Residential Energy – Alternative Energy Devices

ORS 316.116	Year Enacted:	1977	Transferable:	Yes
	Length:	1-year; 4-year	Means Tested:	No
	Refundable:	No	Carryforward:	5-years
TER 1.435	Kind of cap:	Partial Program	Inflation Adjusted:	No

Policy Purpose

Statute does not specifically identify a policy purpose for this incentive. However, bill documentation for the implementing legislation indicates that the major issues discussed during the debate were "the rising cost of fossil fuels, energy conservation, the economic feasibility of alternative forms [of] energy..." The documentation also identified that the problem addressed by creating the tax credit was "the need for development and use of non-fossil energy resources." In 2015, testimony by the ODOE to the House Committee on Energy and the Environment states that the purpose of this credit is "...to promote energy savings or energy displacement and market transformation..." Taken together, a reasonable inference is that the tax credit has the dual purpose of reducing the consumption of fossil fuels while expanding the demand for non-conventional energy resources.

Description and Revenue Impact

Individuals are allowed to claim a tax credit for a qualified device or the installation of qualified alternative energy devices in their homes. The amount of the credit depends on the type of device and the energy savings or yield. Generally, the tax credit amount is the least of:

1. The installed capacity or energy yield/savings multiplied by a dollar value set in statute
2. 50 percent of the device or installed device cost
3. A dollar amount set in statute, which is $1,500, $2,500, or $6,000

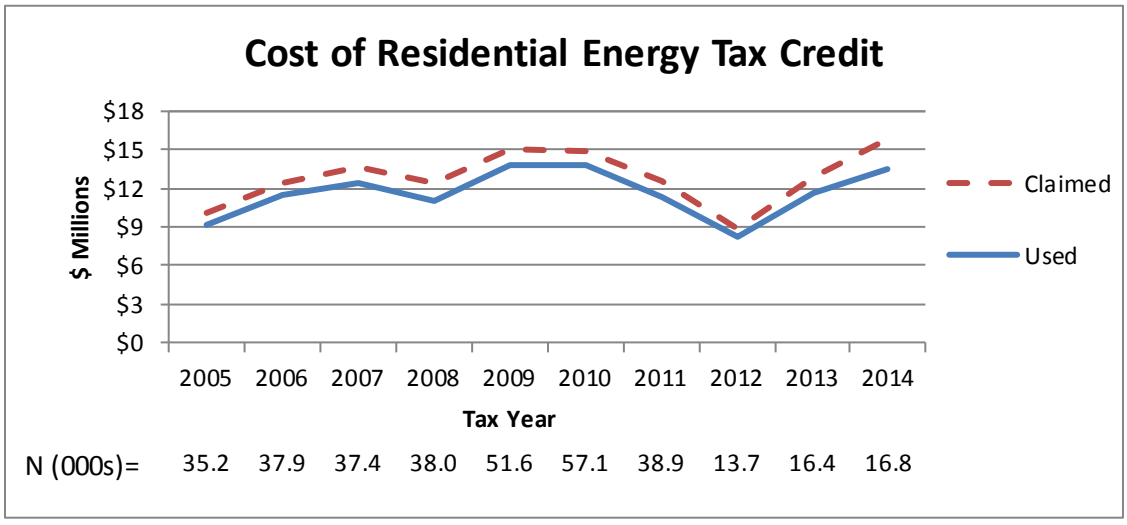
An exception to this structure are home charging and alternative fuel stations, where the tax credit is 50 percent of the eligible device cost up to $750. No more than $1,500 may be claimed per year. The tax credit has a five-year carryforward, but may also be transferred to another taxpayer.

Individuals may also be eligible for federal incentives, or subsidies from either their utility or the Energy Trust of Oregon (ETO). The sum of all incentives cannot exceed the cost of the installed device. The following table contains the eligible devices and the tax credit amounts for 2017.

Device	2017 Credit Amount
Electric heat pump water heater	$300 / $600
Tankless gas water heater	$225 / $245
Storage gas water heater	$125 / $175
Gas furnace "e"	$352 / $492

Direct vent gas fireplace	$350 / $550
Air-source ducted heat pump	$800 / $850 / $925 / $1,000 / $1,125
Ductless heat pump	$1,200 / $1,300
Duct sealing	$250
Geothermal system	$600 / $700 / $800 / $900
Whole house ventilation system	$225 / $330 / $450 / $645
Waste water heat recovery	$92 / $108 / $122 / $138
Wood and pellet stoves	$144 / $216 / $288 / formula
Solar electric (photovoltaic)	$1.30 per watt of installed capacity, up to $6,000
Solar space heating	$0.60 per 1st-year energy yield in kWh, up to $1,500
Solar domestic water heating	$2.00 per 1st-year energy yield in kWh, up to $6,000
Solar swimming pool heating	$0.20 per 1st-year energy yield in kWh, up to $2,500
Solar spa or hot tub heating	$0.15 per 1st-year energy yield in kWh, up to $1,500
Wind system	$2.00 per 1st-year energy yield in kWh, up to $6,000
Alternative fuel device	Up to $750
Fuel cell	$3.00 per watt of installed capacity, up to $6,000

The graph below shows the history of RETCs claimed and used on personal income tax returns from 2005 through 2014. On average, $13 million in tax credits is claimed and $11.5 million is used to reduce tax liability annually. The Great Recession was likely a contributor to the decline in 2008 of $1.2 million. The decline from 2010 through 2012 was likely driven by the 2011 legislative changes that tightened the policy.



Policy Analysis

Theoretically, consumers should invest in energy-efficient and renewable energy production technology if the expected savings over time is greater than the cost of the device. However, some researchers believe that aggregate investment in this technology is below socially optimal levels. This under-investment is often attributed to market failures in both the supply (production) of and demand (consumption) for electricity. The literature generally characterizes

the cause of these market failures as either negative externalities or investment inefficiencies. The former refers to the idea that the production of electricity doesn't incorporate all costs, such as those associated with pollution. Therefore, too much energy from fossil fuels is produced and consumed. Investment inefficiencies refers to the idea that imperfect information leads to poor investment decisions by consumers.

Another policy challenge is known as the principal-agent problem. This occurs when the person consuming the energy is different from the person who makes equipment purchasing decisions. The most common example is the landlord and renter relationship. The challenge is to encourage landlords to improve energy-efficiency when the lower energy costs would benefit renters. This can also occur for builders of new homes. If the housing market doesn't properly incorporate the value of greater energy efficiencies, the incentive for builders is to invest in the less expensive equipment.

To correct for problems related to negative externalities, research suggests the most efficient solution is to adjust electricty prices so that they fully reflect all costs. Tax credits can be a next best solution by reducing the costs of energy-efficient property. Market efficiency can be improved if policies are targeted to consumers who incur the most significant energy inefficiencies.

Significant up-front costs can also be a deterrent to making these investments. This may be due to poor information about the time-value of money, potential problems in the credit market, or concern about how such property affects (or not) the value of residential property. To the extent initial high costs are a deterrent, a tax credit may be an effective policy tool.

According to the Congressional Research Service (CRS 2014), part of the motivation behind the federal energy incentives enacted in 2005 was that Congress determined that too many homes were not adequately insulated. This conclusion is consistent with the notion of suboptimal investment levels. CRS also summarized recent research on federal tax credits as having a positive impact on energy efficient investments, but with an uncertain magnitude.

