Economic Impact of the Proposed

Piedmont Carolina Lithium Project

Prepared by: John E. Connaughton, Ph.D.

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Economic Impact of a Proposed Piedmont Carolina Lithium Project on the Gaston County, North Carolina Economy

Introduction

This report estimates the economic impact of a proposed lithium mining project on the Gaston County, North Carolina economy. The proposed project will be undertaken by Piedmont Carolina Lithium as a single integrated facility that will have three distinct processes; quarrying lithium, spodumene concentration and by product processing, and spodumene conversion to lithium hydroxide. The facility will be located in northwest Gaston County just north of Bessemer City. As of March 31, 2021, the project comprised approximately 2,667 acres of surface property and associated mineral rights, of which approximately 988 acres are owned by Piedmont Carolina Lithium, approximately 113 acres are subject to long-term lease, approximately 79 acres are subject to lease-to-own agreements, and approximately 1,487 acres are subject to exclusive option agreements.

This study consists of seven parts. The first part provides an overview of the Piedmont Carolina Lithium proposed operation. The second section of the study provides an analysis of the lithium industry in the United States and the projected outlook for the industry over the next 20 years. The third section of the study provides an economic overview of the Gaston County economy over the past 50 years.

The fourth section provides a general understanding of regional economic impact methodology and the specific methodology used in this study. The fifth section presents an analysis of the on-going economic impact of the proposed Piedmont Carolina Lithium project on the Gaston County economy over the first six years of the project. The sixth section outlines the economic impact of the construction phase of the Piedmont Carolina Lithium project on the Gaston County economy during the first six years of buildup. The final section of this report provides a summary of all relevant economic impacts resulting from the construction and operation of the proposed Piedmont Carolina Lithium project.

Section 1: Overview of the Project

The proposed project will be undertaken by Piedmont Carolina Lithium as a single integrated facility that will three include distinct processes; quarrying lithium, spodumene concentration and by-product processing, and spodumene conversion to lithium hydroxide. The operation will be located in northwest Gaston County just north of Bessemer City. As of March 31, 2021, the Project comprised approximately 2,667 acres of surface property and associated mineral rights, of which approximately 988 acres are owned by Piedmont Carolina Lithium, approximately 113 acres are subject to long-term lease, approximately 79 acres are subject to lease-to-own agreements, and approximately 1,487 acres are subject to exclusive option agreements.

Figure 1.1 provides a map perspective of the proposed facility in northwestern Gaston County. The different operational components of the facility are detailed on the map. The mining operation is on the eastern side of the facility, with the concentration/aggregation operation in the center and the refining operation in the northwestern part of the facility.

Table 1.1 presents an overview of the initial direct output and employment estimates of the proposed facility during the next six years. The data for this table is provided by Piedmont Carolina Lithium. The facility will reach maximum production by 2025 with over $600 million in direct output and 428 net new jobs.

Table 1.2 presents the direct employment by function during the first six years of the project. The mining component is the first operation to get up and running with 140 employee in 2023. It is also the largest job function once the facility is fully operational in 2025.

Table 1.3 presents the employee compensation by function over the first six years of the proposed facility. In year 2027 the average compensation of the 428 direct employees of Piedmont Carolina Lithium is estimated at $82,181 in constant 2022 dollars. That is 34 percent greater than the current Gaston County average compensation level of $61, 377[1].

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[1] Quarterly Census Employment and Wages (QCEW), retrieved from: D4 - Industry Employment (QCEW) (nccommerce.com)
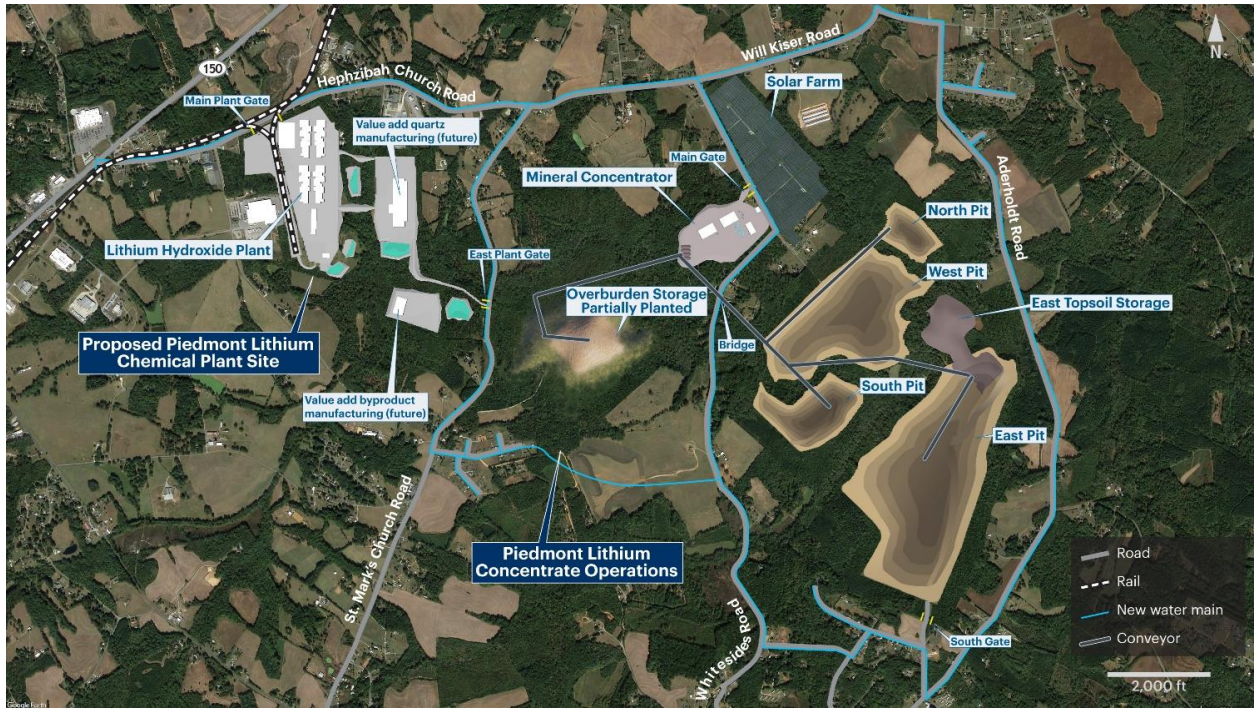
Figure 1.1

Table 1.1

Piedmont Carolinas Lithium Project Output and Employment by Year					
Year	**Output**	**Output/Mining**	**Output/Aggregation**	**Output/Refining**	**Total Employment**
2022					
2023	$6,401,995	6,401,995	0	0	140
2024	$371,817,103	90,791,250	97,469,713	183,556,140	428
2025	$604,782,806	90,791,250	187,645,556	326,346,000	428
2026	$582,079,603	90,791,199	198,027,760	293,260,644	428
2027	$533,607,785	90,791,250	149,555,891	293,260,644	428

Table 1.2

Piedmont Carolina Lithium Project Employment by Function				
Year	**Mining**	**Aggregation**	**Refining**	**Total**
2022				
2023	140			140
2024	177	131	120	428
2025	177	131	120	428
2026	177	131	120	428
2027	177	131	120	428

Table 1.3

	Piedmont Carolina Lithium Project Employee Compensation by Function				
Year	Chemical Plant	Aggregation	Mining	Total Labor Compensation	Average Wage
2022					
2023		$6,889,061	$2,351,315	$9,240,376	$66,003
2024	$9,716,841	$6,889,061	$11,551,912	$28,157,814	$65,789
2025	$9,716,841	$6,889,061	$18,767,296	$35,373,198	$82,648
2026	$9,716,841	$6,889,061	$18,537,188	$35,143,090	$82,110
2027	$9,716,841	$6,889,061	$18,567,647	$35,173,549	$82,181

Section 2: The Lithium Industry

In 2020 Electric Vehicle (EV) sales in the United States reached 231,000[2] units, about 2 percent of total U.S. vehicle sales. Table 2.1 presents a forecast through 2030 for U.S. EV sales, EV share of sales, total EVs in service, and tons of lithium necessary to support EV production in the U.S. By 2030, U.S. EV sales are expected to increase from an annual volume of 231,000 in 2020 to 4,719,375. This represents and annual compound growth rate of 35.2 percent. Today, U.S. EV sales require just under 6,000 tons of lithium to support the battery requirements for plug-in vehicles[3].

Worldwide annual EV sales are expected to reach 34,756,000[4] units in by 2030. This level of EV sales would require 382,316 ton of lithium to be produced annually. This increase in EV production is being driven primarily by government regulation across counties. Figure 2.1 provides a timeline of worldwide government regulations on EV sales by country through 2050.

