More Power to the Wealthy: Renewable Energy Tax Programs, Market Distortions, and the Ramifications on the Cost of Electricity

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This paper details the currently available information on the renewable energy tax program at the federal and state levels. It discusses the distorting effect these programs have on the market and the potential ramifications of these programs for availability of affordable electricity.

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I. INTRODUCTION

A dilemma is looming for the electric sector. The continued integration of renewable energy resources into the electric grid presents a multi-faceted challenge for electricity producers, suppliers, and regulators. Renewable resources, particularly wind and solar, present unique challenges to existing business models, grid stability, and regulations. The inherent challenges of renewables are exacerbated by a set of tax policies that encourage rent-seeking interests and do nothing to promote the equitable adoption of renewable technologies. The connection between innovation and inequality has the potential to divide those able to afford renewable technology and those reliant on the existing utility model.

This paper focuses on the obvious and obscure costs of promoting renewable energy generation through direct and indirect tax policies. Tax policies play a critical role in shaping new, high-cost electric sector infrastructure development. However, these policies often only address the upfront monetary costs of renewable energy development. There are troubling social costs associated with these policies that must be addressed for the electric sector to be able to fulfill its mandate of serving everyone.[1]

Renewable energy is expensive. Electricity generated from solar, until recently, was projected to be more expensive per Megawatt hour (MWh) to produce than electricity generated from fossil fuels or nuclear.[2] In a pure market system, renewable energy would be relatively uncompetitive with traditional resources. Despite an uncompetitive price, renewable energy is poised to expand. This growth is driven by noneconomic factors such as: the introduction of state renewable portfolio standards (RPS),[3] the pending federal regulation of greenhouse gas (GHG) emissions,[4] and the successful implementation of

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1 Cal. Pub. Util. Code § 216(a) (defining public utilities as "every . . . electrical corporation . . . where the service is performed for, or the commodity is delivered to, the public or any portion thereof."); Hotchiss v. Moran, 109 Cal. App. 321, 324 (3rd Dist. 1930) (stating that "[A] public utility corporation is bound, upon demand, to supply its commodity to consumers.").

2 ENERGY INFO. ADMIN., LEVELIZED COST AND LEVELIZED AVOIDED COST OF NEW GENERATION RESOURCES IN THE ANNUAL ENERGY OUTLOOK 2016 8 (2016), https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf [hereinafter ENERGY OUTLOOK 2016]. The average projected costs of new generation resources in 2022, without tax credits, are: advanced coal with carbon control & sequestration--$139.5/MWh; natural gas--$58.1/MWh; nuclear--$102.8/MWh. Contrast this with Solar PV--$84.3/MWh; solar thermal--$235.9/MWh. *Id.* When considering available tax credits, fossil fuel costs remain unchanged while solar PV drops to $66.3/MWh and solar thermal drops to $179.9/MWh. *Id.* These projected costs have dropped over the past several years. *See* ENERGY INFO. ADMIN., LEVELIZED COST AND LEVELIZED AVOIDED COST OF NEW GENERATION RESOURCES IN THE ANNUAL ENERGY OUTLOOK 2015 7 (2015), https://www.eia.gov/outlooks/archive/aeo15/pdf/electricity_generation_2015.pdf (showing the average projected costs of new generation resources in 2020 as: coal--$95.1/MWh; natural gas--$75.2/MWh; nuclear--$95.2/MWh; Solar PV--$125.3/MWh; Solar Thermal--$239.7/MWh); *see also* ENERGY INFO. ADMIN., LEVELIZED COST AND LEVELIZED AVOIDED COST OF NEW GENERATION RESOURCES IN THE ANNUAL ENERGY OUTLOOK 2014 7 (2014), https://www.eia.gov/outlooks/archive/aeo14/pdf/electricity_generation_2014.pdf (showing the average projected costs of new generation resources in 2019 as: coal--$95.60/MWh; natural gas--$64.40/MWh; nuclear--$96.10/MWh; Solar PV--$130/MWh; Solar Thermal--$243.10/MWh).

3 An RPS requires a certain percentage of a utility's electricity to be sourced from qualifying renewable resources. ERIC MARTINOT ET AL., RENEWABLE ENERGY POLICIES AND MARKETS IN THE UNITED STATES (2005), http://www.martinot.info/Martinot_et_al_CRS.pdf.

4 *See generally* Carbon Pollution Emission Guidelines for Existing Stationary Source: Electric

subsidies that have lowered the price of renewable technologies. To encourage growth, offset compliance costs, and spur the adoption and cost reduction of renewable technologies, federal and state governments use tax policies.

The existing tax programs prioritize the construction and installation of renewable energy sources without a full examination of who may access renewable energy effectively and affordably. This attitude of "renewables at any cost" presents a stark challenge to the existing mandates that require utilities to provide reliable and affordable electricity to everyone within a service area. This paper first identifies the current tax credits offered to individual and corporate taxpayers. It then discusses the ways the tax programs impact and distort the traditional electric distribution model. Finally, I will argue that this distortion may create a sharp divide between the people who are able to take advantage of the renewable energy tax policies and those who are left beholden to the traditional utility model. This divide presents a moral problem regarding who may access affordable, clean, and renewable energy that must be addressed if the electric sector continues to adopt renewable energy resources and is required to provide affordable electricity.

II. THE RENEWABLE ENERGY TAX PROGRAMS

Renewable energy policy is predicated on reducing U.S. consumption of electricity generated from fossil fuels.[5] The reasons underlying the policy include reducing pollution (including from GHGs) and producing a resilient, domestically-fueled electric sector.[6] Existing tax policies encourage the installation of renewable EGUs, the continued production of renewable energy, and overall energy conservation through energy efficiency.[7]

Renewable energy tax policies are offered to individual and corporate taxpayers.[8] The programs are generally similar for both payors and provide

Utility Generating Units, 79 Fed. Reg. 117 (June 18, 2014) (to be codified at 40 C.F.R. pt. 60); *see also* Stephanie Joyce, *Appeals Court Hears Challenge to Obama Power-Plant Emissions Rule*, NAT'L PUB. RADIO (Sept. 28, 2016), http://www.npr.org/2016/09/27/495595073/appeals-court-to-hear-challenge-to-obama-power-plant-emissions-rule (describing the Supreme Court Stay of the regulation and the hearing in the D.C. Circuit Court).

[5] *See* THE EXECUTIVE OFFICE OF THE PRESIDENT, BLUEPRINT FOR A SECURE ENERGY FUTURE 5-8 (2011), https://obamawhitehouse.archives.gov/sites/default/files/blueprint_secure_energy_future.pdf.

[6] *See id.*

[7] *Id.*

[8] *See generally* LYNN J. CUNNINGHAM, CONGRESSIONAL RESEARCH SERVICE, RENEWABLE ENERGY AND ENERGY EFFICIENCY INCENTIVES: A SUMMARY OF FEDERAL PROGRAMS (2016), https://fas.org/sgp/crs/misc/R40913.pdf (describing all available federal programs, including available tax credits and exclusions); Justin Barnes et al., *DSIRE Solar Policy Guide: A Resource for State Policymakers*, NORTH CAROLINA SOLAR CENTER (Sept. 2012), http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2015/09/Solar-Policy-Guide.pdf (describing the prevalence of programs available at the state level, including income, sales, and property tax programs).

either a tax credit or a tax exclusion for the installation or use of qualifying technologies.[9] The programs focus on three areas that drive renewable growth: new construction, continuing production, and energy efficiency ("EE") programs.[10] Though not directly related to renewable energy production, EE programs are central to renewable energy policy.[11] These programs encourage the reduction of power consumption and the adoption of more efficient technologies.[12] I have included them in this analysis because they operate comparably to the dedicated renewable energy tax programs and have a similarly disproportionate impact on low-income taxpayers.

A. *Federal Individual Tax Programs*

The federal government offers three tax programs to offset personal income tax: the residential renewable energy tax credit, the residential energy conservation subsidy exclusion, and the residential energy efficiency tax credit.

1. The Residential Renewable Energy Tax Credit

The Residential Renewable Energy Tax Credit (RRETC) is the only generation-focused federal tax credit available to the individual taxpayer.[13] The RRETC is designed to offset the costs incurred by a homeowner when installing a localized renewable energy system and is applied in the tax year the system was installed.[14] Taxpayers claim a portion of the expenditures on an installed, qualifying renewable energy system to offset their tax liability.[15] The allowance is 30 percent of the qualified expenditures on: solar electric systems, solar water heating systems, fuel cell systems, small wind-energy systems, and geothermal heat pump systems.[16] The system must serve a single dwelling occupied by the taxpayer.[17] The Energy Policy Act of 2005 (EPA 2005) established the credit which applied solely to solar-electric systems, solar water heating systems, and fuel cell systems.[18] The Energy Improvement and Extension Act of 2008 (EIEA 2008) extended the RRETC until December 31, 2016, and expanded it to include small wind-energy systems and geothermal heat pump systems installed after January 1, 2008.[19] The Consolidated Appropriations Act of 2016 extended the

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9 *See infra* text accompanying footnotes 12-184 (discussing the available tax policies).

10 *Id.* at 6-7.

11 *Id.*

12 *Id.*

13 *See* DEP'T OF ENERGY, TAX CREDITS, REBATES, & SAVINGS, http://energy.gov/savings (last visited Feb. 13, 2016) (RRETC is the only personal federal tax credit available).

14 I.R.C § 25D(a) (West 2017).

15 *Id.* § 25D.

16 *Id.* § 25D(a)(1)-(5).

17 *Id.* § 25D(d)(1)-(5).

18 Energy Policy Act of 2005, Pub. L. No. 109-58, § 1335(a), 119 Stat. 594 (2005).

19 Energy Improvement and Extension Act of 2008, Pub. L. No. 110-343, § 106(a) (for

RRETC for solar photovoltaic (PV) and solar thermal technologies through December 31, 2021.[20] Initially the expenditure amount was capped, but these limits were removed by two further amendments: EIEA 2008 removed the $2,000 credit limit for solar-electric systems;[21] while the American Recovery and Reinvestment Act of 2009 (ARRA 2009) removed nearly all other maximums.[22] The changes were backdated to affect all eligible technologies installed after 2008.[23] Only fuel cell systems retain a cap of $500 per 0.5 kilowatt (kW).[24]

2. The Residential Energy Conservation Subsidy Exclusion

The Residential Energy Conservation Subsidy Exclusion (RECSE) is complicated. The exclusion allows individual taxpayers to receive money from a public utility for energy conservation measures without the money being considered income for federal income tax purposes.[25] Energy conservation subsidies provided directly or indirectly to customers by public utilities (such as Los Angeles Department of Water & Power or Sacramento Municipal Utility District)[26] "for the purchase or installation of any energy conservation measure" allow beneficiaries to purchase conservation measures without being taxed on the money used.[27]

Eligible energy conservation measures include projects or modifications that reduce electricity or natural gas consumption or improve the management of energy demand.[28] The exclusion only applies to dwelling units such as houses, apartments, condominiums, mobile homes, boats, and similar properties.[29] Potentially included in the subsidy are utility rebates for residential solar-thermal projects, solar photovoltaic (PV) systems, other utility credits, and reduced rates.[30] However, the IRS has not ruled definitively if these measures

timeline extension); § 106(c)-(d) (for wind and geothermal exemptions), 122 Stat. 3765, Division B (2008).

