Kitty Hawk
OFFSHORE

Economic Impact of Kitty Hawk Offshore Wind

EXECUTIVE SUMMARY

The Kitty Hawk Offshore Wind project is projected to generate over $2 billion dollars in total economic revenue in the next decade in Virginia and Northeast North Carolina. This number was derived by calculating the total construction activity, sales, net household earnings and taxes paid at both the state and local level.

The economic impact is made up of $1.51 billion in construction activity and sales in Virginia and Hampton Roads MSA, which includes Northeast North Carolina and Southeast Virginia. Out of this overall total for the state, Hampton Roads represents $1.01 billion in construction activity alone.

The Kitty Hawk Offshore Wind project will also increase net household earnings by nearly $400 million in Virginia, of which $280 million will be in Hampton Roads.

The project will result in $101.1 million in an additional income and sales tax revenue collected by the State of Virginia and City of Virginia Beach. Of this total, $58.7 million will be paid in local taxes.

Kitty Hawk Offshore Wind spending will result in increased employment and household earnings across Virginia and Hampton Roads. Kitty Hawk Offshore Wind construction-related activities will result in an average estimated increase in employment of 736 jobs annually in Virginia. Of those 736 annual jobs, 542 will be in Hampton Roads, totaling 5,962 job years between 2020 and 2030.

Once construction is complete, Kitty Hawk Offshore Wind will support over 900 FTE (full-time equivalent) new jobs in Virginia, of which 830 FTE jobs will reside in the Hampton Roads region. These jobs will include turbine generator technicians, welders, vessel managers, and CAD technicians. Between the first year of operations and 2050, Kitty Hawk Offshore Wind operations will account for 21,675 job years.

Economic Impact of Kitty Hawk Offshore Wind

The following is the result of a net economic development and fiscal impact analysis of the Kitty Hawk Offshore Wind project, an offshore commercial wind project being developed by Avangrid Renewables, located southeast of Hampton Roads, Virginia. These results reflect the full build out of the Kitty Hawk Offshore Wind lease, of up to 2,500 MW by the year 2030.

Kitty Hawk Offshore Wind and the Offshore Wind Industry

The Kitty Hawk Offshore Wind project is an offshore wind electricity generation project that will be built on 122,405 acres of ocean space located 36 nautical miles southeast of Hampton Roads, Virginia. The project will be permitted and developed by Kitty Hawk Wind, LLC, a project of Avangrid Renewables, over the next ten years, with an anticipated completion date of 2030.

Avangrid Renewables has been conducting environmental assessments, engineering and construction studies since 2017 when the firm secured a lease for the offshore area. Avangrid Renewables has also been conducting outreach to local stakeholders to communicate the benefits that the project will bring to Virginia and Hampton Roads, including North Carolina.

Offshore wind is a growing industry in the United States. States along the Atlantic coast are leading the way by setting targets for offshore wind energy. From Massachusetts to Virginia,

states have set targets seeking 30 gigawatts of offshore wind by 2035. The Virginia Clean Economy Act seeks 5.2 gigawatts of offshore wind over the same period. Once complete, the Kitty Hawk Offshore Wind project will contribute 2.5 gigawatts towards this total.

In order to assess the net economic and fiscal impacts of Kitty Hawk Offshore Wind, data was collected from Avangrid Renewables, the U.S. Bureaus of Economic Analysis and Labor Statistics, and the National Renewable Energy Laboratory. Also reviewed were economic impact studies of other offshore wind developments, and state and local laws pertaining to the taxation of renewable energy and affiliated property. After collecting this information, a custom input-output model that estimates the net economic impacts of the Kitty Hawk Offshore Wind project was constructed, and a fiscal impact model that estimates tax revenues associated with the project.

Net Economic Impact

The net economic impact model quantifies the net economic impact of Kitty Hawk Offshore Wind project on Virginia and Hampton Roads by comparing the amount of economic activity that will occur in each region when Kitty Hawk Offshore Wind is built, to the level of economic activity in each region that would occur if Kitty Hawk Offshore Wind was not built. The model accounts for the location of expenditures made by Avangrid Renewables, as well as the impact of substitution, which occurs when project spending crowds out other spending that would have occurred in the absence of the project.

Net Fiscal Impact

The net fiscal impact model quantifies the net fiscal impact of Kitty Hawk Offshore Wind on State of Virginia income and sales tax revenues, as well as Virginia Beach property tax revenue. Similar to the net economic impact analysis, the net fiscal impact analysis compares the amount of sales, income, and property tax revenues that will occur because of the Kitty Hawk Offshore Wind project, to the level of tax revenues that would occur if Kitty Hawk Offshore Wind was not built.