By 2030 Norway, Denmark, Iceland, Ireland, Israel, Scotland, Singapore, Slovenia, Sweden, and the Netherlands will require EVs to account for 100 percent of new car sales. In 2020 EV sales in Norway as a percent of new vehicle sales reached 74 percent. By 2040 virtually all of Europe,

[2] Pew Research, Today's electric vehicle market: Slow growth in U.S., faster in China, Europe, 2021, retrieved from : https://www.pewresearch.org/fact-tank/2021/06/07/todays-electric-vehicle-market-slow-growth-in-u-s-faster-in-china-europe/

[3] Plug-in electric vehicles require an average of 22 pounds of lithium per vehicle
[4] Business Wire, 2021, retrieved from: https://www.businesswire.com/news/home/20210611005364/en/Global-Electric-Vehicle-Market-2021-to-2030---Rising-Demand-for-Electric-Vehicles-in-the-Automotive-and-Transportation-Sectors-Presents-Opportunities---ResearchAndMarkets.com

China, Japan, and the UK will require 100 percent of new car sales to be EVs. China, United States, Europe, and Japan account for over 70 percent of new vehicle sales.

Table 2.1

	U.S. Annual Electric Vehicle Sales Forecast[5]			
Year	U.S. Annual EV Sales	U.S. EV Share of Sales	Total EV in Operation	Tons of Lithium
2021	526,004	3.39%	2,208,526	5,786
2022	845,050	5.37%	2,996,214	9,296
2023	1,154,210	7.21%	4,049,088	12,696
2024	1,570,315	9.52%	5,628,398	17,273
2025	2,056,320	12.46%	7,610,208	22,620
2026	2,707,825	15.93%	10,215,528	29,786
2027	3,077,825	18.10%	13,169,775	33,856
2028	3,703,925	22.45%	16,718,035	40,743
2029	4,158,875	25.99%	20,692,846	45,748
2030	4,719,375	29.50%	25,193,540	51,913

Table 2.2 presents information about EV sales and stock in 2020. China has the largest stock of EVs while Europe leads in annual sales. With the exception of Norway and California, in most countries EVs account for less than 2.0 percent of 2020 total vehicles on the road. However, the rate of adoption (EV Market Share) is in double digits for most European countries and almost double digit market share in California. The trend is clear from both and adoption and regulation perspective, and that is EVs are making significant inroads on the existing internal combustion engine (ICE) technology.

The current U.S. administration is pushing hard to move the U.S. away from ICE technology and push the U.S. to adopt a 50 percent EV new car sales requirement by 2030. While that is significantly behind where the rest of the world is headed, it still will result in a significant shift in the structure of U.S. vehicle manufacturing. In fact, even without government mandates the U.S. EV sales are expected to grow by an annual compound rate of 35.2 percent between 2020 and 2030. This will necessitate a significant increase in both global and U.S. production of lithium to support the increase demand for EV batteries.

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[5] HIS Markit/Auto Manufacturers Alliance, retrieved from: EV Sales Forecasts – EVAdoption
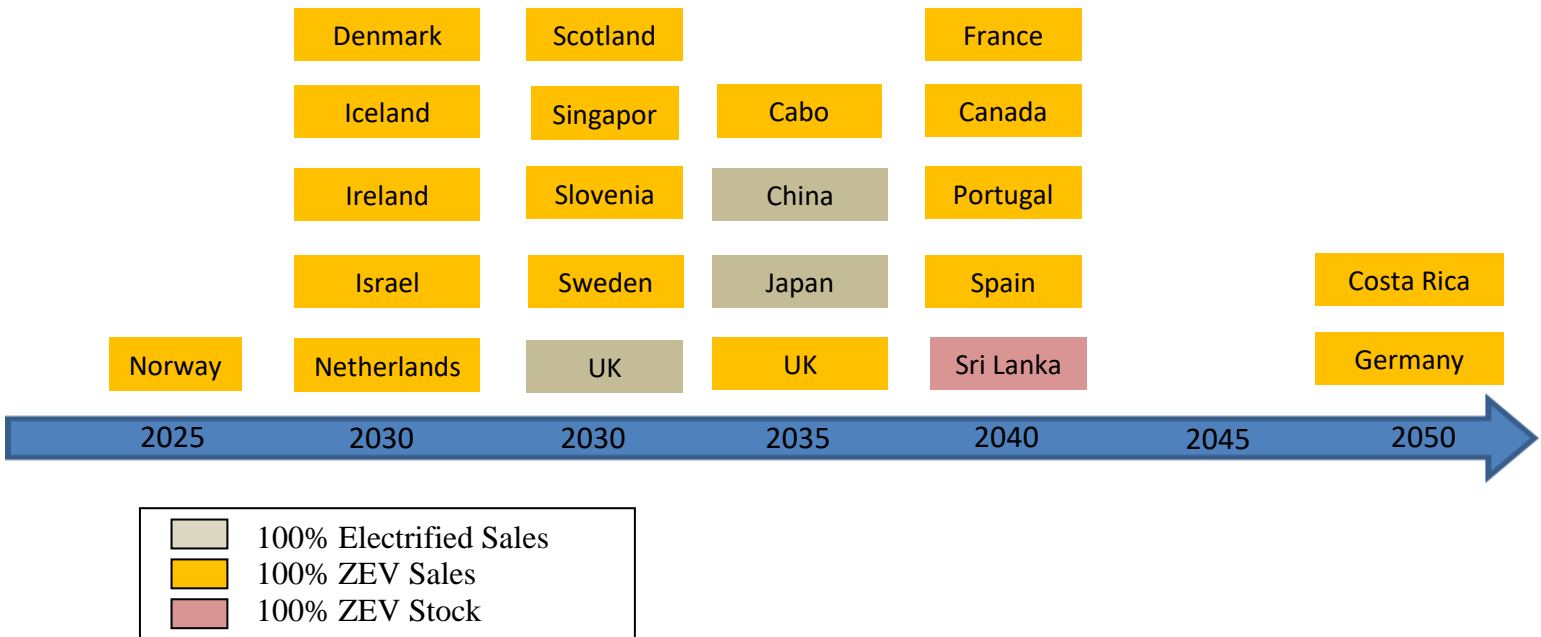
Figure 2.1[6]

	Denmark	Scotland		France		
	Iceland	Singapor	Cabo	Canada		
	Ireland	Slovenia	China	Portugal		
	Israel	Sweden	Japan	Spain		Costa Rica
Norway	Netherlands	UK	UK	Sri Lanka		Germany
2025	**2030**	**2030**	**2035**	**2040**	**2045**	**2050**

Legend:
- 100% Electrified Sales
- 100% ZEV Sales
- 100% ZEV Stock

Table 2.2

Electric Vehicle Sales by Region in 2020				
Region	**EV Stock**	**2020 Annual Sales of EV**	**EV Market Share 2020**	**Percent EV Share of Stock**
China	4,595,100	1,246,000	5.40%	1.75%
Europe	3,299,823	1,364,813	11.40%	1.00%
United States	1,741,566	297,939	2.20%	0.70%
Germany	700,000	394,632	13.50%	1.20%
California	803,816	145,099	8.10%	2.27%
Norway	480,008	113,588	74.70%	17.20%
France	470,295	194,881	11.20%	1.29%
UK	434,282	175,082	10.70%	1.38%
Netherlands	297,380	87,946	24.60%	3%
Japan	297,181	29,000	0.60%	N/A
Sweden	193,054	96,054	32.20%	4%
Canada	188,100	47,000	3.00%	0.73%
Global total	10,800,000	3,240,000	4.60%	1.00%

[6] HIS Markit, 2020, retrieved from: https://ihsmarkit.com/research-analysis/global-electric-vehicle-sales-grew-41-in-2020-more-growth-comi.html

Table 2.3 presents worldwide lithium production and known reserves by country in 2019. Total lithium mining production in 2019 was 86,000 tons. In 2019 lithium ion car battery production accounted for over two thirds of lithium production. As EV sales continue to grow over the next ten years, it is likely that lithium ion car battery usage will increase to 75 percent of lithium production.

Table 2.3

Lithium Production and Known Reserves in 2019[7]				
Region	Lithium	Percent of Total	Known Reserves	Percent of Known Reserves
Australia	42,000	48.84%	2,700,000	19.40%
Chile	18,000	20.93%	8,000,000	57.48%
China	7,500	8.72%	1,000,000	7.18%
Argentina	6,400	7.44%	2,000,000	14.37%
Zimbabwe	1,600	1.86%	70,000	0.50%
Portugal	1,200	1.40%	60,000	0.43%
Other	9,300	10.81%	89,000	0.64%
Total	86,000	100.00%	13,919,000	100.00%

In order to meet the conservative 2030 EV worldwide sales forecasts, Lithium mining production will have to grow by an annual compound rate of 19 percent per year over the next ten years. That level of annual growth will be very hard to achieve given the current level of production, the countries where mining is currently taking place, and the current know reserves of lithium.