[20] Consolidated Appropriations Act of 2016, Pub. L. No. 114-113, § 304(a)(2), 129 Stat. 2242, Division P (2015) (§ 304(a)(1) changed 30% to "applicable percentage" as part of the rolled phase-out of the credit).

[21] Energy Improvement and Extension Act § 106(b).

[22] American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, § 1103(a), 123 Stat. 115 (2009).

[23] *Id.* § 1103(b); I.R.C. § 48(a)(5)(C)(ii).

[24] I.R.C. § 25D(b)(1) (West 2017).

[25] *Id.* § 136(a).

[26] *See* LITTLE HOOVER COMM'N, REWIRING CALIFORNIA: INTEGRATING AGENDAS FOR ENERGY REFORM 1-2 (2012), http://www.lhc.ca.gov/studies/214/Report214_Final%20Complete.pdf [hereinafter REWIRING CALIFORNIA]. Public utilities are non-profit, municipal agencies that provide utility service to a designated political or geographic region. *Id.*

[27] I.R.C. § 136(a).

[28] *Id.* § 136(c)(1).

[29] *Id.* § 280A(f)(1).

[30] *See* I.R.S., PUBL'N 525: TAXABLE AND NONTAXABLE INCOME, CAT. NO. 15047D, 33-34

are allowable under the RECSE.[31] Because utilities also offer low-income customers subsidized measures, the RECSE has the potential to be more equally distributed than the RRETC.

3. Residential Energy Efficiency Tax Credit

The 2005 EPA established the Residential Energy Efficiency Tax Credit (REETC).[32] This credit was extended by EIEA 2008, and then by ARRA 2009.[33] The American Taxpayer Relief Act of 2012 (ATRA 2012) retroactively renewed the tax credit from January 1, 2012 until December 31, 2013.[34] The Tax Increase Prevention Act of 2014 (TIPRA 2014) then retroactively renewed REETC for 2014.[35] The credit was again retroactively renewed in 2015 and expired on December 31, 2016.[36]

The REETC encouraged small home infrastructure improvements by allowing taxpayers to claim residential heating, cooling, and water-heating energy-efficient equipment as a deductible expense.[37] The exact products and credit amounts varied depending on the year. A comprehensive list is available in Table 1.

Table 1: REETC Equipment & Amounts[38]

Technology	**Credit Amount**
Advanced Main Air Circulating Fan	$50
Natural Gas, propane, or oil hot water boiler with an annual fuel utilization rate of 95 or greater	$150
Natural gas, propane, or oil furnace with an annual fuel utilization rate of 95 or greater	$150

(2016) https://www.irs.gov/pub/irs-pdf/p525.pdf; *see also* DSIRE, RESIDENTIAL ENERGY CONSERVATION SUBSIDY EXCLUSION (PERSONAL) (2016), http://programs.dsireusa.org/system/program/detail/666.

31 DSIRE, *supra* note 29.

32 Energy Policy Act of 2005, Pub. L. No. 109-58, § 1333(a), 119 Stat. 594 (2004).

33 Energy Improvement and Extension Act of 2008, Pub. L. No. 110-343, § 302, 122 Stat. 3765 (2008) (establishes extension until 2009); American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, § 11023(e)-(f), 123 Stat. 115 (2009).

34 American Taxpayer Relief Act of 2012, Pub. L. No. 112-240, § 401(a), 126 Stat 2313 (2013).

35 Tax Increase Prevention Act of 2014, Pub. L. No. 113-295, § 151(a), 128 Stat 4010 (2014).

36 Consolidated Appropriations Act of 2016, Pub. L. No. 114-113, § 181(a), 129 Stat. 2242 (2015).

37 I.R.C. § 25C(d)(2) (West 2017).

38 I.R.C. § 25C(b)(3) (West 2017) (providing dollar amounts); *id.* § 25C(d)(3)-(6) (providing definitions of qualifying energy equipment).

Technology	Credit Amount
Electric heat pump water heater with an energy factor of at least 2.0	$300
Electric heat pump which achieves the highest efficiency tier established by the Consortium for Energy Efficiency	$300
Central air conditioner which achievers the highest efficiency tier established by the Consortium for Energy Efficiency	$300
Natural gas, propane, or oil water heater which has either an energy factor of 0.82 or a thermal efficiency of at least 90%	$300
Biomass stoves that use "plant-derived fuel available on renewable or recurring basis."	$300

The REETC also utilized aggregated caps in addition to equipment caps.[39] For 2006 and 2007, the aggregated cap for purchases made in both years was $500.[40] This cap was increased for 2009 and 2010 to $1,500,[41] and then lowered to $500 for 2011 to 2014.[42] The REETC is like the RREETC. Both credits allow individual taxpayers to deduct the cost of small infrastructure improvements from their overall tax liability. The REETC targets energy efficiency, while the RREETC targets small-scale electricity generation. Each program encourages individual investment in renewable energy infrastructure.

B. *Federal Corporate Tax Programs*

The federal government provides more tax programs for corporate taxpayers than it does for individual taxpayers. There are five primary corporate tax programs: the Renewable Electricity Production Tax Credit (PTC), the Energy-Efficiency Commercial Buildings Tax Deduction, the Energy-Efficient New Homes Tax Credit for Home Builders, the Energy Conservation Subsidy Exclusion, and the Business Energy Investment Tax Credit (ITC). Several of these programs mirror the individual tax programs. Corporate taxpayers must also choose between the PTC and the ITC; they may not claim both.[43] The choice depends on the size and nature of the product. A large (more MWh produced) installation, designed to sell power to the grid, benefits more from the

39 Energy Policy Act of 2005, Pub. L. No. 109-58, § 1333(b)(1), 119 Stat. 594 (2005) (providing aggregate lifetime caps).

40 *Id.*

41 American Recovery and Reinvestment Act of 2009 Pub. L. No. 111-5, § 11023(e)-(f), 123 Stat. 115 (2009).

42 Tax Relief, Unemployment Insurance Reauthorization and Job Creation Act of 2010, Pub. L. No. 111-312, §710 (a)-(b), 124 Stat 3296 (2010).

43 I.R.C. § 48(a)(5)(B).

PTC because of long term liquidity.[44] A small, self-contained installation, however, benefits more from the ITC because of the larger tax benefit for start-up costs.[45]

1. The Renewable Electricity Production Tax Credit (Federal PTC)

The Federal PTC allows corporations that operate renewable EGUs to claim credit for "the renewable electricity . . . produced by the taxpayer [corporation] . . . and sold by the taxpayer to an unrelated person during the taxable year."[46] For every kilowatt hour (kWh) produced by a renewable EGU, the corporate taxpayer can claim a credit.[47] The breakdown of the available credits is presented in Table 2.

Table 2: PTC Credit Amounts (2016)[48]

Resource Type	**Begin Construction Deadline**	**Credit Amount**
Wind	Dec. 31, 2013	2.3¢/kWh
Closed-Loop Biomass	Dec. 31, 2013	2.3¢/kWh
Open-Loop Biomass	Dec. 31, 2013	1.2¢/kWh
Geothermal Energy	Dec. 31, 2013	2.3¢/kWh
Landfill Gas	Dec. 31, 2013	1.2¢/kWh
Municipal Solid Waste	Dec. 31, 2013	1.2¢/kWh
Qualified Hydroelectric	Dec. 31, 2013	1.2¢/kWh
Marine & Hydrokinetic (150 kW or larger)	Dec. 31, 2013	1.2¢/kWh

The credit amounts are based on 1.5¢/kWh or .75¢/kWh (depending on the technology) in 2002 dollars and are indexed for inflation.[49] Most of the credits are available for the first ten years of the project's lifespan.[50] However, the

[44] MARK BOLINGER ET AL., NAT'L RENEWABLE ENERGY LAB, PTC, ITC, OR CASH GRANT? AN ANALYSIS OF THE CHOICE FACING RENEWABLE POWER PROJECTS IN THE UNITED STATES 12 (2009), http://www.nrel.gov/docs/fy09osti/45359.pdf.

[45] *Id.*

[46] I.R.C. § 45(a).

[47] *Id.*

[48] I.R.S. Notice 2016-34, 2016-22 I.R.B. 1060, *Credit for Renewable Electricity Production, Refined Coal Production, and Indian Coal Production, and Publication of Inflation Adjustment Factors and Reference Prices for Calendar Year 2016* (May 31, 2016), https://www.irs.gov/irb/2016-22_IRB/ar08.html.

[49] I.R.C. § 45(a)(1)-(2) (describing the 1/5¢/kWh baseline); *id.* (b)(2)(describing the inflation index); *id.* §45(b)(4)(A) (describing the reduction "by one-half" of the base credit amount for enumerated technologies).

[50] There are two exceptions: open-loop biomass, geothermal, small irrigation hydro, landfill

credit is reduced for projects that receive other federal tax credits, grants, tax-exempt financing, or subsidized energy financing.[51]

The Federal PTC was enacted in 1992, and has been renewed multiple times.[52] The credit was expanded by ARRA 2009, ATRA 2012, and the Consolidated Appropriations Act of 2016.[53] The ARRA 2009 legislation allowed facilities that qualify for the PTC to opt instead to take the federal business energy investment credit.[54] The grant allowed businesses to receive up to 30 percent of the capital investment upfront, rather than offsetting that year's tax bill.[55] The grant was attractive to projects that had limited financing options or higher capital costs.[56] The grant option expired on December 31, 2011; however, the investment tax credit is still available.[57] ATRA 2012 changed the "placed-in-service" deadlines to "beginning-construction" deadlines to determine facility eligibility and extended the ability to claim the ITC instead of the PTC through 2013.[58] The credit was extended for 2014 by TIPRA 2014.[59] Finally, the Consolidated Appropriations Act of 2016 again extended the deadline for wind energy facilities to December 31, 2016 for full credit amount and began a tiered phase-out of the credit for facilities beginning construction through December 31, 2019.[60] The Federal PTC encourages long-term and continuous renewable energy production.

2. Business Energy Investment Tax Credit (Federal ITC)

The Business Energy Investment Tax Credit is the other EGU-centric tax credit. A corporate actor that constructs a renewable EGU is eligible for the

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gas, and municipal solid waste combustion facilities placed into service after October 22, 2004, and before the enactment of EPA 2005 on August 8, 2005 are only eligible for 5 years; Open-loop biomass facilities placed in service before October 22, 2004 are only eligible for a 5-year period being January 1, 2005. *Renewable Electricity Production Tax Credit (PTC)*, DSIRE, http://programs.dsireusa.org/system/program/detail/734 (last updated May 24, 2016).

51 I.R.C. § 45(b)(3).

52 *See Renewable Electricity Production Tax Credit (PTC)*, DSIRE, *supra* note 49.

