of additional jobs created by the economic ripples.

The size and impact of any economic wave eventually disappears unless local spending remains consistent. Alternatively, when individuals save money or spend their money in distant economies the size of the local or regional spending multipliers become smaller and the ultimate economic impact of any wave is reduced. Based upon extensive analyses of expenditure patterns, RIMS-II estimates take these circumstances into account.
Figure 6 depicts the estimating process that RIMS-II utilizes. Note three different kinds of economic impacts*: direct, indirect* and *induced*. *Direct economic impact* reflects the immediate economic influence of an expenditure upon incomes and jobs. For example, if a Shell gasoline station receives more business, then it may have to hire more employees and spend more dollars on its own operations.

Figure 6

Rims-ii Measures The Size Of Economic Ripple Effects



3 Federal Reserve Bank of St. Louis, "Per Capita Personal Income in Greenup County, Kentucky,"
4 https://fred.stlouisfed.org/series/PCPI21089

Indirect economic impact reflects purchases that must be made by the businesses whose patronage has increased because of the injection of funds. If more money is spent at the Ford dealer, then the Ford dealer must hire more workers and purchase more supplies to meet this demand.

The employees hired by suppliers earn wages and when they spend their income this generates *induced economic impact.*

The arrows in Figure 6 reflect economic leakages. They reflect the act of saving and non-local purchases, both of which reduce the sizes of the local, regional and state economic multipliers.

The RIMS-II model takes each of these factors into account and provides a net estimate of the total economic impact of an action; direct economic impact + indirect economic impact + induced economic impact = total economic impact. From this, the RIMS-II model deduces the number of additional jobs created as a result of increased demand for a product or service, for example, Braidy purchasing electricity locally to run its operation. Moreover, taking this one step further, we can estimate the additional tax receipts that governments will receive because of the increased economic activity. The usual source for these estimates is the Tax Foundation.[7]

THE ECONOMIC IMPACT OF BRAIDY INDUSTRIES

Table 2 summarizes Braidy's cumulative economic impact upon Eastern Kentucky and the Commonwealth of Kentucky through 2021, assuming that 2021 represents the first full-year of production. The following three phases, which are largely fluid, will contribute to Braidy's cumulative economic impact: (1) planning, (2) construction and, (3) production.

Braidy's planning phase includes programs related both directly and indirectly to the future success and regional impact of the Atlas mill. Local and regional economic development authorities like the Ashland Alliance, The Commonwealth of Kentucky, especially the Cabinet for Economic Development, and prospective partners and suppliers collaborated with Braidy's leadership during this phase. With a wide range of partners, Braidy developed proposals, researched possibilities, worked with legislators and elected officials and negotiated with a variety of suppliers like local electric utility powerhouse Kentucky Power to maximize the mill's impact. With its long-term vision in mind, Braidy, with its partners, laid the groundwork to train Braidy's talent pool, forming the Advanced Integrated Technology Associate's Degree program at Ashland Community and Technical College (ACTC). While Braidy has achieved many milestones in the planning phase to date, planning will continue through the construction and operation phases as Braidy recruits and secures investors for initial and long-term financing.

While planning activities continue, Braidy is heavily engaged in construction work, compaction and foundational work as well as detailed engineering to rapidly build the infrastructure for full-scale production. A significant portion of Braidy's economic impact is associated with the construction of the $1.6 billion Atlas mill and supporting infrastructure.

[7] https://taxfoundation.org/state/kentucky.

Table 2

Economic Impact (Direct, Indirect, Induced) Of Braidy On Eastern Kentucky And The Commonwealth Of Kentucky

Eastern Kentucky				Commonwealth of Kentucky			
		Output				Output	
	Final Demand	Multiplier	Impact on Total Output		Final Demand	Multiplier	Impact on Total Output
Planning and Construction	$731,669,346	1.4807	$1,083,382,801	Planning and Construction	$975,559,128	2.0931	$2,041,942,811
Operations Single Year	$314,335,800	1.4414	$453,083,622	Operations Single Year	$349,262,000	2.1782	$760,762,488
Totals	$1,046,005,146		$1,536,466,423	Totals	$1,324,821,129		$2,802,705,299
		Earnings				Earnings	
	Final Demand	Multiplier	Impact on Earnings		Final Demand	Multiplier	Impact on Earnings
Planning and Construction	$731,669,346	0.3842	$281,107,363	Planning and Construction	$975,559,128	0.6416	$625,918,737
Operations Single Year	$314,335,800	0.2880	$90,528,710	Operations Single Year	$349,262,000	0.4803	$167,750,,539
Totals	$1,046,005,146		$371,636,073	Totals	$1,324,821,128		$793,669,275
		Employment				Employment	
	Final Demand	Multiplier	Impact on Employment		Final Demand	Multiplier	Impact on Employment
Planning and Construction	$731,669,346	8.6353	6,318	Planning and Construction	$975,559,128	14.7250	14,365
Operations Single Year	$314,335,800	6.1359	1,929	Operations Single Year	$500,000,000	10.4798	3,660
Totals	$1,046,005,146		8,247	Totals	$1,481,250,000		18,025
		Value Added				Value Added	
	Final Demand	Multiplier	Impact on Value Added		Final Demand	Multiplier	Impact on Valued Added
Planning and Construction	$731,669,346	0.7923	$579,701,623	Planning and Construction	$975,559,128	1.1000	$1,073,115,041
Operations Single Year	$314,335,800	0.6120	$192,373,510	Operations Single Year	$349,262,000	0.9416	$328,865,099
Totals	$1,046,005,246		$772,075,132	Totals	$1,324,821,128		$1,401,980,140

(1) Eastern Kentucky is defined narrowly as a six-county region including the counties of Boyd, Carter, Elliot, Greenup, Lawrence and Lewis.