Currently the only lithium production in the United States is from a brine operation in Nevada. Domestic production data are withheld to avoid disclosing company proprietary data. The best estimate is that the U.S. currently produces less than 5,000 tons per year.

Going forward, lithium production is likely to be the chokepoint for electric vehicle production over the next decade. As both consumer acceptance and government mandates ramp-up EV production, battery output and growth in lithium production will be the factors that determine the future of electric vehicles. If the United States does not engage in both battery production and

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[7] Wikipedia, retrieved from: https://en.wikipedia.org/wiki/List_of_countries_by_lithium_production

lithium mining growth, the country will again face a strategic constraint on its entire transportation system as we did in the 1970s during the OPEC oil restrictions.

**Section 3: Economic Structure and Growth of Gaston County: 1970-2020**

Gaston County is located on the Piedmont Crescent of North Carolina west of Charlotte and east of the North Carolina foothills.   Interstate 85, the state's most significant interstate highway, bisects the county from east to west. The county area is 364.5 square miles with a population density in 2020 of 625.4 persons per square mile. The county seat and largest city in Gaston County is Gastonia with a population of 77,700 persons in 2020. Gaston County is one of six counties that makeup the Charlotte-Gastonia-Rock Hill NC-SC MSA. Gaston County is also one of the 13 county Charlotte-Gastonia-Salisbury Combined Statistical Area (CSA) which includes the six county Charlotte MSA and seven other Micropolitan areas surrounding the Charlotte MSA. Figure 3.1 shows the counties that makeup the 13 county Charlotte-Gastonia-Salisbury CSA.

The Charlotte MSA is the 23rd largest in the United States, with a 2020 population of 2,111,641, and was the ninth fastest growing among the 50 largest MSAs between 2010 and 2020, growing by 18.6 percent. The Charlotte-Gastonia-Salisbury Combined Statistical Area (CSA) had a population of 2,822,352 in 2020. Over the past five decades, this pattern of robust population and economic growth has been a constant for the Charlotte MSA. However, while the overall growth of the MSA during the last half century has been impressive, not all of the counties within the MSA or CSA have experienced the same level of economic growth.

Mecklenburg County is the largest and second fastest growing county within the CSA. In 1970, Mecklenburg had a population of 354,656 and accounted for 31.5 percent of the total CSA population and 47.9 percent of the total MSA population. Tables 3.1, 3.2, and 3.3 present the population levels, percent growth in population, and percent of total CSA population over the past 50 years. All of the MSA counties except Anson and Gaston more than tripled their populations during the 50-year period. Of the Micropolitan counties, only Iredell, Lincoln, and Lancaster doubled their populations during the same 50-year period while the four other micropolitan counties did not.

Figure 3.1

**Charlotte-Gastonia-Salisbury
Combined Statistical Area**
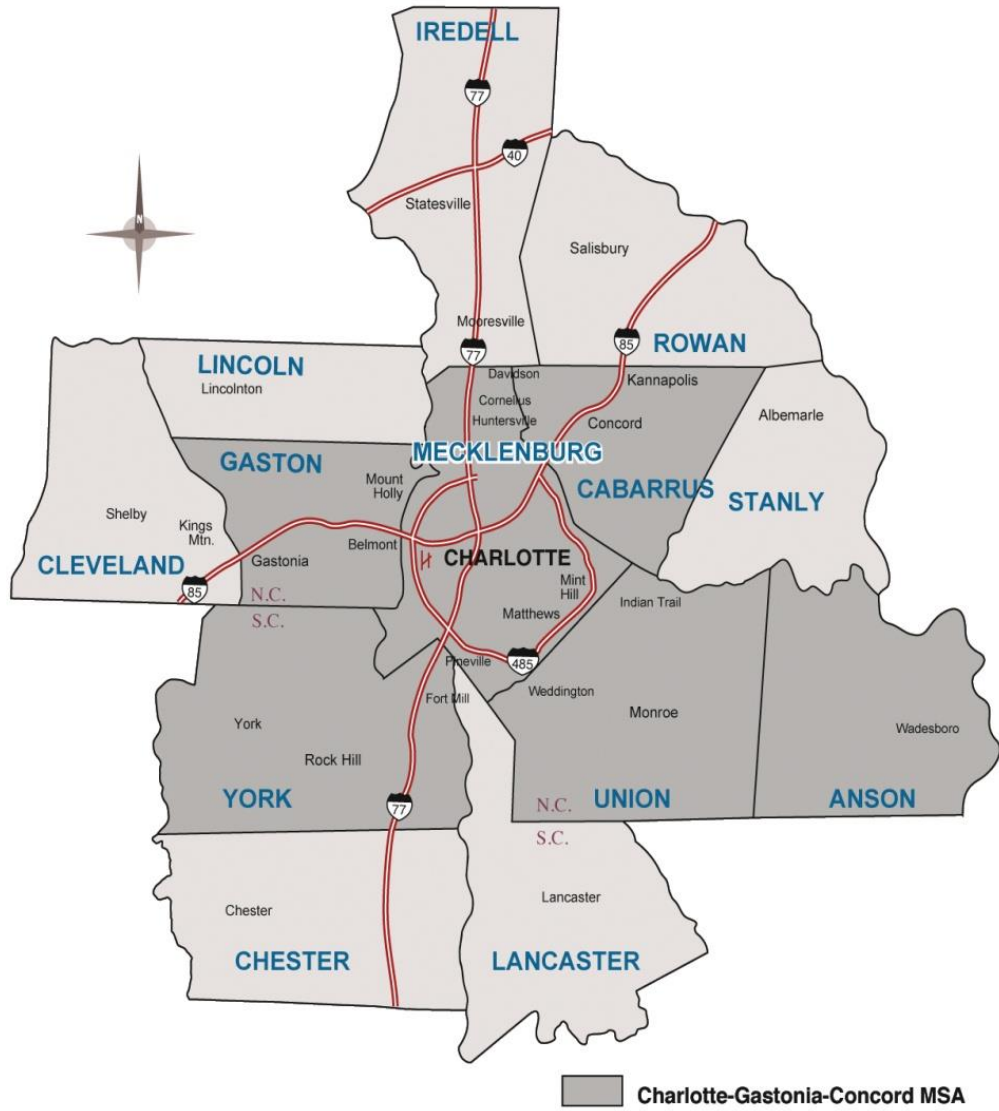
In 1970 Gaston County was the second largest county in both the MSA and CSA with 20.0 percent of the MSA population. By 2020 Mecklenburg's population increased to 1,115,482 and the MSA's largest county had 52.8 percent of the population. Meanwhile, Gaston County's population decreased from 20.0 to 10.8 percent of the MSA ranking fourth behind York County, South Carolina and Union County.

In 2000 Mecklenburg County reached 52 percent of total MSA population and has been constant over the past two decades. Mecklenburg's share of total MSA population will likely decline as the overflow population growth spills over to the adjacent counties in the MSA. This pattern of population spillover is consistent with older MSAs that reached these population levels decades ago. Both Union and York Counties are already experiencing that spillover. Table 3.3 presents the population growth rates for the counties within the Charlotte CSA and MSA over the past five decades.

Table 3.1

Total Population 1970-2020*						
County	**1970**	**1980**	**1990**	**2000**	**2010**	**2020**
Cabarrus	74,629	85,895	98,935	131,043	178,014	225,804
Gaston	148,415	162,568	174,769	190,445	206,086	227,943
Anson	23,488	25,649	23,474	25,268	26,948	22,055
Mecklenburg	354,656	404,270	511,211	695,348	919,625	1,115,482
Union	54,714	70,436	84,210	123,834	201,292	238,267
York (SC)	85,216	106,720	131,497	164,614	234,635	282,090
MSA	**741,118**	**855,538**	**1,024,096**	**1,330,552**	**1,766,600**	**2,111,641**
Chester (SC)	29,811	30,148	32,170	34,068	33,140	32,294
Cleveland	72,556	83,435	84,714	96,287	98,078	99,519
Iredell	72,197	82,538	92,931	122,660	159,437	186,693
Lancaster (SC)	43,328	53,361	54,516	61,351	76,652	96,016
Lincoln	32,682	42,372	50,319	63,780	78,265	86,810
Stanly	42,822	45,517	51,765	58,100	60,585	62,504
Rowan	90,035	99,186	110,605	130,364	138,446	146,875
CSA	**1,124,549**	**1,292,095**	**1,501,116**	**1,897,162**	**2,411,203**	**2,822,352**

* U.S. Census Bureau

Table 3.2

MSA Counties Percent of Total Population 1970-2020						
County	**1970**	**1980**	**1990**	**2000**	**2010**	**2020**
Cabarrus	10.07%	10.04%	9.66%	9.85%	10.08%	10.69%
Gaston	20.03%	19.00%	17.07%	14.31%	11.67%	10.79%
Anson	3.17%	3.00%	2.29%	1.90%	1.53%	1.04%
Mecklenburg	47.85%	47.25%	49.92%	52.26%	52.06%	52.83%
Union	7.38%	8.23%	8.22%	9.31%	11.39%	11.28%
York (SC)	11.50%	12.47%	12.84%	12.37%	13.28%	13.36%

Between 2010 and 2020 Cabarrus County had the largest population growth rate followed by York County, Mecklenburg County, and then Union County. Over the five decade period, only Union County had a faster population growth rate than Mecklenburg County. The second slowest growing county over the 50 year period and for each 10 year interval was Anson County with Gaston County a very close second. Gaston County's population increased by only 53.6 percent over the 50 year period compared to the overall MSA grow rate of 184.9 percent. In fact, only Gaston and Anson County's population growth was less than the MSA or CSA average.