53 *See* American Recovery and Reinvestment Act of 2009 Pub. L. No. 111-5, §§ 1101-1102, 123 Stat. 115 (2009); *see also* The American Taxpayer Relief Act of 2012, Pub. L. No. 112-240, § 407, 126 Stat. 2313 (2013); *see also* Consolidated Appropriations Act of 2016, Pub. L. No. 114-113, 129 Stat. 2242, Div. P § 301 (changing the deadline to January 1, 2020 and inserting the phaseout credit for wind facilities); Div. Q § 187 (changing the deadline to January 1, 2017).

54 American Recovery and Reinvestment Act §1102.

55 *Id.*; *see also infra*, Section B(ii) (describing the Federal ITC).

56 BOLINGER ET AL., *supra* note 43, at 10.

57 The American Taxpayer Relief Act § 407.

58 *Id.*

59 Tax Increase Prevention Act of 2014, Pub. L. No. 113-295, § 155, 128 Stat. 4010 (2014).

60 Consolidated Appropriations Act of 2016, Pub. L. No. 114-113, 129 Stat. 2242, Div. P § 301 (stating the PTC will be reduced by 20% for facilities beginning construction in 2017, 40% for facilities beginning construction in 2018, and 60% for facilities beginning construction in 2019).

credit.[61] Unlike the Federal PTC, the Federal ITC does not require the electricity generated to be sold.[62] Furthermore, the restrictions on participants are relaxed so non-owner/operators can form leasing agreements that take advantage of the Federal ITC.[63] The Federal PTC calculates the credit based on the kWh produced, while the Federal ITC calculates the credit based on the capital cost of the project.[64] EIEA 2008 extended the ITC to include any system placed in service by December 31, 2016.[65] The Consolidated Appropriations Act of 2016 extended the Federal ITC for solar and PTC-eligible technologies.[66] The credit ranges in increments between 10 percent and 30 percent of the eligible cost.[67] Some of the available rebates are capped. The breakdown of limits and rebates is in Table 3.

[61] *See Business Energy Investment Tax Credit (ITC)*, DSIRE, http://programs.dsireusa.org/system/program/detail/658 (last updated February 20, 2017).

[62] BOLINGER ET AL., *supra* note 45, at 12.

[63] *See id.*

[64] WORLD RES. INST. THE BOTTOM LINE ON RENEWABLE ENERGY TAX CREDITS 1, http://www.wri.org/sites/default/files/pdf/bottom_line_renewable_energy_tax_credits.pdf (2008).

[65] Energy Improvement and Extension Act of 2008, Pub. L. No. 110-343, § 103, 122 Stat. 3765 (2008).

[66] Consolidated Appropriations Act of 2016, Pub. L. No. 114-113, § 303, 129 Stat. 2242, Division P (2015).

[67] I.R.C. § 48 (West 2017).

Table 3: Technologies, Credit Percentages, and Maximum Rebates of the ITC

Technology[68]	**2016 and earlier**[69]	**2017**[70]	**2018**[71]	**2019**[72]	**2020**[73]	**2021**[74]	**2022 & Beyond**[75]	**Maximum Rebate**[76]
Solar PV, Solar Water Heating, Solar Space Heating/Cooling Solar Process Heat	30%	30%	30%	30%	26%	22%	10%	No Limit
Large Wind	30%	24%	18%	12%	0%	0%	0%	No Limit
Hybrid Solar Lighting, Small Wind Turbines 1/1/2009 or later	30%	0%	0%	0%	0%	0%	0%	No Limit
Small wind Turbines 10/4/2008-12/31/2008	30%	0%	0%	0%	0%	0%	0%	$4,000
Microturbines	10%	0%	0%	0%	0%	0%	0%	$200 /kW
Geothermal Electric	10%	10%	10%	10%	10%	10%	10%	No Limit
Geothermal heat pumps, CHP	10%	0%	0%	0%	0%	0%	0%	No Limit
Fuel Cells	10%	0%	0%	0%	0%	0%	0%	$1,500 /0.5 kW

68 I.R.C. § 48(a)(3) (West 2017) (for descriptions of "energy property").

69 *Id.* § 48(a)(2) (for existing credit amount).

70 *Id.* § 48(c)(1)(D)-(4)(C)

71 *Id.* § 48 (a)(5)(E) (phasing out wind facility credits); (a)(6) (phasing out solar facility credits). *See also Business Energy Investment Tax Credit (ITC)*, *supra* note 58.

72 *Id*.

73 *Id*.

74 *Id*.

75 *Id*.

76 *Id.* § 48(c)(1)(B) & (c)(2)(B) (with a $200/kW limit); Energy Improvement and Extension Act of 2008, Pub. L. No. 110-343, § 104, 122 Stat. 3765 (2008) (with a $4,000 limit)

3. Energy-Efficiency Commercial Buildings Tax Deduction

The Energy-Efficiency Commercial Buildings Tax Deduction (EECBTD) applies to energy-efficient commercial buildings.[77] EPA 2005 established the deduction for buildings placed in service in 2006 and 2007.[78] EIEA 2008 extended the deduction through 2013.[79] The deduction was $1.80 per square foot for owners of new or existing buildings that installed: interior lighting; building envelope; or heating, cooling, ventilation, or hot water systems that reduced the building's total energy and power cost by 50 percent or more in comparison to a building meeting minimum requirements set by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2007.[80] Furthermore, deductions of $0.60 per square foot were available to owners with buildings that had individual lighting, building envelope, or heating and cooling systems installed which met target levels that would reasonably contribute to an overall savings of 50 percent if additional systems were to be installed.[81] Like the personal REETC, the EECBTD encourages energy-efficiency infrastructure upgrades. The EECBTD simply scales up the concept from residential to commercial buildings and encourages energy-consumption reduction.

4. Energy-Efficient New Homes Tax Credit for Home Builders

The EPA 2005 also established the Energy-Efficient New Homes Tax Credit for Home Builders.[82] The credit applied to homes built between January 1, 2006 and December 31, 2016.[83] Home builders received a $2,000 credit for homes that met a 50 percent energy savings or a $1,000 credit for homes that met a 30 percent energy savings.[84] The required savings were determined based on the 2006 International Energy Conservation Code (IECC).[85] This credit encouraged actions consistent with an energy-efficiency goal and was similar to the EEBTD. It merely applied to new construction, rather than retrofits.

77 *Id.* § 179D.

78 Energy Policy Act of 2005, Pub. L. No. 109-58, §1331, 119 Stat. 594 (2005).

79 Energy Improvement and Extension Act §303.

80 I.R.C. § 179D(b)-(c).

81 *Id.* § 179D(d)(1).

82 Energy Policy Act § 1332.

83 *Id* §1332(f); Consolidated Appropriations Act of 2016, Pub. L. No. 114-113, Div. Q, Title I, § 188(a), 129 Stat. 3074 (2015)

84 I.R.C. § 45L(a)(2), (c)(1)-(3).

85 *Id.* § 45L(c)(1)(A)(i).

5. Residential Energy Conservation Subsidy Exclusion (Corporate)

This program is the exact same program as the Residential Energy Conservation Subsidy Exclusion.[86] It simply applies to corporate taxpayers that receive subsidies from a public utility.[87]

6. Federal Tax Program Analysis

The federal tax programs offered are similar and foster a very limited renewable energy policy. The personal and corporate tax programs fall into three broad categories: encouraging renewable energy production, constructing new EGUs, and encouraging energy efficiency. The major corporate credits prioritize the construction of renewable energy generation. The tax programs essentially subsidize the cost of renewable energy, either through a production subsidy (the Federal PTC) or a construction subsidy (the Federal ITC). However, both programs are lacking. The Federal PTC ignores solar, one of the fastest growing renewable resources, whilst the Federal ITC favors solar almost to the exclusion of other renewable resources.

The energy efficiency programs provide tax benefits for upgrading or constructing efficient infrastructure. At the individual and corporate taxpayer levels there are numerous types of qualifying improvements that reduce energy usage.[88] These credits, while useful for encouraging reduced electricity demand, remain problematic in allowing only those with access to energy efficiency upgrades to benefit from the tax benefits.

C. *State Tax Incentives*[89]

State and municipal governments also offer tax programs that further renewable energy policy. Since the EPA 2005 was enacted, the federal government has offered eight different tax programs. Among the fifty states, there have been numerous other tax programs. Currently, there are 230 different state programs, including: 37 corporate tax credits, four corporate tax deductions, four corporate tax exemptions, 39 personal tax credits, nine personal tax deductions, 85 property tax incentives, and 52 sales tax incentives.[90] This paper focuses on four states—Arizona, Florida, Minnesota, and California—which provide a sampling of the types of the available tax programs. Some

[86] *Id.* § 136; *see supra* text accompanying notes 22-28.

[87] I.R.C. § 136.

[88] *See infra* text accompanying footnotes 12-86 (describing the available energy efficiency improvements).

[89] This paper will focus on the state-level programs and will not address the municipal programs.

[90] DSIRE, *Summary Table*, http://programs.dsireusa.org/system/program/tables (last visited Feb. 13, 2017).

states, like California, pursue renewable energy policy with the minimal aid of tax programs. Other states, like Arizona, use multiple programs.

1. Arizona

Arizona has six programs that mirror federal programs, and several property and sales tax programs available only at the state level. The programs are: the non-residential solar and wind tax credit; the residential solar and wind tax credit; the renewable energy production tax credit; the renewable energy tax credit for manufacturers; the qualifying woodstove deduction; the energy equipment property tax exemption; the property tax assessment for renewable energy; and the solar and wind equipment sales tax exemption.

a. The Non-residential Solar and Wind Tax Credit

Arizona established the non-residential solar and wind tax credit in June 2006.[91] This credit is available through December 31, 2018.[92] The credit applies to all non-residential entities that install a solar or wind system at their Arizona facilities.[93] The credit also applies to an entity that finances, installs, or manufactures a system and is the transferee of tax credits secured by the purchaser of the device.[94] The credit is applicable against corporate or personal taxes, and is equal to 10 percent of the system's installed cost.[95] The maximum available credit is $25,000 for any one building in a tax year and $50,000 per business in any year.[96] Arizona may only issue credits up to $1 million each year.[97] Companies that have unused credit because of the cap can carry it forward for up to five consecutive taxable years.[98]

b. The Residential Solar and Wind Energy Systems Tax Credit

The residential solar and wind energy systems tax credit is available to individual taxpayers who install a solar or wind energy device at an Arizona residence.[99] The credit applies against the taxpayer's personal state income tax for 25 percent of the cost of a solar or wind energy device up to $1,000 per residence.[100] The credit must be claimed in the year of installation; however, if the credit exceeds the taxpayer's liability, the unused portion may be carried

91 ARIZ. REV. STAT. ANN. § 41-1510.01 (2016); in Arizona, a solar energy system includes wind generation. *See* ARIZ. REV. STAT. ANN. § 42-5001(16) (2015).

92 § 43-1085(A) (for individuals); § 43-1164(A) (for corporations).

93 § 43-1085(A)(1) (for individuals); § 43-1164(A)(1) (for corporations).

94 § 43-1085(A)(2) (for individuals); § 43-1164(A)(2) (for corporations).

95 § 43-1085(B) (for individuals); § 43-1164(B) (for corporations).

96 § 43-1085(D) (2015) (for individuals); § 43-1164(D) (for corporations).

