



PREPARED FOR
Avangrid Renewables, LLC



3/1/2024

Economic & Fiscal Impact

Kitty Hawk Wind Projects in Virginia



Internal Use

1. Executive Summary

Avangrid is in the process of developing the Kitty Hawk Wind Projects in federal waters off the coasts of Virginia and North Carolina. The projects, with a total potential capacity of 2,488 megawatts (MW) to 3,500 MW¹, will be implemented in two phases, Kitty Hawk North and Kitty Hawk South. The life of the projects will span over forty years, which includes the development, construction, and operations of the projects. For the purpose of this study, the years analyzed are 2022 to 2061. Chmura Economics & Analytics (Chmura)² was contracted to conduct this study.

The projects' total investment in Virginia is an estimated \$2.7 billion over the life of the projects.

1.1. Virginia Beach Impact

- In Virginia Beach alone, the total economic impact (direct, indirect, and induced) of the Kitty Hawk Wind Projects is estimated to be \$1.2 billion with 2,401 cumulative jobs. The cumulative tax revenue for the City of Virginia Beach is estimated to total \$274.8 million.

1.2. Hampton Roads Impact

- The economic impact of the Kitty Hawk Wind Projects in Hampton Roads is significantly larger than the impact in Virginia Beach alone. The total economic impact (direct, indirect, and induced) in Hampton Roads (including estimates from Virginia Beach) is estimated to be **\$4.0 billion**, supporting **9,587 cumulative jobs**.
- The cumulative tax revenue for all local governments in the Hampton Roads region (including the 274.8 million in Virginia Beach, see Section 1.1) is estimated to total **\$428.4 million**.

1.3. Commonwealth of Virginia Impact

- In the Commonwealth of Virginia, the total economic impact (direct, indirect, and induced) of the Kitty Hawk Wind Projects (including the estimates from Hampton Roads, and therefore, Virginia Beach) is estimated to be **\$4.8 billion**, supporting **12,166 cumulative jobs**.
- The cumulative tax revenue for the state government is estimated to total **\$112.8 million**.

¹ A total capacity of 2,448 MW has been used for this report; an increase in capacity, based on final selection of Wind Turbine Generators is not expected to create a related increase to the economic impacts presented here.

² Chmura provides economic software, consulting, and data to our clients that help them make informed decisions to benefit their communities. Chmura's PhD economists, data scientists, and strategic planners guide clients through their local labor market. Over the past 24 years, Chmura has served hundreds of clients nationwide with thoroughness, accuracy, and objectivity.



Table 1.1: Economic Impact of Kitty Hawk Wind Projects Will Reach \$4.8 Billion in Virginia

		Virginia Beach	Hampton Roads	Virginia	
Development	Cumulative Total (2022-2031)	Spending (Million)	\$130.2	\$247.3	\$274.7
		Employment	184	355	442
Construction	Cumulative Total (2023-2032)	Spending (Million)	\$832.4	\$1,169.3	\$1,521.5
		Employment	1,529	2,276	2,969
Operations	Cumulative Total (2030-2061)	Spending (Million)	\$222.5	\$2,604.2	\$3,000.9
		Employment	689	6,956	8,755
Aggregate	Cumulative Total (2022-2061)	Spending (Million)	\$1,185.1	\$4,020.8	\$4,797.1
		Employment	2,401	9,587	12,166
		Tax Revenue (Million)	\$274.8	\$424.8	\$112.8

Hampton Roads impact includes the Virginia Beach impact. Virginia impact includes Hampton Roads and Virginia Beach impact.

Numbers may not sum due to rounding.

Source: JobsEQ by Chmura



2. Introduction

Avangrid is a leader in the U.S. offshore wind industry, with over 6,000 MW of electricity-generating capacity in active development. Avangrid is a 50% owner of the Vineyard Wind 1 Project off the New England coast—the first commercial-scale offshore wind project under construction in the United States.

In the Mid-Atlantic region, the company proposes to develop the Kitty Hawk North and Kitty Hawk South Wind Projects in federal waters off the coasts of Virginia and North Carolina. The Kitty Hawk Wind Projects are a significant undertaking that will benefit the economies of Virginia Beach, Hampton Roads, and Virginia for decades.

This report assesses the two projects jointly, considering the Kitty Hawk North project (lease area OCW-A 0559) as the first phase of activity and the Kitty Hawk

South project (lease area OCS-A 0508) as the second phase. Each project will consist of development, construction, and operations stages, lasting from 2022 to 2061.

At the time of analysis, the projects propose a total generation capacity of 2,448 MW to 3,500 MW, dependent on final selection of wind turbine generators; 2,488 MW was assumed for this analysis. Kitty Hawk North is assumed to generate 816 megawatts (MW) of electricity-generating capacity, and Kitty Hawk South, a further 1,632 MW capacity.

Avangrid requested the evaluation of the economic and job creation benefits of the Kitty Hawk Wind Projects in the following areas:³

- City of Virginia Beach
- Hampton Roads
- Commonwealth of Virginia

Figure 2.1: Hampton Roads Map



Source: JobsEQ by Chmura

³ This report evaluates the projects' impact in Virginia.



Chmura Economics & Analytics (Chmura) was commissioned to conduct this study. The remainder of this report is organized as follows:

- Section 3 analyzes the cumulative economic impact of the two Kitty Hawk Wind Projects from each of three project stages: the development stage, the construction stage, and the operations stage.⁴
 - Economic impact (direct, indirect, and induced) is measured in both annual averages and cumulative totals for employment and spending in each of the three regions analyzed: Virginia Beach, Hampton Roads, and the Commonwealth of Virginia.
 - Unless otherwise indicated, the estimates for Hampton Roads include the estimates for Virginia Beach, as the city is located within the Hampton Roads region. Likewise, the estimates for the Commonwealth of Virginia include the estimates for Hampton Roads and, therefore, Virginia Beach, as these are within the Commonwealth.
- Section 4 evaluates the tax revenue from the projects. Revenue is calculated for each of the three regions analyzed: Virginia Beach, Hampton Roads, and the Commonwealth of Virginia.
- Appendix 1 presents the economic and fiscal impact of Kitty Hawk North only.
- Appendix 2 presents the economic and fiscal impact of Kitty Hawk South only.
- Appendix 3 explains the Chmura methodology for the economic impact analysis.

⁴ The body of this report is organized to emphasize the cumulative economic impact of both Kitty Hawk North and South Wind Projects.



3. Economic Impact of the Kitty Hawk Wind Projects

3.1. Kitty Hawk Wind Projects Summary

The projects' total investment in Virginia is estimated to be \$2.7 billion in nominal dollars.⁵ The total investment of Kitty Hawk North will be \$971.2 million, spanning from 2022 to 2059. Kitty Hawk South's investment will be \$1.7 billion, spanning from 2024 to 2061. As Figure 3.1 shows, development and construction are concentrated over a ten-year period at the beginning of the projects; these activities will peak in 2031. Afterward, economic impact will come from projects' operations, which are expected to last for 30 years in each phase.

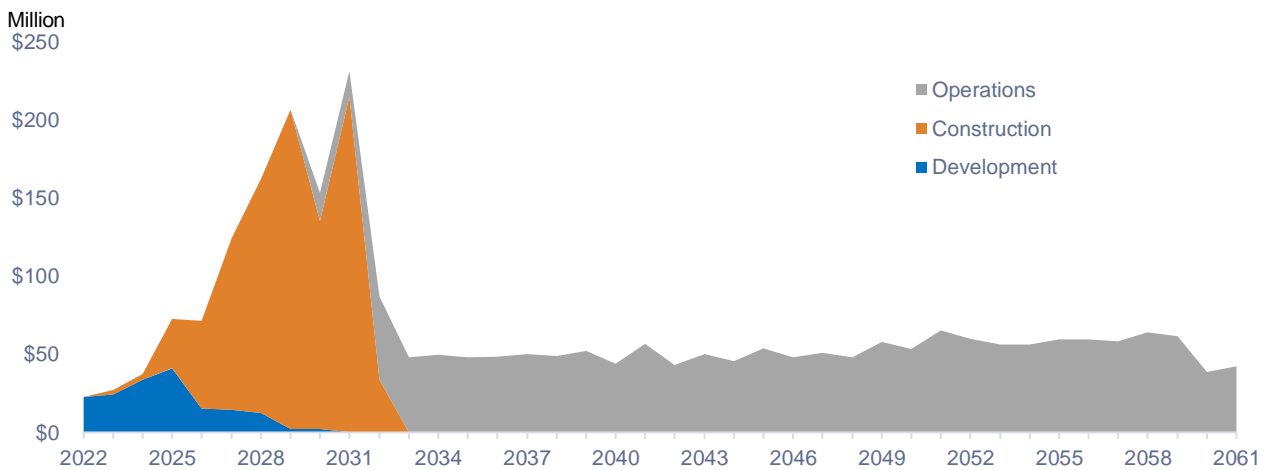
Table 3.1: Total Investment in Virginia Will Reach \$2.7 Billion

Stage	Kitty Hawk North (816 MW)		Kitty Hawk South (1,632 MW)		Combined (2,448 MW)	
	Timeline	Expenditure (Million)	Timeline	Expenditure (Million)	Timeline	Expenditure (Million)
Development	2022-2029	\$75.0	2024-2031	\$94.0	2022-2031	\$168.9
Construction	2023-2030	\$360.8	2025-2032	\$577.9	2023-2032	\$938.7
Operations	2030-2059	\$535.5	2032-2061	\$1,071.0	2030-2061	\$1,606.5
Total	2022-2059	\$971.2	2024-2061	\$1,742.9	2022-2061	\$2,714.1

Note: Numbers may not sum due to rounding.