For a complete description of the economic and fiscal impact methodology, see “Appendix A. Methodology” on page 12.

FINDING 1

The Kitty Hawk Offshore Wind project will produce over $2 billion dollars in total economic impact in the next decade in Virginia and Northeast North Carolina.

Avangrid Renewables plans on spending $7.5 billion to build Kitty Hawk Offshore Wind, and will source parts, labor, and other professional services from around the globe. It is estimated that Avangrid Renewables will spend $922 million of this in Virginia, of which $821 million will be spent in the Hampton Roads region. Avangrid Renewables spending in Virginia and Hampton Roads will include expenditures for turbine foundations for the wind turbines, on-shore electrical substation components, an on-shore operations building, land, and permitting and legal fees.

Because of Kitty Hawk Offshore Wind's size and scope, a portion of Avangrid Renewables spending will crowd out other spending that would have occurred in absence of the project. After accounting for the location of construction spending and crowding out (substitution), it is estimated that total net new construction expenditures will total $880 million in Virginia, of which $673 million will be in the Hampton Roads, between 2020 and 2030, as shown in Table 1 below.

TABLE 1. Kitty Hawk Offshore Wind Net New Construction Activities Spending in Virginia and Hampton Roads, 2020-2030 (millions)

	Net New Construction Activities Spending	
Construction Component	**Virginia**	**Hampton Roads**
Turbine Foundations	$354.0	$298.1
On-shore Substation	$158.0	$99.8
On-shore Operations Building	$21.6	$21.6
Engineering & Surveys	$68.9	$58.1
Permitting	$39.8	$39.8
Legal	$17.9	$17.9
Land	$7.1	$3.6
Other Components	$212.8	$134.4
Total:	**$880.1**	**$673.1**

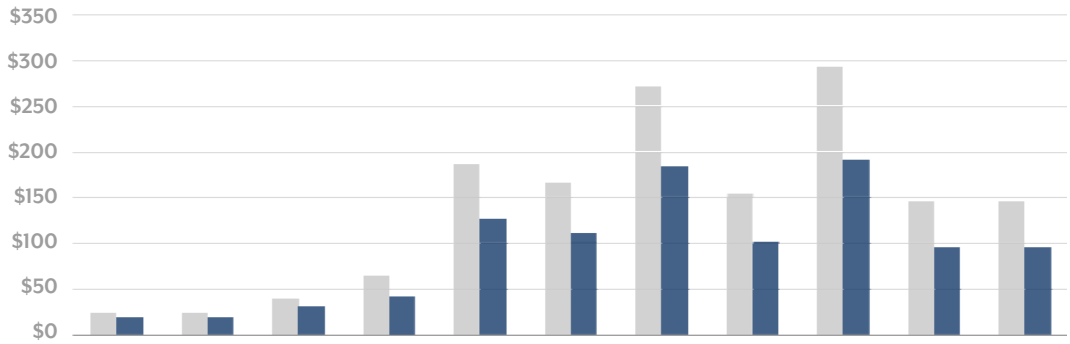
Source: Analysis of base data from Avangrid Renewables, U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, National Renewable Energy Laboratory.

FINDING 2

Over the next 11 years, Kitty Hawk Offshore Wind construction activities will increase sales by Virginia businesses by $1.5 billion, of which will include a $1.0 billion sales increase by businesses in Hampton Roads.

Avangrid Renewables spending on construction-related goods and services will result in increased sales for businesses across Virginia and Hampton Roads. This spending will recirculate through Virginia and Hampton Roads as suppliers purchase goods and services to meet Avangrid Renewables needs, and those suppliers purchase additional goods and services, and so on. Of this $1.5 billion increase in sales (output) by Virginia businesses, $922 million will be for construction-related sales statewide. Out of the $1.0 billion increase in sales (output) that comes out of the Hampton Roads region, $821 million will be in construction-related sales just for the Hampton Roads. The output impact of Kitty Hawk Offshore Wind by year is shown in Figure 1 below.

FIGURE 1. Kitty Hawk Offshore Wind Construction-Related Activities Net Impact on Output, 2020-2030 (millions)



	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Virginia	$23.5	$23.8	$39.2	$64.6	$185.9	$165.7	$271.5	$154.0	$292.4	$146.2	$146.2
Hampton Roads	$18.9	$18.9	$30.8	$41.8	$126.3	$110.5	$183.4	$101.2	$190.7	$95.4	$95.4

Source: Analysis of base data from Avangrid Renewables, U.S. Bureau of Economic Analysis RIMS II Economic Impact Multipliers, National Renewable Energy Laboratory.