97 § 41-1510.01(F).

98 *Id.* § 43-1085(E); *Id.* § 43-1164(E)

99 § 43-1083(A).

100 *Id.* § 43-1083(A)-(B).

over for up to five years.[101] Taxpayers who lease a system or enter into a power purchase agreement with a third party who owns the system are not eligible for the credit.[102] This clear delineation means that homeowners who enter into popular solar leasing programs are unable to qualify for the program.[103]

Solar leases typically charge a monthly payment in lieu of upfront costs, and are responsible for monitoring and repairing the systems.[104] The leasing companies can receive tax benefits from other programs, such as the Federal ITC, because they are the owners of the system.[105] Occasionally, these leasing companies sell the tax benefits to outside investment groups.[106] The Arizona residential credit thereby encourages homeowners to actually own their renewable generation components and discourages leasing. The lack of a leasing tax benefit raises the barrier for taxpayers who are only able to afford leased equipment.

c. The Renewable Energy Production Tax Credit

The renewable energy production tax credit (AZ PTC) is like the Federal PTC. Arizona implemented the credit in 2010 and it applies to qualified renewable energy systems installed on or after December 31, 2010.[107] The credit is available until 2020.[108] Taxpayers submit an application to the Arizona Department of Revenue for the previous year's energy production.[109] The application process is on a first come, first served basis, dependent upon the order in which the application is received.[110] This initial process generates a list of taxpayers who are able to claim the credit.[111] Once a taxpayer is on the list, they must resubmit an application every year of production, or risk losing their ability to claim the credit.[112] The credit is $0.01/kWh for wind and biomass.[113] The credit for solar varies by consecutive year in the program, and is available

101 *Id.* § 43-1083(C).

102 ARIZ. DEP'T OF REV., ARIZONA INDIVIDUAL INCOME TAX RULING ITR 13-4 1-2, http://www.azdor.gov/LinkClick.aspx?fileticket=EpaZ8_1U_Q4%3d&tabid=70&mid=478 (Sept. 6, 2013).

103 CLAUDETTE HANKS REICHAL, LSU AGCENTER, SOLAR POWER FOR YOUR HOME: A CONSUMER'S GUIDE 12 (2015), http://www.lsuagcenter.com/NR/rdonlyres/EA8EB533-3AA4-4283-AB72-09E75C6EFDAC/101040/pub3366SolarPowerForYourHome2.pdf.

104 *Id.*

105 *Id.* at 4 (stating some states, such as Louisiana, offer smaller tax credits for leasing companies than for homeowners).

106 *Id.*

107 ARIZ. REV. STAT. ANN. § 43-1083.02(B)(1) (2015).

108 *Id.*

109 *Id.* § 43-1083.02(F).

110 *Id.* § 43-1083.02(G).

111 *Id.*

112 *Id.*

113 *Id.* § 43-1083.02(D)(1).

in Table 4. The maximum allowable credit per taxpayer is $2 million per year, and Arizona will pay up to $20 million per calendar year for both the corporate and residential programs.[114] This credit offsets some of the cost of building and maintaining utility-scale renewable energy facilities.

Table 4: Credit Amount for Solar Product in the AZ PTC for the life of the program[115]

Year	**Credit Amount**
Year 1	$0.04/kWh
Year 2	$0.04/kWh
Year 3	$0.035/kWh
Year 4	$0.035/kWh
Year 5	$0.03/kWh
Year 6	$0.03/kWh
Year 7	$0.02/kWh
Year 8	$0.02/kWh
Year 9	$0.015/kWh
Year 10	$0.01/kWh

d. The Renewable Energy Tax Credit for Manufacturers (corporate and personal)

In 2014 Arizona enacted the renewable energy tax credit for manufacturers to provide a tax credit for new renewable energy systems designed for self-consumption and used primarily for manufacturing.[116] The credit is available on minimum investments of three million dollars made by December 31, 2017, and credits cannot be claimed on facilities that become operational after December 31, 2025.[117] Though the credit can apply to both corporate and personal taxpayers, the requirements make it only feasible for corporate taxpayers.[118] The credit is worth $5 million per year, per energy facility, for five years.[119] The taxpayer may only claim up to $5 million per year.[120] There is a program-wide cap of $10 million per year for all taxpayers.[121] As with the non-residential solar

114 *Id.* § 43-1083.02(G).

115 *Id.* § 43-1082.02(D)(2)(a)-(j).

116 *Id.* § 43-1164.05(A) (2015).

117 *Id.* § 43-1164.05(B)(1); *Id.* § 43-1164.05(D).

118 *See* § 43-1164.05(B)(1) ("[T]he taxpayer invests at least three hundred million dollars…"); § 43-1164.05(Q)(3) ("'Renewable energy facility' means a facility in which the taxpayer invests at least thirty million dollars…"); *see also* § 43-1083.04 (using same renewable energy facility definition as other sections of the Arizona Revenue Statute).

119 § 43-1164.05(D).

120 *Id.*

121 *Id.* § 43-1164.05(G).

and wind tax credit, unused credits can be carried forward for up to five years.[122] The taxpayer must install a system that is used primarily (90 percent of the energy produced) for self-consumption and is used for manufacturing.[123] The installed system must have a generation capacity of at least 20 megawatts (MW) or have a typical annual generation of at least 40,000 megawatt-hours (MWh).[124] These plants are essentially small utility-scale installations that do not feed energy back to the grid. The technologies allowed are: solar thermal electric, solar photovoltaic, wind, biomass, landfill gas, anaerobic digestion, and fuel cell using renewable fuels.[125] This credit encourages large energy producers to construct on-site generation and reduce the demand for electricity from utilities.

e. The Qualifying Woodstove Deduction

At the other end of the tax spectrum from the manufacturer credit is the qualifying woodstove deduction. This deduction is a personal tax deduction dating from December 31, 1993.[126] The deduction encourages the conversion of an existing wood fireplace to a qualifying wood stove, wood fireplace, or gas-fired fireplace that meets the standards of performance for new wood heaters manufactured after July 1990 or sold after July 1992.[127] The deduction covers the cost of conversion (exclusive of taxes, interest, or finance charges) up to $500.[128] This is essentially a very specific energy efficiency program designed to reduce air pollution and electric heat usage.

f. The Energy Equipment Property Tax Exemption

The energy equipment property tax exemption was enacted in 1997, but by June 2006 it only applied to "solar energy devices . . . and any other device or system designed for the production of solar energy for on-site consumption."[129] The exemption was expanded in 2009 to include other renewable technologies, combined heat and power (CHP) systems, and energy efficient building components.[130] The qualifying renewable technologies are: passive solar, solar water heat, solar space heat, geothermal electric, solar thermal electric, solar thermal process heat, solar photovoltaic, wind, biomass, geothermal heat pumps, CHP, biogas, low-impact hydropower, and forest thinnings.[131] These devices do

[122] *Id.* § 43-1164.05(N).
[123] *Id.* § 43-1164.05(B)(2).
[124] *Id.* § 43-1164.05(Q)(3).
[125] *Id.* § 43-1164.05(Q).
[126] *Id.* § 43-1027(A).
[127] *Id.* § 43-1027(B).
[128] *Id.* § 43-1027(A).
[129] *Id.* § 42-11054(C)(2).
[130] *Id.* § 42-11054(C)(3)(a)-(c).
[131] *Id.* § 42-11054(C).

not add value to property for property tax assessments.[132] This program encourages the installation of renewable energy devices on private property by eliminating the fear of property tax increases.

g. The Property Tax Assessment for Renewable Energy

The property tax assessment for renewable energy applies to renewable energy equipment owned by investor-owned utilities, municipal utilities, and cooperative utilities operating in Arizona.[133] Renewable energy equipment is assessed at 20 percent of the depreciated "taxable original cost."[134] Renewable energy equipment includes "electric generation facilities, electric transmission, electric distribution, gas distribution, or combination gas and electric transmission and distribution . . . that is located in [Arizona], that is used or useful for the generation, storage, transmission, or distribution of electric power, energy, or fuel derived from solar, wind or other nonpetroleum renewable sources . . . ."[135] While not a full tax exclusion, this credits helps subsidize renewable energy infrastructure for utilities. This allows for a more equitable access to renewable resources by a utility's rate-base.

h. The Solar and Wind Equipment Sales Tax Exemption

The solar and wind equipment sales tax exemption was first enacted in 1997.[136] The exemption has been changed twice, in 2006 (which eliminated a $5,000 per device limit) and in 2012 (which extended the exemption to net metering transactions that involve solar-PV and to the sale of renewable energy credits).[137] The exemption only applies to the state sales tax; some cities have a 0.5 to 2 percent city sales tax that applies to sales or installations of solar energy devices.[138] The exemption applies to passive solar, solar water heat, solar space heat, solar thermal electric, solar-PV, wind, daylighting, and solar pool heating.[139] The sales tax exemption expired on December 31, 2016 for solar energy contractors; however for solar energy retailers, there is no expiration date.[140] The program makes upfront equipment costs more affordable.

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132 *Id.*

133 *Id.* § 42-14155(C)(3).

134 *Id.* § 42-14155(B).

135 *Id.* § 42-14155 (C)(3).

136 DSIRE, *Solar and Wind Equipment Sales Tax Exemption* (May 24, 2016), http://programs.dsireusa.org/system/program/detail/119.

137 *Id.*

138 *Id.*

139 ARIZ. REV. STAT. ANN. § 42-5159(E); *Id.* § 42-5151(18)-(19); *see also* DSIRE, *supra* note 137.

140 DSIRE, *supra* note 137.

2. California

California has few state-level renewable energy tax programs. Regulatory policies and loan and grant programs administered by municipalities and utilities are the primary financial methods used to influence California's renewable energy policy.[141] The loan and grant programs administered by public utilities qualify under the federal Energy Conservation Subsidy Exclusion, and therefore are not counted as earned income for tax purposes.[142] There are two California tax programs: the property tax exclusion for solar energy systems and the partial sales and use tax exemption for agricultural solar facilities.

a. The Property Tax Exclusion for Solar Energy Systems

The California property tax exclusion applies to solar energy systems installed between January 1, 1999 and December 31, 2024.[143] As of 2008, an owner-builder that incorporates an active solar energy system in the initial construction of a new building, but that does not plan to occupy or use the building, may also claim the exclusion.[144] Active solar energy systems are "thermally isolated from living space or any other area where the energy is used, to provide for the collection, storage, or distribution of solar energy."[145] Included under this umbrella definition are solar space conditioning systems, solar water heating systems, active solar energy systems, solar process heating systems, photovoltaic and solar thermal electric systems, and solar mechanical energy.[146] Solar pool heating systems and solar hot-tub heating systems are not eligible for the exclusion.[147] Storage devices, power-conditioning equipment, transfer equipment, and parts all qualify for 100 percent exclusion.[148] Pipes and ducts that carry solar energy and energy derived from other sources are only eligible for 75 percent of their cash value.[149] Also, dual-use equipment (used for conventional and solar electric systems) qualifies for a 75 percent exclusion.[150] Like the Arizona property tax exclusion, the California property tax exclusion means that solar energy systems do not add value to the property for tax assessments. This prevents property tax increases caused by renewable energy systems, and therefore makes those systems more attractive for homeowners.

