State of Oklahoma
Incentive Evaluation Commission
Draft Tax Credit for Electricity Generated by Zero Emissions Facilities Evaluation

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Contents

Key Findings and Recommendations

Overview

The tax credit for electricity generated by zero emissions facilities was signed into law in 2001, allowing the first credits to be claimed in tax year 2002. For qualifying facilities, the program offers a $0.005 refundable credit per kilowatt-hour of energy generated by zero emissions facilities for a period of 10 years. Qualifying facilities include those that generate electricity from wind, moving water, sun, or geothermal energy and have a rated production capacity of at least one megawatt. Wind facilities have been the most common credit recipients, but changes to statute in 2017 removed wind from the list of eligible energy sources; wind facilities placed into service on or after July 1, 2017 are no longer eligible for the tax credit. No new credits can be claimed after December 31, 2021.

Since the program's last evaluation in 2016, the program's sunset for wind facilities was moved from January 1, 2021 to July 1, 2017. In 2019, the Legislature also added an annual cap of $500,000 for credits claimed by non-wind facilities.

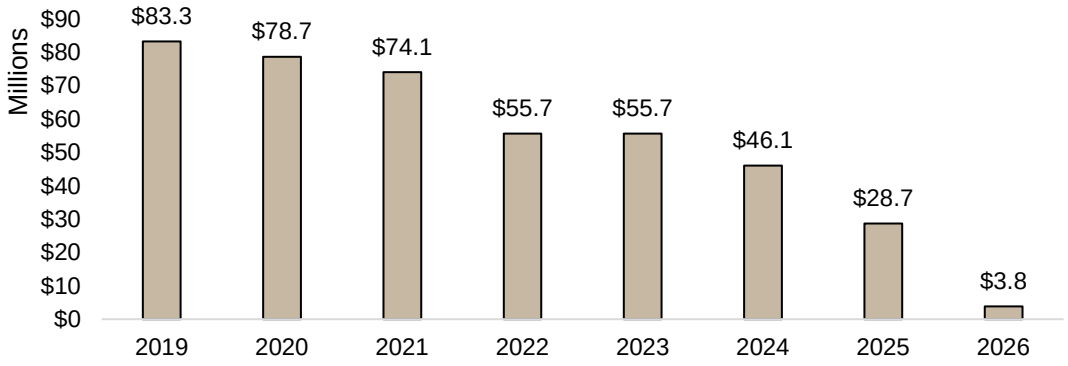
Recommendation: Retain and allow the program to sunset as scheduled.

Key Findings Related to Established Criteria for Evaluation

- **From FY 2012 to FY 2019, the amount of credits used to offset tax liability or refunded (total state cost) increased dramatically, from $2.3 million to $88.0 million.** In FY 2015, when taxpayers began to be required to refund unused tax credits at 85.0 percent of face value rather than carry them forward, total state cost increased from $27.6 million to $59.8 million, with refunded credits accounting for 75.3 percent of the total. In 2018, refunded credits accounted for 99.8 percent of total state cost.

- **Wind facilities will continue to generate tax credits through tax year 2026.** Although wind facilities placed in service after July 1, 2017 are not able to claim the credit, facilities placed in service earlier are able to make claims for their 10-year credit period. This means some wind facilities will still be able to claim the credit through tax year 2026. The Oklahoma Tax Commission (OTC) does not maintain projections of future claims by these facilities. The project team was able to project the potential remaining cost of wind facilities based on added wind capacity in the State over the last several years, according to data from the Energy Information Administration (EIA). These estimates show the potential for over $400 million in tax credits to be generated by wind facilities in tax years 2019 through 2026.[1]

Figure 1: Estimated Potential Credit Claims, Tax Year 2019 through 2026

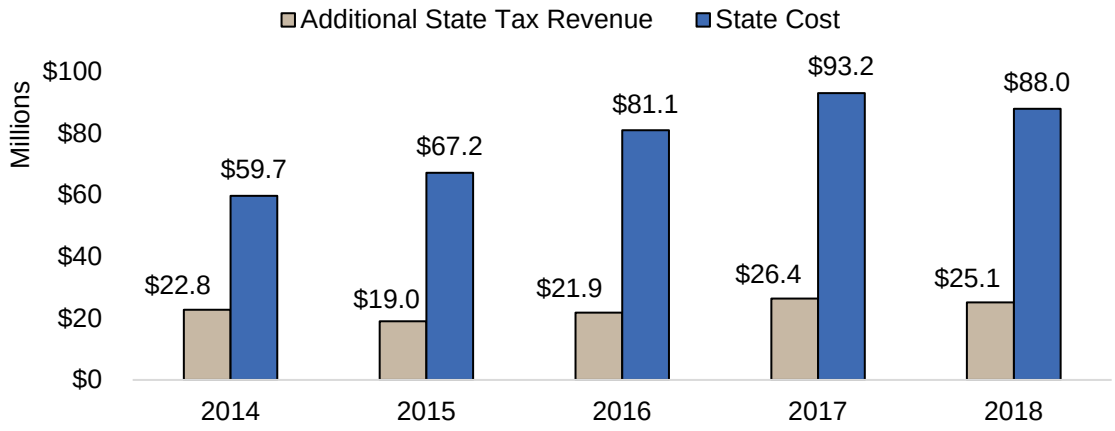


[1] Estimates Energy Information Administration data on capacity factors at the time capacity was added. Projections assume no increase in capacity factors in the years following addition which may increase the potential claims.

- **By sunsetting the program for wind facilities in 2017, the State avoided a potential $177.2 million over 10 years in tax credit claims based on wind generating capacity added to the State in 2018 alone.** This is based on 1,162 MW of nameplate capacity added to the State in 2018 according to EIA data. Assuming all this generating capacity was at newly qualified facilities, it would have the potential to generate 3.5 million MWh of electricity per year, equivalent to $17.7 million in tax credits.

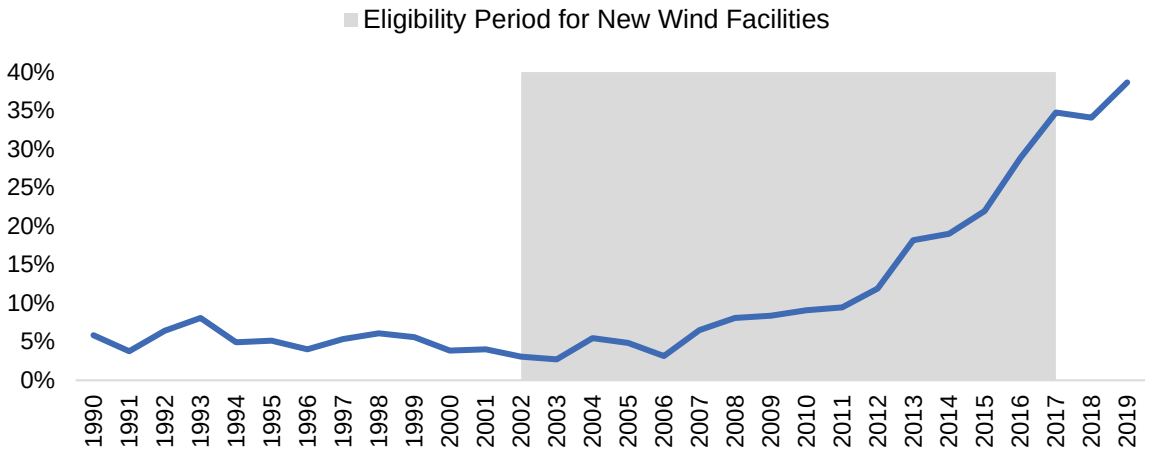
- **From FY 2015 through FY 2019, the program returned between $0.27 to $0.38 in tax revenue for each dollar spent by the State.** In FY 2019, facilities receiving credits generated an estimated $25.1 million in additional State tax revenue while $88.0 million in tax credits were refunded or used to offset tax liability, representing a return of $0.29 per dollar spent by the State that year.