Crandall-Hollick and Sherlock (2016) describe the potential inefficiencies that may occur if federal energy credits are claimed by those who are well-informed about energy efficiency, resulting in windfall benefits for free-riders. They summarize early research as mixed for determining whether or not tax credits cause additional investment in energy-efficient property. Neveu and Sherlock (2016) analyzed federal energy tax credits and found them to be vertically inequitable, more likely to be claimed by households in colder parts of the county, and larger in states with higher electricity costs.

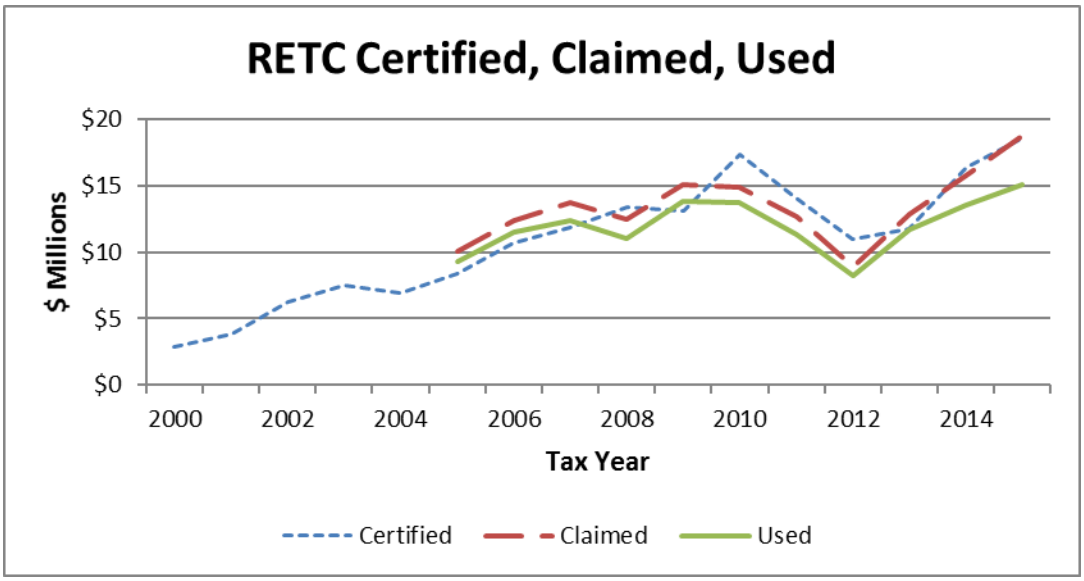
The following table lists the current ETO incentives.

Category	Device	Amount
Weatherization	Insulation	25 per sq. ft. (attic) 30 per sq. ft. (floor, wall) 50 per linear foot (pipe)
	Windows	$1.75 / $4 per sq. ft.
Heating	Gas fireplace	$150 / $250
	Gas furnace	
	Gas boiler	$200
	Ductless heat pump	$800
	Heat pump	$250 / $450 / $500 / $700
	Heat pump advanced controls	$150
	Heat pump test	$150
	Smart thermostat	$50
Water	Water heater	$100 / $150 / $300
	Wastewater treatment system	$400
	Outdoor spa cover	$100
	Pool pump	$200
Solar electric		$6,400 / $7,000
Appliances	Energy star clothes washer	$75

Oregon also has a property tax exemption for alternative energy systems - item 2.115 in the Tax Expenditure Report (TER). Renewable energy systems used for heating, cooling, or generating electricity are exempt from the property tax. The system must be either a net metering facility or for onsite use. Any additional value to the property that results from the renewable energy system is exempt property. According to the 2017-19 TER, this provision resulted in a revenue loss of $1.8 million to local governments.

An analysis of data from ODOE and DOR reveals trends and policy changes made overtime. To provide a sample of these changes, the following tables and charts describe their impacts. The graph below provides a history of the certifications (along with some tax return information). Certification grew at a fairly consistent rate from about $3 million 2000 to $14 million in 2009. In 2010 they jumped to $20 million driven by strong growth in renewables and appliances. This increase was even sufficient to offset the reduction in credits claimed for vehicles. The credits for gas-electric hybrids ended in 2010 and for all alternative fuel vehicles in 2012.

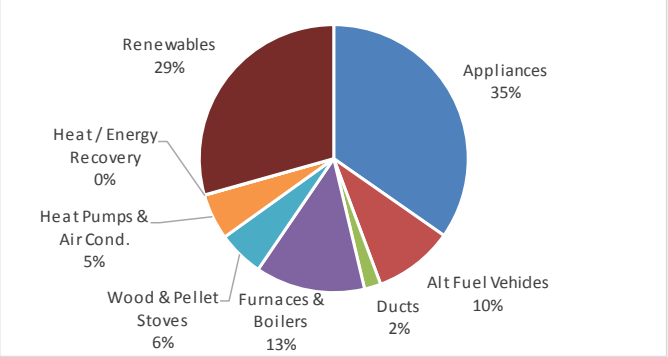
Policy changes in 2011 drove the amount of credits certified down between 2010 and 2013. Most of this decline is accounted for by the required efficiency changes for appliances. In the two years from 2013 to 2015, certified tax credit dollars returned to their historical peak. The recent increase was driven by growth in purchases of renewable energy devices and heat pumps.



The combination table/charts below provide a more detailed comparison of certified tax credits from 2010 and 2015. The two totals are roughly equivalent - $20.2 million in 2010 and $20.6 million in 2015. The make-up of the credits, however, is very different. In 2010, 75 percent of all credits allowed were for appliances. Their average credit amount was $122. Appliances were also the largest dollar share of certified credits, at 35 percent. Renewables accounted for the next largest share of the total. Their $5.9 million accounted for 29 percent of the total.

2010 Tax Credit Certificates

Device	Credits	Amount	Average
Appliances	57,517	$7,003,982	$122
Alt Fuel Vehicles	1,316	$1,938,798	$1,473
Ducts	1,764	$400,768	$227
Furnaces & Boilers	7,657	$2,662,371	$348
Wood & Pellet Stoves	3,770	$1,120,403	$297
Heat Pumps & Air Cond.	3,569	$1,115,410	$313
Heat / Energy Recovery	33	$7,528	$228
Renewables	1,291	$5,924,995	$4,589
Total	76,917	$20,174,255	$262



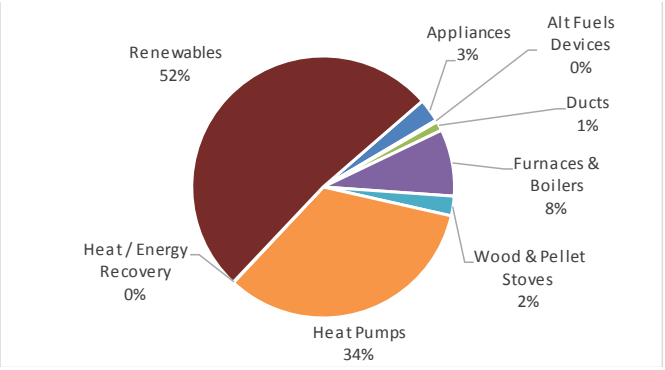
The eligibility requirements for appliances were significantly tightened in 2011. As a result, the number of appliance tax credits claimed fell from a peak of about 57,500 in 2010 to about 850 in 2013. During this same time the amount of appliance credit certifications fell by about $6.5 million. The tax credit for alternative fuel vehicles was also eliminated during this time,

contributing roughly $1.9 million to the decline. Growth in renewables and heat pumps generally offset these declines.