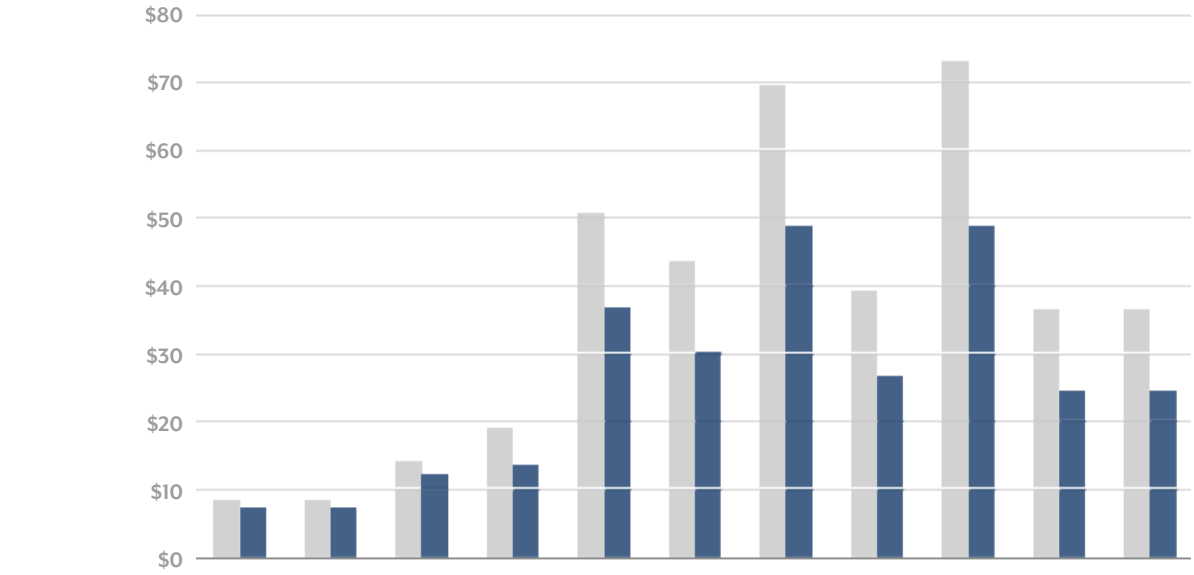
FINDING 3

The Kitty Hawk Offshore Wind project will alone increase net household earnings by nearly $400 million in Virginia, of which $280 million will be in Hampton Roads.

These figures represent the cumulative 11 year construction period resulting in an earnings increase of nearly $400 million to Virginia residents, of which $281 million in earnings increase to Hampton Roads residents. Figure 2 below represents this.

Also, once construction is complete, Kitty Hawk Offshore Wind operations alone will support nearly $100 million in new annual household earnings in Virginia, of which over $90 million in annual household earnings will be in the Hampton Roads.

FIGURE 2. Kitty Hawk Offshore Wind Construction-Related Activities Net Impact on Household Earnings, 2020-2030



	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Virginia	$8.3	$8.4	$13.9	$19.1	$50.6	$43.5	$69.4	$39.2	$73.0	$36.5	$36.5
Hampton Roads	$7.3	$7.4	$12.1	$13.6	$36.6	$30.4	$48.7	$26.7	$48.9	$24.5	$24.5

Source: Analysis of base data from Avangrid Renewables, U.S. Bureau of Economic Analysis RIMS II Economic Impact Multipliers, National Renewable Energy Laboratory.

FINDING 4

Between 2020 and 2030, Kitty Hawk Offshore Wind project will generate an additional $101 million in income and sales tax revenues for the State of Virginia, and the City of Virginia Beach.

The increased economic activity caused by Kitty Hawk Offshore Wind project will generate several new types of taxes for state and local government. These include:

- Sales tax revenue generated from construction materials purchased in Virginia;
- Income tax revenue from taxes paid on increased household earnings;
- Sales tax revenue generated from new household earnings spent in Virginia; and
- Increased property tax revenue for the City of Virginia Beach due to construction of an on-shore substation and operations and maintenance facility.