Figure 2: Fiscal Impact



- **Over the life of the credit for wind facilities, renewable energy as a share of all electricity generated in the State increased from 3.1 percent in 2002 to 34.7 percent in 2017.** From 1990 through 2001 prior to the credit, renewable energy accounted for an average of 5.3 percent of total energy generation in Oklahoma annually. In 2019, this percentage increased to 38.7.

Figure 3: Renewable Energy Share of Total Electricity Generated in Oklahoma



Source: US Energy Information Administration

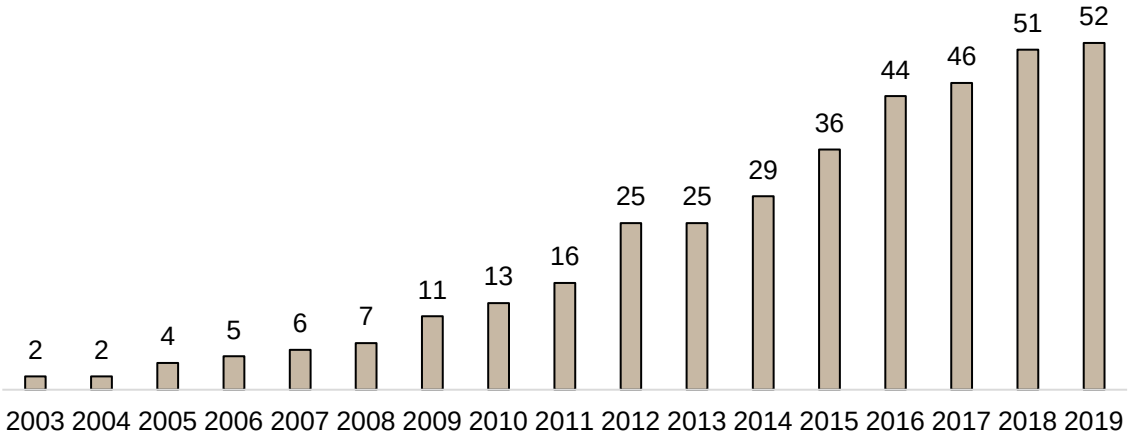
- **In 2017, the last year of eligibility for new wind facilities, wind accounted for 92.1 percent of the State's renewable energy generation.** This percentage increased to 93.1 percent in 2018 but

declined to 88.1 percent in 2019. This decline was driven by an increase in hydroelectric power generation which nearly doubled from 2.0 million megawatt hours (MWh) to 3.9 million from 2018 to 2019. From 1990 to 2001 prior to the credit, hydroelectric power was responsible for nearly all renewable energy produced in the State. Wind power was first generated in Oklahoma in 2003 and accounted for just 3.3 percent of renewable energy produced in the State that year.

- **In 2017, electricity qualifying for the credit accounted for 85.9 percent of total wind electricity generated statewide.** Generation associated with the credit was 20.3 million megawatt-hours while a total of 23.6 million megawatt-hours of wind electricity was generated statewide.

- **A total of 46 wind facilities were placed into operation over the life of the credit program.** Over the life of the program, facilities increased from 2 in 2003 to 46 in 2017.[2] The EIA does not have data on wind facilities in the State prior to 2003. However, the US Wind Turbine Database, created by the US Department of Energy, shows a total of just 6 turbines in service in two counties in the State prior to 2003.[3] Since the last year of eligibility for new wind facilities in 2017, 6 facilities have been added, bringing the State's total to 52 in 2019.

Figure 4: Wind Power Facilities in Oklahoma

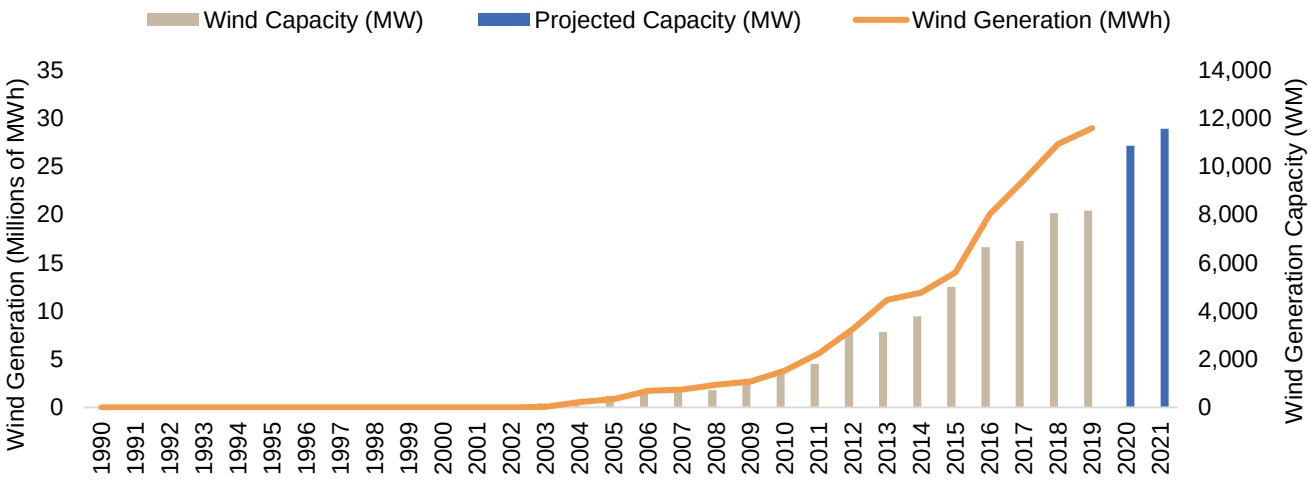


Source: Energy Information Administration

- **Wind electricity capacity and generation has continued to increase following the end of credit eligibility.** In 2018, 1,1162.3 megawatts of wind capacity were added in the State, followed by another 100 megawatts in 2019. According to the EIA's survey of planned capacity additions, another 3,409.4 megawatts will be added in 2020 and 2021.

[2] To be eligible for the credit, wind facilities must be in operation by July 31, 2017.
[3] United States Wind Turbine Database. Accessed electronically at: https://eerscmap.usgs.gov/uswtdb/

Figure 5: Wind Electricity Capacity and Generation in Oklahoma, 1990-2021[4]



Source: US Energy Information Administration

- **While the industry has experienced significant growth (in terms of facilities and power generated), it has not had an equivalent direct impact on employment.** According to U.S. Bureau of Labor Statistics data, the wind electric power generation industry employed just 178 people in Oklahoma in 2018.

- **Electricity prices in Oklahoma have been consistently lower than the national average since 2001.** Over this period, average electricity prices increased 45.4 percent nationally, but only increased 26.9 percent in Oklahoma.

[4] Projected capacity calculated using planned addition data from the US Energy Information Administration

Introduction

Incentive Evaluation Commission Overview

In 2015, HB2182 established the Oklahoma Incentive Evaluation Commission (the Commission). It requires the Commission to conduct evaluations of all qualified state incentives over a four-year timeframe. Between 2016 and 2019, the Commission conducted more than 40 evaluations.

The Tax Credit for Electricity Generated by Zero Emissions Facilities, first evaluated in 2016, is one of nine programs scheduled for an updated review by the Commission in 2020. Based on this evaluation and their collective judgment, the Commission will make recommendations to the Governor and the Legislature.