Source: Avangrid

Figure 3.1: Total Investment of Kitty Hawk Wind Projects in Virginia Will Reach \$2.7 Billion



Source: Avangrid

⁵ Nominal dollars reflect the actual amount spent in a given year and are not inflation adjusted. Economic impacts estimated in this report are measured in nominal dollars. Further, \$2.7 billion represents the projects' spending in Virginia, not the entire Kitty Hawk Wind Project cost.



3.2. Economic Impact of the Development Stage

Total development spending in Virginia is expected to be \$168.9 million from 2022 to 2031 (Table 3.2), with allocations of \$75.0 million for Kitty Hawk North and \$94.0 million for Kitty Hawk South. All of this development spending will occur within the Hampton Roads region. Half of this amount is expected to occur in the City of Virginia Beach, reaching \$84.5 million.

Table 3.2: Development Spending Will Reach \$168.9 Million

Development Activities	Virginia Beach (Million)	Hampton Roads (Million)	Virginia (Million)
Onshore and offshore surveys	\$45.2	\$90.3	\$90.3
Engineering and Design	\$14.3	\$28.6	\$28.6
Fishery Management	\$1.0	\$2.0	\$2.0
Land and Leases	\$13.3	\$26.5	\$26.5
Legal	\$2.0	\$4.1	\$4.1
Lobbyists	\$0.3	\$0.5	\$0.5
Stakeholder Management and Marketing	\$2.0	\$4.1	\$4.1
Interconnection Fees	\$5.0	\$10.0	\$10.0
Travel and Expenses	\$0.4	\$0.7	\$0.7
Memberships and Sponsorships	\$1.0	\$2.0	\$2.0
Total	\$84.5	\$168.9	\$168.9

Note: Hampton Roads spending includes Virginia Beach spending. Virginia spending includes Hampton Roads and Virginia Beach spending.

Note: Numbers may not sum due to rounding.

Source: Avangrid

Development spending will be in the areas of design and surveys, legal, marketing, public relations, and stakeholder engagement, among others. Specifically, the largest component will be onshore and offshore surveys, with \$90.3 million projected for this activity in Hampton Roads. Other large spending categories include engineering and design (\$28.6 million in Hampton Roads), land and leases (\$26.5 million), and interconnection fees (\$10.0 million). There are also other spending items on professional services such as legal, lobbyists and marketing.

Table 3.3 summarizes the economic impact of development spending in the city, region, and state.⁶ In the City of Virginia Beach, the development spending activity will generate an estimated total cumulative economic impact (direct, indirect, and induced) of \$130.2 million (in nominal dollars) from 2022 through 2031, supporting 184 cumulative jobs in the city.⁷ Of this total economic impact, \$84.5 million is the estimated direct spending in Virginia Beach, supporting 29 cumulative jobs, mostly in engineering, surveys, legal, marketing, and other professional services. The cumulative indirect impact from the projects' development spending is estimated to be \$24.3 million, which can support 50 cumulative jobs in the city. The cumulative induced impact is estimated to total \$21.4 million and is associated with 104 cumulative jobs. Since the source of the induced impact is wages and salaries paid to workers of the projects, the beneficiaries are businesses in consumer service industries such as retail, restaurants, and health care. On an annual

⁶ This section presents the economic impact of both phases of development spending. Appendix 1 and 2 present impacts of Kitty Hawk North only and Kitty Hawk South only.

⁷ Cumulative jobs are the sum of annual jobs. For example, if one individual works on the projects for two years, the cumulative number of jobs is two. It includes both full-time and part-time jobs, not full-time equivalent jobs.

average basis, development spending is expected to generate \$13.0 million in total impact (direct, indirect, and induced) which will support an average of 18 jobs per year in the City of Virginia Beach from 2022 through 2031.

Table 3.3: Economic Impact of Kitty Hawk Wind Projects Development Averages \$27.5 Million per Year in Virginia

			Direct	Indirect	Induced	Total Impact
Virginia Beach	Cumulative Total (2022-2031)	Spending (Million)	\$84.5	\$24.3	\$21.4	\$130.2
		Employment	29	50	104	184
	Annual Average (2022-2031)	Spending (Million)	\$8.4	\$2.4	\$2.1	\$13.0
		Employment	3	5	10	18
Hampton Roads	Cumulative Total (2022-2031)	Spending (Million)	\$168.9	\$30.8	\$47.5	\$247.3
		Employment	59	67	230	355
	Annual Average (2022-2031)	Spending (Million)	\$16.9	\$3.1	\$4.8	\$24.7
		Employment	6	7	23	36
Virginia	Cumulative Total (2022-2031)	Spending (Million)	\$168.9	\$48.5	\$57.2	\$274.7
		Employment	59	100	284	442
	Annual Average (2022-2031)	Spending (Million)	\$16.9	\$4.9	\$5.7	\$27.5
		Employment	6	10	28	44

Note: Hampton Roads impact includes Virginia Beach impact. Virginia impact includes Hampton Roads and Virginia Beach impacts.

Numbers may not sum due to rounding.

Source: JobsEQ by Chmura

The estimated economic impact of the projects' development in both the Hampton Roads region and Virginia is larger than in the City of Virginia Beach because businesses outside the city will also benefit. In the Hampton Roads region, it is estimated that the projects' development expenditure will generate an annual average of \$24.7 million in total impact (direct, indirect, and induced) that supports 36 jobs per year from 2022 through 2031. The indirect and induced impacts in Virginia are slightly higher than in the Hampton Roads region, averaging a total impact (direct, indirect, and induced) of \$27.5 million per year that will support 44 jobs from 2022 to 2031.

3.3. Economic Impact of the Construction Stage

The estimated construction spending of the Kitty Hawk Wind Projects in Virginia is expected to be \$938.7 million,⁸ with \$360.8 million spent for Kitty Hawk North and \$577.9 million spent for Kitty Hawk South (Table 3.4). The largest component of construction spending will be onshore export cable works, comprising the transport and installation of the onshore export cable and all associated civil works from cable landfall to the onshore substation; a sum of \$222.9 million is projected for this category in the state. The category of onshore substation works is the second-largest item, with spending estimated at \$217.8 million in Virginia Beach. Other large spending categories include construction of ports (\$154.8 million in Hampton Roads) and transmission payment (\$125.5 million).

Table 3.4 Construction Spending Will Reach \$938.7 Million

	Virginia Beach	Hampton Roads	Virginia
Project Resources	\$70.0	\$70.0	\$70.0
WTGs - Transport, Pre-Assembly	--	\$49.0	\$49.0
Foundation T&I - Scour Protection	--	\$0.0	\$30.2
Array Cables T&I - Project Management	\$36.5	\$36.5	\$36.5
Construction Ports - WTG Marshalling, Construction Harbor	--	\$154.8	\$154.8
O&M Facilities	--	\$32.0	\$32.0
Onshore Substation Works	\$217.8	\$217.8	\$217.8
Onshore Export Cables Works	\$222.9	\$222.9	\$222.9
Transmission Payment	--	--	\$125.5
Total	\$547.2	\$783.0	\$938.7

Note: Hampton Roads spending includes Virginia Beach spending. Virginia spending includes Hampton Roads and Virginia Beach spending.

Note: Numbers may not sum due to rounding.

WTG: wind turbine generator; T&I: transportation and installation; O&M: operation and maintenance

Source: Avangrid

Of all spending in Virginia, an estimated 83% will be spent in the Hampton Roads region, and 58% will be spent in the City of Virginia Beach. Outside the Hampton Roads region, there will be some investment in the Richmond region (Figure 3.2)

⁸ Please note that this amount represents the spending in Virginia, not the entire projects' cost.