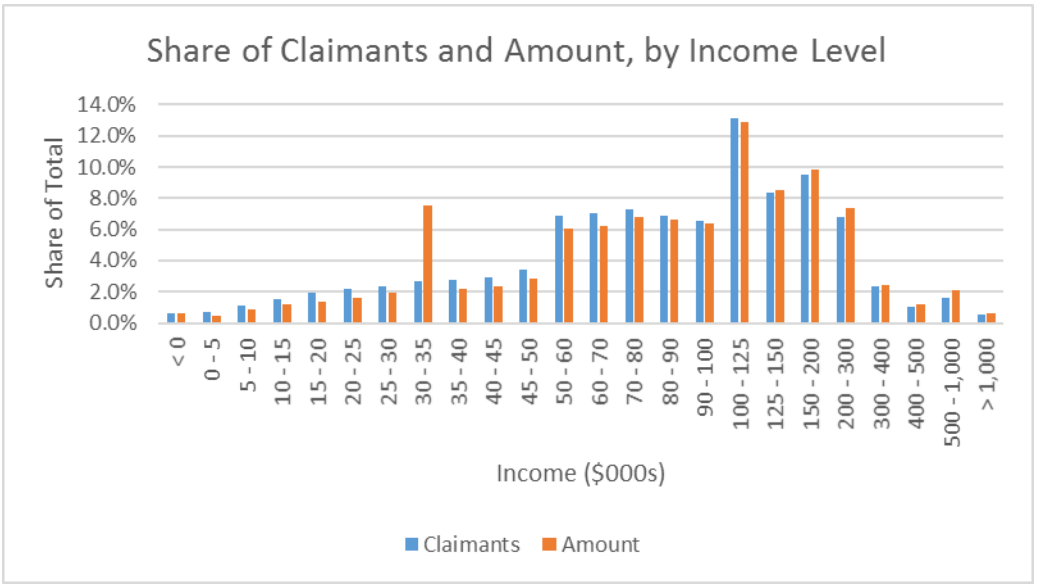
By 2015, the total number of certified credits had been reduced to 16,303. Appliances accounted for only seven percent of the claimants; the average had increased, however, to $543. This change reflects the modified policy of limiting appliance credits to the highest energy efficiency products. As mentioned previously, the largest categories in 2015 were renewables and heat pumps / air conditioners. Renewables accounted for 52 percent of the total amount certified and heat pumps 34 percent. This latter group account for the largest share of certified tax credits (43 percent). Furnaces & boilers were the second most common credit, at 26 percent; their lower average credit of $398 puts them at third (eight percent) for total credit amount certified.

2015 Tax Credit Certificates

Device	Credits	Amount	Average
Appliances	1,087	$590,054	$543
Alt Fuels Devices	169	$48,058	$284
Ducts	738	$236,260	$320
Furnaces & Boilers	4,265	$1,696,986	$398
Wood & Pellet Stoves	1,102	$497,891	$452
Heat Pumps	6,957	$6,870,689	$988
Heat / Energy Recovery	28	$12,435	$444
Renewables	1,957	$10,604,493	$5,419
Total	16,303	$20,556,866	$1,261



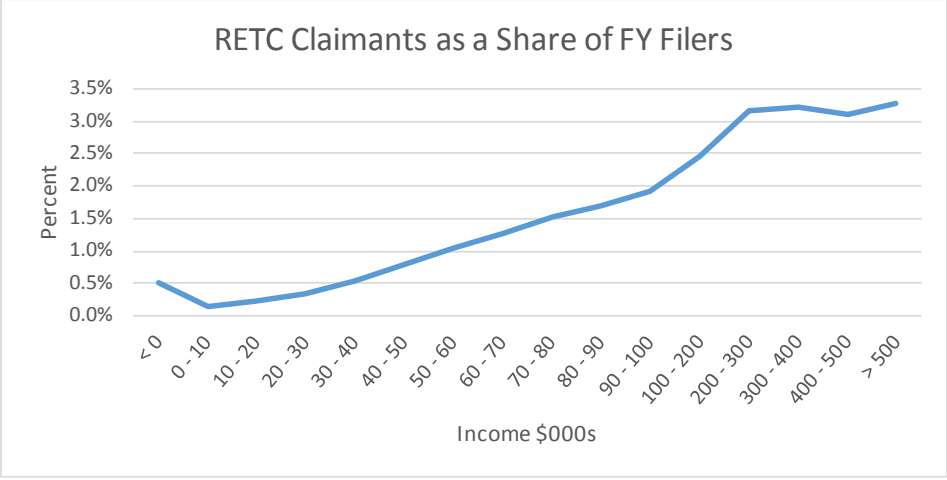
The bar chart below shows the distributions of tax credits and amounts claimed on personal income tax returns in 2014. With the exception of tax filers with incomes between $30,000 and $35,000, the distributions are quite similar. Most of the credit is claimed by taxpayers with income between $50,000 and $300,000 of annual income. They represent $11 million of the $15.5 million total claimed that year.



Taxpayers from every county claimed the RETC in 2014. The share of county filers claiming the credit ranged from about 0.2 percent in a few counties to 1.7 percent in Benton County. The table below shows the six counties with a total amount claimed of at least one million dollars; the remaining counties are grouped together in "other". Aside from Coos County, the county average amount claimed ranged from $509 (Morrow) to $1,209 (Tillamook). Coos County represents an outlier with an average RETC of $5,458 in 2014. Multnomah County had the largest total amount claimed with $2.5 million.

County	Returns	Claimants	Share	Amount	Average
Clackamas	173,432	1,787	1.0%	$1.5	$836
Coos	24,084	192	0.8%	$1.0	$5,458
Lane	146,883	2,047	1.4%	$1.9	$932
Marion	129,902	1,161	0.9%	$1.0	$824
Multnomah	343,403	3,062	0.9%	$2.5	$800
Washington	240,285	2,620	1.1%	$2.3	$891
Other	621,621	5,558	0.9%	$5.4	$963
Total	1,679,610	16,427	1.0%	$15.5	$946

The following chart shows the share of FY filers in 2014 who claimed this tax credit. Generally speaking, the use of the tax credit increases with income. This claim rate increases from about 0.1 percent for the lowest positive income group to 3.3 percent for those with income of at least $500,000. Two potential drivers behind this trend may be: (1) higher income households are more likely to be homeowners; and (2) the non-refundability of the credit limits its potential value for lower income filers.



One of the key policy features of this tax credit was added in 2011. The Legislature authorized the ODOE to change the incentive level for solar electric and fuel cell systems as market conditions warrant. Ideally, this policy should make the tax credit more efficient by reducing its cost without reducing its use. The table to the right shows the incentive rate offered each year from 2012 through 2017. The incentive rate has been reduced every year since 2013.