141 *See* DSIRE, *DSIRE California Programs*, http://programs.dsireusa.org/system/program?fromSir=0&state=CA (last visited Apr. 4, 2017) (listing 211 programs, of which 183 are non-federal programs, and 3 of those non-federal programs are tax policies).

142 *See* I.R.C. § 136 (West 2017).

143 CAL. REV. & TAX CODE § 73(i)(1) (West 2017).

144 *Id.* § 73(e)(1).

145 *Id.* § 73(b)(1).

146 *Id.* § 73(b)(1)-(3).

147 *Id.*

148 *Id.* § 73(d)(1)(B).

149 *Id.* § 73(d)(2).

150 *Id.* § 73(d)(3).

b. The Partial Sales and Use Tax Exemption for Agricultural Solar Facilities

The partial sales and use tax exemption for agricultural solar facilities applies only to taxes levied by the state of California and not to sales and use taxes levied by local governments.[151] Solar-PV systems that are used to provide electricity to farm equipment and machinery also qualify for the exemption.[152] In order to qualify, 50 percent or more of the electricity produced by the system must be used to power machinery that produces or harvests agricultural products.[153] The exemption applies to equipment that is connected to the local electrical grid and offsets the farm's electrical use through a net metering arrangement with the local utility.[154] The exemption also applies to leased equipment.[155] This is unlike Arizona's anti-leasing policy. Leasing allows more tax payers to take advantage of the exclusion, and allows for more equitable use of the program. The California program is slightly better at decreasing the upfront costs of systems.

3. Florida

Florida has four tax programs. Two are corporate tax credits, one is a property tax exclusion, and one is a sales tax exemption. The programs are: the renewable energy production tax credit; the renewable energy technologies investment tax credit; the property tax exclusion for residential renewable energy property; and the solar and CHP sales tax exemption.

a. The Renewable Energy Production Tax Credit (FL PTC)

The FL PTC is like the Federal PTC and the AZ PTC. The credit was originally available between 2006 and 2010.[156] The tax credit was reestablished in 2013 and will expire in 2017.[157] The FL PTC provides an offset credit worth $0.01/kWh of energy produced using geothermal electric, solar thermal electric, solar-PV, wind, biomass, hydroelectric, CHP, hydrogen, tidal, or wave methods.[158] There is a cap of $1 million per corporation, and a program cap of $5 million during FY2012-2013 that rises to a $10 million state cap through FY2016-2017.[159] Similar to the AZ PTC, the credit allows unused credits from

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151 *Id.* § 6356.5(a), (c)(1)-(2) (West 2017).

152 CAL. STATE BOARD OF EQUAL'N, SPECIAL NOTICE: SOLAR POWER FACILITIES MAY QUALIFY AS FARM EQUIPMENT L-330 1 (Nov. 2012), http://www.boe.ca.gov/news/pdf/l330.pdf.

153 *Id.*

154 *Id.*

155 CAL. CODE REGS. tit. 18 § 1533.1(h) (2015).

156 *See* DSIRE, *Renewable Energy Production Tax Credit* (June 19, 2015), http://programs.dsireusa.org/system/program/detail/1608.

157 FLA. STAT. ANN. § 220.193(3)(b) (West 2017).

158 *Id.* § 220.193 (3)(a) (stating dollar amount); *Id.* § 377.803(4) (listing qualifying facilities).

159 *Id.* § 220.193(3)(c)(3) (listing the individual cap); *Id.* § 220.193(3)(g) (listing the program caps).

one year to be carried forward for up to five years, but only due to insufficient tax liability.[160] Florida prioritizes the credit allocation, instead of allocating credits on a first-come, first served basis.[161] The priority is: new facilities placed in operation after May 1, 2012 (up to $250,000 maximum) are considered Priority 1; then facilities unable to claim credits under Priority 1 and which claim a credit of $50,000 or less are considered Priority 2; then facilities not able to claim credits under Priority 1 or Priority 2 are considered Priority 3.[162] Similar to the Federal PTC and ITC, a taxpayer cannot claim both the FL PTC and the Florida Renewable Energy Technologies Investment Credit.[163] This credit encourages long-term and continuous renewable energy production.

b. The Renewable Energy Technologies Investment Tax Credit (FL ITC)

The FL ITC was like the Federal ITC. The credit provided corporations a credit up to 75% of all capital costs, operation and maintenance costs, and research and development costs for renewable EGUs.[164] The credit was available between 2013 and 2016.[165] Each taxpayer was capped at $1 million, and the state had a budget of $10 million per year for the entire program.[166] This program encouraged the development of new renewable energy EGUs.

c. The Property Tax Exclusion for Residential Renewable Energy Property

The Property Tax Exclusion for Residential Renewable Energy Property is like Arizona's and California's property tax exclusions. In Florida, the value of residential solar-PV systems, wind energy systems, solar water heaters, and geothermal heat pumps installed on or after January 1, 2013, do not count towards property tax assessments.[167] This program encourages homeowners to install renewable systems without fear of increased taxes.

d. The Solar and CHP Sales Tax Exemption

Solar energy systems have been exempt from Florida sales and use tax since 1997.[168] This exemption was made permanent in 2005.[169] The exemption also

160 *Id.* § 220.193(3)(d).

161 *Id.* § 220.193(3)(b).

162 *Id.* § 220.193(3)(c)(1)-(3).

163 *Id.* § 220.193(3)(i).

164 *Id.* § 220.192(1)(c) (stating amount and definition); *Id.* § 220.192(2) (listing credit applicability).

165 *Id.* § 220.192(2).

166 *Id.* § 220.192(1)(c).

167 *Id.* § 193.624.

168 *Id.* § 212.08(5)(hh); 1996 Fla. Sess. Law Serv. Ch. 96-320 § 161 (C.S.C.S.S.B. 958) (West 2017) (enacting the exemption, effective July 1, 1997).

169 *See* DSIRE, *Solar and CHP Sales Tax Exemption* (May 5, 2015), http://programs.dsireusa.org/system/program/detail/243.

applies to CHP facilities that are used for manufacturing, processing, compounding, or producing for sale items of tangible personal property in Florida.[170] This program encourages large energy consumers to install on-site renewable EGUs and decrease their dependence on Florida utilities.

4. Minnesota

Minnesota, like California, does not use many state level tax programs to implement renewable energy policy. There are two dedicated sales tax programs and a property/production tax exclusion. There is also a community solar program that allows residents to buy shares in a solar EGU and receive an energy credit on their utility bill.

a. The Wind & Solar Energy Sales Tax Exemption

Wind-energy systems used as electric power sources are exempt from Minnesota sales tax.[171] Materials used to manufacture, install, construct, repair, or replace a wind-energy system are also exempt from state sales tax.[172] This program decreases the upfront costs of constructing a wind energy facility.

Solar systems—including solar water heat, solar space heat, solar thermal process heat, solar-PV, and solar pool heating—are exempt from Minnesota sales tax.[173] All the components for these systems are also exempt, including panels, wiring, pipes, pumps, and racks.[174] This program decreases the upfront costs of installing a renewable solar system.

b. The Wind and Solar-Electric Systems Exemption

Minnesota uses production taxes instead of taxing wind and solar energy systems as personal or corporate property. Wind systems are exempt from the state's property tax (excluding the real property on which the wind system is located).[175] Solar energy systems are also exempt from property tax (excluding the real property on which the solar system is located).[176] Instead of assessing property tax, Minnesota taxes the amount of power produced by wind and solar EGUs. Most of the smaller wind and solar systems are exempt from the production tax, as summarized in Tables 5 and 6, below. In lieu of the established rates, a developer may negotiate a different payment schedule with

[170] § 212.08(5)(b)(1)-(2).

[171] MINN. STAT. ANN. § 297A.68 Subd. 12 (West 2017).

[172] *Id.*

[173] *Id.* § 297A.67 Subd. 29 (explaining that solar energy systems are exempt); *Id.* § 216C.06 Subd. 17 (defining "solar systems").

[174] *Id.* § 216C.06 Subd. 17.

[175] *Id.* § 272.02 Subd. 22.

[176] *Id.* § 272.02 Subd. 24.

the local authority.[177] This allows homeowners to remain exempt, while lightly taxing utility scale installations. This makes renewable energy systems attractive for homeowners, while maintaining some revenue from larger EGUs.

Table 5: Minnesota Production Tax on Wind Energy Systems[178]

System Capacity	**Tax**
Greater than 12MW nameplate	$0.0012/kWh
Between 2MW and 12 MW nameplate	$0.00036/kWh
Between 0.25MW and 2MW nameplate	$0.00012/kWh
Below 0.25MW	Exempt

Table 6: Minnesota Production Tax on Solar Energy Systems[179]

System Capacity	**Tax**
Greater than 1MW	$1.20MWh
1MW or less	Exempt

c. The Community Solar Program

The Minnesota Community Solar program is not a tax-program, but it does attempt to alleviate a significant concern regarding small-scale renewable energy production. Essentially, utility customers can subscribe to a portion of a utility scale solar project.[180] The production of this portion of the project is then credited on the subscriber's electric bill.[181] The program provides a way for those who rent or do not live in a single-family dwelling to benefit from small-scale solar production.[182] Program participants do not receive significant tax benefits, but do benefit with credits on their utility bills. This allows low-income utility customers to reap some benefit from small-scale renewable energy.

D. *State Tax Policies Analysis*

State tax programs are more diverse than federal programs, primarily because of sales and property tax programs. Arizona and Florida have largely followed the Federal example and provide investment or production tax credits. At the

177 *Id.* § 272.028.

178 *Id.* § 272.029 Subd. 3.

179 *Id.* § 272.0295 Subd. 3.

180 *Id.* § 216B.1641(a).

181 *Id.* § 216B.1641(d).

182 David Shaffer, *XCEL Gets 427 Solar Garden Applications in Minnesota*, MINNEAPOLIS STAR-TR. (Dec. 19, 2014), http://www.startribune.com/business/286401911.html.

state level, these programs are capped and prioritized for large energy producers; essentially independent power producers and utilities. California and Minnesota have forgone federal imitations. These states solely use state level sales, use, and property tax policies.

States with a renewable energy policy driven by other methods offer limited tax programs. These states rely on regulatory mechanisms, such as stringent RPS goals, cap-and-trade programs, and energy standards, to drive renewable energy adoption.[183] States lacking a comprehensive policy or regulatory mechanisms rely on the PTC-ITC model. PTCs and ITCs subsidize renewable energy production to make it cost-competitive with fossil fuel generation.[184] In making renewable technology more cost-competitive, the technologies will proliferate and the free market will decrease overall costs to make renewable energy naturally competitive with fossil fuels.[185] While reducing the cost of renewables is admirable, essential—and somewhat successful—the lack of considered impacts is troubling.