Figure 3.2: 83% of Virginia Construction Spending Will Be in Hampton Roads

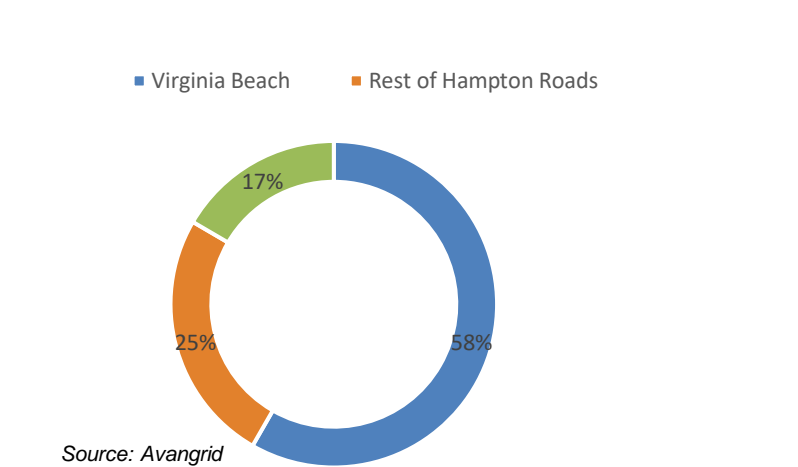


Table 3.5 summarizes the economic impact of construction spending for the projects in Virginia Beach, Hampton Roads, and Virginia. In the City of Virginia Beach, construction spending can generate an estimated total cumulative economic impact (direct, indirect, and induced) of \$832.4 million (in nominal dollars) from 2023 through 2032, supporting 1,529 cumulative jobs in the city. Of this total economic impact, \$547.2 million is the estimated direct construction spending in the City of Virginia Beach, supporting 707 direct cumulative jobs, mostly in construction and transportation industries. The cumulative indirect impact from the projects' construction spending is estimated to be \$132.0 million, which can support 238 cumulative jobs in the city. The cumulative induced impact in the city is estimated to total \$153.2 million and is associated with 584 cumulative jobs. On an annual average basis, construction of the Kitty Hawk Wind projects is expected to generate \$83.2 million in total impact (direct, indirect, and induced) which will support an average 153 jobs per year in the City of Virginia Beach from 2023 through 2032.

Table 3.5: Economic Impact of Construction of Kitty Hawk Wind Projects Will Average \$152.1 Million in Virginia

			Direct	Indirect	Induced	Total Impact
Virginia Beach	Cumulative Total (2023-2032)	Spending (Million)	\$547.2	\$132.0	\$153.2	\$832.4
		Employment	707	238	584	1,529
	Annual Average (2023-2032)	Spending (Million)	\$54.7	\$13.2	\$15.3	\$83.2
		Employment	71	24	58	153
Hampton Roads	Cumulative Total (2023-2032)	Spending (Million)	\$783.0	\$138.5	\$247.8	\$1,169.3
		Employment	966	289	1,022	2,276
	Annual Average (2023-2032)	Spending (Million)	\$78.3	\$13.9	\$24.8	\$116.9
		Employment	97	29	102	228
Virginia	Cumulative Total (2023-2032)	Spending (Million)	\$938.7	\$243.7	\$339.1	\$1,521.5
		Employment	1,190	438	1,340	2,969
	Annual Average (2023-2032)	Spending (Million)	\$93.9	\$24.4	\$33.9	\$152.1
		Employment	119	44	134	297

Note: Hampton Roads impact includes Virginia Beach impact. Virginia impact includes Hampton Roads and Virginia Beach impacts.

Numbers may not sum due to rounding.

Source: JobsEQ by Chmura

The estimated economic impact of construction in both the Hampton Roads region and Virginia is larger than in Virginia Beach. This is because businesses outside the city can also benefit from the construction. In the Hampton Roads region, it is estimated that the projects' construction spending will generate an annual average of \$116.9 million in total impact (direct, indirect, and induced) that supports 228 jobs per year from 2023 through 2032. The total impact (direct, indirect, and induced) in Virginia is slightly higher than that in the Hampton Roads region, averaging \$152.1 million per year that can support 297 jobs per year from 2023 to 2032.



3.4. Economic Impact of Operations Stage

After construction is complete, the ongoing operations of the Kitty Hawk Wind Projects will also generate significant economic impact. All spending in Virginia will occur in the Hampton Roads region, with 9% in the City of Virginia Beach. Other localities in the Hampton Roads region, such as Portsmouth, will also benefit significantly from the projects' operational spending.

Table 3.6: Operations Spending Will Reach \$1.6 Billion

Spending Category	Virginia Beach (Million)	Hampton Roads (Million)	Virginia (Million)
Labor: WTG SMA & Self-Perform	--	\$446.1	\$446.1
Labor: BoP	--	\$139.7	\$139.7
Labor: Administration	--	\$300.0	\$300.0
Labor: Crew Logistics	--	\$52.0	\$52.0
Materials/Equip: WTG SMA & Self-Perform	--	\$129.5	\$129.5
Materials/Equip: BoP	--	\$68.6	\$68.6
Materials/Equip: Administration	--	\$81.9	\$81.9
Materials/Equip: Crew Logistics	--	\$97.6	\$97.6
Fees/Taxes - WTG SMA	--	\$3.2	\$3.2
Fees/Taxes - Crew Logistics	--	\$24.4	\$24.4
Fees/Taxes - Environmental + General	\$141.1	\$141.1	\$141.1
Leases - Facilities	--	\$122.3	\$122.3
Total	\$141.1	\$1,606.5	\$1,606.5

Note: Hampton Roads spending includes Virginia Beach spending. Virginia spending includes Hampton Roads and Virginia Beach spending.

Note: Numbers may not sum due to rounding.

SMA: service and maintenance agreement; BoP: balance of plant; Self-perform: in-house technicians

Source: Avangrid

Total operational spending of the projects in Hampton Roads is expected to be \$1.6 billion, with \$535.5 million spent for Kitty Hawk North and \$1.1 billion spent for Kitty Hawk South (Table 3.6). Operational spending items include labor, materials, facility maintenance, management, and back-office operations. Specifically, total labor cost (including all categories) will reach \$937.8 million in Hampton Roads, and total cost for materials will reach \$377.6 million.

Table 3.7 summarizes the economic impact of operational spending of the Kitty Hawk Wind Projects in Virginia Beach, Hampton Roads, and Virginia. In the City of Virginia Beach, the operational spending will generate an estimated total cumulative economic impact (direct, indirect, and induced) of \$222.5 million (in nominal dollars) from 2030 through 2061, supporting 689 cumulative jobs in the city. Of this total economic impact, \$141.1 million is the estimated direct operational spending in Virginia Beach, supporting 290 cumulative jobs. The cumulative indirect impact from the projects' operations is estimated to be \$31.1 million, which will support 130 cumulative jobs in the city. The cumulative induced impact in the city is estimated to total \$50.3 million and is associated with 268 cumulative jobs. On an annual average basis, operations are expected to generate \$7.0 million in total impact (direct, indirect, and induced) which will support an average of 22 jobs per year in Virginia Beach from 2030 through 2061.



Table 3.7: Economic Impact of Operations of Kitty Hawk Wind Projects Will Average \$93.8 Million per Year in Virginia

			Direct	Indirect	Induced	Total Impact
Virginia Beach	Cumulative Total (2030-2061)	Spending (Million)	\$141.1	\$31.1	\$50.3	\$222.5
		Employment	290	130	268	689
	Annual Average (2030-2061)	Spending (Million)	\$4.4	\$1.0	\$1.6	\$7.0
		Employment	9	4	8	22
Hampton Roads	Cumulative Total (2030-2061)	Spending (Million)	\$1,606.5	\$446.1	\$551.6	\$2,604.2
		Employment	2,763	1,514	2,679	6,956
	Annual Average (2030-2061)	Spending (Million)	\$50.2	\$13.9	\$17.2	\$81.4
		Employment	86	47	84	217
Virginia	Cumulative Total (2030-2061)	Spending (Million)	\$1,606.5	\$707.4	\$687.0	\$3,000.9
		Employment	2,763	2,486	3,506	8,755
	Annual Average (2030-2061)	Spending (Million)	\$50.2	\$22.1	\$21.5	\$93.8
		Employment	86	78	110	274

Note: Hampton Roads impact includes Virginia Beach impact. Virginia impact includes Hampton Roads and Virginia Beach impacts.

Numbers may not sum due to rounding.