Year	Solar PV Incentive per watt of installed capacity of direct current
2012	$2.10
2013	$2.10
2014	$1.90
2015	$1.70
2016	$1.50
2017	$1.30

In 2015, the Legislature extended that authority so that ODOE could, by rule, adjust all RETC incentive rates based on market conditions. An example of the use of that authority pertains to electric heat pump water heaters. ODOE has reduced the prior rate of 60 cents per first year energy savings to 30 cents for tier one and 49 cents for tier two devices.

Lantz and Doris (2009) provide a summary of challenges and best practices for state incentive policies. Their focus is on renewable energy, but the concepts have broader applicability. Two challenges are determining the proper incentive level and the limitations of the tax system. The challenge of determining the most efficient level can be said about virtually every tax credit and highlights the value of quality data. The limitations of the tax system largely refer to the fact that a tax credit can only be an incentive for a person or business that has a tax liability. The most common approaches to addressing this restriction are refundable credits and the sale or transfer of tax credits. Betchelder et. al. (2006) put forth the general case for all policy-focused tax credits to be refundable. This prevents limiting the impact of the policy to those taxpayers who have a tax liability.

Some of what Lantz and Doris describe as best practices include: designing incentives to be goal specific, evaluating incentive levels, and enabling entities with no tax liability to utilize the incentives. The process that the Oregon Legislature is undertaking with respect to credits is an example of how to establish a process for clarifying policy goals and establishing relevant metrics. A good example of evaluating incentive levels may be the process that enables the ODOE to modify the incentive level. Ensuring the possible use of tax credits by individuals and businesses without a tax liability will likely continue to be a point of debate.

Other Issues

The majority of the administrative costs of this program are incurred by the ODOE. They administer the program, issue certifications, and maintain the data that facilitates policy analysis. As is often the case, the DOR incurs an incremental cost as this is one of several tax credits offered by the state. Because this particular credit is only available to residential users, it is only available on personal income tax returns.

Most states offer a similar type of tax credit. Appendix B contains a table with summaries of each state's policy. The tax credits tend to be investment tax credits where a certain percentage of the system cost is allowed as an income tax credit. In some cases, there is also a property tax exemption. A few states offer a production tax credit that is, generally, a certain rate per kilowatt hour of renewable energy produced.

Key Characteristics of Tax Credits Offered by Other States

- A fixed percentage of the device cost
- A tax credit cap per device
- Different percentages for different types of devices
- Production credit per kWh of energy produced

In Summary:

Advantages	• Ability of ODOE to adjust incentive levels • Broad applicability for various devices
Disadvantages	• Non-refundable
Potential Modifications	• Require incentive level adjustments • Make refundable

Other Recommendations:

JCDEO*	• Continue for two years or until a replacement is adopted
Governor	• Allow to sunset

*Joint Committee on the Department of Energy Oversight

Renewable Energy Development Contributions

ORS 315.236	Year Enacted:	2011	Transferable:	No
	Length:	1-year	Means Tested:	No
	Refundable:	No	Carryforward:	3-years
TER 1.438	Kind of cap:	Program	Inflation Adjusted:	No

Policy Purpose

Statute directs the ODOE to adopt rules to achieve certain goals. One of them consists of ORS 315.326(2)(b)(C) which states that ODOE shall adopt rules to "Provide the necessary financial incentives for taxpayers to make contributions..." to the Renewable Energy Development Subaccount of the Clean Energy Deployment Program. ORS 470.805(1) states that these funds are "...for purposes related to renewable energy development."

Testimony in 2015 by ODOE to the House Committee on Energy and the Environment stated that the purpose of this credit is "...to promote investment in renewable energy development..."

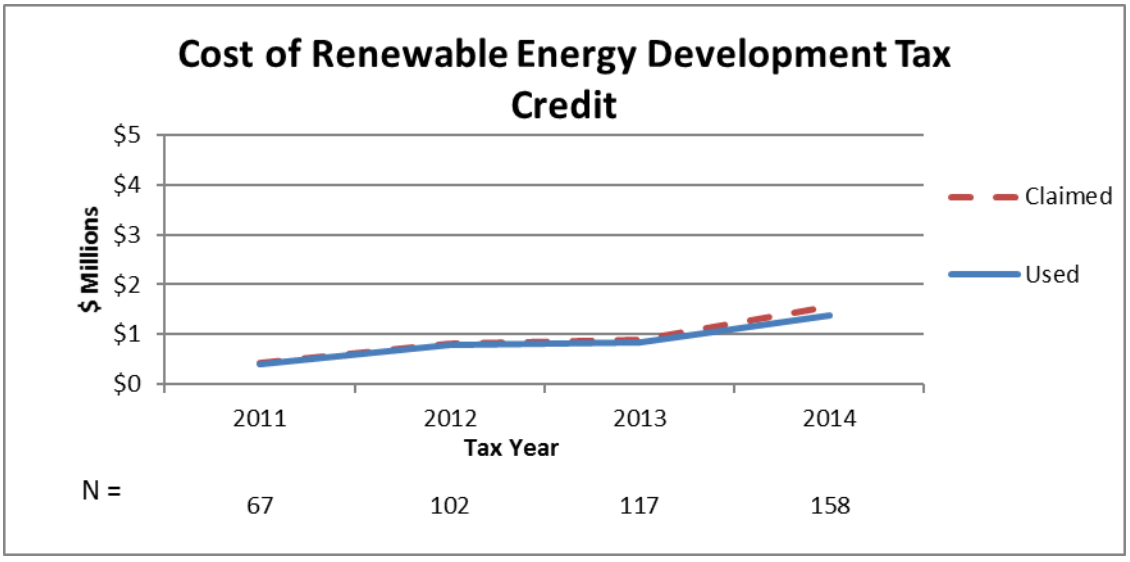
Because receipts from the tax credit auction are deposited into the Clean Energy Deployment Fund, the core policy is reflected in the use of these funds and this tax credit is simply a means of funding those activities.

As described by the ODOE in 2015 testimony, a timeline for this goal may be driven by the state's Renewable Portfolio Standard. This policy requires large utilities to supply 25 percent and smaller utilities to supply either five percent or 10 percent of their electricity from renewable resources by 2025. Projects that are funded through the grant program are intended to help the state reach this goal.

Description and Revenue Impact

Taxpayers may purchase, at auction, a tax credit where the proceeds to the state are used to fund renewable energy development projects. Eligible projects are those generating electricity from biomass, solar, geothermal, hydroelectric, wind, landfill gas, biogas, wave/tidal energy, or ocean thermal energy systems. A maximum of $1.5 million in tax credits is auctioned each year by the Department of Revenue. The credits are sold in $500 increments with a minimum bid of $475 (95 percent of the value of the tax credit). The Department of Energy administers the fund. The credit is not transferable but has a three-year carryforward.

The graph below shows the tax credits claimed and used between 2011 (the beginning of this program) and 2014. As the tax auction process has matured, the use of these tax credits has also increased. During the first three years, the usage rate was roughly 95 percent. 2014 was the first year the usage rate fell below 90 percent (to 89 percent). Up to $3 million in tax credits may be sold at auction per biennium. Assuming ODOE continues to auction $1.5 million in credits each year, the use of this credit should remain between one and two million dollars per year.