Most of the tax policies are in some way regressive—impacting those with more higher income less, and thereby create more of a burden on individuals who lack the resources to invest in the technologies encouraged by federal and state policies. These tax policies further the narratives that the adoption of renewables is more important than equally distributing the costs of adopting renewables. The minor exception to this is Arizona's woodstove deduction, which recognizes that some people are unable to afford the upfront investment in newer renewable technologies, so instead encourages the adoption of cleaner, more efficient traditional technologies that have other, knock-on environmental impacts as well (such as cleaner emissions.) Furthermore, because states have the exclusive ability to regulate sale and property taxes, there is the very real risk of significant regressive taxes on energy consumption that will disproportionately impact taxpayers without access to renewable technologies. For example, a sales tax benefit on solar is facially good, because it reduces the cost of the upfront system. But, if someone cannot afford to purchase the solar equipment; those who can afford it get a subsidy while lower income tax brackets are denied access to the benefits of solar, and become increasingly burden with the costs of unequitable adoption of renewable resources discussed below. Most state and federal programs have existed for at least a decade. Some

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183 Ann E. Carlson, *Designing Effective Climate Change Policy: Cap-And-Trade and Complementary Policies*, 49 HARV. J. ON LEGIS. 207, 211 (2012) (explaining that California, for example, utilizes three primary mechanisms to achieve renewable energy goals amongst climate policy).

184 ERIC LANTZ ET AL., NAT'L RENEWABLE ENERGY LAB., IMPLICATIONS OF A PTC EXTENSION ON US WIND DEPLOYMENT 2 (2014).

185 PHILIP BROWN, CONG. RESEARCH SERV., U.S. RENEWABLE ELECTRICITY: HOW DOES THE PRODUCTION TAX CREDIT (PTC) IMPACT WIND MARKETS 14 (2012), http://www.fas.org/sgp/crs/misc/R42576.pdf.

have existed for nearly a quarter century. In that time, the programs have succeeded in artificially accelerating the adoption of renewable EGUs and energy efficiency technology. While furthering renewable energy policy, these tax programs have also exposed a widening gap in equality between those able to afford new technologies and those beholden to the monopoly-utility behemoth.

III. RENEWABLE RESOURCES: A DISRUPTION IN ELECTRICITY PRICES

A. *A Brief Overview of the Electric Sector*

The implementation of these tax policies presents a problem for the continued and equitable integration of renewable resources onto the grid. The existing utility model is built around government-sanctioned monopoly.[186] Even after deregulation in the 1990s, there are key factors that support the continued existence of centralized electric distribution, such as the high cost of delivery infrastructure maintenance.[187] Utilities exist either as non-profit governmental entities (publicly owned utilities or POUs) or profit-seeking companies (investor owned utilities or IOUs).[188] The utilities are charged with a must-serve mandate in a geographic service area, maintenance of electrical distribution infrastructure, and ensuring a supply of electricity to satisfy the load in their service territory.[189] In exchange, the utilities charge rates. For MOUs, these rates reflect the costs required to maintain the system and further future investment.[190] For IOUs, the state's utilities commission sets the rates.[191] The set rates reflect a reasonable return on investment and the cost of maintaining the existing infrastructure—including power generation assets and power purchase agreements.[192] This model supports a centralized distribution model and is under strain from the introduction of distributed renewable resources.[193] The strain

186 *See* U.S. DEP'T OF ENERGY, A PRIMER ON ELECTRIC UTILITIES, DEREGULATION, AND RESTRUCTURING OF U.S. ELECTRICITY MARKETS 2.1 (May 2002), http://www.pnl.gov/main/publications/external/technical_reports/PNNL-13906.pdf [hereinafter U.S. DEP'T OF ENERGY PRIMER].

187 *Id.*

188 *Id.*

189 *Id.* at 2.2.

190 *Id.* at 2.1.

191 *Id.*

192 *Id.* at 5.2.

193 Alan Neuhauser, *Utility CEO: Generators Will Soon Make Electric Grid an 'Antiquated System,'* U.S. NEWS & WORLD REPORT (Feb. 28, 2014), https://www.usnews.com/news/articles/2014/02/27/utility-ceo-generators-will-soon-make-electric-grid-an-antiquated-system (describing the transformation potential for the U.S. grid into a series of microgrids and describing the backbone role the centralized grid plays); *see also* Severin Borenstein, *The Economics of Fixed Cost Recovery by Utilities*, 29 THE ELECTRICITY J. 5, 7 (2016) (stating, "For instance, energy efficiency programs, discounts to low-income customers, and subsidies for installing distributed generation are now costs

presents not an issue of utility survival, but of utilities' ability to continue serving customers who are unable to achieve grid independence. This is an issue exacerbated by the reality of the renewable energy tax programs and their interplay with the existing model.

B. *Renewable Resources and the Grid*

Renewable resources exist in two capacities: utility-scale and distributed generation (DG). Utility-scale installations are large-scale EGUs that generate electricity on the same scale as a traditionally fueled power plant, generally 10 MW nameplate capacity or larger.[194] These facilities are owned and operated by a utility or independent power producer.[195] The utility then incurs either the operating cost of the power plant or the purchase cost, at wholesale rates, of electricity from the independent producer.[196] DG is, essentially, rooftop solar. DG is decentralized energy production, where myriad individual producers produce small amounts of energy.[197] The energy is produced behind the meter, that is, at the consumer's home or business.[198] The energy offsets the individual's own electricity usage.[199] Any excess energy is fed back to the grid.[200] During peak-DG hours in the late afternoon, there is usually an excess of energy.[201] During the peak demand hours of the early evening, these DG generators usually consume electricity from the grid.[202] Most DG producers are

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that the utility must recover, but are not part of the social marginal cost of providing a kWh to a specific customer. In addition, energy efficiency programs and distributed generation have reduced demand and thus required that the revenue shortfall from marginal-cost pricing be made up over a smaller number of kWh.").

194 U.S. DEP'T OF ENERGY PRIMER, *supra* note 187, at 3.4-3.5; *see also* CAL. ENERGY COMM'N, *Utility Scale Renewable Energy*, http://www.energy.ca.gov/research/renewable/utility.html (last visited March 27, 2017) (describing utility scale renewable energy as being 10 MW or larger); *see also* U.S. ENERGY INFORMATION ADMIN., Glossary, https://www.eia.gov/tools/glossary/index.php?id=G#gen_nameplate (under letter "G", scroll down for definition of "Generation Nameplate Capacity (installed)") (last visited March 27, 2017) (defining nameplate capacity as the "maximum rated output of a generator, prime mover, or other electric power production equipment . . . .").

195 U.S. DEP'T OF ENERGY, *Electricity 101*, https://energy.gov/oe/information-center/educational-resources/electricity-101 (last visited March 27, 2017) (describing the ownership of the electric system as: IOUs owning 38% of net generation, publicly-owned utilities and cooperatives owning 15% of net generation, independent power producers owning 40% of net generation; and the Federal Government owning 7% of net generation).

196 U.S. DEP'T OF ENERGY PRIMER, *supra* note 187, at 6.8-6.10.

197 AM. PUB. POWER ASS'N, DISTRIBUTED GENERATION: AN OVERVIEW OF RECENT POLICY AND MARKET DEVELOPMENTS 3 (2013), https://www.publicpower.org/files/PDFs/Distributed%20Generation-Nov2013.pdf.

198 *Id.*

199 *Id.* at 3-4.

200 *Id.* at 4.

201 LITTLE HOOVER COMM'N, *supra* note 27, at 9-10.

202 *Id.*

unable to achieve full grid independence without an on-site energy storage system.[203]

DG has, in the past five years, changed the dynamics of power supply and demand.[204] This drastic change is coupled with policies that offset the costs of installing DG infrastructure and protectionist measures for utility-scale renewable generation. States use a net-metering policy for DG and most states have experimented with feed-in tariffs for utility-scale.[205]

C. *The Cost of Buying Electricity*

Traditionally, utilities procure generation in three ways: owning and operating EGUs, entering long-term power-purchase agreements (PPAs) with other plant operators, and buying electricity on the spot market for exceptional demand days.[206] Utility customers who own DG do not fall into any of these three categories. These producer-customers are not sophisticated or large enough to participate in PPAs or the spot market.[207] To remedy this, state utility commissions force utilities to purchase the excess power from DG producers.[208] This purchase is at retail—not wholesale—rates.[209] States differ in the specifics of net-metering, but the concept is broadly the same. At the end of each billing period, a credit for the amount of electricity produced is given to the customer.[210] This amount often offsets a large portion of the customer's bill.[211] Occasionally, the customer receives a negative credit and is owed money by the

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[203] PETER BRONSKI ET AL., ROCKY MOUNTAIN INST., THE ECONOMICS OF GRID DEFECTION: WHEN AND WHERE DISTRIBUTED SOLAR GENERATION PLUS STORAGE COMPETES WITH TRADITIONAL UTILITY SERVICE 6 (2014), http://www.rmi.org/PDF_economics_of_grid_defection_full_report.

[204] *Id.* at 12. Between 2010 and 2012, DG has increased installed capacity by 62%. *See also* CAL. ENERGY COMM'N, *Tracking Progress* 19 (2016), http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf (describing installation of a combined 5,100 MW of solar PV by the end of 2016).

[205] AM. PUB. POWER ASS'N, *supra* note 198, at 3-4.

[206] U.S. DEP'T OF ENERGY PRIMER, *supra* note 187, at 6.6-6.9.

[207] Nicholas A. Giannasca, *PPAs for DG: What Every Real Property Owner Should Know*, PUB. UTILITIES FORTNIGHTLY 1 (June 2013), https://www.fortnightly.com/fortnightly/2013/06/ppas-dg?page=0,0. The article also notes that as policies change, the PPA model is increasingly creeping into the DG market, especially where property owners are not DG system owners. *Id.*

[208] MARTINOT ET AL., *supra* note 4, at 12-13.

[209] Ashley Brown & Louisa Lund, *Distributed Generation: How Green? How Efficient? How Well-Priced?*, 26 THE ELECTRICITY J. 28, 30 (2013).

[210] MARTINOT ET AL., *supra* note 4, at 12-13.

[211] *Id.*

utility.[212] This negative balance is paid out, carried over, or zeroed out at the end of the year depending on the state.[213]

Feed-in tariffs function in a similar manner to net-metering, but on the utility scale.[214] The intermittent nature of renewables (the sun does not always shine, the wind does not always blow, and most renewables are unable to fulfill baseload utility functions without effective, large storage)[215] makes renewable assets unattractive from a reliability perspective.[216] To remedy this issue, some states utilize feed-in tariffs.[217] Feed-in tariffs require utilities to purchase the electricity from renewable EGUs at set prices.[218] These prices do not always reflect market rates.[219] The feed-in tariff often increases the overall cost of electricity for the utility and can create significant tariff deficits (or where the value of the electricity is worth less than the mandated payments.)[220] This cost is then passed on to customers through increased rates.[221]

D. *A Regressive Tax on Electric Consumption*

The combined effects of net-metering, feed-in tariffs, forced renewable portfolio standards, and renewable energy tax programs have created an exceptionally regressive tax on electricity. Individually and facially not all tax policies are regressive. However, when implemented in the real world and used in conjunction with other renewable energy polices, the effect is one of massive inequality across tax brackets.

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212 MASS. EXECUTIVE OFFICE OF ENERGY AND ENVTL AFFAIRS, *Net Metering Frequently Asked Questions & Answers*, http://www.mass.gov/eea/grants-and-tech-assistance/guidance-technical-assistance/agencies-and-divisions/dpu/net-metering-faqs.html (last visited March 27, 2017).