Source: JobsEQ by Chmura

The estimated economic impact of the projects' operations in both the Hampton Roads region and Virginia is larger than the impact in Virginia Beach. In the Hampton Roads region, it is estimated that the projects' operational expenditure will generate an annual average \$81.4 million in total impact (direct, indirect, and induced) that can support 217 jobs per year from 2030 through 2061. The total impact (direct, indirect, and induced) in Virginia is larger than the impact in the Hampton Roads region, averaging \$93.8 million that will support 274 annual jobs from 2030 to 2061.

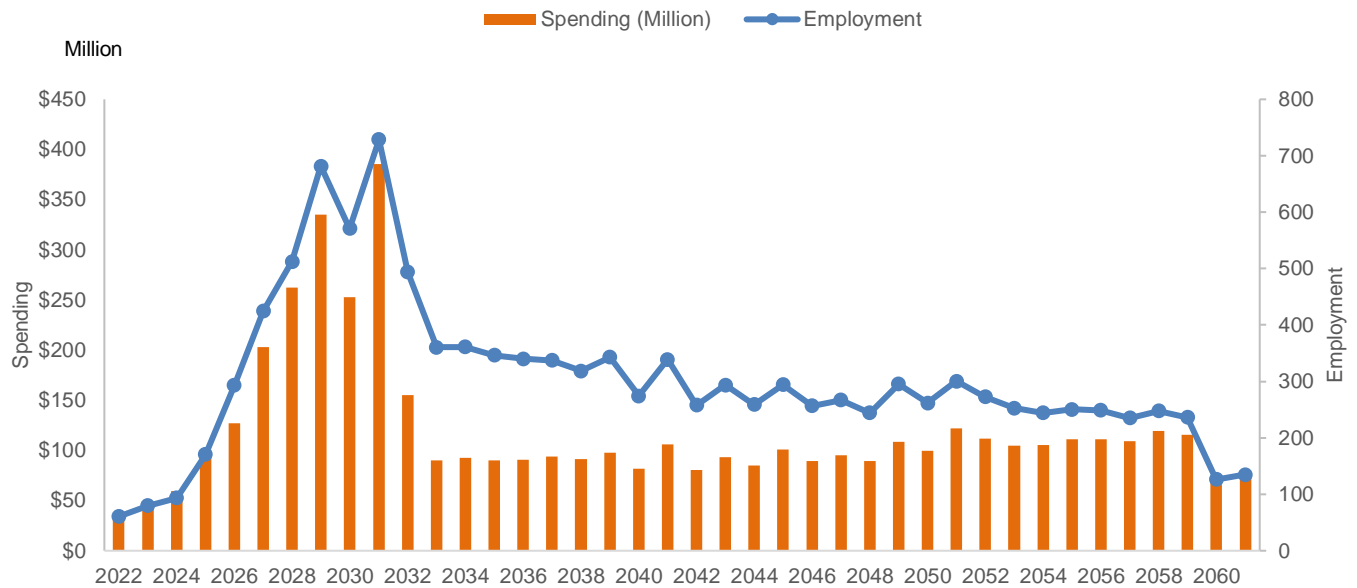
3.5. Economic Impact Summary

The combined economic impact from spending on development, construction, and operations, specifically in Virginia beach (direct, indirect, and induced) is estimated to average \$29.6 million and is associated with an annual average of 60 jobs in the city. The cumulative impact in the city is estimated to be \$1.2 billion with 2,401 cumulative jobs supported from 2022 to 2061.

The economic impact of the Kitty Hawk Wind Projects in Hampton Roads is significantly larger than the impact in Virginia Beach alone. The total economic impact (direct, indirect, and induced) is estimated to average \$100.5 million per year, supporting 240 jobs annually in the region (including estimates from Virginia Beach). The cumulative impact in the Hampton Roads region (including Virginia Beach) is expected to be \$4.0 billion and is associated with 9,587 cumulative jobs from 2022 through 2061.

In Virginia, the total economic impact (direct, indirect, and induced) is estimated to average \$119.9 million per year, supporting 304 jobs annually in the state. The cumulative impact in the state (including Hampton Roads and, therefore, Virginia Beach) is expected to be \$4.8 billion and is associated with 12,166 cumulative jobs from 2022 through 2061 (Figure 3.3).

Figure 3.3: Combined Total Economic Impact of Kitty Hawk Wind Projects in the Commonwealth of Virginia Will Be \$4.8 Billion (Development, Construction, & Operations)



Source: Chmura Economics & Analytics

The economic impact estimated in this analysis is based on the existing industrial structure in the city, region, and Commonwealth. If the Hampton Roads region were to become a center of wind energy on the East Coast, it is anticipated that some of the suppliers for the Kitty Hawk Wind Projects will choose to be based there in the future; this could boost the economic impact of the projects in the region and the state.

3.6. Economic Impact Summary by Industry

A wide range of industries benefit from the Kitty Hawk Wind Projects. Using the JobsEQ economic impact model, Chmura estimated the employment supported by the projects in various industry sectors (Table 3.8). Of the 2,401 total cumulative jobs supported by the projects (including direct, indirect, and induced) in Virginia Beach from 2022 to 2061, an estimated 577 will be in construction, 335 will be in utilities, and 279 will be in professional, scientific, and technical services. This is because the operations of the projects are classified within the utility industry, while the development and construction of the projects will utilize many businesses in the construction and professional services industries. Induced impact will support industries in health care, retail, and food services, as workers spend their wages and salaries on various consumer services in the region. In the Hampton Roads region and Virginia, the top industries are utilities, construction, health care, and professional services.

Table 3.8: Kitty Hawk Wind Projects Will Support Jobs in Many Industries

Industry	Virginia Beach	Hampton Roads	Virginia
Agriculture, Forestry, Fishing and Hunting	12	41	95
Mining, Quarrying, and Oil and Gas Extraction	--	10	71
Utilities	335	3,317	3,424
Construction	577	866	1,167
Manufacturing	74	365	629



Industry	Virginia Beach	Hampton Roads	Virginia
Wholesale Trade	1	7	14
Retail Trade	111	456	572
Transportation and Warehousing	92	427	615
Information	81	264	286
Finance and Insurance	82	298	448
Real Estate and Rental and Leasing	48	186	228
Professional, Scientific, and Technical Services	279	578	811
Management of Companies and Enterprises	37	100	155
Administrative and Support and Waste Management and Remediation Services	131	518	810
Educational Services	47	166	217
Health Care and Social Assistance	228	905	1,193
Arts, Entertainment, and Recreation	21	89	123
Accommodation and Food Services	152	595	788
Other Services (except Public Administration)	82	316	392
Public Administration	14	83	129
Total Employment	2,401	9,587	12,166

Note: Hampton Roads impact includes Virginia Beach impact. Virginia impact includes Hampton Roads and Virginia Beach impacts.

Numbers may not sum due to rounding.

Source: JobsEQ by Chmura

4. Tax Revenue from the Kitty Hawk Wind Projects

Throughout their lifespan, the Kitty Hawk Wind Projects will add significant economic impact to Virginia Beach, Hampton Roads, and Virginia. The projects will also generate significant tax revenue for the local and state governments. State revenue includes individual income, corporate income, and sales tax. Local revenue includes real estate, sales, and BPOL (business, professional and occupational license) tax. To be conservative, only tax revenue from the direct impact is estimated.⁹

4.1. Tax Revenue from the Development Stage

Spending on development activities, such as legal, marketing, and other professional services, is subject to local BPOL tax in Virginia. The City of Virginia Beach has a 0.58% BPOL tax rate on professional services, based on gross receipts of those businesses.¹⁰ For other local governments in the Hampton Roads region, Chmura used the average BPOL rate to estimate this tax. The cumulative BPOL tax is estimated to be \$0.5 million for the City of Virginia Beach and \$0.3 million for all other local governments in the region, from 2022 to 2031 (Table 4.1).

⁹ This approach is recommended by Burchell and Listokin in The Fiscal Impact Handbook. Source: Burchell, R.W. and Listokin, D. 1978. The Fiscal Impact Handbook: Estimating Local Costs and Revenues of Land Development. Center for Urban Policy Research, New Brunswick, NJ; Rutgers, The State University of New Jersey.

¹⁰ City of Virginia Beach, Tax Rates and Deadlines, accessed December 5, 2023, <https://virginiabeach.gov/services/launch-virginia-beach/operating-a-business/tax-rates-deadlines>.