Policy Analysis

The Congressional Research Service (CRS) reports a summary review of two federal tax credits related to renewable energy. One credit is an investment tax credit that is generally either 10 percent or 30 percent of property costs. The second is a production tax credit that in 2014 was

either 1.1¢ or 2.3¢ per kWh of renewable energy produced. In their summary analysis of these incentives, they note that such subsidies may reduce inefficiencies when energy markets fail to reflect the full costs of energy production. They note that such incentives reduce the cost of complying with renewable portfolio standards, if applicable. To the extent that high capital costs are a barrier to developing renewable energy technologies, tax incentives may address some of the associated uncertainties by reducing such costs. As for the production tax credit, CRS cites work done by Metcalf (2009) that suggests that a one percent reduction in the use cost of capital for wind power increases such investment by more than one percent.

While the Oregon tax credit is neither a direct investment credit nor a direct production subsidy, it is an alternative means of publicly funding eligible projects. Because grants are awarded as the result of a competitive process with a funding limit, the administration of the grant should be able to emphasize efficiencies that may not be captured through other means. For example, presumably projects that are more efficient and more likely to succeed would obtain funding over those that are less efficient. Another consideration is that there can be value in allocating some resources to riskier projects that have a potentially much larger payoff.

The table below shows the full history of tax credit auctions, from 2011 through 2016. The number of tax credits sold has varied over the years. As described above the tax credits have been, for the most part, sold in increments of $500. Individuals may bid on multiple increments. For example, if a taxpayer bids on and wins five increments, they may claim one tax credit of $2,500. One item of particular note is that for some years, in aggregate, the amount paid for the tax credits has exceed the value of those tax credits.

RED Tax Credit Auctions

				Bid Amount	
Year	Number of Increments	Number of Tax Credits	Credit Amount ($M)	Total ($M)	Share of Credit
2011	461	34	$0.5	$0.5	101%
2012	3,000	47	$1.5	$1.5	100%
2013	1,108	29	$0.6	$0.5	97%
2014	4,524	80	$2.3	$2.2	99%
2015	3,000	59	$1.5	$1.6	106%
2016	3,000	53	$1.5	$1.6	107%
Total	15,093	302	$7.8	$7.9	102%

The following table shows the distribution of tax credit claimants by income level. These data are for full-year filers in tax year 2014. As expected, usage is focused toward higher income

filers. Filers with at least $100,000 of income represented 60 percent of the claimants and 98 percent of the amount claimed. The overall average credit claimed was just under $9,900; the average credit for filers with at least $500,000 of income was roughly $34,600.

Tax Credits Claimed

(Tax Year 2014)

Income $000	Number of Claimants	Amount ($)	Average ($)
< 25	15	$1,964	$131
25 - 50	15	$6,152	$410
50 - 100	18	$9,659	$537
100 - 200	22	$72,540	$3,297
200 - 500	31	$436,217	$14,072
> 500	19	$657,992	$34,631
Total	120	$1,184,524	$9,871

The following table shows grant data through July of 2016. There are 20 projects, all photovoltaic. Each grant is 35 percent of eligible costs, up to a maximum of $250,000. As grant awards have increased, so has the amount of energy produced annually from those projects. In particular, 2016 experienced a significant increase. One metric that may bear further exploration is grant dollars spent per kWh. Such metrics may provide useful insight moving forward as future projects compete for limited resources. As more of these projects are funded over time, there may be opportunities to continuously increase the return-on-investment.

Renewable Energy Development Grant Awards

Year	Grant Total ($)	Project Cost ($)	Grant as % of Project Costs	kWh produced	Grant Dollars per kWh Produced	MMBtu
2012	$12,234	$59,475	21%	22,729	$0.54	78
2013	$104,869	$313,852	33%	119,940	$0.87	409
2014	$120,105	$613,603	20%	234,491	$0.51	800
2015	$340,211	$1,546,059	22%	590,832	$0.58	2,016
2016	$432,466	$11,908,782	4%	4,550,984	$0.10	15,528
Total	$1,009,885	$14,441,771	7%	5,518,975	$0.18	18,831

Other Issues

Administrative costs are primarily born by the ODOE as the administrative agency. Some costs are born by the DOR as the agency that conducts the auction. They also incur some incremental costs as they are responsible for compliance with Oregon tax laws. This credit is one of several that are included in tax returns and other information provided to taxpayers.

It is unclear at this time if other states offer such a tax credit. Some states do offer tax credits that are a function of renewable energy production or property costs.

In Summary:

Advantages	• Maximizes efficiency due to auction
Disadvantages	• The dollar amount auctioned is not directly tied to the demand for project funding
Potential Modifications	• Allow cap to increase as the program is sold out • Tie the auction cap to the amount of available funds • Suspend auction in years when project demand is low

Other Recommendations:

JCDEO*	• Allow to sunset
Governor	• Allow to sunset

*Joint Committee on the Department of Energy Oversight

Energy Conservation Projects

ORS 315.331	Year Enacted:	2011	Transferable:	Yes
	Length:	1-year; 5-years	Means Tested:	No
	Refundable:	No	Carryforward:	5-years
TER 1.439	Kind of cap:	Program	Inflation Adjusted:	No

Policy Purpose

Statute does not specifically identify a policy purpose for this incentive. The tax credit on which this one was founded included a broad policy regarding the importance of energy conservation. In 2015, testimony by the ODOE to the House Committee on Energy and the Environment states that the purpose of this credit is "...to promote energy savings and market transformation..."

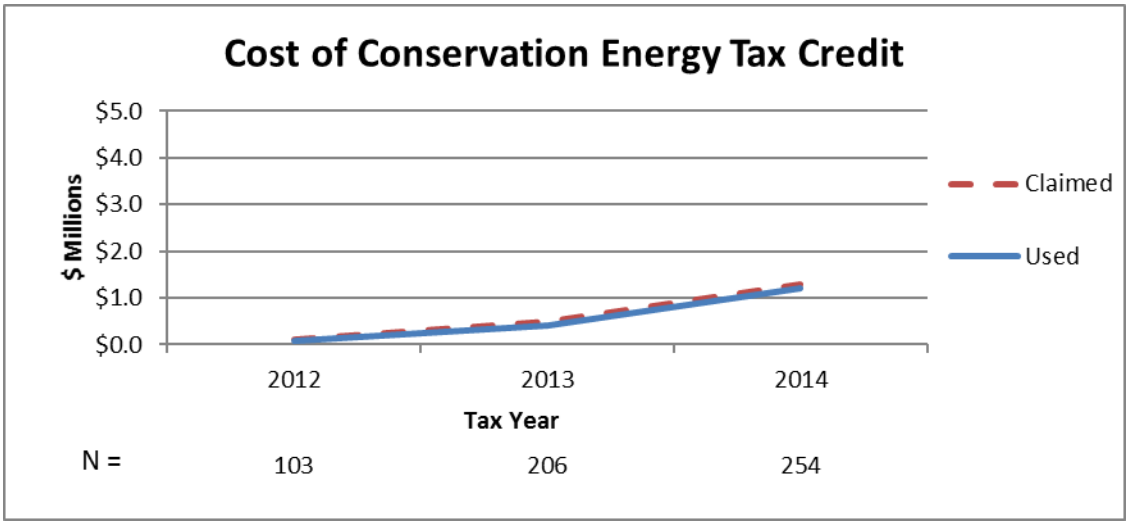
As described by the ODOE in 2015 testimony, a timeline for achieving this purpose may align with the Energy Action Plan adopted by the Northwest Power and Conservation Council. One of the goals outlined in the plan is to meet all load growth over the next ten years from conservation. This tax credit is intended to fund projects that help the state reach this goal.