Table 3.3

Total Population Change 1980-2020						
County	**1970-80**	**1980-90**	**1990-00**	**2000-10**	**2010-20**	**1970-2020**
Cabarrus	15.10%	15.18%	32.45%	35.84%	26.85%	202.57%
Gaston	9.54%	7.51%	8.97%	8.21%	10.61%	53.58%
Anson	9.20%	-8.48%	7.64%	6.65%	-18.16%	-6.10%
Mecklenburg	13.99%	26.45%	36.02%	32.25%	21.30%	214.53%
Union	28.73%	19.56%	47.05%	62.55%	18.37%	335.48%
York (SC)	25.23%	23.22%	25.18%	42.54%	20.23%	231.03%
MSA	**15.44%**	**19.70%**	**29.92%**	**32.77%**	**19.53%**	**184.93%**
Chester (SC)	1.13%	6.71%	5.90%	-2.72%	-2.55%	8.33%
Cleveland	14.99%	1.53%	13.66%	1.86%	1.47%	37.16%
Iredell	14.32%	12.59%	31.99%	29.98%	17.10%	158.59%
Lancaster (SC)	23.16%	2.16%	12.54%	24.94%	25.26%	121.60%
Lincoln	29.65%	18.76%	26.75%	22.71%	10.92%	165.62%
Stanly	6.29%	13.73%	12.24%	4.28%	3.17%	45.96%
Rowan	10.16%	11.51%	17.86%	6.20%	6.09%	63.13%
CSA	**14.90%**	**16.18%**	**26.38%**	**27.10%**	**17.05%**	**150.98%**

The MSA employment picture looks similar to the population picture. Table 3.4 presents employment levels for the MSA and the CSA from 1980 to 2020. The information in Table 3.4 is based on U.S. Census Bureau County Business Patterns data. Over the 40 year period, Mecklenburg County has the largest level of employment. In 1980 Gaston County had the second largest level of employment and ranked well ahead of the other four MSA counties and all the CSA counties. By 2010 the employment level in Gaston County was actually lower than in 1980. However, between 2010 and 2020 Gaston County employment recovered to just exceed its 1980 level. By 2020, Gaston County slipped from number two in MSA employment to number four in total employment behind Mecklenburg County, York County, and Cabarrus County.

Table 3.4

Total County Employment 1980-2020					
County	**1980**	**1990**	**2000**	**2010**	**2020**
Cabarrus	35,324	35,191	52,821	55,864	73,986
Gaston	67,413	72,861	70,768	57,599	70,138
Anson	6,542	7,404	6,219	4,243	6,874
Mecklenburg	238,593	366,224	498,694	502,944	692,033
Union	20,323	30,003	39,205	42,518	62,819
York (SC)	30,322	40,703	55,687	64,216	96,903
MSA	**398,517**	**552,386**	**723,394**	**727,384**	**1,002,753**
Chester (SC)	11,063	10,595	10,087	6,116	9,517
Cleveland	27,824	34,514	33,294	27,544	34,312
Iredell	29,963	38,291	49,522	56,377	74,527
Lancaster (SC)	16,600	15,440	17,193	13,009	25,305
Lincoln	10,961	14,949	20,576	16,368	24,053
Stanly	16,759	18,094	19,060	15,317	18,458
Rowan	29,534	36,084	47,602	38,896	46,226
CSA	**541,221**	**720,353**	**920,728**	**901,011**	**1,235,151**

* U.S. Census Bureau: County Business Patterns

Table 3.5 presents the percent of total CSA employment for each of the thirteen counties within the Charlotte CSA. Mecklenburg County is the clear leader in percent of total CSA employment. In 1980 Mecklenburg accounted for 44.1 percent of total CSA employment, and by 2020 it accounted for 56.0 percent. The obvious outlier is Gaston County. In 1980 Gaston County

provided 12.5 percent of total CSA employment and was behind only Mecklenburg. By 2020 Gaston County accounted for only 5.7 percent of total CSA employment and had dropped to fifth in total CSA employment behind Mecklenburg County, York County, Iredell County, and Cabarrus County

Table 3.6 presents the total employment growth within the CSA over the past four decades. Overall, the CSA has increased its total employment level by 128.2 percent in 40 years. Four of the thirteen counties have exceeded the overall CSA average. York County has seen its total employment level increase by 219.6 percent, followed by Union County with a 209.1 percent, Mecklenburg County with 190.1 percent, and Iredell County with 148.7 percent increase. Chester County is the only county of the thirteen CSA counties that experience an employment decline over the 40 year period. Gaston and Anson Counties are the only counties in the CSA where the employment level during the past 48 years has only achieved single digit growth.

.   **Table 3.5**

Total County Employment 1980-2020					
County	**1980**	**1990**	**2000**	**2010**	**2020**
Cabarrus	6.53%	4.89%	5.74%	6.20%	5.99%
Gaston	12.46%	10.11%	7.69%	6.39%	5.68%
Anson	1.21%	1.03%	0.68%	0.47%	0.56%
Mecklenburg	44.08%	50.84%	54.16%	55.82%	56.03%
Union	3.76%	4.17%	4.26%	4.72%	5.09%
York	5.60%	5.65%	6.05%	7.13%	7.85%
MSA	73.63%	76.68%	78.57%	80.73%	81.18%
Chester (SC)	2.04%	1.47%	1.10%	0.68%	0.77%
Cleveland	5.14%	4.79%	3.62%	3.06%	2.78%
Iredell	5.54%	5.32%	5.38%	6.26%	6.03%
Lancaster (SC)	3.07%	2.14%	1.87%	1.44%	2.05%
Lincoln	2.03%	2.08%	2.23%	1.82%	1.95%
Stanly	3.10%	2.51%	2.07%	1.70%	1.49%
Rowan	5.46%	5.01%	5.17%	4.32%	3.74%

Table 3.6

	Total Employment Growth 1980-2020				
County	**1980-90**	**1990-00**	**2000-10**	**2010-20**	**1980-2020**
Cabarrus	-0.40%	50.10%	5.80%	32.44%	109.45%
Gaston	8.10%	-2.90%	-18.60%	21.77%	4.04%
Anson	13.20%	-16.00%	-31.80%	62.01%	5.07%
Mecklenburg	53.50%	36.20%	0.90%	37.60%	190.05%
Union	47.60%	30.70%	8.50%	47.75%	209.10%
York	34.20%	36.80%	15.30%	50.90%	219.58%
MSA	**38.60%**	**31.00%**	**0.60%**	**37.86%**	**151.62%**
Chester (SC)	-4.20%	-4.80%	-39.40%	55.61%	-13.97%
Cleveland	24.00%	-3.50%	-17.30%	24.57%	23.32%
Iredell	27.80%	29.30%	13.80%	32.19%	148.73%
Lancaster (SC)	-7.00%	11.40%	-24.30%	94.52%	52.44%
Lincoln	36.40%	37.60%	-20.50%	46.95%	119.44%
Stanly	8.00%	5.30%	-19.60%	20.51%	10.14%
Rowan	22.20%	31.90%	-18.30%	18.85%	56.52%
CSA	**33.10%**	**27.80%**	**-2.10%**	**37.09%**	**128.22%**

Table 3.7 presents the employment to population ratio for all 13 counties within the Charlotte CSA. Overall, the CSA has an employment population ratio of 43.7 percent. Mecklenburg County is at the top of the list at 62.0 percent. This indicates that Mecklenburg County is a daily in-migration county. In fact, Only Mecklenburg County has a higher employment to population ratio that the CSA average. The rest of the CSA counties are experience daily out-migration as residents go to jobs in other counties. Gaston County has the second lowest employment to population ratio of the six MSA counties indicating significant daily out-migration of residents for employment reasons.