Between 2020 and 2030, Kitty Hawk Offshore Wind will generate an additional $101 million in tax revenue for state and local governments - $42.4 million for the State of Virginia and $58.7 million for the City of Virginia Beach. After construction is complete in 2030, the ongoing fiscal impact of the project will be nearly $11.4 million annually, consisting of $4 million in state revenue and $7.4 million in local property tax revenue as shown in Table 2 below.[1]

TABLE 2. Kitty Hawk Offshore Wind Net Fiscal Impact of Construction-Related Activities and Operations

	Net Fiscal Impact (millions)	
Revenue Type	**2020-2030[a] (cumulative)**	**2031+ (annual)**
Income	$21.7	$2.9
Sales	$20.7	$1.1
Property[b]	$58.7	$7.4
Net Fiscal Impact:	**$101.1**	**$11.4**

(a) Construction-related spending will occur between 2020 and 2030. Operations spending begins in 2026 at a reduced level, and reaches full spending in 2030.
(b) First year of taxable property will be 2024.

Source: Analysis of base data from Avangrid Renewables, U.S. Bureau of Economic Analysis RIMS II Economic Impact Multipliers, U.S. Bureau of Labor Statistics Consumer Expenditure Survey, Tax Foundation, State of Virginia Corporation Tax Commission, City of Virginia Beach Assessor.

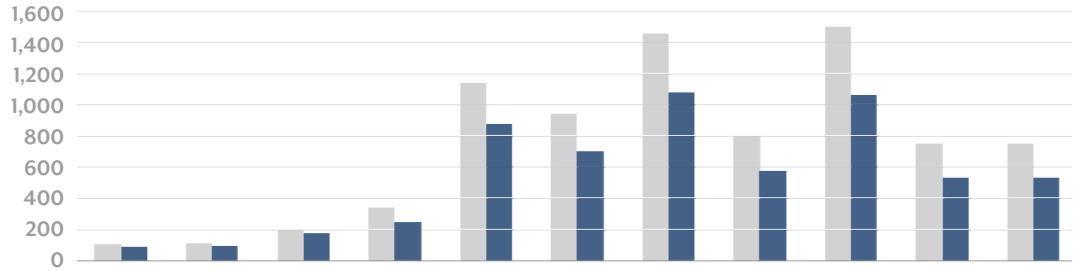
1. In addition to generating the tax revenue discussed above, Avangrid Renewables could potentially pay corporate income taxes in Virginia. Because the amount Avangrid Renewables would pay would depend on a number of unknown factors, these potential revenues are not estimated.

FINDING 5

Kitty Hawk Offshore Wind construction-related activities will result in an average estimated increase in employment of 736 jobs annually in Virginia. Once construction is complete, Kitty Hawk Offshore Wind will support over 900 FTE (full time equivalent) new jobs in Virginia, of which 830 FTE jobs will be in the Hampton Roads Region.

Of the 736 construction-related jobs created annually in Virginia, they will total 8,097 job years between 2020 and 2030. Of these 736 annual jobs, 542 will be in Hampton Roads, totaling 5,962 job years between 2020 and 2030 just in the Hampton Roads. See Figure 3 below.

FIGURE 3. Kitty Hawk Offshore Wind Construction-Related Activities Net Impact on Employment, 2020-2030 (millions)



	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Virginia	104	110	202	342	1,136	943	1,457	804	1,499	750	750
Hampton Roads	90	95	176	244	876	703	1,079	575	1,060	530	530

Source: Analysis of base data from Avangrid Renewables, U.S. Bureau of Economic Analysis RIMS II Economic Impact Multipliers, National Renewable Energy Laboratory.

Avangrid Renewables will build an on-shore facility to support wind project operations as each phase of construction-related activities concludes. By 2030, this new facility will be home to nearly 200 full-time Avangrid Renewables employees and contractors (“direct” jobs), including turbine generator technicians, welders, vessel managers, and CAD technicians. Facility operations will support a total of 929 (193 full-time direct jobs, plus 736 indirect jobs) jobs annually across Virginia by 2030. Between the first year of operations in 2025 until 2050, Kitty Hawk

Offshore Wind operations will account for 21,675 job years.Kitty Hawk Offshore Wind operations will also support 830 jobs (193 full-time direct jobs, plus 637 indirect jobs) in Hampton Roads by 2030. Between 2025 and 2050, these jobs will account for 19,366 job years.

As previously stated, Kitty Hawk Offshore Wind operations will also support nearly $100 million in new annual household earnings in Virginia, of which over $90 million in annual household earnings will be in the Hampton Roads. Employment totals by year are located in Table 3 below.