Description and Revenue Impact

Taxpayers who invest in an energy conservation project are allowed to claim a tax credit of up to 35 percent of the eligible project costs, as certified by the Department of Energy. The credit is

taken over five years: 10 percent in the first and second years and 5 percent each year thereafter. If the project has certified costs of no more than $20,000, the tax credit may be taken in one year. The credit has a five-year carryforward but may be transferred. There is a program cap of $28 million in tax credits that may be issued per biennium. For more information on tax credit transfers, refer to Section IV Tax Credit Transferability.

The graph below shows the tax credits claimed and used as reported on personal and corporation tax returns between 2012 and 2014.[6] Over these three years, the amount claimed grew from about $0.1 million to $1.3 million. The usage rate grew each year from about 80 percent to 92 percent.



Policy Analysis

Much of the analysis of energy tax credits described earlier is applicable here as well. The CRS (2014) provides an analytical summary within the context of evaluating the federal energy tax credits. One could argue that the business market for energy-efficient property is more efficient than the residential market as profit motives are more likely to be a determining factor. Savings from a reduction in the costs of energy consumed could be redirected toward investments in either capital or labor, enhancing prospects for long-term growth.

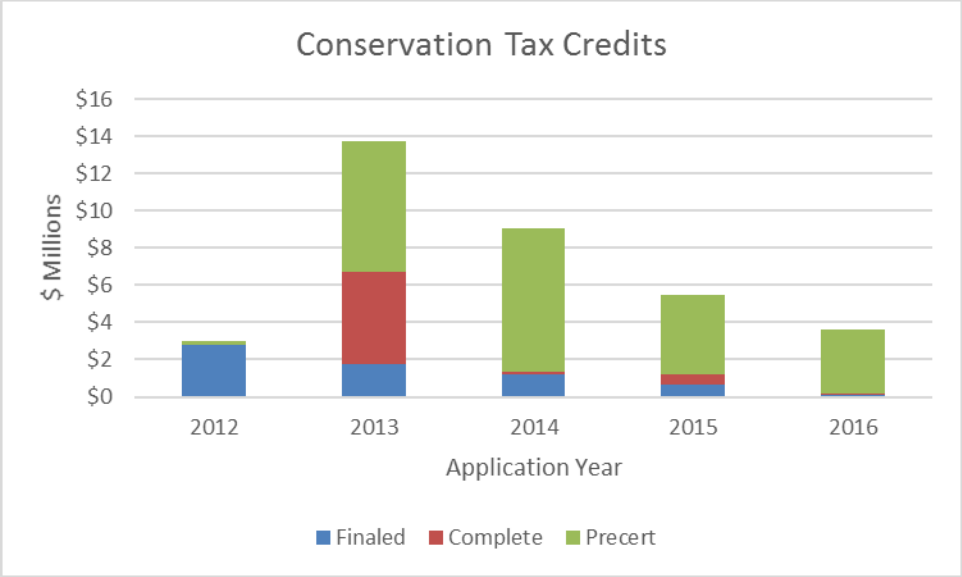
The key question remains whether or not businesses would make such investments regardless of tax incentives. In his discussion on the value of such tax incentives and constrained budgets, Nadel (2012) describes, roughly, a history of implementation that has improved over time. For example, the theme of the federal incentives enacted in 2005 were larger and more targeted with an emphasis on emerging technologies. He argues that a key factor in minimizing the free rider problem is to focus incentives on technologies with small market shares, where incentives can be used to help develop markets in the medium to long-term.

The changes made by the Legislature in 2011 present an opportunity to focus these policies, including this conservation tax credit, in a way that maximizes the value of each tax credit dollar and minimizes inefficiencies. A recent example of how these policies can be modified and made

[6] Due to some reporting concerns, these data have been calibrated using certification data.

more efficient is the recertification process established in 2015. With HB 2448 the state required owners of large conservation projects - a cost at least $1 million - to enter into a performance agreement that would require annual recertification. The recertification occurs during the same five years over which the initial credit is claimed and should ensure project integrity.

The graph below shows the amount of conservation credits for which ODOE has received applications since program inception, $34.9 million from 2012 through December of 2016. The blue bars show the amount and application year for projects that have received final certification. Many of these are the small projects that result in one-year tax credits. The red bars indicate projects that have been completed but are waiting for their final certification. The green bars are projects that have received pre-certification and are, presumably, under construction, installation, etc. From the day the initial application is received to final certification, the average length of time for the five-year credits is about 18 months. For the one-year tax credits, it is just over six months.



The following table provides more detailed information on the conservation projects that have received a final certification. During the first (nearly) five years of the program, a total of 971 projects have been completed. Total certified project costs were $18.6 million and $6.4 million in tax credits have been awarded. Not surprisingly, most of the projects (96 percent) are small projects with an average one-year credit of $1,976. One-year credits issued since program inception total just over $1.8 million.

There were 39 large projects awarded five-year tax credits. The average credit was just under $118,000; their total is $4.6 million. The two dominant categories are Commercial Building

Systems and Commercial, Agricultural, Industrial Processes. There are 11 projects of each type totaling $1.7 million and $2 million, respectively.

Conservation Tax Credit Certifications

Type of Tax Credit	Number	Project Costs ($)	Tax Credits ($)	kWh Savings	MMBtu
1-year tax credits					
Small Premium Projects	925	$5,215,000	$1,824,624	6,916,498	23,599
Commercial Building Systems	7	$48,365	$16,927	91,873	313
Subtotal	932	$5,263,365	$1,841,551	7,008,371	23,913
5-year tax credits					
Commercial Building Envelope	9	$805,579	$281,953	760,676	2,595
Commercial Building Systems	11	$4,778,749	$1,660,723	4,759,859	16,241
Commercial Thermal	4	$271,261	$94,941	296,114	1,010
Commercial, Agricultural, Industrial Process	11	$5,771,718	$1,958,034	8,827,793	30,120
Sustatinable Buildings	4	$1,729,462	$605,312	371,869	1,269
Subtotal	39	$13,356,769	$4,600,963	15,016,311	51,236
Total	971	$18,620,134	$6,442,514	22,024,682	75,148

Given a goal of reduced energy consumption, the table includes initial estimates of energy saved. The estimates are tied to the project size. Collectively these projects have reduced energy consumption in Oregon by 22 million kWh per year. The total energy savings is an estimated 75,148 MMBtu. Overall, each tax credit dollar spent saved 3.4 kWh per year. Depending on the ability to collect, organize, and maintain quality data, the potential exists for more sophisticated analysis to be done that may help identify strengths and weaknesses of the approved projects. That information could then be translated into future program enhancements.

Other Issues

Administration costs are almost entirely incurred by the ODOE as program administrators. Program participants are required to pay fees when submitting their pre-certification application, technical review, final application, and amendments. The DOR likely incurs an incremental expense as they administer both the individual and corporation tax systems. This credit is one of several that they track to ensure compliance.

A few states appear to have a similar policy that focuses on energy conservation. Some offer loan or grant programs. Others offer income tax deduction or property tax credits. Massachusetts has a unique program; they offer an income tax deduction for any patent or royalty income from the sale of energy conservation technology.