2016 Evaluation Findings and Recommendations

Key findings from PFM's 2016 evaluation of this program are displayed in the following table:

Fiscal and Economic Impact	The amount of credits claimed increased rapidly between 2010 and 2014, from $3.7 million to $113.2 million. Tax revenue generated by projects over this period totaled $73.8 million.
Adequate Protections for Future Fiscal Impact?	No, there has been a significant increase in costs with the potential to accelerate in future years and the program has no caps in place.
Effective Administration?	Yes. Administration is straight-forward, but there is some concern that the tax credit reporting is not sufficient for revenue estimating.
Achieving Its Goals?	Yes, the program has achieved its goal of supporting the renewable energy industry and the State was able to meet its renewable energy goals.
Changes to Improve Future Evaluation	Increase reporting requirements related to expected energy generation and use of state credits.

2020 Criteria for Evaluation

The provisions of HB 2182 require that criteria specific to each incentive be used for the evaluation. A key factor in evaluating the effectiveness of incentive programs is to determine whether they are meeting the stated goals as established in state statute or legislation. In the case of this incentive, specific goals were not established in legislation. However, the goal of the program can reasonably be assumed to be to support the development of the renewable energy industry in Oklahoma and increase the amount of renewable energy generated in the State.

The Tax Credit for Electricity Generated by Zero Emissions Facilities was ended for facilities that commenced operation after July 1, 2017. While those in operation prior to July 1, 2017 may continue to take the credit for 10 years, the elimination of the program creates an opportunity to determine the impact that the tax credit has on the industry as a whole, both for facilities that can and cannot take advantage of the credit. As a result, the Incentive Evaluation Commission has adopted the following criteria, which are particularly focused on a lapsed incentive program:

- Comparison to the period prior, during and after the credit of renewable energy and wind's share of renewable energy;

- Comparison to the period prior, during and after the credit of renewable energy kilowatt hours generated vs all kilowatt hours generated in the state;
- Facilities put into operation before, during and after the end date of initiating the credit;
- Income generated within the State by eligible projects;
- Jobs generated within the state by eligible projects;
- Use with other related business incentives;
- State return on investment;
- Lease revenue generated by zero-emission facilities;
- Change in average price of electricity before, during and after the tax credit.

Industry Background

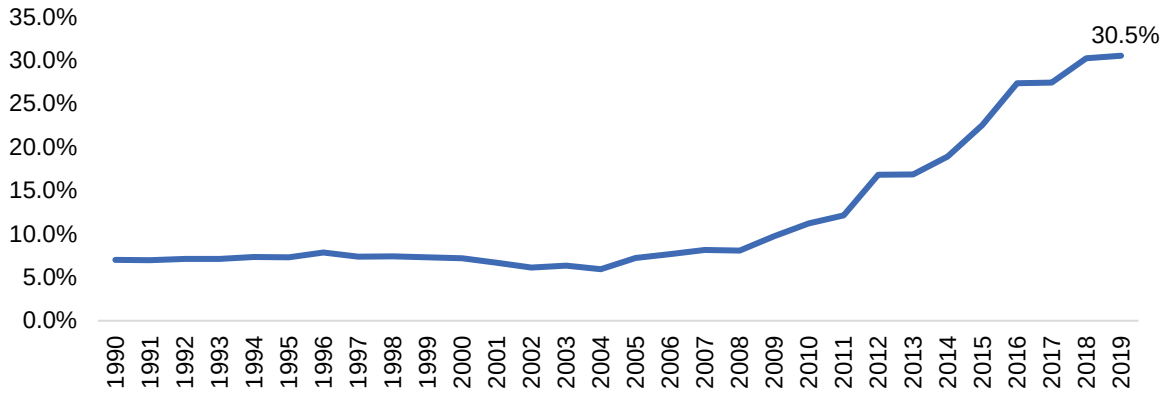
Background and History

Renewable Energy Capacity and Generation in Oklahoma

The tax credit for electricity generated by zero emissions facilities was signed into law in 2001, allowing the first credits to be claimed in tax year 2002. At the time, renewable energy was not a significant part of the State's energy portfolio. In fact, renewable energy accounted for just 6.7 percent of the State's overall nameplate capacity.[5]

By 2010, renewable energy had grown to 11.2 percent and the Legislature established a goal of reaching 15 percent by 2015. The State exceeded this goal, reaching 22.5 percent in 2015. In 2019, renewable energy accounted for 30.5 percent of Oklahoma's total nameplate capacity and the State ranked third among all states in installed nameplate capacity.

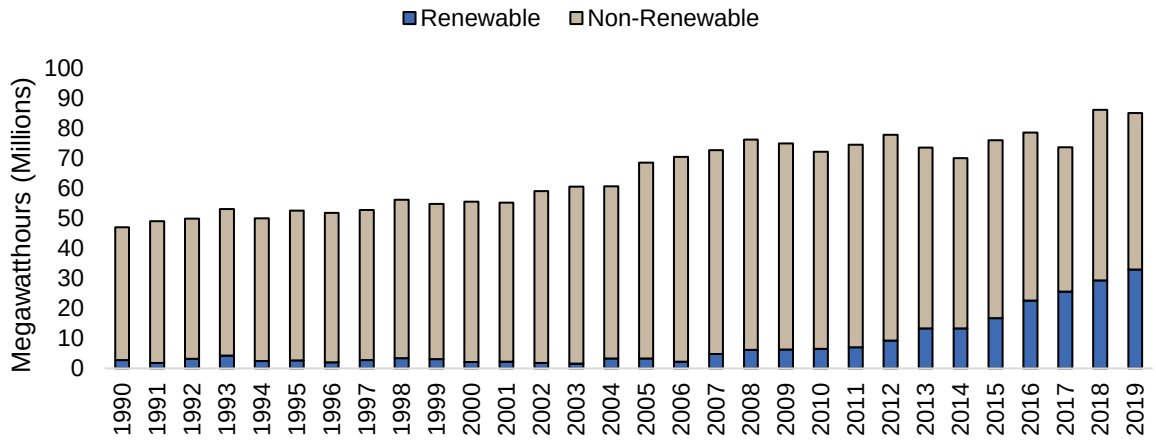
Figure 5: Renewable Sources as a Percent of Total Nameplate Capacity in Oklahoma



Source: U.S Energy Information Administration

This installed nameplate capacity has been used to generate a significant portion of the electricity generated in the State. Renewable energy as a percentage of all electricity generated in the State exceeded 10 percent for the first time in 2012. In 2019, renewable energy accounted for 38.7 percent of total electricity generated in the State.

Figure 6: Electricity Net Generation in Oklahoma



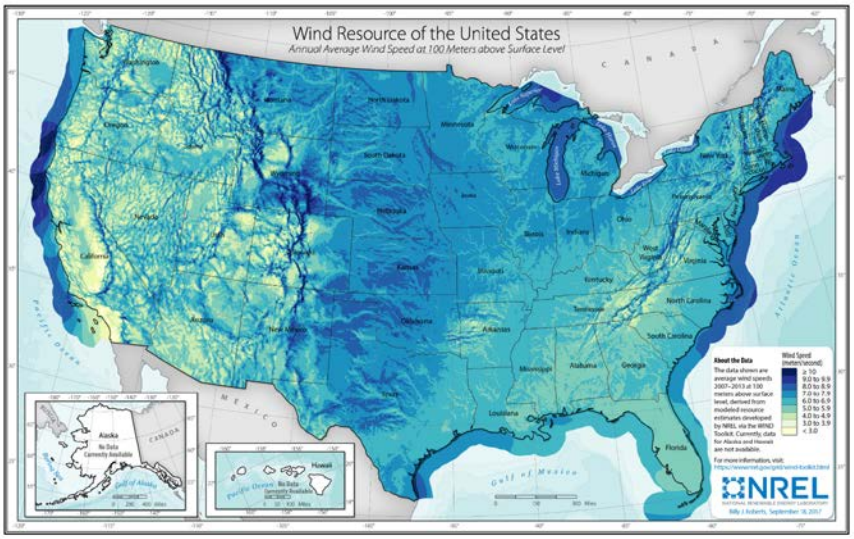
Source: U.S. Energy Information Administration

[5] The U.S. Energy Information Administration defines nameplate capacity as the maximum rated output of a generator, prime mover, or other electric power production equipment

Wind Power and the Renewable Energy Portfolio

Wind power has been the driver of the State's renewable energy boom. Oklahoma is well positioned in the country to sustain a strong wind energy industry. Wind electricity generation in the U.S. is concentrated in what is referred to as the "wind corridor" which stretches from Texas Northward through North Dakota and includes Oklahoma.