There are two primary and related causes for Gaston County's meager population growth and employment growth during the past four decades. The first is the historic economic structure of the county that resulted from the rapid relocation of the U.S. textile industry from New England to the Carolina Piedmont during the latter part of the 19th century. The second, which is related because it led to the relocation of the textile industry, is the presence of water power and later hydroelectric power in the western Piedmont region of the Carolinas. The Catawba River basin provided this resource but also has been a geographic barrier to both Gaston and Lincoln

Counties during the second half of the 20th century and has blocked Gaston County's ability to take advantage of its proximity to one of the fastest growing counties in the U.S

Table 3.7

Employment to Population Ratio 1980-2020					
County	**1980**	**1990**	**2000**	**2010**	**2020**
Cabarrus	41.12%	40.97%	53.39%	42.63%	41.56%
Gaston	41.47%	41.69%	37.16%	27.95%	30.77%
Anson	25.51%	31.54%	24.61%	15.75%	31.17%
Mecklenburg	59.02%	71.64%	71.72%	54.69%	62.04%
Union	28.85%	35.63%	31.66%	21.12%	26.36%
York	28.41%	30.95%	33.83%	27.37%	34.35%
MSA	**46.58%**	**53.94%**	**54.37%**	**41.17%**	**47.49%**
Chester (SC)	36.70%	32.93%	29.61%	18.46%	29.47%
Cleveland	33.35%	40.74%	34.58%	28.08%	34.48%
Iredell	36.30%	41.20%	40.37%	35.36%	39.92%
Lancaster (SC)	31.11%	28.32%	28.02%	16.97%	26.35%
Lincoln	25.87%	29.71%	32.26%	20.91%	27.71%
Stanly	36.82%	34.95%	32.81%	25.28%	29.53%
Rowan	29.78%	32.62%	36.51%	28.09%	31.47%
CSA	**41.89%**	**47.99%**	**48.53%**	**37.37%**	**43.76%**

Gaston County is located just west of Mecklenburg County in the southern Piedmont of North Carolina. It is the 74th largest in land area of the 100 North Carolina counties. It contains 364.5 square miles and ranks 9th (2020) in county population. Gaston County became a county in 1846 and during most of its growth and development remained independent from Charlotte and the concept of an MSA.

The county's economic development history begins in the latter part of the 19th century as the textile industry began to move south from New England to the Carolina Piedmont. Manufacturers originally moved to the Carolinas due to the proximity of raw materials, abundant water power of the Piedmont's rivers, and inexpensive labor. By the early 20th century, the Piedmont of North Carolina was the textile capital of the U.S. Hydroelectric mills began replacing water powered mills during this time, but the Piedmont's river structure still remained the important resource for the expanding textile cluster. Over the next 60 years, Gaston County,

along with a number of other Piedmont counties, benefited from the economic opportunities that the textile industry provided.

In the 1980s the counties that benefited from the growth of the textile industry experienced a negative economic structural change. North Carolina had 835,585 workers employed by manufacturing firms in 1980 which accounted for 42.4 percent of total North Carolina employment. Of that, 244,535 jobs were in textile mills. North Carolina accounted for 28.7 percent of total U.S. employment in the textile industry. By 1990 manufacturing employment in North Carolina was still growing but accounted for only 32.3 percent of total state employment. Textile employment had declined to 206,324 by 1990, a loss of over 38,000 jobs. In 2000 manufacturing employment in North Carolina fell to 731,399, a loss of 135,000 jobs in ten years, and accounted for 21.6 percent of total state employment. Textile employment fell to 116,262, a loss of over 80,000 jobs in ten years.

By 2020 the picture was even worse. Manufacturing employment in North Carolina was 423,000, a loss of 300,000 jobs since 2000. In 2020 manufacturing accounted for just 9.7 percent of total North Carolina employment.

Section 4: Economic Impact Methodology

The most important measures of the economic impact of an industry are output and jobs. To assess the total economic impact accurately, the first piece of information estimated is *direct* output. If this is not available, either *direct* earnings or *direct* jobs can be used. The term *direct* refers to the dollar output or employment associated with the operation of the firm, activity, or industry being evaluated. For this impact study, the term *direct* is most closely associated with the total output that the proposed facility produces at the Gaston County, North Carolina Piedmont Carolina Lithium facility.

The multiplier concept then captures the *total* effect of the economic activity on output and employment in the overall economy. For instance, a job multiplier value of 2.1 means that for each job in a particular industry an additional 1.1 jobs are generated in other parts of the

economy (the *total* benefit to the economy being 2.1 jobs). Therefore, a new facility that creates 100 new jobs in an industry would, using the multiplier, translate into a subsequent employment gain of 110 jobs in other sectors, for a *total* employment gain of 210 jobs (100 x 2.1). IMPLAN provides the basic multiplier methodology used in this study. IMPLAN is a multiplier methodology originally developed by the United States Government and currently maintained by the IMPLAN located in Huntersville, North Carolina.. For this study, output, employment, and labor income multipliers for the following IMPLAN sectors have been used: 53 (Construction of new manufacturing structures), 33 (Potash, soda, and borate mineral mining), and 162 (Industrial gas manufacturing).

This study uses the IMPLAN multipliers for the Gaston County, North Carolina to obtain multipliers for dollar output, employment, and labor income. This IMPLAN methodology provides multipliers all detailed three and four-digit NAICS industries within the region. In addition, for all industries within a region the IMPLAN methodology provides industry-specific *indirect* multipliers.

The IMPLAN multipliers can be applied to *direct* output and employment information to estimate the *total* impact of an industry on a region's economy. In addition, IMPLAN provides a comprehensive set of disaggregated multipliers that can estimate the *indirect* and *induced* impacts separately from the *total* impact at the regional level.

The *indirect* impacts measure the additional business and jobs created in industries that are supported by the *direct* economic activity of the proposed facility. This *indirect* effect focus on what is generally referred to as the supply chain of a firm or organization. The *induced* impacts measure the additional business and jobs created within the region that are supported by the incomes of persons employed by the proposed facility and by the facility's supply chain industries.

Table 4.1 presents the Gaston County output multipliers used to estimate the impact of the on-going on-site revenue generated by the proposed new facility. The proposed integrated facility has two NAICS codes. The quarrying and concentration operations are classified under NAICS

Code 212393, Lithium mineral mining and/or beneficiating and the refining operation under NAICS Code 325180 Lithium compounds, not specified elsewhere by process, manufacturing. The NAICS Code most closely matches IMPLAN industry Codes 33 Potash, soda, and borate mineral mining and 162 Industrial gas manufacturing. For each direct dollar of output in the Potash, soda, and borate mineral mining industry (IMPLAN code 33), the total output impact is $1.27.

Table 4.2 presents the employment multipliers used to estimate the jobs impact of the proposed facility, the jobs impact of the construction phase of the facility, and the jobs impact off-site activities associated with visitors to the proposed facility. The multipliers listed in Table 4.2 show the number of jobs created for each direct job within each industry. For each direct job in the Potash, soda, and borate mineral mining industry (IMPLAN code 33), the total employment impact is 2.39 jobs created.

Table 4.3 presents an alternative set of employment multipliers used to estimate the jobs impact of the proposed facility, the jobs impact of the construction phase of the facility, and the jobs impact off-site activities associated with visitors to the proposed facility. These multipliers are based on the number of jobs created in and by an industry, based on output in 2016 and adjusted for inflation to 2022. For example, in the Construction of new manufacturing structures industry (IMPLAN Code 53) for each $1,000,000 of direct output 8.48 direct jobs are created, along with 0.46 indirect jobs, and 1.91 induced jobs for a total of 10.85 jobs per $1,000,000 in direct output.

Table 4.1

Output Multipliers for Gaston County					
Industry Code	Description	Direct Effects	Indirect Effects	Induced Effects	Total
33	Potash, soda, and borate mineral mining	1.000000	0.167886	0.103870	1.271756
162	Industrial gas manufacturing	1.000000	0.202555	0.100660	1.303215

Industry Code	Description	Direct Effects	Indirect Effects	Induced Effects	Total
53	Construction of new manufacturing structures	1.000000	0.078225	0.254561	1.332786

Table 4.2

	Employment Multipliers for Gaston County				
Industry Code	**Description**	**Direct Effects**	**Indirect Effects**	**Induced Effects**	**Total**
33	Potash, soda, and borate mineral mining	1.000000	0.700588	0.685455	2.386043
162	Industrial gas manufacturing	1.000000	0.753333	0.882267	2.635601

Industry Code	**Description**	**Direct Effects**	**Indirect Effects**	**Induced Effects**	**Total**
53	Construction of new manufacturing structures	1.000000	0.054286	0.225261	1.279547

Table 4.3

	Employment Multipliers for Gaston County (Jobs per $1,000,000 in Output) Adjusted for 2022				
Industry Code	**Description**	**Direct Effects**	**Indirect Effects**	**Induced Effects**	**Total**
33	Potash, soda, and borate mineral mining	1.136440	0.796176	0.778979	2.711594
162	Industrial gas manufacturing	0.855739	0.644657	0.754991	2.255387

Industry Code	**Description**	**Direct Effects**	**Indirect Effects**	**Induced Effects**	**Total**
53	Construction of new manufacturing structures	8.475781	0.460119	1.909265	10.845165

Table 4.4 presents the IMPLAN labor income multipliers for the Gaston County.