Key Characteristics of Tax Credits Offered by Other States

- A percentage of installed costs
- Credit cap per taxpayer

In Summary:

Advantages	• Consistent with the state energy plan • Clarity in determining the credit amount
Disadvantages	• Not a direct function of saved energy
Potential Modifications	• Enhance integration with other incentives • Increase $20,000 threshold • Replace transferability with refundability

Other Recommendations:

JCDEO*	• Allow to sunset
Governor	• Allow to sunset

*Joint Committee on the Department of Energy Oversight

Biomass Production or Collection

ORS 315.141	Year Enacted:	2007	Transferable:	Yes
	Length:	1-year	Means Tested:	No
	Refundable:	No	Carryforward:	4-years
TER 1.443	Kind of cap:	None	Inflation Adjusted:	No

Policy Purpose

2007 implementing legislation (HB 2110) indicates this tax credit is part of a policy "...to encourage greater development, distribution and use of agricultural and forest material for biofuels, for electricity and for other forms of biomass energy use." It also indicates that the policy is intended to improve Oregon's rural economy, lead to cleaner air, and reduce Oregon's reliance on oil. Legislative documentation includes the following metrics to be used in the subsequent evaluation of the tax credit:

- Amount of biofuel raw material collected or produced as a result of this tax credit
- Amount of liquid fuel or electricity produced from the material collected or produced
- Amount of energy produced (in million BTUs)
- Annual dollar value of the energy produced
- Tons of CO2 emissions avoided
- Amount of fossil fuel displaced
- Total Average Payback Period / Return on Investment

Testimony for proposed legislation in 2011 proposed that the tax credit would also create living wage jobs, diversify local economies, improve forest health, and enhance water resources. 2015 testimony by the ODOE to the House Committee on Revenue states, in part, that the purpose of the tax credit is "...to reduce Oregon's dependence on foreign oil, stimulate markets and reduce greenhouse gas emissions." Their testimony goes on to say that it "... encourages value-added utilization of material that would otherwise be disposed of through burning, landfilling, flushing down the drain, or other traditional management techniques." Their testimony at that time also included potential improvements in the tax credit. These policy changes are included in the Policy Analysis section.

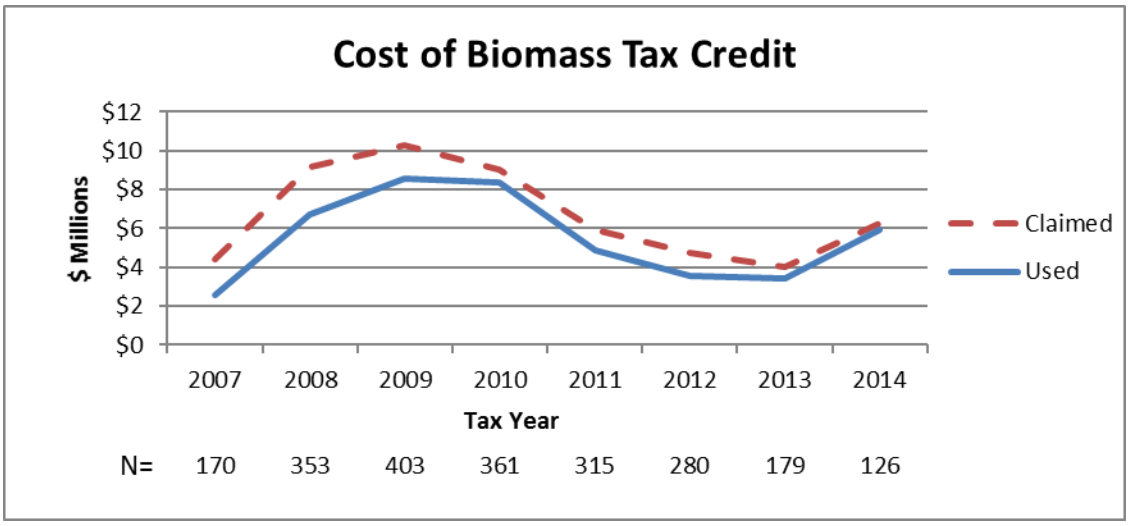
Description and Revenue Impact

Taxpayers are allowed a tax credit for the production or collection of biomass. The material must be sourced within Oregon and used as a biofuel or used to produce biofuels in Oregon. Taxpayers must be certified by ODOE. The credit is nonrefundable but may be carried forward four years. The credit is transferable and may be claimed only once for each unit of biomass. The tax credit rate depends on the source material. The table below contains the tax credit rates and certified amounts for 2015. Also included in the table is the volume of qualifying material.

Material	Tax Credit Rate	2015 Volume	2015 Credit ($M)
Oil seed	$0.05 per pound	0	$0
Grain crops	$0.90 per bushel	0	$0
Virgin oil	$0.10 per gallon	0	$0
Biosolids	$10.00 per wet ton	0	$0
Vegetative	$10.00 per bond dry ton	3,053	$0.03
Manure*	$5.00 per wet ton	828,604	$4.14
Used oil	$0.10 per gallon	3,825,253	$0.38
Wood	$10.00 bone dry ton	55,714	$0.57

* The tax credit rate is reduced to $3.50 in 2016

The graph below shows the amount of tax credits claimed and used as reported on individual and corporation tax returns from 2007 through 2014. DOR had administrative authority from inception through 2009. In 2010, administration was moved to ODOE where a certification system was established. Between 2007 and 2009, use of the credit grew from about $2 million to $8 million. Tax credit use declined from 2010 through 2013, and then increased in 2014. Usage rates have generally increased over time, reaching 94 percent in 2014.



Policy Analysis

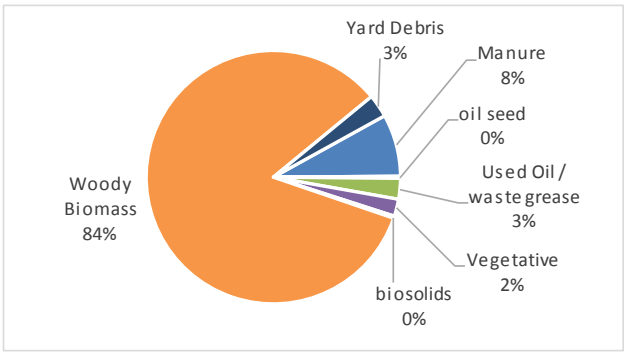
One of the challenges of evaluating this tax credit is the fact that various biomass materials that are eligible for the subsidy may or may not have market overlap. According to one source, vegetative and wood biomass is an input for the wood fuels market; manure is an input for anaerobic digesters for energy on farms as well as liquid fertilizer; and used oil may be used to produce biofuel as well as animal feed supplements. A full understanding of the impact the credit has on each of the markets may require separate and distinct studies.

One such study was conducted in 2011. The Ecosystem Workforce Program, which is part of the University of Oregon, released a report on the impact of this tax credit based on 2010 data. Nielsen-Pincus, et. al. (2011) studied the wood biomass portion tax credit to better understand its effects on Oregon's wood fuel market and, more broadly, on Oregon's economy. Their research suggests that the tax credit had a positive impact on market volume and fuel market prices. They also found that this portion of the tax credit had a positive impact on the broader economy and that results hold even if as little as 20 percent of the wood biomass volume that received the credit was directly attributable to the credit.