Table 4.1: Development of Kitty Hawk Wind Projects Will Generate \$4.7 Million Total Tax Revenue

Tax Category	Virginia Beach	Other Hampton Roads Localities	Virginia	Total (2022-2031)	Annual Average (2022-2031)
BPOL	\$0.5	\$0.3	--	\$0.8	\$0.1
Individual Income	--	--	\$3.1	\$3.1	\$0.3
Corporate Income	--	--	\$0.8	\$0.8	\$0.1
Total	\$0.5	\$0.3	\$3.9	\$4.7	\$0.5

Note: For the purposes of this table, Virginia Beach totals are not included in the Hampton Roads column and Hampton Roads totals are not included in the Virginia column

Note: Numbers may not sum due to rounding.

Source: Chmura

The government of the Commonwealth of Virginia is expected to receive individual and corporate income taxes from development spending. To estimate this revenue, Chmura first estimated the percentage of development spending that will be paid as wages and salaries and corporate profits, before applying respective state income tax rates.¹¹ It is estimated that the state government will receive \$3.1 million in cumulative individual income tax and \$0.8 million in cumulative corporate income tax from 2022 to 2031.

Combined, state and local taxes from capital expenditure will likely reach \$4.7 million from 2022 to 2031, averaging \$0.5 million per year.¹²

4.2. Tax Revenue from the Construction Stage

Construction expenditure on contracting services for construction of ports or operational facilities can provide BPOL tax to local governments in Virginia. The City of Virginia Beach has a 0.16% BPOL tax rate on general contractor businesses. For other local governments in the Hampton Roads region, the average BPOL tax rate is 0.13% on contractors. The cumulative BPOL tax is estimated to be \$1.3 million for the City of Virginia Beach and \$0.3 million for all other local governments in the region, from 2023 to 2032 (Table 4.2).

Similarly, the state government is expected to receive individual and corporate income taxes from construction spending. It is estimated that the state government will receive \$18.3 million in cumulative individual income tax and \$2.6 million in cumulative corporate income tax from 2022 to 2031.

¹¹ Virginia has a progressive individual tax system. Based on regional average wages, the state individual income tax rate is 5.3%. The corporate income tax rate is 6.0%. This information is from the Virginia Department of Taxation.

¹² Please note that those taxes are paid by contractors to the state and local governments and not by Avangrid directly.

Table 4.2: Construction of Kitty Hawk Wind Projects Will Generate \$44.5 Million Total Revenue

Tax Category	Virginia Beach	Other Hampton Roads Localities	Virginia	Total (2023-2032)	Annual Average (2023-2032)
BPOL	\$1.3	\$0.3	--	\$1.7	\$0.2
Sales	\$2.2	\$0.9	\$18.8	\$21.9	\$2.2
Individual Income	--	--	\$18.3	\$18.3	\$1.8
Corporate Income	--	--	\$2.6	\$2.6	\$0.3
Total	\$3.5	\$1.3	\$39.7	\$44.5	\$4.4

Note: For the purposes of this table, Virginia Beach totals are not included in the Hampton Roads column and Hampton Roads totals are not included in the Virginia column

Note: Numbers may not sum due to rounding.

Source: Chmura

Spending on construction materials is subject to state and local sales taxes. In Virginia Beach and the Hampton Roads region, the general sales tax rate is 6.0%, with 1% going to local governments.¹³ As a result, cumulative sales tax is estimated to be \$2.2 million for the City of Virginia Beach, \$0.9 million for other local governments in the Hampton Roads region, and \$18.8 million for Virginia from 2023 through 2032.

Combined, state and local taxes from construction spending are estimated to reach \$44.5 million from 2023 to 2032, averaging \$4.4 million per year.¹⁴

4.3. Tax Revenue from Kitty Hawk Wind Projects Operations

From operations, local governments in the Hampton Roads region can collect BPOL tax based on the different types of operational spending in their jurisdictions. The cumulative BPOL tax is estimated to be \$0.6 million for local governments in the region from 2030 to 2061 (Table 4.3)

Table 4.3: Operations of Kitty Hawk Wind Projects Will Generate \$492.0 Million Total Revenue

Tax Category	Virginia Beach	Hampton Roads	Virginia	Total (2030-2061)	Annual Average (2030-2061)
BPOL	\$0.0	\$0.6	--	\$0.6	\$0.0
Sales	\$0.0	\$3.8	\$18.9	\$22.7	\$0.7
Property	\$270.8	\$147.5	--	\$418.4	\$13.1
Individual Income	--	--	\$38.7	\$38.7	\$1.2
Corporate Income	--	--	\$11.7	\$11.7	\$0.4
Total	\$270.8	\$152.0	\$69.2	\$492.0	\$15.4

Note: For the purposes of this table, Virginia Beach totals are not included in the Hampton Roads column and Hampton Roads totals are not included in the Virginia column

Note: Numbers may not sum due to rounding.

Source: Chmura

¹³ Virginia Department of Taxation website at <https://www.tax.virginia.gov/retail-sales-and-use-tax>. The remaining sales tax goes to the state government (4.3%) and to Hampton Roads for regional transportation projects.

¹⁴ Please note that those taxes are paid by contractors to the state and local governments and not by Avangrid directly.



Operational expenditure on materials and equipment are subject to state and local sales taxes. As a result, cumulative sales tax is estimated to be \$3.8 million for local governments in the Hampton Roads region, and \$18.9 million for Virginia from 2030 through 2061.

Construction of different structures by Avangrid in the region will expand the tax base and generate additional real estate tax revenue for local governments. Data from Avangrid indicate that all onshore facilities will be in the City of Virginia Beach and Portsmouth. The current real estate tax rate is 0.99% in Virginia Beach and 1.30% in Portsmouth.¹⁵ In this analysis, Chmura used the cost of construction as the approximate assessed value for buildings and structures. It is assumed that real property in the region and the Consumer Price Index both appreciate at the same rate.¹⁶ The resulting real estate tax revenue is estimated to be \$270.8 million for Virginia Beach and \$147.5 million in Portsmouth from 2030 to 2061.

The state government is expected to receive individual and corporate income taxes from operations. It is estimated that the state government will receive \$38.7 million in individual income tax and \$11.7 million in corporate income tax from 2030 to 2061.

In summary, operations of the Kitty Hawk Wind Projects will contribute \$492.0 million in tax revenue to the state and local governments from 2030 to 2061, averaging \$15.4 million per year.

4.4. Fiscal Impact Summary

From 2022 to 2061, the cumulative tax revenue for the state and local governments is estimated to total \$541.2 million, averaging \$13.5 million per year. The cumulative state tax revenue will total \$112.8 million, averaging \$2.8 million per year, and cumulative tax revenue for other Hampton Roads localities (excluding Virginia Beach) is estimated to be \$153.6 million, averaging \$3.8 million per year. For the City of Virginia Beach, the cumulative tax revenue is estimated to be \$274.8 million, averaging \$6.9 million per year.

¹⁵ Virginia Beach Economic Development, "Tax Rates", accessed October 26, 2023, <https://www.yesvirginiabeach.com/business-environment/tax-rates>, and City of Portsmouth, "Real Estate Tax", accessed October 26, 2023, <https://www.portsmouthva.gov/faq.aspx?TID=45#:~:text=2.%,%24100%20of%20the%20assessed%20value>.

¹⁶ Chmura used a CPI value of 2.65%, which is the average from 2010 to the third quarter of 2023.



Appendix 1: Economic and Fiscal Impact of Kitty Hawk North

A1.1. Kitty Hawk North Economic Impact

A1.1.1. Kitty Hawk North Development Impact

Total development spending for Kitty Hawk North alone is expected to be \$75.0 million in Virginia from 2022 to 2031. All development spending will occur in the Hampton Roads region, with half occurring in the City of Virginia Beach.

Table A1.1 summarizes the economic impact of development spending of Kitty Hawk North in the city, region, and state. In Virginia Beach, the development spending is expected to generate \$7.2 million in total annual impact (direct, indirect, and induced) which will support an average of 10 jobs per year in Virginia Beach from 2022 through 2029.

Table A1.1: Economic Impact of Development of Kitty Hawk Wind North Will Average \$15.1 Million in Virginia

		Di- rect	Indi- rect	In- duced	Total Impact	
Virginia Beach	Cumulative Total (2022-2029)	Spending (Million)	\$37.5	\$10.8	\$9.1	\$57.5
		Employment	15	23	43	81
	Annual Average (2022-2029)	Spending (Million)	\$4.7	\$1.4	\$1.1	\$7.2
		Employment	2	3	5	10
Hampton Roads	Cumulative Total (2022-2029)	Spending (Million)	\$75.0	\$14.2	\$20.3	\$109.4
		Employment	30	32	97	159
	Annual Average (2022-2029)	Spending (Million)	\$9.4	\$1.8	\$2.5	\$13.7
		Employment	4	4	12	20
Virginia	Cumulative Total (2022-2029)	Spending (Million)	\$75.0	\$21.7	\$24.4	\$121.0
		Employment	30	47	121	198
	Annual Average (2022-2029)	Spending (Million)	\$9.4	\$2.7	\$3.0	\$15.1
		Employment	4	6	15	25

Note: Hampton Roads impact includes Virginia Beach impact. Virginia impact includes Hampton Roads and Virginia Beach impacts.