TABLE 3. Kitty Hawk Offshore Wind Net Economic Impact of Operations

Impact Type	2025	2026	2027	2028	2029	2030+
Virginia						
Earnings (millions)	$0	$42.0	$42.0	$71.8	$71.8	$99.0
Employment	0	409	409	674	674	929
Hampton Roads						
Earnings (millions)	$0	$39.3	$39.3	$67.2	$67.2	$92.6
Employment	0	366	366	602	602	830

Source: Analysis of base data from Avangrid Renewables, U.S. Bureau of Economic Analysis RIMS II Economic Impact Multipliers, National Renewable Energy Laboratory.

FINDING 6

It is expected that Kitty Hawk Offshore Wind will attract new offshore wind parts manufacturers and suppliers to Virginia or Hampton Roads, making the economic and fiscal impacts of the project larger than those estimated above.

The offshore wind industry is an emerging industry with significant growth potential in the next decade. Multiple states along the eastern seaboard are seeking deployment of approximately 30 gigawatts of offshore wind energy by 2035. The Department of Energy's Offshore Wind Vision envisages 86 gigawatts deployed by 2050.

Because the industry has not fully developed in the U.S., offshore wind projects rely heavily on international suppliers and expertise. The U.S. Department of Energy notes that, to date, "there has yet to be a U.S.-flagged [offshore wind project] installation vessel or any [offshore wind project] domestic manufacturing center built" in the United States.[2]

As more projects are built in the U.S., suppliers will increasingly see the value in locating on the East Coast to be close to developers and other manufacturers. If Virginia is able to attract upstream suppliers to the state, Avangrid Renewables will likely shift some if its planned international spending to Virginia or specifically, Hampton Roads. The domestic offshore wind industry is already seeing significant growth, with manufacturers announcing investments of over $340 million in manufacturing and supply chain facilities. It is very likely that Avangrid Renewables will be able to switch a portion of its planned future expenditures from international suppliers to suppliers in the United States, increasing the size of the economic impacts projected here.

In addition to bringing new offshore wind suppliers to the United States, Kitty Hawk Offshore Wind will also bring a wealth of offshore wind knowledge to Virginia and Hampton Roads. Kitty Hawk Offshore Wind's uniquely large scale will require knowledge sharing between Avangrid Renewables and U.S. based firms that support the project. This knowledge "spillover" could help Hampton Roads and Virginia become a hub for offshore wind development expertise.

2. U.S. Department of Energy 2018 Offshore Wind Technologies Market Report.

Appendix A. Methodology

Described below are the analytical steps taken to assess the net economic and fiscal impacts of Kitty Hawk Offshore Wind.

Net Economic Impact Analysis

Net Economic Impact Defined. Net economic impact of the Kitty Hawk Offshore Wind project is defined as the new economic activity that will occur in Virginia or the Hampton Roads Metropolitan Statistical Area as a result of the project. The amount of new economic activity that will be caused by the project is quantified in terms of three measures—output, earnings, and employment. Output is the additional sales by businesses that will occur in Virginia and Hampton Roads as a result of the project. Earnings are the increased household earnings that will occur due to the project, while employment is the total increase in jobs caused by the project.

The economic impacts of Kitty Hawk Offshore Wind occur primarily from two sources—construction and operations. Avangrid Renewables anticipates that the bulk of construction activity for the project will occur between 2024 and 2030. The economic impacts of project construction are temporary impacts that will cease once construction is complete. Avangrid Renewables anticipates that normal operations spending will begin in 2026, coinciding with the completion of the first phase of construction. Operations spending will continue to grow until 2030 when all phases of construction are complete, after which point anticipated spending will level off. Unlike the economic impacts of construction, the economic impacts of operations are permanent.

Construction Economic Impact Methodology. The net economic impact of project construction was estimated by reviewing Avangrid Renewables budget documents for the project's development and categorizing construction expenditures by industry. It was then determined which of these expenditures will happen in Virginia or Hampton Roads. In the model, only spending that will happen in either region will have an economic impact. For example, Avangrid Renewables plans to purchase most of the components of the offshore wind turbines from suppliers not located in Virginia. This spending does not have an economic impact in Virginia or Hampton Roads since it will occur outside of the state.

After determining the total new spending that will occur in each region, a substitution rate is estimated for each spending category. Substitution occurs when Avangrid Renewables spending

crowds out other spending that would have occurred in the absence of the project. For example, if Avangrid Renewables spends $354 million in Virginia on foundation components for Kitty Hawk Offshore Wind, this spending could crowd out other expenditures that would be made to fabricated metals manufacturers in Virginia or Hampton Roads if the project had not been undertaken.