Figure 7: U.S. Wind Resource Map



In 2002, no electricity from wind power was generated in Oklahoma, but by 2019, 29.0 million megawatt-hours were generated by wind facilities in the State, accounting for 88.1 percent of the State's renewable energy generation. The next highest source of renewable energy in the State is hydroelectric, followed by biomass and solar power.

Table 1: Megawatt hours Generated by Renewable Source

Year	Wind	Hydroelectric Conventional	Other Biomass	Solar Thermal and Photovoltaic
2014	11,937,000	1,428,000	92,000	0
2015	14,031,000	2,664,000	91,000	2,000
2016	20,069,000	2,573,000	119,000	5,000
2017	23,599,000	2,036,000	68,000	33,000
2018	27,338,000	2,035,000	77,000	62,000
2019	29,008,131	3,903,231	74,815	59,623

Source: U.S. Energy Information Administration

The renewable energy industry appears to be set to continue its expansion in Oklahoma. In addition to ranking third among all states in installed wind nameplate capacity (as of 2019, according to the U.S. Energy Information Administration's survey of planned energy projects), Oklahoma also ranks third among states in planned wind nameplate capacity additions over the next eight years (2020-2026). A total of 3,409 megawatts of additional capacity is planned, which would increase the State's wind nameplate capacity by 42.2 percent.

Table 2: Planned Wind Nameplate Capacity Additions (Megawatts), 2020-2026

State	
Texas	8,554
Wyoming	4,660
Oklahoma	**3,409**
New York	1,337
New Mexico	1,258
Colorado	1,253
Missouri	1,234
South Dakota	1,161
Iowa	1,105
Illinois	8,554

Source: U.S Energy Information Administration, Electric Power Monthly, July 2020

There is documented potential for growth in both wind and solar energy in Oklahoma. The National Renewable Energy Laboratory published a report in 2012 on the technical potential of renewable energy technologies in each state. Technical potential goes beyond resource potential and considers land-use and topographic constraints to provide a more realistic estimate of the amount of electricity that could be generated by renewable resources. Oklahoma ranked among the top 10 in technical potential for rural utility-scale photovoltaics and onshore wind potential. The state's rural solar technical potential far exceeds its onshore wind potential. This suggests that while solar energy ranked lowest among renewable sources in Oklahoma by electricity generated in 2018, there is significant potential for the industry to expand in the State.

Table 3: Oklahoma Renewable Energy Technical Potential

Energy Type	GWh per Year	Rank
Rural Solar	9,341,920	9th
Onshore Wind	1,521,652	9th
Urban Solar	50,041	16th

Source: National Renewable Energy Laboratory, 2012

The State's solar power capacity is expected to increase significantly in 2024 following the planned completion of the Skeleton Creek solar project in Major, Alfalfa and Garfield Counties. The project is expected to add 250 megawatts of solar nameplate capacity, increasing the State's installed solar nameplate capacity from 30.5 to 280.5 megawatts.

Establishments and Employment

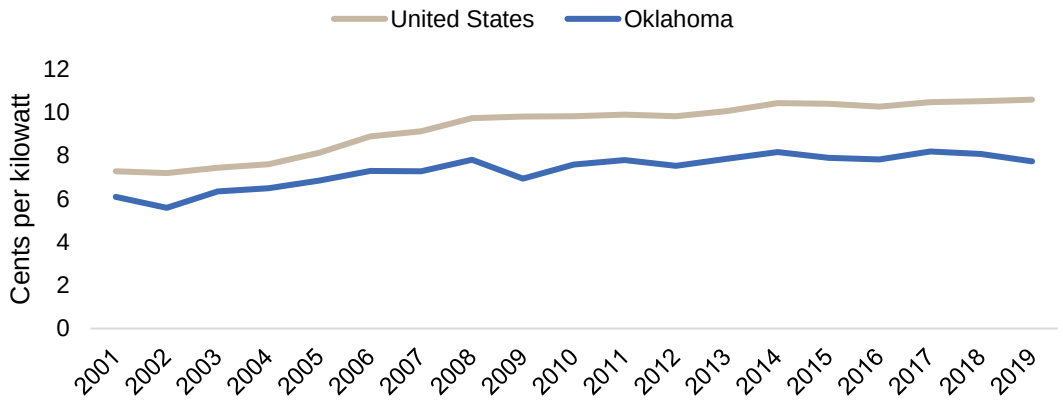
From 2003 to 2018, the total number of wind power facilities grew from 2 to 51.[6] While the industry has experienced significant growth (in terms of facilities and power generated), it has not had an equivalent direct impact on employment. According to U.S. Bureau of Labor Statistics data, the wind electric power generation industry employed just 178 people in Oklahoma in 2018.

[6] U.S. Energy Information Administration

Electricity Prices

Since 2001, the price of electricity in Oklahoma has remained low relative to the rest of the United States. Over this period, average electricity prices increased 45.4 percent nationally, but only increased 26.9 percent in Oklahoma.

Figure 8: Average Retail Price of Electricity, All Sectors



Source: U.S. Energy Information Administration

Incentive Usage and Administration

Incentive Characteristics

For qualifying facilities, the program offers a $0.005 refundable credit per kilowatt-hour of energy generated by zero emissions facilities. Qualifying facilities include those that generate electricity from wind, moving water, sun, or geothermal energy and have a rated production capacity of at least one megawatt. Wind facilities have been the most common credit recipients, but changes to statute in 2017 removed wind from the list of eligible energy sources; wind facilities placed into service on or after July 1, 2017 are no longer eligible for the tax credit. No new credits can be claimed after December 31, 2021.

Eligible facilities can claim the tax credit each year over a 10-year period. Credits generated before January 1, 2014 but not used may be carried forward to be used for subsequent years' tax liability over a period of 10 years. Credits generated before January 1, 2014 are also transferable. Credits generated on or after January 1, 2014 but not used are refunded to the taxpayer at 85 percent of the credit's face value. Starting with credits first claimed on or after July 1, 2019, recipients have the option to decline refunding and carry credits forward for a 10-year period.

Effective tax year 2019, the total amount of credits that can be claimed for water, sun, or geothermal energy is capped at $500,000 per year. If the OTC determines the total amount of credits allowed exceeds the cap, the OTC will determine the percentage of the credit which may be claimed so the $500,000 cap is not exceeded.