The next few tables and charts summarize data from ODOE and DOR. The first combination table/chart shows the biomass credit as it was used in 2010. A total of 96 tax credits were awarded to 49 businesses. The total amount awarded was $5.8 million dollars for an average credit of just over $60,000. As the pie chart indicates, woody biomass was, by far, the largest component of the tax credit, accounting for 84 percent of the dollar impact. Manure was second, with eight percent. The average credit was roughly $76,000 for both woody and manure biomass.

2010 Tax Credits Certified

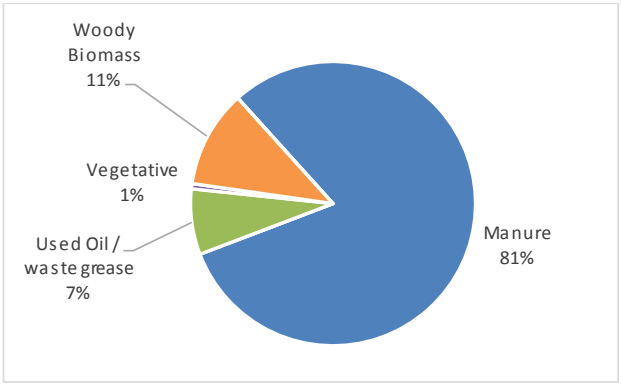
Material	Credits	Amount	Average
Manure	6	$457,843	$76,307
oil seed	5	$15,713	$3,143
Used Oil / waste grease	4	$152,676	$38,169
Vegetative	3	$126,057	$42,019
biosolids	2	$15,897	$7,948
Woody Biomass	63	$4,834,190	$76,733
Yard Debris	13	$168,296	$12,946
Total	96	$5,770,671	$60,111



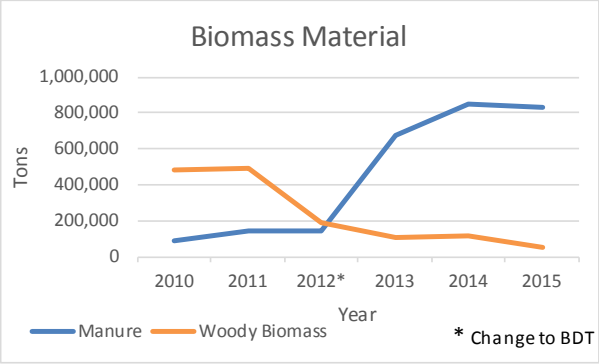
By 2015, the composition of material had changed significantly. These changes could be market driven, but a contributing factor may be that the incentive for woody biomass was reduced from $10 per green ton to $10 per bone dry ton in 2012. The total number of tax credits awarded had increased to 106, but the number of businesses receiving those credits had fallen to 33. While use in 2010 included seven different materials, in 2015 that number had fallen to four and that includes a singular claimant for vegetative biomass. The largest component was manure; it accounted for 56 percent of the tax credits and 81 percent of the total amount awarded.

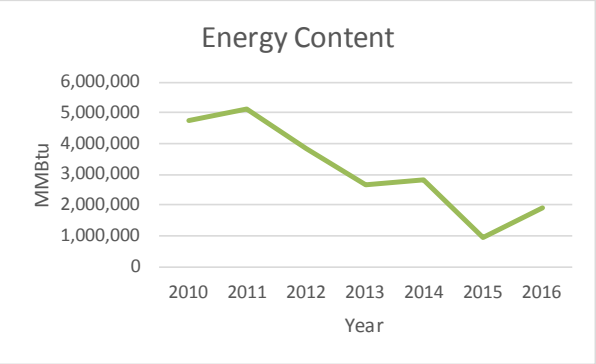
2015 Tax Credits Certified

Material	Credits	Amount	Average
Manure	59	$4,143,022	$70,221
oil seed	0	$0	
Used Oil / waste grease	20	$382,525	$19,126
Vegetative	1	$30,530	$30,530
biosolids	0	$0	
Woody Biomass	26	$567,139	$21,813
Yard Debris	0	$0	
Total	106	$5,123,216	$48,332



The following two charts provide time series data and are examples of the type of metrics included in the Policy Purpose section. Two of these metrics are the amount of material collected or produced and the total amount of energy produced. The Biomass Material chart shows the change in relative quantities over time for the two dominant biomass materials. (The manure credit was reduced beginning in 2016, so stakeholders will be interested in the impact that may have.) The Energy Content chart shows data for the total amount of energy for all biomass material each year. These charts provide examples of the additional information that could be helpful in ongoing policy evaluations, depending, in part, on the desired policy outcomes.





The potential for a policy to evolve over time is exemplified by the 2015 legislative discussion over HB 2449. This was a bill proposed by ODOE to significantly modify the incentives related to biomass. The long-term goal was to craft a policy that directly incentivized the production and use of bio-energy in Oregon. At the time, the existing biomass tax credit was scheduled to sunset on January 1, 2018. To acknowledge the concerns of the stakeholders for the existing program, that sunset date was proposed to be extended four years. This would provide sufficient lead time for markets to adjust to the policy change. During that time, a pilot project would be administered by ODOE to encourage bio-energy production. It would have been a capped program that included a competitive selection process with a focus on creating new capacity. During the implementation of the pilot program, both energy and non-energy benefits could be evaluated. Potential non-energy benefits included forest health, nutrient management, an alternative to non-value added disposal of biomass, and increased labor demand. In short, it may be a better approach to achieve many of the goals for the existing tax credit, as described in the Policy Purpose section above.

Other Issues

Administrative costs are mostly born by ODOE. As with most tax credits, DOR may incur some incremental expense from ensuring tax compliance with the tax credit. According to 2015 testimony by the ODOE, no other states offer a similar tax credit, one that is directly tied to the production or collection of biomass material. Several states do offer tax incentives for the

production of biofuels. Some of the credits are investment credits that are a fixed percentage of the cost of equipment. Others are a rate incentive per unit of biofuel.

In Summary:

Advantages	• Direct function of material
Disadvantages	• To extent transportation costs are a market barrier, it is an indirect subsidy
Potential Modifications	• Separate credits according to purpose or function • Convert to a production based incentive • Include a data collection process

Other Recommendations:

JCDEO*	• Allow to sunset, except for manure credit • Move the manure credit to the Department of Agriculture and establish a program cap
Governor	• Allow to sunset

*Joint Committee on the Department of Energy Oversight

Appendix C: Policy Questions

When reviewing the tax credit sunset extension bills and proposed new credits, the Joint Committee on Tax Credits intends to address the follow questions:

- What is the public policy purpose of this credit? Is there an expected timeline for achieving this goal?

- Who (groups of individuals, types of organizations or businesses) directly benefits from this credit? Does this credit target a specific group? If so, is it effectively reaching this group?

- What is expected to happen if this credit fully sunsets? Could adequate results be achieved with a scaled down version of the credit? What would be the effect of reducing the credit by 50%?

- What background information on the effectiveness of this type of credit is available from other states?

- Is use of a tax credit an effective and efficient way to achieve this policy goal? What are the administrative and compliance costs associated with this credit? Would a direct appropriation achieve the goal of this credit more efficiently?

- What other incentives (including state or local subsides, federal tax expenditures or subsidies) are available that attempt to achieve a similar policy goal?

- Could this credit be modified to make it more effective and/or efficient? If so, how?