Numbers may not sum due to rounding.

Source: JobsEQ by Chmura

The estimated economic impact of Kitty Hawk North development in both the Hampton Roads region and Virginia is larger than the impact in Virginia Beach. In the Hampton Roads region, it is estimated that Kitty Hawk North will generate an annual average of \$13.7 million in total impact (direct, indirect, and induced) that will support 20 jobs per year from 2022 through 2029. The total impact (direct, indirect, and induced) in Virginia is slightly larger, averaging \$15.1 million that will support 25 jobs per year from 2022 to 2029.

A1.1.2. Kitty Hawk North Construction Impact

In Virginia, total construction spending for Kitty Hawk North is expected to be \$360.8 million. It is estimated that 83% of this spending will occur in the Hampton Roads region, and 58% will occur in the City of Virginia Beach.

Table A1.2 summarizes the economic impact of construction spending of Kitty Hawk North in the city, region, and state. In Virginia Beach, on an annual average basis, construction in this phase is expected to generate \$37.2 million in total impact (direct, indirect, and induced) which will support an average of 82 jobs per year in the city from 2023 through 2030.

Table A1.2: Economic Impact of Construction of Kitty Hawk North Will Average \$73.2 Million in Virginia

			Direct	Indirect	Induced	Total Impact
Virginia Beach	Cumulative Total (2023-2030)	Spending (Million)	\$195.9	\$46.7	\$55.1	\$297.7
		Employment	335	98	222	656
	Annual Average (2023-2030)	Spending (Million)	\$24.5	\$5.8	\$6.9	\$37.2
		Employment	42	12	28	82
Hampton Roads	Cumulative Total (2023-2030)	Spending (Million)	\$300.3	\$54.5	\$96.4	\$451.2
		Employment	484	127	451	1,062
	Annual Average (2023-2030)	Spending (Million)	\$37.5	\$6.8	\$12.1	\$56.4
		Employment	60	16	56	133
Virginia	Cumulative Total (2023-2030)	Spending (Million)	\$360.8	\$93.1	\$131.5	\$585.4
		Employment	598	189	624	1,411
	Annual Average (2023-2030)	Spending (Million)	\$45.1	\$11.6	\$16.4	\$73.2
		Employment	75	24	78	176

Note: Hampton Roads impact includes Virginia Beach impact. Virginia impact includes Hampton Roads and Virginia Beach impacts.

Numbers may not sum due to rounding.

Source: JobsEQ by Chmura

The estimated economic impact of Kitty Hawk North construction in both the Hampton Roads region and in Virginia is larger than in Virginia Beach. In the Hampton Roads region, it is estimated that the construction expenditure will generate an annual average of \$56.4 million in total impact (direct, indirect, and induced) that will support 133 jobs per year from 2023 through 2030. The total impact (direct, indirect, and induced) in Virginia is estimated to average \$73.2 million that will support 176 jobs from 2023 to 2030 in the state.

A1.1.3. Kitty Hawk North Operations Impact

Total operational spending for Kitty Hawk North is estimated to be \$535.5 million in Virginia. All spending in Virginia will occur in the Hampton Roads region, with 9% in the City of Virginia Beach. Other localities in Hampton Roads, such as Portsmouth, will also benefit significantly from the projects' operational spending.

Table A1.3 summarizes the economic impact of operational spending of Kitty Hawk North in the city, region, and state. In Virginia Beach, operations are expected to generate \$2.5 million in annual average total impact (direct, indirect, and induced) which will support an average of eight jobs per year in Virginia Beach from 2030 through 2059.

Table A1.3: Economic Impact of Operations of Kitty Hawk North Will Average \$33 Million in Virginia

			Direct	Indirect	Induced	Total Impact
Virginia Beach	Cumulative Total (2030-2059)	Spending (Million)	\$47.0	\$10.4	\$16.8	\$74.2
		Employment	110	49	88	247
	Annual Average (2030-2059)	Spending (Million)	\$1.6	\$0.3	\$0.6	\$2.5
		Employment	4	2	3	8
Hampton Roads	Cumulative Total (2030-2059)	Spending (Million)	\$535.5	\$191.2	\$183.9	\$910.5
		Employment	1,288	706	986	2,981
	Annual Average (2030-2059)	Spending (Million)	\$17.8	\$6.4	\$6.1	\$30.4
		Employment	43	24	33	99
Virginia	Cumulative Total (2030-2059)	Spending (Million)	\$535.5	\$235.8	\$229.0	\$1,000.3
		Employment	1,288	1,160	1,291	3,739
	Annual Average (2030-2059)	Spending (Million)	\$17.8	\$7.9	\$7.6	\$33.3
		Employment	43	39	43	125

Note: Hampton Roads impact includes Virginia Beach impact. Virginia impact includes Hampton Roads and Virginia Beach impacts.

Numbers may not sum due to rounding.

Source: JobsEQ by Chmura

In the Hampton Roads region, it is estimated that the projects' operational expenditure will generate an annual average of \$30.4 million in total impact (direct, indirect, and induced) that supports 99 jobs per year from 2030 through 2059. The total impact (direct, indirect, and induced) in Virginia is slightly larger, averaging \$33.3 million that will support 125 jobs from 2030 to 2059 in Virginia.

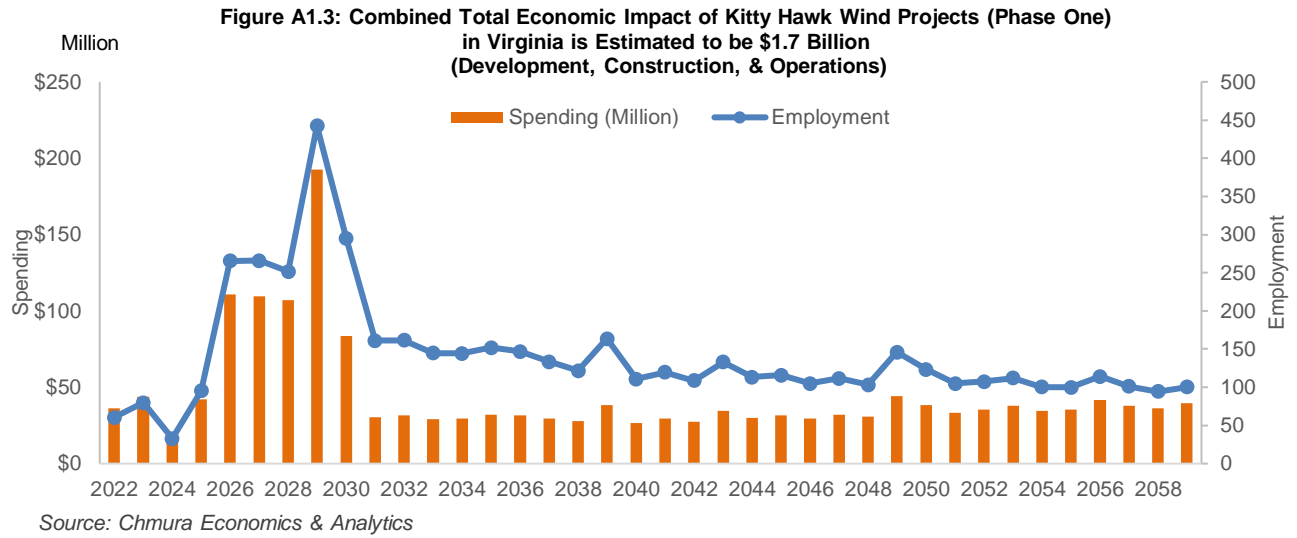
A1.1.4. Economic Impact Summary

Combining the economic impact from development, construction, and operations, Figure A1.1 summarizes the impact of Kitty Hawk North in Virginia Beach from 2022 through 2059. The total economic impact (direct, indirect, and induced) is estimated to average \$15.3 million and is associated with an annual average of 35 jobs in the city. The cumulative impact in the city is estimated to be \$429.3 million which supports 984 cumulative jobs.