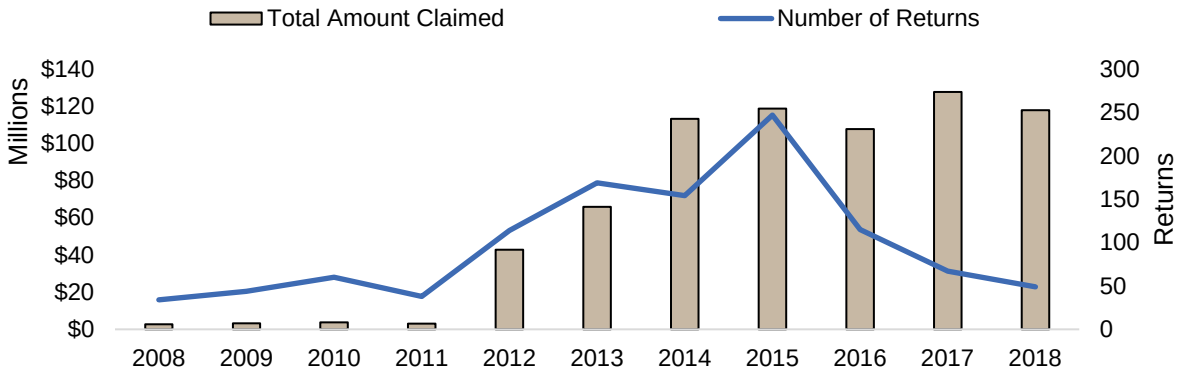
Incentive Administration

The OTC is responsible for the administration of the tax credit. Claimants submit information on the OTC's form 511CR. Form 511CR is used to collect information for 27 different tax credits, including the Zero Emissions tax credit. The form asks claimants to list the amount of credit claimed in the current year as well as the amount being carried forward from previous years. In recent years, the form has also asked claimants of the Zero Emissions credit to report which renewable energy source generated the electricity. This is the only information related to this credit collected by the OTC.

Historic Use of the Credit

The credit amount claimed increased every year from 2011 to 2015, before slightly declining in 2016 and reaching its all-time high of $127.7 million in 2017. The total number of returns claiming credits declined from a peak of 247 in 2015 to 49 in 2018.

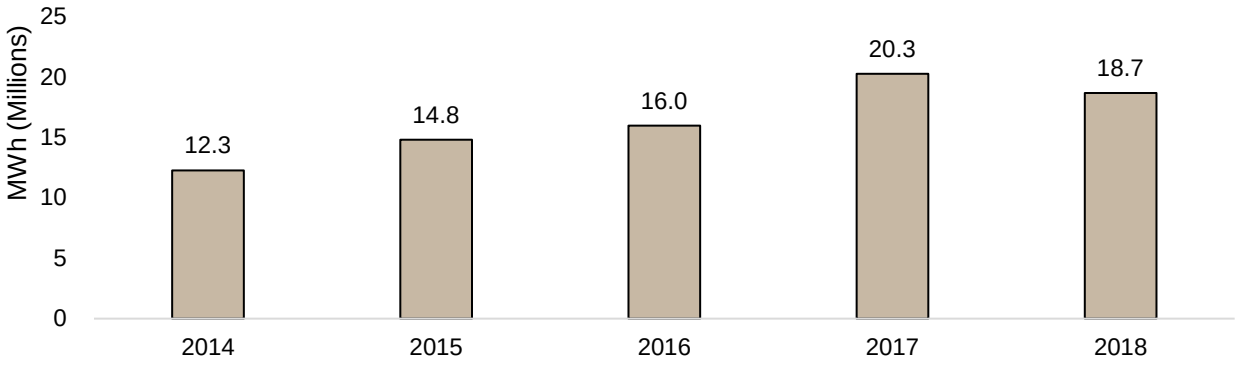
Figure 9: Returns and Amount Claimed



Source: Oklahoma Tax Commission

Based on the amount of credits established in each tax year, which OTC began tracking in 2014, it is possible to calculate the amount of electricity generation associated with claimed credits. In 2017, total electricity produced under the credit reached a peak of 20.3 million megawatt-hours.

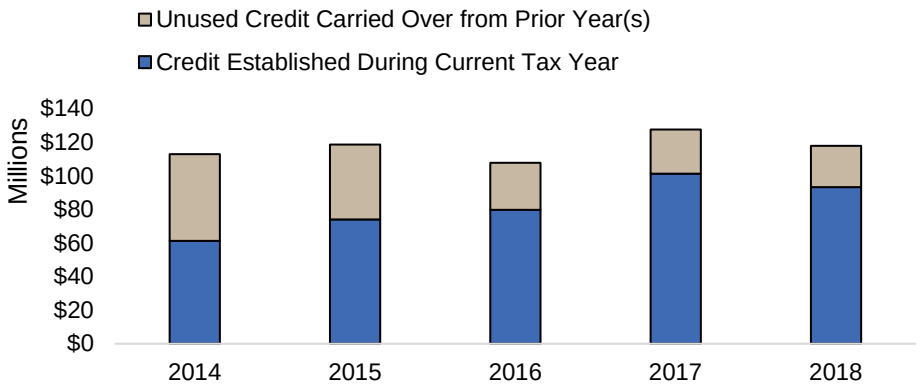
Figure 10: Electricity Generation Associated with Credits Established by Tax Year[7]



Source: Oklahoma Tax Commission, PFM Calculations

In 2014, the OTC began separately tracking the credit amount established in the current year and the unused credits carried over from prior years. Starting the same year, unused credits were required to be refunded in the year they were generated instead of being carried forward for future use.[8] Since 2014, the amount carried over from prior years has declined from $51.7 million in 2014 to $24.5 million in 2018.

Figure 11: Credit Amount Claimed

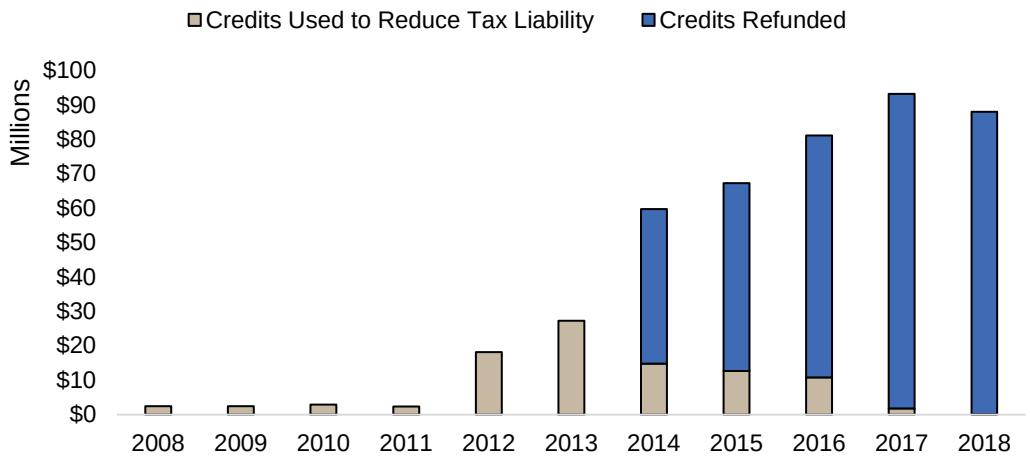


Source: Oklahoma Tax Commission

The total cost of the credit to the State in a given year is a combination of the amount of credit used to offset tax liability and the amount of credits refunded. Starting in 2014 when the tax credits became refundable, there was a significant increase in the total cost of the credit to the State, and this has continued to increase. A review of data provided by the OTC shows refunded credits drive this growth. Since 2014, refunded credits have increased from $45.0 million to $87.9 million in 2018. In 2018, refunded credits accounted for 99.8 percent of the total cost to the State. Meanwhile, the amount of credits used to offset tax liability has decreased by 98.9 percent. This suggests that the amount of tax credits claimed is exceeding taxpayer liability.

[7] Assumes credit rate of $0.005 per kilowatt-hour in each year. .
[8] Starting July 1, 2019, claimants may choose to carry forward newly generated credits instead of receiving a refund.

Figure 12: Credit Amount Used



Source: Oklahoma Tax Commission

Potential Future Use

Future use of the credit is limited to tax year 2021 for non-wind renewable energy facilities. For wind facilities placed in operation prior to July 1, 2017, credits may continue to be claimed until the 10-year credit period has expired. This means that wind facilities added in 2017 will be able to continue claiming the credit through tax year 2026. The OTC does not maintain projections of this future cost, but the project team was able to create estimates of the potential credits that may be claimed in these years.