Table 4.4

	Labor Income Multipliers for Gaston County				
Industry Code	**Description**	**Direct Effects**	**Indirect Effects**	**Induced Effects**	**Total**
33	Potash, soda, and borate mineral mining	0.150066	0.039897	0.032151	0.222115
162	Industrial gas manufacturing	0.148000	0.036117	0.031152	0.215268

Industry Code	**Description**	**Direct Effects**	**Indirect Effects**	**Induced Effects**	**Total**
53	Construction of new manufacturing structures	0.441196	0.024407	0.078784	0.544387

Section 5 Economic Impact of the Proposed Piedmont Carolina Lithium Project

Table 5.1A presents the projected economic impact of the mining component of the proposed Piedmont Carolina Lithium project over the first five years of operation. All the dollar values are expressed in 2022 constant dollars. The facility ramps-up operations over a five-year period beginning in 2023. In 2023 the direct output of the mining component of the project is

estimated to be $6,401,995. The total output impact in 2023 (including supplier chain impacts and induced impacts) is estimated at $8,141,774. By year 2027, the direct output impact of the mining component is estimate to be $90,791,250.   The total output impact in 2027 (including supplier chain impacts and induced impacts) is estimated at $115,464,298 in 2022 constant dollars.

Table 5.1A

	Mining Operation Output Impact			
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2022				
2023	$6,401,995	$1,074,806	$664,973	$8,141,774
2024	$90,791,250	$15,242,593	$9,430,455	$115,464,298
2025	$90,791,250	$15,242,593	$9,430,455	$115,464,298
2026	$90,791,199	$15,242,585	$9,430,449	$115,464,233
2027	$90,791,250	$15,242,593	$9,430,455	$115,464,298

Table 5.1B presents the projected economic impact of the aggregation component of the proposed Piedmont Carolina Lithium project over the first four years of operation. All the dollar values are expressed in 2022 constant dollars. The facility ramps-up operations over a four-year period beginning in 2024.   In 2024 the direct output of the aggregation component of the project is estimated to be $97,469,713. The total output impact in 2024 (including supplier chain impacts and induced impacts) is estimated at $123,957,672. By year 2027, the direct output impact of the aggregation component is estimate to be $149,555,891.   The total output impact in 2027 (including supplier chain impacts and induced impacts) is estimated at $190,198,570.

Table 5.1B

	Aggregation Operation Output Impact			
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2022				
2023				
2024	$97,469,713	$16,363,815	$10,124,144	$123,957,672
2025	$187,645,556	$31,503,089	$19,490,677	$238,639,322
2026	$198,027,760	$33,246,118	$20,569,073	$251,842,951
2027	$149,555,891	$25,108,362	$15,534,317	$190,198,570

Table 5.1C presents the projected economic impact of the refining component of the proposed Piedmont Carolina Lithium project over the first four years of operation. All the dollar values

are expressed in 2022 constant dollars. The facility ramps-up operations over a four-year period

beginning in 2024.   In 2024 the direct output of the refining component of the project is

estimated to be $183,556,140. The total output impact in 2024 (including supplier chain impacts

and induced impacts) is estimated at $239,213,049. By year 2027, the direct output impact of the

refining component is estimate to be $293,260,644.   The total output impact in 2027 (including

supplier chain impacts and induced impacts) is estimated at $382,181,565.

Table 5.1C

Refining Operation Output Impact			
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2022				
2023				
2024	$183,556,140	$37,180,197	$18,476,712	$239,213,049
2025	$326,346,000	$66,102,984	$32,849,901	$425,298,885
2026	$293,260,644	$59,401,382	$29,519,538	$382,181,565
2027	$293,260,644	$59,401,382	$29,519,538	$382,181,565

Table 5.1D presents the projected total economic impact of all three components of the proposed

Piedmont Carolina Lithium project over the first five years of operation. All the dollar values

are expressed in 2022 constant dollars. The facility ramps-up operations over a five-year period

beginning in 2023.   In 2023 the direct output of all three components of the project is estimated

to be $6,401,995. The total output impact in 2023 (including supplier chain impacts and induced

impacts) is estimated at $8,141,774. By year 2027, the direct output impact of all three

components is estimate to be $533,607,785.   The total output impact in 2027 (including supplier

chain impacts and induced impacts) is estimated at $687,844,432.

Table 5.1D

Total Piedmont Lithium Project Output Impact			
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2022				
2023	$6,401,995	$1,074,806	$664,973	$8,141,774
2024	$371,817,103	$68,786,604	$38,031,311	$478,635,018
2025	$604,782,806	$112,848,666	$61,771,033	$779,402,505
2026	$582,079,603	$107,890,085	$59,519,060	$749,488,748
2027	$533,607,785	$99,752,338	$54,484,310	$687,844,432

Table 5.2A presents the projected employment impact of the mining component of the proposed Piedmont Carolina Lithium project over the first five years of operation. The facility ramps-up operations over a five-year period beginning in 2023. In 2023 the direct employment of the mining component of the project is estimated to be 140 jobs. The total employment impact in 2023 (including supplier chain impacts and induced impacts) is estimated at 334 jobs. By year 2027, the direct employment impact of the mining component is estimate to be 177 jobs. The total employment impact in 2027 (including supplier chain impacts and induced impacts) is estimated at 422 jobs.

Table 5.2B presents the projected employment impact of the aggregation component of the proposed Piedmont Carolina Lithium project over the first four years of operation. The facility ramps-up operations over a four-year period beginning in 2024. In 2024 the direct employment of the aggregation component of the project is estimated to be 131 jobs. The total employment impact in 2024 (including supplier chain impacts and induced impacts) is estimated at 313 jobs. By year 2027, the direct employment of the aggregation component is estimate to be 131 jobs. The total output impact in 2027 (including supplier chain impacts and induced impacts) is estimated at 313 jobs.

Table 5.2A

Mining Operation Employment Impact				
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2022				
2023	140	98	96	334
2024	177	124	121	422
2025	177	124	121	422
2026	177	124	121	422
2027	177	124	121	422

Table 5.2C presents the projected employment impact of the refining component of the proposed Piedmont Carolina Lithium project over the first four years of operation. The facility ramps-up operations over a four-year period beginning in 2024. In 2024 the direct output of the refining component of the project is estimated to be 120 jobs. The total employment impact in 2024 (including supplier chain impacts and induced impacts) is estimated at 316 jobs. By year 2027,

the direct output impact of the refining component is estimate to be 120 jobs.   The total output impact in 2027 (including supplier chain impacts and induced impacts) is estimated at 316 jobs.

Table 5.2B

Year	Direct Effects	Indirect Effects	Induced Effects	Total
Aggregation Operation Employment Impact				
2022				
2023				
2024	131	92	90	313
2025	131	92	90	313
2026	131	92	90	313
2027	131	92	90	313

Table 5.2D presents the projected total employment impact of the three components of the proposed Piedmont Carolina Lithium project over the first five years of operation. The facility ramps-up operations over a five-year period beginning in 2023.   In 2023 the direct employment of all three component of the project is estimated to be 140 jobs. The total employment impact in 2023 (including supplier chain impacts and induced impacts) is estimated at 334 jobs. By year 2027, the direct employment impact of all three components of the project is estimate to be 428 jobs.   The total employment impact in 2027 (including supplier chain impacts and induced impacts) is estimated at 1,051 jobs.

Table 5.2C

Year	Direct Effects	Indirect Effects	Induced Effects	Total
Refining Operation Employment Impact				
2022				
2023				
2024	120	90	106	316
2025	120	90	106	316
2026	120	90	106	316
2027	120	90	106	316

Table 5.2D

Total Piedmont Lithium Project Employment Impact				
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2022				
2023	140	98	96	334
2024	428	306	317	1,051
2025	428	306	317	1,051
2026	428	306	317	1,051
2027	428	306	317	1,051

Table 5.3 presents the projected total employee compensation impact of all three components of the proposed Piedmont Carolina Lithium project over the first five years of operation. All the dollar values are expressed in 2022 constant dollars. The facility ramps-up operations over a five-year period beginning in 2023. In 2023 the direct employee compensation of all three components of the project is estimated to be $9,240,376. The total employee compensation impact in 2023 (including supplier chain impacts and induced impacts) is estimated at $13,676,784. By year 2027, the direct employee compensation impact of all three components is estimate to be $35,173,549. The total employee compensation impact in 2027 (including supplier chain impacts and induced impacts) is estimated at $51,812,053.