It is estimated that the overall substitution rate for Kitty Hawk Offshore Wind construction will be 9.2% in Virginia, and 18.9% in Hampton Roads, reflecting the larger size of the Virginia economy and its greater ability to absorb new construction-related demand.[3]

The estimates of construction spending by major category in Virginia are shown in Table 4 below, and our estimates for Hampton Roads in Table 5 on page 14.

TABLE 4. Kitty Hawk Offshore Wind Project Net New Construction-Related Spending in Virginia

Construction Activity Component	Percent Spend in Virginia	Substitution Rate	Net New Spending in Virginia (millions)
Foundations	30%	5%	$354.0
On-shore Substation	70%	5%	$158.0
O&M Building (onshore)	100%	0%	$21.6
Engineering & Surveying	30%	5%	$68.9
Land	100%	0%	$39.8
Permitting	20%	0%	$17.9
Legal	40%	0%	$7.1
Other Components	4%	5%	$212.8
Total:	12.3%	9.2%[a]	**$880.1**

(a) calculated substitution excludes land transaction costs.

Source: Analysis of base data from Avangrid Renewables, U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, National Renewable Energy Laboratory.

3. Land and property transactions are excluded from economic impact models since the transaction represents the transfer of an asset, not the creation of additional economic value.

TABLE 5. Kitty Hawk Offshore Wind Project Net New Construction-Related Spending in Hampton Roads (millions)

Construction Activity Component	Percent Spend in Hampton Roads	Substitution Rate	Net New Spending in Hampton (millions)
Foundations	30%	20%	$298.1
On-shore Substation	52.5%	20%	$99.8
O&M Building (onshore)	100%	0%	$21.6
Engineering & Surveying	30%	20%	$58.1
Land	100%	0%	$39.8
Permitting	20%	0%	$17.9
Legal	20%	0%	$3.6
Other Components	3%	20%	$134.4
Total:	11.0%	18.9%[a]	**$673.1**

(a) calculated substitution excludes land transaction costs.

Source: Analysis of base data from Avangrid Renewables, U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, National Renewable Energy Laboratory.

After determining total spending in Virginia and Hampton Roads, a construction timeline was used to determine which years Avangrid Renewables will make expenditures for various construction items.

The direct "net new" expenditures (i.e. total expenditures after accounting for substitution) that Avangrid Renewables will make in each region to build Kitty Hawk Offshore Wind will spark successive rounds of new expenditures in each region as Kitty Hawk Offshore Wind suppliers pay their workers and purchase inputs, and those suppliers then pay their workers and suppliers, and so on. In economic impact modeling, these successive rounds of spending are known as "indirect" impacts. In order to quantify indirect impacts, the U.S. Bureau of Economic Analysis RIMS II economic impact multipliers were applied to the estimates of net new direct spending. The sum of direct and indirect construction impacts is the total economic impact of construction. The net economic impact of construction by year in Tables 6 and 7 on page 18.

Operations Economic Impact Methodology. Avangrid Renewables plans to establish and maintain staff in Virginia Beach to manage Kitty Hawk Offshore Wind beginning in 2026. Based upon Avangrid Renewables estimates of on-site employment from 2026 to 2030, as well as total payroll spending by year, Avangrid Renewables anticipates hiring 25 employees and 60 contractors to manage operations beginning in 2026. The total number of employees and contractors will increase to 193 by 2030. Employees will have an annual average salary of $125,000 to $135,000 per year, and contractors will be compensated similarly.

This information was used to estimate the direct and indirect employment and earnings impacts of Kitty Hawk Offshore Wind operations in Virginia and Hampton Roads. The assumption was that all Kitty Hawk Offshore Wind operations employees and contractors will work in Hampton Roads. Also assumed that unlike construction expenditures, there will be no substitution impacts due to operations, since project operations will entail much less spending than construction. The net impacts of operations by year are shown in Tables 6 and 7 on page 18. Output impacts from Kitty Hawk Offshore Wind operations are not estimated, since Avangrid Renewables was unable to provide us with information about project operations. In absence of this information, it is assumed that the operations spending will have a spending pattern similar to that of a standard utility operations facility.

Fiscal Impact Analysis

Some of the economic activity caused by Kitty Hawk Offshore Wind project will be subject to state and local taxes, such as:

Avangrid Renewables expenditures on construction materials will be subject to sales taxes; Earnings caused by the project will be subject to Virginia income taxes; A portion of new earnings that are spent in Virginia will be subject to sales taxes; and New property constructed by Avangrid Renewables will be subject to Virginia Beach property taxes.