The project team's projections assume all added capacity in the State over the last several years qualified for the credit. This provides the added nameplate capacity figures in the following table. The estimates must also assume a capacity factor for the added capacity. For this, the project team uses annual capacity factors for wind power facilities reported by the EIA.[9] An estimate of potential electricity production from these facilities can be calculated by multiplying the nameplate capacity in kilowatt-hours and the assumed capacity factor. By further multiplying the tax credit of $0.005 by the production estimate in kilowatt-hours, an annual tax credit claim amount can be calculated.

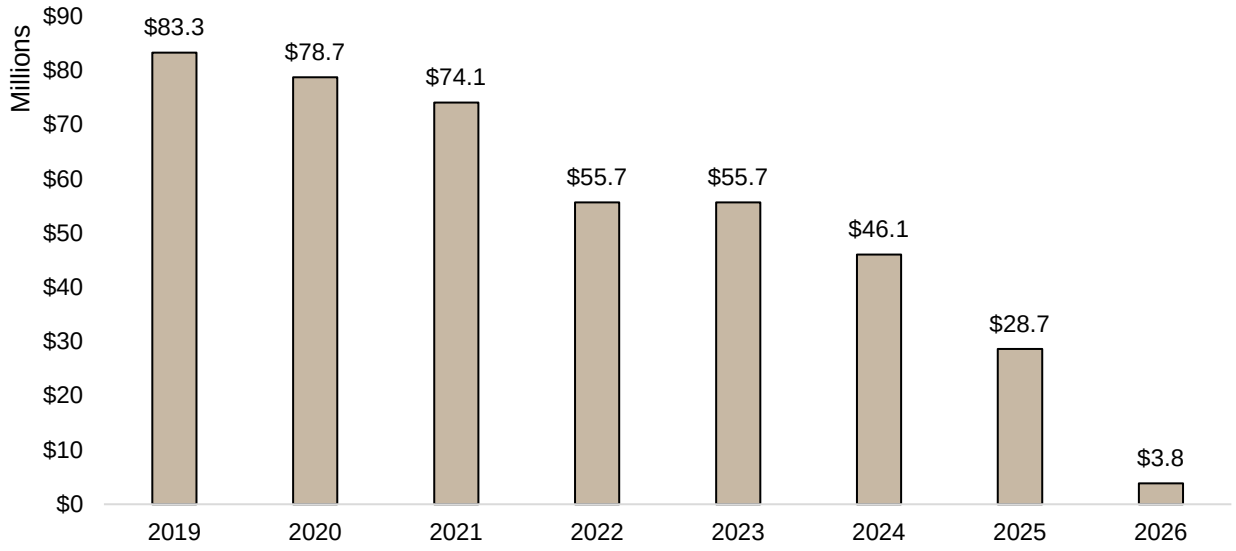
Table 4: Tax Credit Claim Estimates

Year	Existing Wind Nameplate Capacity	Added Nameplate Capacity	Added Capacity (kWh)	Capacity Factor	Estimated Output (kWh)	Annual Tax Credit Value
2009	1,130	-	-	-	-	-
2010	1,480	350	3,066,000,000	29.7%	910,602,000	$4,553,010
2011	1,811	331	2,897,808,000	32.1%	930,196,368	$4,650,982
2012	3,133	1,322	11,581,596,000	31.8%	3,682,947,528	$18,414,738
2013	3,133	0	0	32.4%	0	$0
2014	3,780	647	5,664,216,000	34.0%	1,925,833,440	$9,629,167
2015	5,012	1,233	10,797,576,000	32.2%	3,476,819,472	$17,384,097
2016	6,655	1,643	14,390,052,000	34.5%	4,964,567,940	$24,822,840
2017	6,908	254	2,221,536,000	34.6%	768,651,456	$3,843,257

[9] US Energy Information Administration. Electric Power Monthly, Table 6.07.B. Capacity Factors for Utility Scale Generators Primarily Using Non-Fossil Fuels. Accessed electronically at: https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_6_07_b

Based on these annual tax credit estimates, tax credit claims would decline in tax years 2019 through 2026 as seen in the following chart.

Figure 13: Estimated Potential Tax Credit Claims, Tax Years 2019 - 2026



Another 1,162 MW of wind nameplate capacity was added in 2018, according to EIA data. If eligibility for new wind facilities did not end in 2017, this new addition would result in a potential $17.7 million in tax credits annually using the method previously outlined.

Economic and Fiscal Impact

Economic and Fiscal Impact

Under the Zero Emissions incentive, the level of renewable electricity generation benefitted by incentive claims has remained in a range from 13.2 million MWh to 20.3 million MWh during the period from 2014-2018. Estimated renewable electricity sales, based on wholesale prices, associated with the incentive has been in a range from $414 million in 2015 to a peak of $558 million in 2017.

More than 2,100 jobs in 2018 were supported by incentivized renewable electricity generation, with more than $150 million in annual wages paid. This results in total economic benefits of $1.0 billion during 2018. Annually, since 2014, total economic returns averaged $12 for each $1 in incentives paid. On average over the past five years, for each $1.00 in rebates spent by the state, $0.30 in sales tax has been generated.

The basis on which sales tax associated with the program is estimated is by applying the multi-year average of sales taxes collected as a ratio with Oklahoma Gross State Product to the revenue generated by electricity sales associated with claims. The ratio data for the sales tax estimate is found in Appendix B. Discussion and definition of terms of the IMPLAN economic impact methodology is found in Appendix C.

Table 5: Economic and Fiscal Impact

Year	Effect	Output	Value Added	Labor Income	Employment	Est. OK Tax Revenue	Total Claims Paid	Ratio: Output/ Claims	Ratio: Revenue/ Claims
2014	Direct Effect	$520,128,028	$247,423,737	$43,316,647	447				
	Indirect Effect	$384,922,370	$140,267,578	$68,987,762	983				
	Induced Effect	$82,886,036	$43,670,604	$24,214,076	607				
	Total Effect	**$987,936,434**	**$431,361,919**	**$136,518,484**	**2,036**	**$22,750,028**	**$59,748,591**	**$17**	**$0.38**
2015	Direct Effect	$413,941,989	$207,116,807	$36,260,084	370				
	Indirect Effect	$296,471,194	$117,417,081	$57,749,208	814				
	Induced Effect	$68,331,880	$36,556,380	$20,269,446	503				
	Total Effect	**$778,745,063**	**$361,090,268**	**$114,278,739**	**1,687**	**$19,043,901**	**$67,232,686**	**$12**	**$0.28**
2016	Direct Effect	$454,650,993	$238,005,667	$41,667,819	421				
	Indirect Effect	$327,557,612	$134,928,358	$66,361,774	926				
	Induced Effect	$78,424,099	$42,008,303	$23,292,379	572				
	Total Effect	**$860,632,703**	**$414,942,327**	**$131,321,972**	**1,918**	**$21,884,058**	**$81,082,849**	**$11**	**$0.27**
2017	Direct Effect	$558,399,992	$287,206,071	$50,281,368	498				
	Indirect Effect	$406,054,306	$162,820,676	$80,080,045	1,097				
	Induced Effect	$95,206,802	$50,692,237	$28,107,367	677				
	Total Effect	**$1,059,661,100**	**$500,718,983**	**$158,468,779**	**2,272**	**$26,407,919**	**$93,163,097**	**$11**	**$0.28**
2018	Direct Effect	$529,786,000	$273,402,726	$47,864,807	463				
	Indirect Effect	$385,136,362	$154,995,389	$76,231,336	1,019				
	Induced Effect	$89,707,932	$48,255,929	$26,756,505	629				
	Total Effect	**$1,004,630,294**	**$476,654,044**	**$150,852,648**	**2,112**	**$25,138,734**	**$88,027,882**	**$11**	**$0.29**