Table 5.3

Total Piedmont Lithium Project Employee Compensation Impact				
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2021				
2022				
2023	9,240,376	2,456,685	1,979,723	13,676,784
2024	28,157,814	7,274,009	5,996,161	41,427,984
2025	35,373,198	9,192,322	7,542,036	52,107,556
2026	35,143,090	9,131,144	7,492,736	51,766,970
2027	35,173,549	9,139,242	7,499,262	51,812,053

Tables 5.4 and 5.5 present the output and employment spinoff impacts by industry based on the operation of the proposed Piedmont Carolina Lithium project over the first five years of operation. The total output and employment impact for all industries (last row in both tables) is the same as presented in Tables 5.1D and 5.2D. The industries in each table are ranked by

supplier chain (indirect) impact in 2027. The industry with the most impacted output increase resulting from the on-going operations of the new proposed facility is electric power transmission and distribution with $30,202,978 in new supplier chain revenue in constant 2022 dollars. The industry with the most impacted employment increase resulting from the on-going operations of the new proposed facility is maintenance and repair construction of nonresidential structures with 65 new supplier chain jobs.

Table 5.4

Sector	Description	Indirect	Induced	Total
	Piedmont Lithium Project Top 15 Supplier Chain Industries by Output			
49	Electric power transmission and distribution	30,202,978	1,185,377	31,388,355
43	Electric power generation - Nuclear	17,763,959	697,183	18,461,141
62	Maintenance and repair construction of nonresidential structures	9,736,382	257,657	9,994,039
395	Wholesale trade	4,379,369	1,162,572	5,541,941
471	Waste management and remediation services	3,429,970	245,747	3,675,717
438	Insurance agencies, brokerages, and related activities	3,228,060	300,620	3,528,680
445	Commercial and industrial machinery and equipment rental and leasing	2,606,166	69,452	2,675,618
50	Natural gas distribution	2,449,664	55,767	2,505,431
461	Management of companies and enterprises	2,345,413	69,560	2,414,973
446	Lessors of nonfinancial intangible assets	2,176,634	131,737	2,308,371
433	Monetary authorities and depository credit intermediation	1,822,062	1,338,878	3,160,940
411	Truck transportation	1,763,577	337,897	2,101,474
468	Services to buildings	1,359,789	384,102	1,743,891
448	Accounting, tax preparation, bookkeeping, and payroll services	1,118,672	181,298	1,299,971
440	Real estate	1,084,082	3,831,451	4,915,533
	Other	14,285,560	44,235,013	592,128,358
	Total	99,752,338	54,484,310	687,844,432

Table 5.5

Sector	Description	Indirect	Induced	Total
	Piedmont Lithium Project Top 15 Supplier Chain Industries by Employment			
62	Maintenance and repair construction of nonresidential structures	65	1	67
468	Services to buildings	27	8	35
438	Insurance agencies, brokerages, and related activities	20	2	22
448	Accounting, tax preparation, bookkeeping, and payroll services	16	2	17
395	Wholesale trade	13	4	16
49	Electric power transmission and distribution	12	1	12
43	Electric power generation - Nuclear	10	0	11
471	Waste management and remediation services	9	1	10
20	Extraction of natural gas and crude petroleum	9	0	9
464	Employment services	8	6	14
461	Management of companies and enterprises	7	0	8
449	Architectural, engineering, and related services	7	0	7
445	Commercial and industrial machinery and equipment rental and leasing	7	0	7
469	Landscape and horticultural services	7	4	11
411	Truck transportation	7	1	8
	Other	84	286	798
	Total	306	317	1,051

Tables 5.6 and 5.7 present the top 15 induced industries impacted by the proposed Lithium mining operation in Gaston County. The induced economic impact is unrelated to the operation of the mine and the indirect supplier industries. The induced impact results from the additional local income generated by the mining operations and the supplier chain operations. The top induced industries by output are Owner-occupied dwellings at $9,887,087 in additional revenue per year, Hospitals at $4,488,398 in additional revenue per year, and Real estate at $3,831,451 in additional revenue per year. The top induced industries by jobs are Limited-service restaurants with 25 additional jobs, Hospitals with 20 additional jobs, and Full-service restaurants with 20 additional jobs.

Table 5.6

Sector	Description	Indirect	Induced	Total
441	Owner-occupied dwellings	$0	$9,887,087	$9,887,087
482	Hospitals	$0	$4,488,398	$4,488,398
440	Real estate	$1,084,082	$3,831,451	$4,915,533
475	Offices of physicians	$0	$2,916,775	$2,916,775
502	Limited-service restaurants	$227,791	$2,655,008	$2,882,799
405	Retail - General merchandise stores	$38,039	$1,465,028	$1,503,067
433	Monetary authorities and depository credit intermediation	$1,822,062	$1,338,878	$3,160,940
501	Full-service restaurants	$288,062	$1,311,071	$1,599,133
49	Electric power transmission and distribution	$30,202,978	$1,185,377	$31,388,355
395	Wholesale trade	$4,379,369	$1,162,572	$5,541,941
396	Retail - Motor vehicle and parts dealers	$178,195	$1,072,094	$1,250,289
483	Nursing and community care facilities	$0	$989,307	$989,307
504	Automotive repair and maintenance, except car washes	$599,397	$987,140	$1,586,536
476	Offices of dentists	$0	$894,335	$894,335
478	Outpatient care centers	$0	$872,480	$872,480
	Total	99,752,338	54,484,310	687,844,432

Piedmont Lithium Project Top 15 Induced Industries by Output (header of Table 5.6)

Table 5.7

Sector	Description	Indirect	Induced	Total
502	Limited-service restaurants	2	23	25
482	Hospitals	0	20	20
501	Full-service restaurants	4	20	24
440	Real estate	5	16	21
405	Retail - General merchandise stores	0	15	15
475	Offices of physicians	0	13	13
400	Retail - Food and beverage stores	0	10	10
483	Nursing and community care facilities	0	9	9
468	Services to buildings	27	8	35
485	Individual and family services	0	8	8
504	Automotive repair and maintenance, except car washes	3	7	10
396	Retail - Motor vehicle and parts dealers	2	7	8
464	Employment services	8	6	14
509	Personal care services	0	6	6
480	Home health care services	0	6	6
	Total	306	317	1,051

Piedmont Lithium Project Top 15 Induced Industries by Employment (header of Table 5.7)

Construction Impact: Table 6.1 presents the total construction impact by year during the six-year construction period of the facility. In 2022, the first year of construction, the direct impact on the Gaston County economy is estimated at $451,893,208. The total economic impact of construction in 2022 (including supplier chain impacts and induced impacts) is estimated at $578,218,823. Each year's construction impact is a one-time impact and does not represent a continuing annual impact like that estimates presented in section 5 that focus on the on-going annual impact of the operation of the facility. Over the six-year construction period the cumulative direct construction output is estimated to be $942,877,669. The cumulative total impact (including supplier chain impacts and induced impacts) is estimated to be $1,206,456,761.

Table 6.2 presents the annual employment impact during the seven-year construction and personal property purchase phase. In Table 6.2 the IMPLAN multipliers used to estimate the employment levels are derived from Table 4.3. These multipliers estimate the level of direct, indirect, and induced jobs per $1,000,000 in output. These multipliers are adjusted for 2022 constant dollars.

Table 6.1

Gaston Construction Impact				
Year	**Direct**	**Indirect**	**Induced**	**Total**
2022	451,893,208	24,531,603	101,794,012	578,218,823
2023	434,922,907	23,610,348	97,971,262	556,504,517
2024	2,876,908	156,177	648,056	3,681,140
2025	16,222,950	880,684	3,654,401	20,758,035
2026	17,927,678	973,227	4,038,411	22,939,316
2027	19,034,018	1,033,286	4,287,626	24,354,930
Total	942,877,669	51,185,324	212,393,768	1,206,456,761

In 2022, the peak construction year, the direct construction job impact is estimated at 199 jobs. The total impact of construction during 2022 (including supplier chain impacts and induced impacts) is estimated at 246 jobs. In 2023, the direct construction job impact is estimated at 192 jobs. The total employment impact of construction in 2022 (including supplier chain impacts and induced impacts) is estimated at 237 jobs.