Each of these impacts by year are shown in Table 8 on page 19, and the analysis steps are shown below.

Construction Materials Sales Tax. Any construction materials that Avangrid Renewables purchases in Virginia will be subject to the Virginia sales tax of 5.3%. Avangrid Renewables construction budget identified several items that will be purchased in Virginia, including materials for turbine foundations and the on-shore substation.[4] Since Avangrid Renewables did not have a detailed breakdown of material and labor costs for these items, a simplifying assumption was made that 40% of the budgeted capital costs for these components will be for labor. After accounting for a 5% substitution rate, and the state's 5.3% sales tax rate, the cumulative sales tax impact from construction material purchases is estimated to be $13.8 million from 2024 through 2030.

Household Spending Sales Tax. A portion of the new household earnings generated by Kitty Hawk Offshore Wind will be spent on taxable goods and services in Virginia. The sales tax impact of earnings spent by these households are estimated by first quantifying the total direct and indirect earnings impacts of the project. Direct earnings are those earnings paid to new employees of Avangrid Renewables. Indirect earnings are those earnings generated by Avangrid Renewables spending that go to individuals not employed by Avangrid Renewables. For example, some of the indirect household earnings from construction spending will go to manufacturing workers who increase their hours in order to meet Avangrid Renewables demand for turbine foundations.

Avangrid Renewables plans to create nearly 200 direct jobs by 2031, including contractors and Avangrid Renewables employees. These jobs will have an average compensation of $150,000 to $160,000 including benefits. Based on data from the U.S. Bureau of Labor Statistics Consumer Expenditure Survey, it is estimated that each employee will spend approximately 70% of their earnings, and that 34.2% of these earnings will be subject to Virginia's 5.3% sales tax.

Since there is less information at this time about where indirect earnings go (whether these indirect earnings are creating new jobs or simply increasing the earnings of existing workers), a conservative assumption was made that a smaller portion of indirect income—45.2%—will be spent. This reflects the spending patterns of middle class households in the Hampton Roads region that make $50,000 to $70,000 dollars per year. Also assumed, like direct earnings, 34.2% of indirect earnings will be subject to Virginia sales tax.

4. Note: operations building materials purchases were excluded from this component of the analysis due to lack of information about the building.

Income Tax. The new earnings generated by Kitty Hawk Offshore Wind will be subject to Virginia income tax. Income tax collections were estimated separately for direct and indirect earnings, as was done for the sales tax estimates. For new jobs created by Avangrid Renewables, total annual salaries were used and subtracted from this, a standard $12,500 deduction per worker, and then applied the Virginia individual income tax rates to each respective income tier of each worker. Indirect earnings was assumed to be taxed at an average rate of 3.02%—the effective income tax rate reported by the State of Virginia in its 2019 Comprehensive Annual Financial Report.

Property Tax. The Kitty Hawk Offshore Wind project will be built primarily offshore. However, two components of the project will be built on-shore—the operations building and the on-shore electrical substation. The assessed value of each property was estimated, and then applied an estimated Virginia Beach property tax rate to determine the tax revenue that will be generated by each component of the project. Several individuals at the City of Virginia Beach and the Virginia Corporation Commission were contacted to determine how the building and substation will be assessed. According to the Corporation Commission, property in Virginia is assessed at market value, or slightly less than market value. Based on guidance received by the Corporation Commission, it was assumed that the substation and operations buildings will be assessed at 90% of their construction costs through 2030.

After estimating the assessed value of each property, an estimated property tax rate for Virginia Beach was applied for future years. The current property tax rate in Virginia Beach is $1.0025 per $100 of property. Based on historic property tax rate increases, property tax rates will increase by roughly 1% each year through 2030 was used as an assumption.