Incentive Benchmarking

Benchmarking

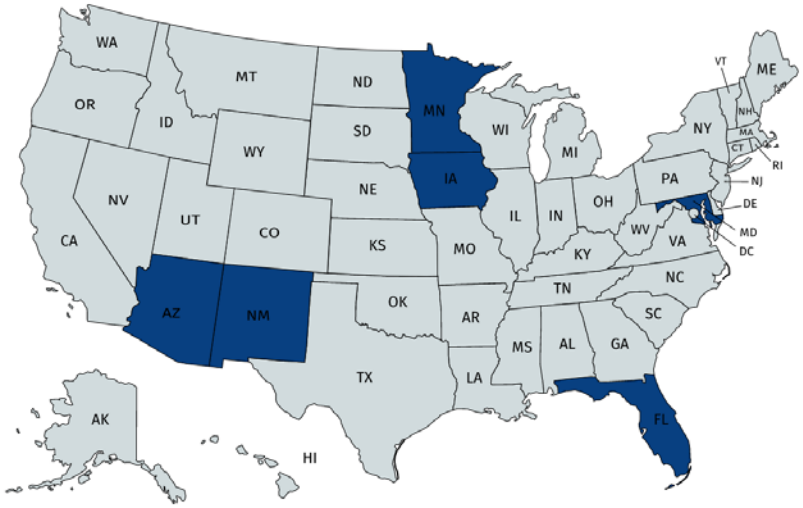
A detailed description of comparable state programs can be found in **Appendix A.**

For evaluation purposes, benchmarking provides information related to how peer states use and evaluate similar incentives. At the outset, it should be understood that no states are 'perfect peers' – there will be multiple differences in economic, demographic and political factors that will have to be considered in any analysis; likewise, it is exceedingly rare that any two state incentive programs will be exactly the same.[10] These benchmarking realities must be taken into consideration when making comparisons – and, for the sake of brevity, the report will not continually re-make this point throughout the discussion.

The process of creating a comparison group for incentives typically begins with bordering states. This is generally the starting point, because proximity often leads states to compete for the same regional businesses or business/industry investments. Second, neighboring states often (but not always) have similar economic, demographic or political structures that lend themselves to comparison.

For the Zero Emissions Facility tax credit, comparable programs are found across the country in regions where certain forms of renewable sources are abundant. For example, most wind power generation the U.S. takes place in what is referred to as the "wind corridor" stretching from Texas, and Northward through North Dakota. The comparison group includes three states located in this corridor: Iowa, Minnesota, and New Mexico. Solar power is concentrated in the Southwestern part of the country, as well as Florida. The comparison group includes Arizona, Florida, and New Mexico, which are all located in areas with high solar power potential.

Figure 14: Comparison Group States



Sunsets

All comparison group programs have either sunset their programs or established sunset dates for the near future, which is similar to Oklahoma. Minnesota made its last payment to wind facilities in 2015 and its last payment to biogas facilities in 2017. Hydropower is expected to be phased out of the program in 2021. Iowa and New Mexico's programs are only available for facilities placed in service prior to January 1, 2018. Maryland's credit is only available to facilities placed into service before January 1, 2019. Arizona's credit is scheduled to sunset on January 1, 2021.

[10] The primary instances of exactly alike state incentive programs occur when states choose to 'piggyback' onto federal programs.

Credit Rates

Each comparable program is structured similarly to Oklahoma's, in that the credit is offered per kilowatt-hour of qualifying electricity produced. Oklahoma's per-kilowatt-hour rate ranks lowest among the comparison group at $0.005. Rates among the comparison group are commonly $0.01 or $0.015 per kilowatt-hour.

Credit Duration

Four comparable programs offered the credit over a 10-year period, matching Oklahoma. Florida's program was only available between January 1, 2013 and June 30, 2016. Maryland's credit was available over a 5-year period.

Program Caps

Oklahoma's credit was arguably the most generous among the comparison group. Although Oklahoma's per kilowatt-hour rate is the lowest among the group, prior to instituting the $500,000 aggregate cap for non-wind power sources in 2019, only Maryland and Oklahoma had programs with no aggregate cap in place. Most states placed an aggregate dollar-value spending cap on their credit programs. For example, New Mexico capped each of its wind, biomass and solar programs at $20 million per year. Other states, like Iowa and Minnesota, capped their programs by megawatts of nameplate capacity. Iowa capped its program at 426 megawatts, while Minnesota capped its program at 200 megawatts.

The impact of the caps used in other state programs is shown in the following table. This analysis assumes 12 million MWh (an amount similar to what was generated in Oklahoma under its program in 2014) are generated and qualify for the credit in each state. In this scenario, Oklahoma, despite having the lowest credit per kilowatt-hour, has the highest total program cost, ahead of Iowa's program, which has a credit rate three times greater than Oklahoma's.

Table 6: Total Program Cost Assuming 12 Million MWh Generated

	Per kWh Credit	Cap (kWh)	Credit Cost with No Cap	Credit Cost with Cap
Oklahoma	**$0.005**	**N/A**	**$60,000,000**	**$60,000,000**
Iowa (476C)	$0.015	3,731,760,000	$180,000,000	$55,976,400
Minnesota	$0.015	1,752,000,000	$180,000,000	$26,280,000
Maryland	$0.009	2,941,176,471	$102,000,000	$25,000,000
New Mexico	$0.010	2,000,000,000	$120,000,000	$20,000,000
Arizona	$0.010	2,000,000,000	$120,000,000	$20,000,000
Florida	$0.010	1,000,000,000	$120,000,000	$10,000,000

Benchmarking Program Evaluations

Evaluations of similar programs in Florida and New Mexico have found significant economic benefits resulting from renewable energy projects. As with all incentive programs, the challenge many evaluations face is determining how much of the economic benefits to attribute directly to the incentive. For renewable energy production tax credits this issue is complicated by incentives provided by the federal government along with renewable energy policies established at the state level. The federal government enacted a production tax credit in 1992, which offers a per kilowatt-hour tax credit for the first 10 years of production at qualified facilities. In the late 1990s and early 2000s many states adopted Renewable Energy Portfolio Standards which require electric utilities to use a certain amount of renewable sources in energy production by a certain date. A total of

29 states have implemented such standards.[11] Oklahoma is one of seven additional states which set a goal for utilities to use renewable sources did not require utilities to do so.

A 2015 review of New Mexico's renewable energy production credit discusses these challenges. New Mexico established a Renewable Portfolio Standard in 2002, the same year its State credit was enacted, that requires electric utilities to produce 20 percent of energy from renewable sources by 2020. The reviewers surveyed credit recipients and asked them to rank the importance of several factors in its decision to move forward with their project. It found recipients consistently ranked the State's Renewable Portfolio Standard and the federal production tax credit ahead of the State's production tax credit. Due to these other influences on industry behavior, the review could not determine the amount of economic activity that was specifically induced by the credit. Therefore, despite finding significant economic benefits that exceeded program costs, the review concluded it would not be appropriate to calculate a net benefit to the State. Instead, the review offered some perspective by determining that the credit would need to have induced the construction of at least 14.2 percent of qualifying facilities for the credit's benefits to the State to outweigh its costs.