213 *Id.*; *see e.g.,* Southern California Edison, *Understanding Your Energy Bill For Net Energy Metering Customers*, 4 https://www.sce.com/wps/wcm/connect/b94f53d4-81f5-4e7f-ad0d-1c60c2a1fa64/NEM_FactSheet.pdf?MOD=AJPERES (2011) (allowing net metering customers to roll over or cash out energy credits at the end of a 12-month period).

214 AM. PUB. POWER ASS'N, *supra* note 198, at 4.

215 Mark A. Delucchi & Mark Z. Jacobson, *Providing All Global Energy with Wind, Water, and Solar Power, Part II: Reliability, System and Transmission Costs, and Policies*, 39 ENERGY POL'Y 1170, 1178 (2011) (describing the need for centralized or decentralized storage over the grid to support 100% renewable energy production).

216 *See* Paul L. Joskow, *Creating a Smarter U.S. Electricity Grid*, 26 J. OF ECON. PERSP. 29, 36-37 (2012).

217 National Renewable Energy Laboratory, *Feed in Tariffs,* http://www.nrel.gov/tech_deployment/state_local_governments/basics_tariffs.html (last visited March 27, 2017) (stating California, Hawaii, Maine, Oregon, Vermont, and Washington utilizes feed-in tariffs or similar).

218 AM. PUB. POWER ASS'N, supra note 198, at 4.

219 *Id.*

220 The worst example of this is in Spain where, in 2012, utilities paid solar producers €1.6 in subsidy payments for 4 percent of the power supply, causing bills to rise. Andrés Cala, *Renewable Energy in Spain is Taking a Beating*, N.Y. TIMES (Oct. 9, 2013).

221 *Id.*

The least regressive tax program is the Federal Residential Energy Conservation Subsidy Exclusion ("Conservation Subsidy").[222] By excluding the money received for energy conservation programs from taxable income, the exclusion prevents low-income taxpayers from jumping brackets and missing out on vital tax programs and other federal benefits. This is critical in allowing low-income taxpayers to participate in energy efficiency programs without potentially sacrificing other benefits. However, the Conservation Subsidy does not disqualify high-income taxpayers who install energy conservation measures without utility help. Therefore, the facially progressive Subsidy does nothing to offset the tax benefits available to high-income earners, or allow low-income earners to offset energy efficiency in a more progressive and beneficial manner. In other words: all the Conservation Subsidy does is NOT tax low-income earners on improving energy efficiency, while rewarding high income earners with minor rebates. Furthermore, the program applies only to POU customers, and not IOU customers,[223] limiting the ability of most beneficiaries to use the exclusion.

Many federal and state corporate tax programs are facially fair. The federal and state PTC and ITC programs subsidize the construction of renewable EGUs and the production of renewable electricity. Theoretically, this subsidy reduces the overall cost of electricity, and therefore reduces potential rate increases on utility customers considering the RPS and feed-in tariffs.[224] Because renewable electricity generally costs more per MWh than fossil fuel or nuclear electricity, and remains unable to provide reliable baseline energy without efficient large-scale storage, the PTC and ITC programs help to offset this cost by lowering the cost of utility-scale renewable generation. And, theoretically, if utilities provide renewable generation, then the benefits of renewable energy are distributed equitability among the ratebase.

[222] Kenneth W. Costello, *Rethinking Regulation - Not So Fast: Why The Electric Industry May Be Heading in the Wrong Direction*, PUB. UTILITIES FORTNIGHTLY (March 2015), https://www.fortnightly.com/fortnightly/2015/03/rethinking-regulation?page=0%2C0 (stating "Are customers funding the advancement of social objectives through inflated electricity rates without compensatory benefits? These actions might also have a regressive effect by disproportionally burdening below-average income households. For example, the beneficiaries might mostly include high-income households while the payers are households of lower incomes."); *see also infra* text accompanying footnotes 26-32 (discussing the application of the FEECSE).

[223] *Briefing Background*, CAL. MUN. UTIL. ASS'N, http://cmua.org/wpcmua/wp-content/uploads/2015/02/Briefing_Background.pdf (2015) (stating that POUs serve only 25% of Californians, and that 75% of Californians are automatically ineligible for the Subsidy exclusion if they receive benefits from an IOU).

[224] In 2012, for example, most renewable wind producers received more subsidies than their tax burden, except for producers in Arizona. INST. FOR ENERGY RESEARCH, ESTIMATING THE STATE-LEVEL IMPACT OF FEDERAL WIND ENERGY SUBSIDIES (2013), http://instituteforenergyresearch.org/wp-content/uploads/2013/12/State-Level-Impact-of-Federal-Wind-Subsidies.pdf.

In reality these policies have a regressive impact. The PTC and ITC only offset a portion of the cost of renewable generation. Even with the tax subsidies, renewable generation generally costs more than baseload fossil fuel generation for utility plants entering service in 2018 and 2040.[225] These facts, coupled with the RPS mandate to produce or buy a set amount of renewable energy, means utilities spend more money on electricity production.[226] Increased costs impact low-income customers in several ways. State utility commissions may allow rate increases to account for the increased cost of procurement, thereby increasing the rates beyond what would be natural in the market.[227] This means low-income customers will pay more for electricity, and a greater percentage of their wealth will pay for electricity. If the utility commission does not allow a rate increase, utilities are forced to allocate fewer funds for low-income programs and infrastructure maintenance.[228] This reallocation impacts reliability and prevents some low-income customers from participating in essential programs. Both scenarios disproportionately impact low-income ratepayers. While these tax programs are designed to offset the cost of renewable energy integration, the amount is not enough to appropriately subsidize renewable energy considering other regulatory programs, like net-metering, that can shift the burden of renewable integration from traditional high-electricity users to moderate electricity users. To have the desired effect, the tax credits must be increased to offer a true subsidy, and ensure that the economic benefits of installed renewable resources are distributed equitably among electricity users.

Energy efficiency tax policies are slightly more regressive than the PTC and ITC programs because they generally impact high-electricity users more than

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[225] ENERGY INFO. ADMIN, ENERGY OUTLOOK 2016, *supra* note 3, at 13, 16 (the average costs of technologies entering service in 2018 would be: nuclear--$93/MWh; Solar PV--$65.50/MWh; Solar Thermal--$189.40/MWh; Natural Gas--$57.60/MWh; Natural Gas with Carbon Capture & Sequestration--$108.1/MWh. The average cost of technologies entering service in 2040 with tax credits would be: nuclear--$93/MWh; Solar PV--$65.50/MWh; Solar Thermal--$189.40/MWh; Natural Gas--$57.6/MWh; Natural Gas with Carbon Capture & Sequestration--$81.10/MWh. Without tax credits, natural gas and nuclear would remain unchanged. Solar PV would increase to $71.2/MWh and Solar Thermal would increase to $205/MWh). *Id.* This reduction over natural market prices is not nearly enough to offset the benefits derived from individual tax benefits and allow more utility scale renewable development. Remember, these costs are also only for generation, and don't fully consider requirements for storage and dispatch ability necessary for a stable grid.

[226] *See* Costello, *supra* note 223, at 4.

[227] *See id.* (describing outdated rate designs, including paying retail rates for wholesale electricity from net metering customers); *see also* Morgan Lee, *California Regulators Approve Higher Electricity Rates For Most Residents*, L.A. TIMES (July 3, 2015), http://www.latimes.com/business/la-fi-california-regulators-pass-higher-electricity-rates-20150703-story.html (describing the California Public Utilities Commission's vote to allow IOU rate increases because moderate electricity users pay less than the cost to serve them, particularly because of DG solar); *see also* Rajab Khalilpour & Anthony Vassallo, *Leaving the Grid: An Ambition or A Real Choice?*, 82 ENERGY POL'Y 207, 217 (2015) (explaining that if too many people go off the electric grid, prices will rise and the utilities industry could ultimately fail).

[228] *Id.*

moderate or law energy users. These policies effectively encourage the reduction of energy consumption. This allows more consumers to access the grid without requiring a corresponding increase in production.[229] These tax policies help keep utility rate-bases flat through reduced demand.[230] With a flat rate-base, utilities do not have income growth to pay for increased electricity costs, infrastructure maintenance, and low-income assistance programs.[231] Utilities must serve more customers with flat or declining income.[232]

In addition to market distortion, energy efficiency taxes also generally benefit those with means. Corporations and individuals able to afford qualifying infrastructure upgrades are those who can also pay higher utility rates. The energy efficiency programs allow these taxpayers to offset the cost of the upgrades and reduce overall electricity consumption. This consumption reduction further shrinks a utility's rate base, and exacerbates the funding problem that disproportionately affects low-income customers. EE measures reduce the rates paid by high-income customers. As these customers use less electricity, low-income customers who are unable to reduce usage through increased individual generation or energy efficiency upgrades pay a greater percentage of their income for a basic necessity.[233] And these low-income customers cannot reduce their usage because they are already using less energy than non-low income households and they cannot afford to install EE upgrades without financial help from utilities.

Property and sales tax exemptions and exclusions, as well as the individual generation credits, are the most regressive tax policies available. These policies disproportionately benefit higher income brackets, penalize low-income brackets, and contribute to the accelerating issues of load defection and grid

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229 TRAVIS BRADFORD & ANNE HOSKINS, COLUMBIA AND PRINCETON UNIVERSITIES, VALUING DISTRIBUTED ENERGY: ECONOMIC AND REGULATORY CHALLENGES 12 (2013) (discusses the distribution of fixed costs over average per-customer kWh sales; when those sales decrease, costs are shifted to those consumers who cannot decrease kWh usage); *see also* Brown & Lund, *supra* note 210, at 31.

230 BRADFORD & HOSKINS, *supra* note 228, at 12; *see also* SOUTHERN ENVIRONMENTAL LAW CENTER & CAROLINE GOLIN, A TROUBLING TREND IN RATE DESIGN: PROPOSED RATE DESIGN ALTERNATIVES TO HARMFUL FIXED CHARGES 1 (2015) https://www.southernenvironment.org/uploads/news-feed/A_Troubling_Trend_in_Rate_Design.pdf.

231 SOUTHERN ENVIRONMENTAL LAW CENTER, *supra* note 231 at 1.

232 *Id.*

233 SOUTHERN ENVIRONMENTAL LAW CENTER, *supra* note 231 at 2 (in the majority of states, low-income households use anywhere from –1.9% to –37%, with an average of –16.% less kWh, than non-low income households); *see also* Diana Hernandez, *Energy Insecurity: A Framework for Understanding Energy, the Built Environment, and Health Among Vulnerable Populations in the Context of Climate Change*, 103 Am. J. Pub. Health e32 (2013), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3673265/ (stating that for households earning more than $50,000, energy expenditures are 3% of after tax income; whereas for households earning less than $10,000, energy expenditures are 33% of after tax income).

defection. These defections further reduce a utility's rate base and perpetuate the consumer death spiral.[234]

Exempting renewable energy equipment from the state sales tax seems to benefit lower income brackets. Without the added cost of a state sales tax, renewable energy equipment should become more affordable. However, the overall price of solar panels and other renewable EGUs is such that lower income tax payers are unable to afford them even with the sales tax exclusion, considering the cost of a system can range from $2.87 to $3.85 per watt, with an average 5 kilowatt system costing $16,800 before tax credits and between $10,045 to $13,475 after tax credits.[235] The sales tax exclusion eliminates a valuable source of revenue and subsidizes the ability of wealthy taxpayers to purchase equipment used to diminish their electricity bills. Lower income brackets are unable to take advantage of the sales tax exemptions, while wealthier tax brackets acquire the means to further offset their energy usage.