(2) Incremental state and local government tax collections estimated to be $35.48 million in Eastern Kentucky and $82.62 million in the Commonwealth of Kentucky.

(3) Kentucky's average state and local tax rate as a percentage of personal income is 9.5% according to the Tax Foundation, https://taxfoundation.org/state-and-local-tax-burdens-historic-data. The assumption is that Kentucky's 6.0% sales tax rate and its 5.0% flat rate income tax will continue at least through the end of 2021.

In 2021, the nearly 2 million square foot, fully integrated aluminum rolling mill in the EastPark Industrial Center will begin to produce aluminum, primarily in the form of Series 3000, 5000 and 6000 aluminum sheet products. The results presented here assume full-scale production in 2021.

The economic impact data reported in Table 2 reveal four important relationships.

- The overall economic impact of planning and construction of the major facility on the Commonwealth of Kentucky will be almost 2.6 times larger than the annual economic impact generated by annual production when output begins in 2021.
- The Commonwealth of Kentucky, outside of the six-county Eastern Kentucky region, will receive in excess of 70 percent of the economic impact associated with Braidy's planning and construction activities.
- Ongoing production anticipated by Braidy in 2021 will generate an economic impact of $453.1 million, employee earnings of $90.5 million, and 1,929 additional jobs in the six-county Eastern Kentucky region.
- Braidy's 2021 anticipated production will result in $760.8 million in economic impact, $173.8 million in employee earnings, and 3,600 additional jobs in the Commonwealth of Kentucky overall.

Braidy's Impact on Output Value

Businesses produce outputs, which are conventionally valued by the prices at which they sell. Our estimates through 2021 of Braidy's impact on the value of output are $1.536 billion in Eastern Kentucky and $2.803 billion in Kentucky overall. To place these numbers in context, we estimate that Eastern Kentucky's $1.536 billion economic impact for Eastern Kentucky will be slightly more than one-third (34.5 percent) of the value of its entire 2017 economic output. This will supercharge the economies of the six-county Eastern Kentucky region. For the Commonwealth, the impact is smaller (1.39 percent of the value of its 2017 annual output), but still highly significant.[8]

Braidy's Impact on Earnings

Through 2021, we estimate a $371.64 million impact of Braidy on earnings in the six-county Eastern Kentucky region and a $736.67 million impact of Braidy on earnings in Kentucky. For context, total personal income reported by residents of the six-county region was $4.98 billion in 2017. Braidy's activities will increase this number by approximately 7.5 percent, albeit over the space of three years. For the Commonwealth, Braidy's activities through 2021 will generate earnings that will be about .4 percent of its total annual earnings in 2017.

[8] Note, however, that Braidy's economic impact is spread over several years, while the value-of-output numbers are for a single year. The source for these numbers if the Federal Reserve Bank of St. Louis's FRED data base.

Braidy's Impact on Employment

Providing opportunities for individuals to engage in productive, well-compensated employment is central to Braidy's vision. We estimate that Braidy's activities will generate 8,247 additional jobs in the six-county Eastern Kentucky area and 18,025 additional jobs in Kentucky overall over the space of three years. Construction activities will account for approximately three-quarters of these jobs. Braidy's construction activities, however, are occurring over an approximate two-year period. Thus, in job years, Braidy's activities will generate about 12,000 incremental job years in Eastern Kentucky and about 31,000 more job years in the Commonwealth.

Braidy's Tax Payments

Estimating tax payments can be a fraught enterprise because the taxes businesses pay often depend on somewhat subjective assessments of the value of assets, which items and activities are (or are not) in the tax base, a host of possible deductions, exemptions and exclusions, and local administrative preferences and quirks.

Fortunately, the Tax Foundation provides a viable alternative to an otherwise complicated process by providing estimates of total state and local tax effective average tax rates in states. For Kentucky, this percentage is 9.5 percent of state personal income and includes the Commonwealth's 6.0 percent sales tax rate and its 5.0 percent flat rate income tax. The Tax Foundation ranks Kentucky 23rd among the states in terms of its overall business tax climate.[9] The estimated state and local tax payments that will be made by Braidy through 2021 are $35.31 million to government entities in the six-county Eastern Kentucky region and $75.40 million within the Commonwealth overall. Approximately three-quarters of these tax payments will relate to planning and construction activities.

Acknowledgements

So many organizations and individuals contributed to this report that it is impossible to mention all of them. Particularly crucial, however, were Craig T. Bouchard, Braidy's Board Chairman and CEO of the corporation, Blaine Holt, Braidy's Chief Operating Officer Nate Haney, Braidy's Senior Vice President for Government Relations, and Julie Kavanaugh, Braidy's Chief of Staff. Numerous other individuals within Braidy and the Ashland Alliance provided vital inputs at critical junctures.

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At the end of the day, errors and omissions remain the responsibility of James V. Koch.

[9] https://files.taxfoundation.org/20180925174436/2019-State-Business-Tax-Climate-Index.pdf.