Testimony to
The Public, Utilities, Energy, and Technology Interim Committee
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The first guiding principle in Governor Herbert's 10-year strategic energy plan asserts that Utah is dependent on "responsible" energy development.[1] That same principle emphasizes the role of the free market in achieving responsible energy development and for good reason — subsidized energy is not responsible energy. If policymakers were to allow the energy market to function with minimal intervention, consumers and taxpayers would benefit. Government policies that support or hasten a particular form of energy's development harm individuals not just once, but twice — first as consumers of electricity and again as taxpayers. Removing the subsidies, credits, and exemptions for energy producers — whether they are renewable or fossil fuel-based — would help consumers and bolster Utah's economy.

This testimony will explore the incentives and policies surrounding alternative energy currently offered by Utah and the federal government and then explore the impact these programs have had on Utah's economy and energy system.

Current Programs

Utah Programs

The Renewable Energy Systems Tax Credit is an amalgam of two separate credits — the Investment Tax Credit and the Production Tax Credit. The Investment Tax Credit can be applied to solar, wind, geothermal, hydro, and biomass energy systems installed by either households or commercial operations. For residential installations, the credit covers the lesser of $2000 or 25 percent of the system cost. For commercial builds, the credit is valued at the lesser of $50,000 or 10% of the system cost. Moreover, the commercial credit, unlike the credit offered to residential installs, is refundable. The Production Tax Credit is available only for solar photovoltaic, wind, geothermal, and biomass projects that are at least 660 kilowatts, and offers over a third of a cent ($0.0035) per kilowatt hour for the first two years of production.[2] In a budget brief on the Office of Energy Development, the Office of the Legislative Fiscal Analyst reported that in 2013, this tax credit expended more than double its target cost. Slated to spend $1.96 million, the program instead spent $4.06 million.[3]

The Alternative Energy Development Incentive is a tax incentive for major alternative energy projects in Utah, which includes the same energy sources covered by the Renewable Energy Systems Tax Credit as well as waste heat, nuclear, oil-impregnated diatomaceous earth, oil sands, oil shale, and petroleum coke. It allows large projects that require significant capital investment or create high-paying jobs while providing new state revenue to reclaim up to 75 percent of the new state revenues created.[4]

The Qualified Energy Conservation Bonds program is federally funded through the Emergency Economic Stabilization Act of 2008 and provides interest-subsidized bonds for energy conservation projects, allowing borrowers to pay only principal payments. Qualified energy conservation projects

[1] Governor's Office. March 2, 2011. "Energy Initiatives & Imperatives: Utah's 10-Year Strategic Energy Plan." Retrieved from: http://www.utah.gov/governor/docs/10year-stragegic-energy.pdf

[2] Governor's Office of Energy Development. "Renewable Energy Systems Tax Credit." Retrieved on October 18, 2016 from http://energy.utah.gov/renewabletaxcredit/

[3] Djambov, Ivan. Oh, Angela. Office of Energy Development. 2013. "Budget Brief." Retrieved from: http://le.utah.gov/interim/2013/pdf/00001036.pdf

[4] Governor's Office of Energy Development. "Alternative Energy Development Incentive (AEDI)." Retrieved on October 18, 2916 from http://energy.utah.gov/alternativeincentive/

include rural renewable energy development and research into non-fossil fuel. Utah was allocated $28.39 million under this program, of which $4.31 million remains to be spent.

The Utah Department of Environmental Quality's Clean Fuels program offers subsidized loans and grants to natural gas, electric, and electric-hybrid vehicles. The costs of those loans and grants are not allowed to exceed $500,000 a year.[5] Beyond those subsidies, the department also offers a clean fuel tax credit, which allows taxpayers to deduct $1,000 for purchasing a plug-in hybrid vehicle or $1,500 for a natural gas or electric vehicle. The program includes various other write-offs for fuel conversion, electric motorcycles, and other technologies that shrink dependence on traditional gasoline or diesel fuels.[6]

This list of government interventions into the energy and fuel industries is not comprehensive. Nor could it be — many distortions are implied by policies that are not explicitly monetary. For example, Utah allows clean fuel vehicles to use I-15 express lanes without carpooling.[7] Policies that confer additional benefits to users of alternative energy also distort markets without necessarily requiring any state expenditure. Even for explicit subsidies, it is often difficult for citizen watchdogs to monitor the extent of government spending because of a dearth of publicly available data. Most of Utah's tax incentive programs do not have a lot of information that is easy to access regarding the amount they cost each year.