The property tax exclusions also facially appear beneficial to low-income taxpayers. When solar panels or other small renewable EGUs are installed on low-income properties the owners do not risk increased property tax. In theory, the exclusion should encourage low-income property owners to install renewable technologies.[236] However, those who own low value property are less likely to install renewable technologies because of the initial cost. Those that do install renewable capacity usually do so through a third-party leasing company.[237] This arrangement does not allow the homeowner to receive the tax benefits, and instead allows a larger company to take advantage of the available tax programs. This further contributes to a shrinking rate-base for utility companies and the attendant program funding issues. High-income brackets can subsidize their energy usage, while low-income brackets face increased rates and less funding for programs that would achieve similar bill reductions.

Parallel to the sales tax exclusions, the properties benefiting from the property tax exclusions are generally owned by wealthier tax brackets, but the increase in value is not assessed.[238] Therefore, states and municipalities again eliminate

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234 JANEE BRIESEMEISTER, AARP, RESIDENTIAL CONSUMERS AND THE ELECTRIC UTILITY OF THE FUTURE 7 (2016) http://publicpower.org/files/Residential%20%20Utility%20of%20the%20Future_final.pdf (describing that those who end up bearing costs are fewer and fewer captive utility customers).

235 *How Much Do Solar Panels Cost in the U.S.?*, ENERGY SAGE, http://news.energysage.com/how-much-does-the-average-solar-panel-installation-cost-in-the-u-s/ (last visited March 27, 2017).

236 *See* Sanya Carley, *State Renewable Energy Electricity Policies: An Empirical Evaluation of Effectiveness*, 37 ENERGY POL'Y, 3071, 3077 (2009) (stating that essentially, property tax benefits do not really affect the installation of renewable energy capacity; upfront costs and other tax benefits have a much stronger impact).

237 REICHAL, *supra* note 104, at 12.

238 There is no hard data on this. However, some inferences can be drawn from two telling numbers. Between 2013 and 2014, solar assets rose by $5.1 billion dollars. *See* BLOOMBERG ENERGY FINANCE & THE BUS. COUNCIL FOR SUSTAINABLE ENERGY, 2015 FACTBOOK:

significant increases in the value of property assessments and the corresponding revenue because those properties no longer have the value of a renewable energy system assessed. This exclusion further subsidizes the ability of high income earners to install renewable generation capacity and reduce their burden of utility costs, while excluding low-income earners from the same ability to engage in the equitable adoption and distribution of benefits of renewable technologies.

The apex of regressive renewable energy tax programs are individual generation credits. The state sales and property tax programs reduce the upfront and long-term costs of installing small-scale renewable EGUs. Net-metering pays the consumer retail rates for their generation capacity.[239] This payment further reduces or eliminates the long-term cost of DG for the individual consumer. In addition to these benefits, the individual generation credits offset incurred upfront costs. The reduction in costs of small-scale renewable EGUs is incredibly attractive to those able to afford the equipment. The tax programs are subsidies that allow wealthy energy consumers to become relatively independent of the grid.[240] And while some programs, such as Minnesota's Community Solar Initiative, attempt to diversify the type of individual that can take advantage of small-scale DG product, the core problem remains. Grid independence results in two linked phenomena: load defection and grid defection. These phenomena shift the cost burden of electric production and distribution to low-income utility customers.

E. *A Shrinking Utility Rate-Base*

Load defection is the decrease in electricity consumed from the centralized grid.[241] Load defection will occur as DG becomes more affordable and prevalent.[242] Wealthier tax brackets will be able to reduce their electricity consumption before lower tax brackets.[243] Load defection will create a situation where many utility rate payers will be lower income.[244] This burden shift effectively acts as a regressive tax on electricity use.

SUSTAINABLE ENERGY IN AMERICA 77 (3rd ed. 2015), http://www.bcse.org/images/2015%20Sustainable%20Energy%20in%20America%20Factbook.pdf. Of that growth, only $2.64 billion of funds were derived from third-party lessors (the method lower-income homeowners utilize). *Id.* at 78. The majority of DG asset growth seems to be among those who can afford the upfront costs. *Id.*

239 RICHARD SCHAMLENSEE ET AL., MIT, THE FUTURE OF SOLAR ENERGY: AN INTERDISCIPLINARY MIT STUDY xvii (2015) https://energy.mit.edu/wp-content/uploads/2015/05/MITEI-The-Future-of-Solar-Energy.pdf.

240 Costello, *supra* note 223, at 4.

241 *See* PETER BRONSKI ET AL., ROCKY MOUNTAIN INST., THE ECONOMICS OF LOAD DEFECTION 5 (2015), http://www.rmi.org/electricity_load_defection.

242 *Id.* at 31.

243 *See id.* at 32.

244 *See id.* at 33-34.

Utility customers that completely remove themselves from the existing centralized grid defect from the grid.[245] It is the logical conclusion of load-defection. Grid defection is a current rarity (until DG plus storage proliferates), and will likely become a feasible reality as the "mutually reinforcing accelerants" of cheaper DG technologies and increasing adoption of DG technologies create an environment of "grid parity".[246] However, as the adoption of DG increases and storage technology becomes more viable, grid defection becomes a very real possibility.[247] Wealthier tax brackets will be able to afford complete grid independence.[248] This will force utilities to drastically increase rates or drastically reduce service, severely impacting lower income utility customers.[249] As grid defection increases, a greater share of utility costs will fall on low-income brackets that are unable to achieve grid defection.[250] This increase in costs will make electricity prohibitively expensive.[251] Again, there is a *de facto* regressive tax on electricity use that penalizes those without the economic means to become self-sustaining energy producers.

The federal and state tax programs provide subsidies for the wealthy to install renewable energy systems and reduce electricity consumption. This reduction leads to reduced revenue for utility companies. Reduced revenue, and increased operating costs, are driven by adopting renewable energy programs that are not fully offset by the existing corporate tax programs. This reality leads to increased rates or a reduction in infrastructure maintenance and low-income programs. The utility customers who benefit from the existing tax programs are those who can afford increased electric costs. The tax programs make it attractive for these customers to install their own generation capacity, rather than relying on an increasingly green-centralized distribution model. Furthermore, other state policies, like net-metering, ensure that DG is economically favored over utility-scale renewable EGUs. This allows wealthy tax brackets to consume less energy from the grid, and thereby pay less overall costs. As the wealthy become increasingly energy independent, the cost of a centralized grid model shifts to those who can least afford it.

245 *Id.* at 5.

246 BRONSKI ET AL., *supra* note 204, at 11. Grid parity is "economic and technical service equality with the electrical grid."

247 *Id.* at 7.

248 *Id.* at 30.

249 Khalilpour & Vassallo, *supra* note 228, at 217.

250 *Id.*

251 PETER KIND, EDISON ELECTRIC INST., DISRUPTIVE CHALLENGES: FINANCIAL IMPLICATIONS AND STRATEGIC RESPONSES TO A CHANGING RETAIL ELECTRIC BUSINESS, 11 (2013), http://www.eei.org/ourissues/finance/documents/disruptivechallenges.pdf.

IV. CONCLUSION

The existing federal and state renewable energy tax policies provide a stark reminder of the negative impact tax programs can have. The programs interact with other policies to create a system that redistributes tax benefits to wealthier tax brackets and creates a regressive tax on electric consumption. Renewable EGUs and energy efficiency infrastructure improvements are expensive. The tax programs that offset these costs are utilized primarily by wealthier tax brackets, increasing the adoption of these technologies among a subset of the population and stranding low-income earners. This is merely one permutation of a trend in upwards wealth redistribution created by a tax code riddled with deductions and exemptions.[252] And while some of the tax programs, notably the sales tax exemptions and property tax exclusions in Arizona, California, Florida, and Minnesota, attempt to alleviate the regressive nature of renewable energy tax programs, the actual implementation of the policies results in greater inequality.

The lower income tax brackets do not have the means to produce their own electricity and are dependent on the existing utility system for services that are fundamental to modern life. Wealthier tax brackets can afford renewable EGUs and energy efficient home upgrades. These brackets can then partially offset the costs of these improvements through tax programs. These brackets then pay less to the utility, shifting the burden of electric sector infrastructure costs to those fully dependent on traditionally delivered electricity. This burden shifting occurs while oases of wealth remain connected to grid solely for their convenience in a utility system that has not yet figured out how to modernize in an equitable and just fashion. Many of these oases will decouple from monopoly utilities altogether, stranding those dependent on utilities with high costs.

Making renewable energy tax programs more progressive may not be the best answer. These programs have successfully fostered the adoption of renewable technologies and the subsequent reduction in cost that widespread use brings. The adoption of renewable EGUs decreases air pollution, GHG pollution, and furthers energy independence.[253] However, the tax programs that further these goals lack a moral calculation. Does creating a green energy grid have to result

252 Beverly Moran, *Wealth Redistribution and the Income Tax*, 53 HOWARD L. J, 319, 324-25 (2010).

253 INT'L ENERGY AGENCY, ENERGY AND AIR POLLUTION: WORLD ENERGY OUTLOOK SPECIAL REPORT 66 (2016), https://www.iea.org/publications/freepublications/publication/WorldEnergy Outlook SpecialReport2016EnergyandAirPollution.pdf (including table and data that seeks to avoid pollutant emissions through the adoption of non-combustion renewables); *see also* EUROPEAN ENVTL AGENCY, RENEWABLE ENERGY IN EUROPE 2016: RECENT GROWTH AND KNOCK-ON EFFECTS 47 (2016) (providing a table of demonstrative reductions of GHG emissions by increase in discrete renewable energy sources); *see also* John A. Matthews & Hao Tan, *Manufacture Renewables to Build Energy Security*, 513 NATURE 166, 167 (2014) (describing China's ability to become net importers of fossil fuels by manufacturing domestic renewable energy and suggesting other nations do so as well).

in a mad rush that increases inequality and strands low-income consumers with high costs?

The existing renewable tax systems must reduce inequality. If federal and state policies aim to reduce energy consumption, flatten energy demand, and increase renewable resource usage, these programs should not disproportionately benefit the upper tax brackets. Tax programs should instead encourage subsidization of renewable resources and programs that benefit the entirety of a utility's rate-base and discourage the proliferation of wealthy micro-grids. This redirection will allow those without property interests, and without means, to benefit from renewable energy. Utilities provide a public good essential to modern life. The tax programs currently offered indiscriminately further a renewable energy policy that disrupts the availability of this public good. The tax programs favor those with wealth and strand those without, and this will create an electric grid of haves and have-nots.