The economic impact of the Kitty Hawk Wind Projects in Hampton Roads is significantly larger (Figure A1.2) when compared to the impact in Virginia Beach. The total economic impact (direct, indirect, and induced) is estimated to average \$52.5 million per year, supporting 150 jobs annually in the region. The cumulative impact in the state is expected to be \$1.5 billion and is associated with 4,202 cumulative jobs from 2022 through 2059.

In Virginia, the total economic impact (direct, indirect, and induced) is estimated to average \$61.0 million per year, supporting 191 jobs annually in the state from 2022 to 2059. The cumulative impact in the state is expected to be \$1.7 billion and is associated with 5,348 cumulative jobs from 2022 through 2059.





A1.2. Kitty Hawk North Fiscal Impact

Table A1.4 summarizes the tax revenue for Virginia Beach, other local governments in the Hampton Roads region, and Virginia. It is estimated that Kitty Hawk North will generate a total of \$206.3 million in tax revenue for state and local governments from 2022 to 2059, averaging \$5.4 million per year. Of the total tax revenue, \$98.3 million will go to the City of Virginia Beach, \$67.9 million to other local governments in the Hampton Roads region, and \$40.1 million to the state government.

Table A1.4: Total Tax Revenue from Kitty Hawk North is Estimated to be \$206.3 Million

	Virginia Beach	Other Hampton Roads Localities	Virginia	Total	Annual Average
Development (2022-2029)	\$0.2	\$0.1	\$1.7	\$2.0	\$0.3
Construction (2023-2030)	\$1.3	\$0.6	\$15.3	\$17.2	\$2.1
Operations (2030-2059)	\$96.8	\$67.2	\$23.1	\$187.1	\$6.2
Total (2022-2059)	\$98.3	\$67.9	\$40.1	\$206.3	\$5.4

Note: Numbers may not sum due to rounding.

Source: Chmura



Appendix 2: Economic and Fiscal Impact of Kitty Hawk South

A2.1. Kitty Hawk South Economic Impact

A2.1.1 Kitty Hawk South Development Impact

Total development spending for Kitty Hawk South is expected to be \$94.0 million in Virginia from 2024 to 2031. All development spending will occur in the Hampton Roads region, with half occurring in the City of Virginia Beach.

Table A2.1 summarizes the economic impact of development spending for Kitty Hawk South in the city, region, and state. In Virginia Beach, the development spending is expected to generate \$9.1 million in total annual average impact (direct, indirect, and induced) which will support an average of 13 jobs per year in Virginia Beach from 2024 through 2031.

Table A2.1: Economic Impact of Development of Kitty Hawk South Averages \$19.2 Million in Virginia

		Direct	Indirect	Induced	Total Impact	
Virginia Beach	Cumulative Total (2024-2031)	Spending (Million)	\$47.0	\$13.4	\$12.3	\$72.7
		Employment	14	26	61	102
	Annual Average (2024-2031)	Spending (Million)	\$5.9	\$1.7	\$1.5	\$9.1
		Employment	2	3	8	13
Hampton Roads	Cumulative Total (2024-2031)	Spending (Million)	\$94.0	\$16.6	\$27.3	\$137.8
		Employment	29	35	132	196
	Annual Average (2024-2031)	Spending (Million)	\$11.7	\$2.1	\$3.4	\$17.2
		Employment	4	4	17	25
Virginia	Cumulative Total (2024-2031)	Spending (Million)	\$94.0	\$26.9	\$32.8	\$153.7
		Employment	29	53	163	245
	Annual Average (2024-2031)	Spending (Million)	\$11.7	\$3.4	\$4.1	\$19.2
		Employment	4	7	20	31

Note: Hampton Roads impact includes Virginia Beach impact. Virginia impact includes Hampton Roads and Virginia Beach impacts.

Numbers may not sum due to rounding.

Source: JobsEQ by Chmura

In the Hampton Roads region, it is estimated that Kitty Hawk South development will generate an annual average of \$17.2 million in total impact (direct, indirect, and induced) that supports 25 jobs per year from 2024 through 2031. The total impact (direct, indirect, and induced) in Virginia is slightly larger, averaging \$19.2 million that will support 31 jobs per year from 2022 to 2029.



A2.1.2. Kitty Hawk South Construction Impact

Total construction spending for Kitty Hawk South is expected to be \$577.9 million in Virginia. It is estimated that 83% will be spent in the Hampton Roads region, and 58% will be spent in the City of Virginia Beach.

Table A2.2 summarizes the economic impact of construction spending for Kitty Hawk South in the city, region, and state. In Virginia Beach, on an annual average basis, construction during this phase is expected to generate \$66.8 million in total impact (direct, indirect, and induced) which will support an average of 109 jobs per year in Virginia Beach from 2025 through 2032.

Table A2.2: Economic Impact of Construction of Kitty Hawk South Averages \$117.0 Million in Virginia

			Direct	Indirect	Induced	Total Impact
Virginia Beach	Cumulative Total (2025-2032)	Spending (Million)	\$351.3	\$85.3	\$98.1	\$534.7
		Employment	372	140	361	873
	Annual Average (2025-2032)	Spending (Million)	\$43.9	\$10.7	\$12.3	\$66.8
		Employment	47	18	45	109
Hampton Roads	Cumulative Total (2025-2032)	Spending (Million)	\$482.6	\$84.1	\$151.4	\$718.1
		Employment	482	161	570	1,214
	Annual Average (2025-2032)	Spending (Million)	\$60.3	\$10.5	\$18.9	\$89.8
		Employment	60	20	71	152
Virginia	Cumulative Total (2025-2032)	Spending (Million)	\$577.9	\$150.6	\$207.6	\$936.1
		Employment	592	249	716	1,557
	Annual Average (2025-2032)	Spending (Million)	\$72.2	\$18.8	\$26.0	\$117.0
		Employment	74	31	90	195

Note: Hampton Roads impact includes Virginia Beach impact. Virginia impact includes Hampton Roads and Virginia Beach impacts.

Numbers may not sum due to rounding.

Source: JobsEQ by Chmura

In the Hampton Roads region, it is estimated that Kitty Hawk South construction expenditure will generate an annual average of \$89.8 million in total impact (direct, indirect, and induced) that supports 152 jobs per year from 2025 through 2032. The total impact (direct, indirect, and induced) in Virginia is estimated to average \$117.0 million that will support 195 jobs per year from 2023 to 2032.

A2.1.3. Kitty Hawk South Operations Impact

Total operational spending for Kitty Hawk South is estimated to be \$1.1 billion in Virginia. All spending in Virginia will occur in the Hampton Roads region, with 9% in the City of Virginia Beach.

Table A2.3 summarizes the economic impact of operational spending for Kitty Hawk South in the city, region, and state. In Virginia Beach, operations are expected to generate \$4.9 million in total impact (direct, indirect, and induced) which will support an average of 15 jobs per year in the city from 2032 through 2061.



Table A2.3: Economic Impact of Operations of Kitty Hawk South Will Average \$66.7 Million in Virginia

			Direct	Indirect	Induced	Total Impact
Virginia Beach	Cumulative Total (2032-2061)	Spending (Million)	\$94.1	\$20.7	\$33.5	\$148.3
		Employment	180	81	181	442
	Annual Average (2032-2061)	Spending (Million)	\$3.1	\$0.7	\$1.1	\$4.9
		Employment	6	3	6	15
Hampton Roads	Cumulative Total (2032-2061)	Spending (Million)	\$1,071.0	\$254.9	\$367.8	\$1,693.6
		Employment	1,474	808	1,693	3,975
	Annual Average (2032-2061)	Spending (Million)	\$35.7	\$8.5	\$12.3	\$56.5
		Employment	49	27	56	132
Virginia	Cumulative Total (2032-2061)	Spending (Million)	\$1,071.0	\$471.6	\$458.0	\$2,000.6
		Employment	1,474	1,327	2,215	5,016
	Annual Average (2032-2061)	Spending (Million)	\$35.7	\$15.7	\$15.3	\$66.7
		Employment	49	44	74	167

Note: Hampton Roads impact includes Virginia Beach impact. Virginia impact includes Hampton Roads and Virginia Beach impacts.

Numbers may not sum due to rounding.

Source: JobsEQ by Chmura

In the Hampton Roads region, it is estimated that Kitty Hawk South operational expenditure will generate an annual average of \$56.5 million in total impact (direct, indirect, and induced) that supports 132 jobs per year from 2032 through 2061. The total impact (direct, indirect, and induced) in Virginia is estimated to average \$66.7 million that will support 167 jobs per year from 2032 to 2061.