Appendix B. Tables

TABLE 6. Kitty Hawk Offshore Wind Net Economic Impact on Virginia

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Construction											
Output (millions)	$23.5	$23.8	$39.2	$64.6	$185.9	$165.7	$271.5	$154.0	$292.4	$146.2	$146.2
Earnings (millions)	$8.3	$8.4	$13.9	$19.1	$50.6	$43.5	$69.4	$39.2	$73.0	$36.5	$36.5
Employment	104	110	202	342	1,136	943	1,457	804	1,499	750	750
Operations											
Earnings (millions)							$42.0	$42.0	$71.8	$71.8	$99.0
Employment							409	409	674	674	929
Total Impact											
Output	$23.5	$23.8	$39.2	$64.6	$185.9	$165.7	$271.5	$154.0	$292.4	$146.2	$146.2
Earnings	$8.3	$8.4	$13.9	$19.1	$50.6	$43.5	$111.4	$81.2	$144.8	$108.3	$135.5
Employment	104	110	202	342	1,136	943	1,866	1,213	2,173	1,424	1,679

Source: Analysis of base data from Avangrid Renewables, U.S. Bureau of Economic Analysis RIMS II Economic Impact Multipliers, National Renewable Energy Laboratory.

TABLE 7. Kitty Hawk Offshore Wind Net Economic Impact on Hampton Roads

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Construction											
Output (millions)	$18.9	$18.9	$30.8	$41.8	$126.3	$110.5	$183.4	$101.2	$190.7	$95.4	$95.4
Earnings (millions)	$7.3	$7.4	$12.1	$13.6	$36.6	$30.4	$48.7	$26.7	$48.9	$24.5	$24.5
Employment	90	95	176	244	876	703	1,079	575	1,060	530	530
Operations											
Earnings (millions)							$39.3	$39.3	$67.2	$67.2	$92.6
Employment							366	366	602	602	830
Total Impact											
Output	$18.9	$18.9	$30.8	$41.8	$126.3	$110.5	$183.4	$101.2	$190.7	$95.4	$95.4
Earnings	$7.3	$7.4	$12.1	$13.6	$36.6	$30.4	$88.0	$66.0	$116.1	$91.7	$117.1
Employment	90	95	176	244	876	703	1,445	941	1,662	1,132	1,360

Source: Analysis of base data from Avangrid Renewables, U.S. Bureau of Economic Analysis RIMS II Economic Impact Multipliers, National Renewable Energy Laboratory.

TABLE 8. Kitty Hawk Offshore Wind Net Fiscal Impact on Virginia and Virginia Beach, by Year (millions)

Tax Revenue Source	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Income Tax	$0.3	$0.3	$0.4	$0.6	$1.5	$1.3	$3.4	$2.5	$4.3	$3.2	$4.0
Sales Tax	$0.1	$0.1	$0.1	$0.2	$2.0	$1.9	$3.8	$2.4	$4.5	$2.7	$3.0
Property Tax	$0.8	$1.5	$3.1	$3.9	$5.6	$6.4	$7.3	$7.4	$7.5	$7.5	$7.6
Total	**$1.1**	**$1.9**	**$3.7**	**$4.7**	**$9.1**	**$9.7**	**$14.5**	**$12.2**	**$16.3**	**$13.4**	**$14.6**

Source: Analysis of base data from Avangrid Renewables, U.S. Bureau of Economic Analysis RIMS II Economic Impact Multipliers, U.S. Bureau of Labor Statistics Consumer Expenditure Survey, Tax Foundation, State of Virginia Corporation Tax Commission, City of Virginia Beach Assessor.

Appendix C. Works Consulted

Cost estimates from Avangrid Renewables.

DeOrsey, A., (2017), “Rhode Island “Energy 2035”: Economic Outcomes of an Increased Offshore Wind Energy Target,” Harvard University.

BW Research Partnership, (2018), “Offshore Wind Farms Economic Impact Analysis,” . http://www.bwresearch.com/.

BVG Associates, (2018), “The Virginia Advantage: The Roadmap for the Offshore Wind Supply Chain in Virginia,” .

City of Virginia Beach real estate tax rates, (2019). https://www.vbgov.com/.

National Renewable Energy Laboratory Jobs and Economic Development Impacts model for offshore wind developments. https://www.nrel.gov/.

Phone conversations with the Virginia State Corporation Commission on taxation of utility property.

State of Virginia Comprehensive Annual Financial Report for the Fiscal Year ending June 30, 2019. https://www.doa.virginia.gov/.

Tax Foundation Individual Income Tax Rates, (2019). http://www.taxfoundation.org/.

U.S. Bureau of Economic Analysis RIMS II Economic Impact Multipliers for the State of Virginia and the Hampton Roads Metropolitan Statistical Area.

U.S. Bureau of Economic Analysis State and Metropolitan GDP data.

U.S. Bureau of Labor Statistics Consumer Expenditure Survey for the Northeastern U.S. Census Region, (2018).

U.S. Department of Energy, “2018 Offshore Wind Technologies Market Report.” https:// www.energy.gov/, (2018).

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