Table 6.2

Gaston County Construction Employment Impact				
Year	Direct	Indirect	Induced	Total
2022	199	11	36	246
2023	192	11	34	237
2024	1	0	0	2
2025	7	0	1	9
2026	8	0	1	10
2027	8	0	1	10

Section 7: Conclusions

Table 7.1 presents the projected total economic impact of the proposed Piedmont Carolina Lithium project over the first five years of operation. All the dollar values are expressed in 2022 constant dollars. The facility ramps-up operations over a five-year period beginning in 2023. In 2023 the direct output of the project is estimated to be $6,401,995. The total output impact in 2023 (including supplier chain impacts and induced impacts) is estimated at $8,141,774. By year 2027, the direct output impact is estimate to be $533,607,785. The total output impact in 2027 (including supplier chain impacts and induced impacts) is estimated at $687,844,432.

Table 7.1

Total Piedmont Lithium Project Output Impact				
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2022				
2023	$6,401,995	$1,074,806	$664,973	$8,141,774
2024	$371,817,103	$68,786,604	$38,031,311	$478,635,018
2025	$604,782,806	$112,848,666	$61,771,033	$779,402,505
2026	$582,079,603	$107,890,085	$59,519,060	$749,488,748
2027	$533,607,785	$99,752,338	$54,484,310	$687,844,432

Table 7.2 presents the combined on-going economic impact and the construction impact by year. In 2025 the total annual impact of construction and on-going operations peaks at $800,160,540.

Table 7.2

	Total On-Going and Construction Output Impact			
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2022	$451,893,208	$24,531,603	$101,794,012	$578,218,823
2023	$441,324,902	$24,685,155	$98,636,235	$564,646,291
2024	$374,694,011	$68,942,781	$38,679,367	$482,316,159
2025	$621,005,756	$113,729,350	$65,425,434	$800,160,540
2026	$600,007,281	$108,863,312	$63,557,471	$772,428,063
2027	$552,641,803	$100,785,624	$58,771,936	$712,199,363

Table 7.3 presents the projected total economic impact of the proposed Piedmont Carolina Lithium project over the first five years of operation. The facility ramps-up operations over a five-year period beginning in 2023. In 2023 the direct employment of the project is estimated to be 140 jobs. The total employment impact in 2023 (including supplier chain impacts and induced impacts) is estimated at 334 jobs. By year 2027, the direct employment impact of the project is estimate to be 428 jobs. The total employment impact in 2027 (including supplier chain impacts and induced impacts) is estimated at 1,051 jobs.

Table 7.3

	Total Piedmont Lithium Project Employment Impact			
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2022				
2023	140	98	96	334
2024	428	306	317	1,051
2025	428	306	317	1,051
2026	428	306	317	1,051
2027	428	306	317	1,051

Table 7.4 presents the combined on-going economic employment impact and the construction employment impact by year. In 2027 the total annual employment impact of construction and on-going operations peaks at 1.062 jobs.

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Table 7.4

	Total On-Going and Construction Employment Impact			
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2022	199	11	36	246
2023	332	109	130	571
2024	429	306	317	1,053
2025	435	307	318	1,060
2026	436	307	318	1,061
2027	436	307	318	1,062

Major Findings of This Report:

Gaston County Impacts:

- In 2027, the direct output impact is estimate to be $533,607,785 in constant 2022 dollars.

- In 2027 the total output impact (including supplier chain impacts and induced impacts) is estimated at $687,844,432 in constant 2022 dollars.

- In 2027 the direct employment of the project is estimated to be 348 jobs

- In 2027 the total employment impact (including supplier chain impacts and induced impacts) is estimated at 1,051 jobs.

- In 2022, the peak construction year, the direct construction job impact is estimated at 199 jobs.

- In 2022 the total employment impact of construction (including supplier chain impacts and induced impacts) is estimated at 246 jobs.

- The cumulative construction total impact of the 2022 through 2027 construction phase is estimated to be $1,206,456,761in constant 2022 dollars.

Appendix: Sensitivity Section

The appendix section of the report looks at the economic impact of a proposed lithium mining project on the Gaston County, North Carolina economy based on the assumption that the initial estimates of annual mining activity are increased by 20 percent. This sensitivity analysis is included based on the prospect that the electric vehicle sales in the United States is likely to increase considerably over current estimates during the next decade.

Table A.1 presents the adjusted on-going annual output impacts of the lithium mining project on the Gaston, County economy for the 2023 through 2027 period. Overall, the annual impact will approach $900 million per year.

Table A.1

Total Piedmont Lithium Project Output Impact			
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2021				
2022				
2023	$7,682,394	$1,289,768	$797,968	$9,770,129
2024	$446,180,523	$82,543,925	$45,637,573	$574,362,022
2025	$725,739,367	$135,418,399	$74,125,239	$935,283,006
2026	$698,495,524	$129,468,102	$71,422,872	$899,386,498
2027	$640,329,342	$119,702,805	$65,381,172	$825,413,319

Table A.2 presents the adjusted on-going annual job impacts of the lithium mining project on the Gaston, County economy for the 2023 through 2027 period. Overall, the annual impact will support an additional 1,261 jobs each year.

Table A.3 presents the adjusted on-going annual labor income impacts of the lithium mining project on the Gaston, County economy for the 2023 through 2027 period. Overall, the annual labor income impact will exceed $62 million per year.

Table A.2

	Total Piedmont Lithium Project Employment Impact			
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2021				
2022				
2023	168	118	115	401
2024	514	367	380	1,261
2025	514	367	380	1,261
2026	514	367	380	1,261
2027	514	367	380	1,261

Table A.3

	Total Piedmont Lithium Project Labor Income Impact			
Year	Direct Effects	Indirect Effects	Induced Effects	Total
2021				
2022				
2023	11,088,451	2,948,023	2,375,668	16,412,141
2024	33,789,376	8,728,811	7,195,394	49,713,581
2025	42,447,838	11,030,786	9,050,443	62,529,067
2026	42,171,708	10,957,373	8,991,283	62,120,364
2027	42,208,259	10,967,091	8,999,114	62,174,464

Tables A.4 and A.5 present the output and employment spinoff impacts by industry based on the operation of the proposed Piedmont Carolina Lithium project over the first five years of operation. The total output and employment impact for all industries (last row in both tables) is the same as presented in Tables A.1 and A.2. The industries in each table are ranked by supplier chain (indirect) impact in 2027. The industry with the most impacted output increase resulting from the on-going operations of the new proposed facility is electric power transmission and distribution with $36,243,573 in new supplier chain revenue in constant 2022 dollars. The industry with the most impacted employment increase resulting from the on-going operations of the new proposed facility is maintenance and repair construction of nonresidential structures with 78 new supplier chain jobs.

Table A.4

Sector	Description	Indirect	Induced	Total
49	Electric power transmission and distribution	36,243,573	1,422,452	37,666,026
43	Electric power generation - Nuclear	21,316,750	836,619	22,153,369
62	Maintenance and repair construction of nonresidential structures	11,683,658	309,188	11,992,847
395	Wholesale trade	5,255,243	1,395,087	6,650,330
471	Waste management and remediation services	4,115,964	294,897	4,410,860
438	Insurance agencies, brokerages, and related activities	3,873,672	360,744	4,234,416
445	Commercial and industrial machinery and equipment rental and leasing	3,127,400	83,342	3,210,742
50	Natural gas distribution	2,939,596	66,921	3,006,517
461	Management of companies and enterprises	2,814,496	83,472	2,897,968
446	Lessors of nonfinancial intangible assets	2,611,961	158,084	2,770,045
433	Monetary authorities and depository credit intermediation	2,186,475	1,606,653	3,793,128
411	Truck transportation	2,116,292	405,477	2,521,769
468	Services to buildings	1,631,747	460,922	2,092,670
448	Accounting, tax preparation, bookkeeping, and payroll services	1,342,407	217,558	1,559,965
440	Real estate	1,300,898	4,597,741	5,898,639
	Other	17,142,672	53,082,015	710,554,029
	Total	119,702,805	65,381,172	825,413,319

Table A.5

Sector	Description	Indirect	Induced	Total
62	Maintenance and repair construction of nonresidential structures	78	2	80
468	Services to buildings	32	10	42
438	Insurance agencies, brokerages, and related activities	24	2	26
448	Accounting, tax preparation, bookkeeping, and payroll services	19	2	21
395	Wholesale trade	15	4	20
49	Electric power transmission and distribution	14	1	15
43	Electric power generation - Nuclear	12	1	13
471	Waste management and remediation services	11	1	11
20	Extraction of natural gas and crude petroleum	11	0	11
464	Employment services	9	7	17
461	Management of companies and enterprises	9	0	9
449	Architectural, engineering, and related services	8	0	9
445	Commercial and industrial machinery and equipment rental and leasing	8	0	8
469	Landscape and horticultural services	8	5	13
411	Truck transportation	8	2	10
	Other	100	344	958
	Total	367	380	1,261