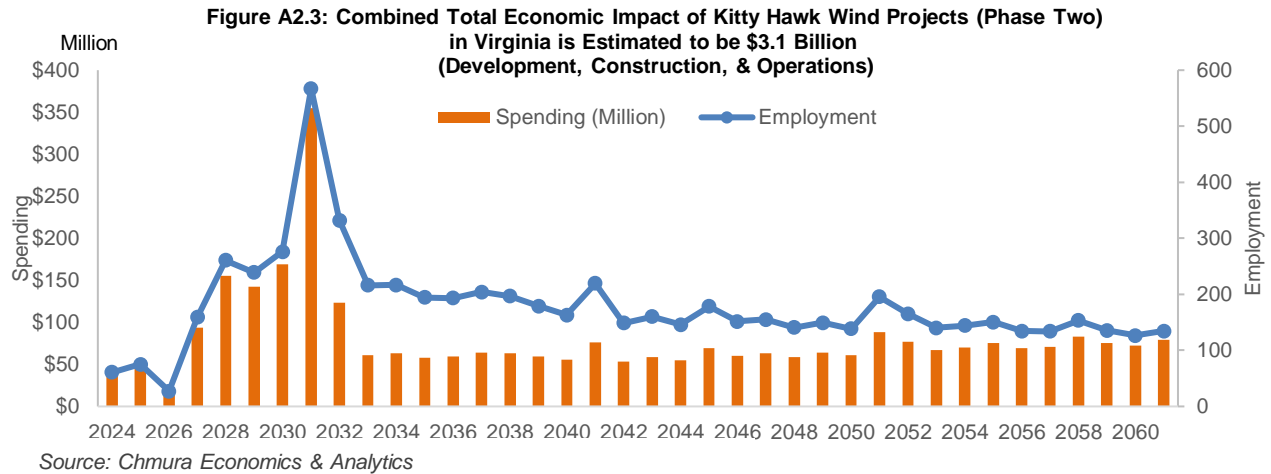
A2.1.4. Economic Impact Summary

Combining the economic impact from development, construction, and operations, Figure A2.1 summarizes the impact of Kitty Hawk South in the City of Virginia Beach from 2024 through 2061. The total economic impact (direct, indirect, and induced) is estimated to average \$27.0 million per year and is associated with an annual average of 51 jobs in the city. The cumulative impact in the city is estimated to be \$755.8 million supporting 1,418 cumulative jobs.

The economic impact of the Kitty Hawk Wind Projects in Hampton Roads is significantly larger (Figure A2.2) than in Virginia Beach. The total economic impact (direct, indirect, and induced) is estimated to average \$91.1 million per year, supporting 192 jobs annually in the region. The cumulative impact in the state is expected to be \$2.5 billion and is associated with 5,385 cumulative jobs from 2024 through 2061.

In Virginia, the total economic impact (direct, indirect, and induced) is estimated to average \$110.4 million per year, supporting 244 jobs annually in the state. The cumulative impact in the state is expected to be \$3.1 billion and is associated with 6,818 cumulative jobs from 2024 through 2061 (Figure A2.3).





A2.1. Kitty Hawk South Fiscal Impact

Table A2.4 summarizes the tax revenue for Virginia Beach, other local governments in the Hampton Roads region, and Virginia from Kitty Hawk South. It is estimated that Kitty Hawk South will generate a total of \$334.9 million in tax revenue for state and local governments from 2024 to 2061, averaging \$8.8 million per year. Of the total tax revenue, \$176.4 million will go to the City of Virginia Beach, \$85.6 million to other local governments in the Hampton Roads region, and \$72.7 million to the state government.

Table A2.4: Total Tax Revenue from Kitty Hawk South is Estimated to be \$334.9 Million

	Virginia Beach	Other Hampton Roads Localities	Virginia	Total	Annual Average
Development (2024-2031)	\$0.3	\$0.2	\$2.2	\$2.7	\$0.3
Construction (2025-2032)	\$2.2	\$0.7	\$24.4	\$27.3	\$3.4
Operations (2032-2061)	\$174.0	\$84.8	\$46.2	\$304.9	\$10.2
Total (2024-2061)	\$176.4	\$85.6	\$72.7	\$334.9	\$8.8

Note: Numbers may not sum due to rounding.

Source: Chmura

Appendix 3: Economic Impact Methodology

A3.1. Impact Methodology

Chmura understands this analysis will point non-economists toward a greater understanding of the economic and fiscal impacts of the Kitty Hawk Wind Projects. Specifically, the results from this analysis will be used to inform federal and state officials including the Bureau of Ocean and Energy Management, policy-makers, members of the public, and other stakeholders regarding the impact of the projects.

The areas in this impact study are:¹⁷

- City of Virginia Beach, Virginia
- Hampton Roads region, Virginia
- Commonwealth of Virginia

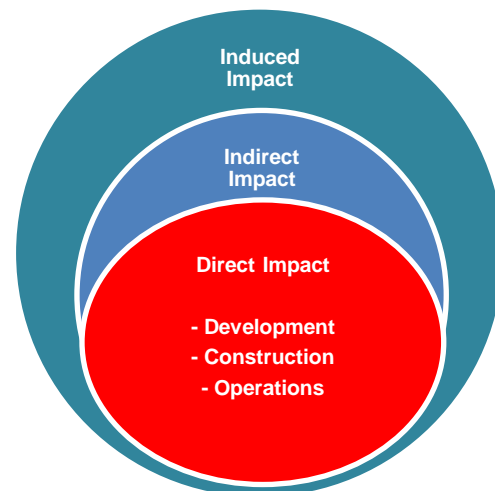
The study analyzes the Kitty Hawk Wind Projects for two phases and in aggregate:

- Kitty Hawk North: development of 816 megawatts (MW) of electricity-generating capacity
- Kitty Hawk South: implementation of 1,632 MW of electricity-generating capacity
- Aggregate: combined impact of Kitty Hawk North and Kitty Hawk South

For each phase, Chmura analyzed the economic impact of the Kitty Hawk Wind Projects from the following three stages:

- **Development.** The development stage involves activities related to projects approval. It also involves design and surveys, legal, marketing, public relations, and stakeholder engagement, among others.
- **Construction.** Construction of the Kitty Hawk Wind Projects will last for more than a decade. Many contractors in the city, region, and state will be hired for installation, transportation, and project management services. This stage also includes construction of a port facility and operations buildings throughout the region. Construction spending will benefit city, regional, and state economies.
- **Ongoing Operations.** After construction is completed, operations are expected to last 30 years for each phase. Ongoing operations and maintenance of the projects will generate sustained economic impact in the city, region, and state.

Figure A3.1: Economic Impact Analysis Framework



Source: Chmura Economics & Analytics

¹⁷ The precise definition of regions will be finalized after study proposal approval.



In economic impact analysis, total economic impact includes direct, indirect, and induced impacts. For example, construction of a project creates direct impact in a region from the purchase of construction materials and hiring of labor. The indirect impact measures the secondary benefit to the regional economy as local contractors purchase goods and services in the region. The induced impact occurs when construction workers spend money in regional consumer-related businesses such as retail, restaurants, and health care establishments.

Direct impact was estimated based on the data provided by Avangrid. Ripple impacts (indirect and induced impacts) were estimated using Chmura's JobsEQ[®] economic impact model. In this study, impacts are presented as annual average values, as are the cumulative impacts over the lifespan of the Kitty Hawk Wind Projects.

The economic impact of the projects is measured as the value of the economic activity (or spending impact) and employment. Chmura includes not only the overall indirect and induced impacts of the projects, but also impacts by industry sectors—based on major North American Industry Classification System (NAICS) codes.

For the fiscal impact analysis, Chmura estimated applicable taxes for state and local governments. For Virginia and North Carolina state governments, major tax revenue includes corporate and individual income tax and sales tax. For local governments, tax structures vary, but applicable local revenue will be property tax and local sales tax. Chmura estimated other applicable taxes through research of local tax structures.

A.3.2. Impact Analysis Glossary

Input-Output Analysis—an examination of business-business and business-consumer economic relationships capturing all monetary transactions in a given period, allowing one to calculate the effects of a change in an economic activity on the entire economy (impact analysis).

Direct Impact—economic activity generated by a project or operation. For construction, this represents the activity of the contractor; for operations, this represents activity by tenants of the property.

Overhead—construction inputs not provided by the contractor.

Indirect Impact—secondary economic activity that is generated by a project or operation. An example might be a new office building generating demand for parking garages.

Induced (Household) Impact—economic activity generated by household income resulting from direct and indirect impacts.

Ripple Effect—the sum of induced and indirect impacts. In some projects, it is more appropriate to report ripple effects than indirect and induced impacts separately.

Multiplier—the cumulative impacts of a unit change in economic activity on the entire economy.