Arizona's 2016 evaluation of its program cites similar concerns about the ability to determine how much activity was induced by its credit. It opts to not calculate an economic impact figure and Iowa's programs cited similar concerns.[12]

Florida evaluated its program in 2015 and did not address these concerns. Florida's evaluation, conducted by the State's Department of Agriculture and Consumer Service which administers the program, assumes all activity benefiting from the credit was induced by the credit. It reports that the $10.0 million of tax credits used in 2015 generated $15.0 million in additional tax revenue that year.[13]

[11] National Conference of State Legislatures. "State Renewable Portfolio Standards and Goals". Accessed electronically at: https://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx
[12] Arizona Joint Legislative Budget Committee. "2016 Income Tax Credit Review". Accessed electronically at: https://www.azleg.gov/jlbc/jlitcrcrpt121516.pdf
[13] Florida Department of Agriculture and Consumer Services. "2015 Analysis of the Economic Contribution of the Renewable Energy Tax Incentives". Accessed electronically at: https://www.fdacs.gov/content/download/64673/file/Analysis%20of%20the%20Economic%20Contribution%20of%20the%202015%20Renewable%20Energy%20Tax%20Incentives.pdf

Appendices

Appendix A: Comparable State Programs

State	Energy Sources	Capacity Requirements	Credit per kWh	Aggregate Cap	Duration	Transferrable?	Carry-forward?	Refundable?
Oklahoma	Moving Water, Solar, Geothermal	Min: 1 MW	$0.005[4]	$500,000 per year	10 Years	Only credits earned prior to January 1 2014 are transferrable	Up to 10 years only for credits earned prior to January 1 2014 or after July 1 2019	At 85% only for credits earned after January 1, 2014
Iowa (476B)	Wind	2 to 30 Megawatt (MW)	$0.01	50 MW of Nameplate Capacity	10 Years	Yes	Yes, 7 years, not to exceed the 10 year pay period	No
Iowa (476C)	Wind, biogas recovery, biomass, methane gas recovery, solar, refuse	Max: 10 MW	$0.015	426 MW of Nameplate Capacity[1]	10 Years	Yes	Yes, 7 years, not to exceed the 10 year pay period	No
New Mexico	Wind and biomass	Min:1 MW	$0.01 up to $4 million	$20,000,000 per year	10 Years	No	Only facilities placed in service prior to October 1, 2007, 5 years	Only for facilities placed into service after October 1, 2007
	Solar	Min:1 MW	$0.027 (average)[2]	$20,000,000 per year				
Minnesota	Hydroelectric, biomass, and wind	Max: 2 MW	$0.015	200 MW of nameplate capacity for wind	10 Years	Not Specified	Not Specified	Not Specified
Arizona	Wind and Biomass	Min: 5 MW	$0.01 per kWh up to $2 million	$20 million per year	10 Years	No	Yes, 5 years	No
	Solar	Min: 5 MW	$0.0275 (average)[3]					
Florida	Hydrogen, biomass, solar energy, geothermal energy, wind energy, ocean energy, waste heat, or hydroelectric power	None	$0.01	$10 Million per year	May be claimed for energy produced between January 1 2013 and June 30 2016	In the event of a merger or acquisition	Yes, 5 years	No
Maryland	Solar, Wind, Biomass, hydroelectric, municipal solid waste, and others as defined by § 45 (c)(1) of the Internal Revenue Code	None	$0.0085 up to $2.5 million	$25 Million per year, removed in 2016	5 Years	No	No	Yes

[1] 363 MW for wind and 63 MW for all other sources
[2] New Mexico's Solar Incentive Changes throughout the 10-Year pay period
[3] Arizona's solar incentive changes throughout the 10-year pay period
[4] This is the current rate for facilities placed in operation on or after 1/1/2007

Appendix B: State of Oklahoma Tax Collection / Gross State Product

Year	Oklahoma GSP	Oklahoma Tax Revenue	Ratio
2005-06	$136,363,200,000	$8,435,214,025	6.2%
2006-07	$143,042,900,000	$8,685,842,682	6.1%
2007-08	$163,616,400,000	$9,008,981,280	5.5%
2008-09	$144,015,000,000	$8,783,165,581	6.1%
2009-10	$152,043,000,000	$7,774,910,000	5.1%
2010-11	$164,150,600,000	$8,367,871,162	5.1%
2011-12	$172,865,600,000	$8,998,362,975	5.2%
2012-13	$180,665,000,000	$9,175,334,979	5.1%
2013-14	$195,249,800,000	$9,550,183,790	4.9%
2014-15	$185,986,800,000	$9,778,654,182	5.3%
2015-16	$179,023,400,000	$8,963,894,053	5.0%
2016-17	$187,677,500,000	$8,789,362,844	4.7%
2017-18	$201,870,700,000	$9,837,247,035	4.9%
2018-19	$206,139,300,000	$11,091,161,884	5.4%
Average	**$172,336,371,429**	**$9,088,584,748**	**5.3%**

Sources: U.S. Bureau of Economic Analysis Regional Economic Accounts; OTC Annual Reports

Appendix C: IMPLAN Economic Impact Methodology

The economic impact methodology utilized to determine the multiplier effects is IMPLAN (IMpact Analysis for PLANning).

IMPLAN's Social Accounting Matrices (SAMs) capture the actual dollar amounts of all business transactions taking place in a regional economy as reported each year by businesses and governmental agencies. SAM accounts are a better measure of economic flow than traditional input-output accounts because they include "non-market" transactions. Examples of these transactions would be taxes and unemployment benefits.

Economic Indicators

Employment
Employment data in IMPLAN follows the same definition as Bureau of Economic Analysis Regional Economic Accounts (BEA REA) and Bureau of Labor Statistics Census of Employment and Wages (BLS CEW) data, which is full-time/part-time annual average. Thus, 1 job lasting 12 months = 2 jobs lasting 6 months each = 3 jobs lasting 4 months each. A job can be either full-time or part-time. Similarly, a job that lasts one quarter of the year would be 0.25 jobs. Note that a person can hold more than one job, so the job count is not necessarily the same as the count of employed persons.

Labor Income
Labor Income represents the total value of all forms of employment income paid throughout a defined economy during a specified period of time. It reflects the combined cost of total payroll paid to employees (e.g. wages and salaries, benefits, payroll taxes) and payments received by self-employed individuals and/or unincorporated business owners (e.g. capital consumption allowance) across the defined economy. Labor Income (LI) encompasses two additional representative metrics called Proprietor Income (PI) and Employee Compensation (EC).

Value Added
Value Added represents the difference between *Output* and the cost of *Intermediate Inputs* throughout a defined economy during a specified period of time. It equals gross Output minus Intermediate Inputs (consumption of goods and services purchased from other industries or imported). Value Added is a measure of the contribution to GDP made by an individual producer, Industry, or Sector.

Output
All analysis in IMPLAN is based on Output, which is the value of production by industry in a calendar year. IMPLAN Output data largely come from the same sources as those used by the BEA in developing their Benchmark Input-Output tables. Since output is the total production value of a Sector, it includes all components of production value or output for a given Sector: Output = Employee Compensation + Proprietor Income + Intermediate Expenditures + Tax on Production and Imports + Other Property Income.

Economic Effects

Input-Output (I-O) Analysis and IMPLAN (SAM) is designed to predict the ripple effect of an economic activity by using data about previous spending. Production in a given Sector in an economy supports demand for production in Sectors throughout the economy, both due to supply chain spending and spending by workers.

Direct Effect

A Direct effect is the initial exogenous change in final demand in terms of Industry Output, Employment, and Labor Income Dollars. When consumers purchase goods and services, they create final demand to the Industries producing the goods and services they consume. When you analyze final demand in IMPLAN, we call this a Direct Effect.

Indirect Effect
Indirect effects are the business to business purchases in the supply chain taking place in the region that stem from the initial industry input purchases. As the Industry specified in an Event spends their money in the region with their suppliers, this spending is shown through the Indirect Effect.

Induced Effect
The Induced Effects stem from income being spent throughout the Selected Region. Typically, the income being analyzed are the wages of employees working in the Direct/Indirect Industries.