Federal Programs

An Energy Information Administration report released last year calculated the total value of federal financial interventions and subsidies into the U.S. energy market. Their report included only programs with an "identifiable federal budget impact" that were "specifically targeted at energy," and emphasized repeatedly that those criteria left out numerous programs with obvious market impacts on the energy industry. That report estimates that the federal government spent about $29.26 billion on energy subsidies in fiscal year 2013, $15.04 billion of which came from renewable electricity production and $1.82 billion of which came from biofuels. Spending on electricity-related subsidies increased 38 percent relative to 2010.[8]

The federal Renewable Electricity Production Tax Credit and Business Energy Investment Tax Credit closely resemble Utah's own Renewable Energy Systems Tax Credit. The Renewable Energy Production Tax Credit (known as the PTC) provides nearly two and a half cents ($0.023) per kilowatt hour for wind, geothermal, and closed-loop biomass energies and one and a fifth cents ($0.012) per kilowatt hour for other renewable energies. The credit lasts until 10 years after the production facility goes online and is adjusted for inflation.[9] As reported by the Congressional Research Service, the Joint Committee on Taxation projects that between 2014 and 2018 PTCs offered to renewable producers will cost $16.4 billion.[10]

The Business Energy Investment Tax Credit (known as the ITC) gives tax rebates for 30 percent of the cost of solar, fuel cell, and small wind projects and 10 percent of geothermal, microturbine, and CHP projects. While many projects used to be able to choose between the PTC and the ITC, now only wind projects can opt into the ITC instead of the PTC.[11] In 2013, the ITC cost taxpayers $1.95 billion.[12]

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[5] Utah Department of Environmental Quality. "Clean Fuels Program." Retrieved on October 18, 2016 from: http://www.deq.utah.gov/ProgramsServices/programs/air/cleanfuels/grants/grantsintro.htm

[6] http://www.deq.utah.gov/ProgramsServices/programs/air/cleanfuels/taxcredits/2015/main.htm

[7] Utah Department of Transportation (UDOT). August 30, 2016. "C Decal- Clean Fuel Vehicle Decal and Permit." Retrieved from: http://www.udot.utah.gov/main/f?p=100:pg::::1:T,V:2280

[8] Energy Information Administration (EIA). March 2015. "Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2013." Retrieved from: https://www.eia.gov/analysis/requests/subsidy/pdf/subsidy.pdf

[9] U.S. Department of Energy (DOE). 2015. "Renewable Electricity Production Tax Credit (PTC)." Retrieved on October 18, 2016 from: http://energy.gov/savings/renewable-electricity-production-tax-credit-ptc

[10] Congressional Research Service (CRS). July 14, 2015. "The Renewable Electricity Production Tax Credit: In Brief." Retrieved from: http://nationalaglawcenter.org/wp-content/uploads/assets/crs/R43453.pdf

[11] U.S. Department of Energy (DOE). 2015. "Business Energy Investment Tax Credit (ITC). Retrieved on October 18, 2016 from: http://energy.gov/savings/business-energy-investment-tax-credit-itc

The Qualifying Advanced Energy Property Investment Tax Credit offers a 30 percent credit for investments in eligible properties used in some manufacturing projects of renewable products such as wind turbines or solar arrays. In 2013, manufacturers making solar panels, wind towers, as well as wind turbines and blades received 64 percent of the project's total funding of $133 million.[13]

The Credit for Clean Renewable Energy Bond Holders pays interest on bonds for building renewable energy facilities issued mainly by public entities throughout the United States. The credit pays a portion of the bonds' interest, reducing borrowing costs for the owner of the renewable energy facility. This program's allocation was raised to $2.4 billion by the American Recovery and Reinvestment Act of 2009.[14]

The federal government subsidizes ethanol and biodiesel under a number of credits and programs too varied to cover here. Beyond just financial supports for alcohol fuels, the government also enforces the Renewable Fuel Standard, known commonly as the ethanol mandate, which requires mixing almost 16 billion gallons of biofuels into the domestic gasoline and diesel supplies.[15]

Other policies litter the tax code, often by allowing certain projects to take advantage of MACRS depreciation. All forms of energy production collect tax breaks and other subsidies that distort the market. For example, the Center for American Progress estimates that removing just nine particular credits for oil and gas interests would save the the U.S. Treasury $37.7 billion over 10 years.[16] Our own research shows, however, renewable electricity producers collect an outsized portion of those benefits because of how the tax code is written.[17]

Impacts of Alternative Energy Programs: Measure What Matters

Clearly, both Utah's state government and the federal government have been heavily investing in alternative energy sources for decades. What have those investments produced? Policymakers should carefully consider the accomplishments of subsidized industries and ensure they represent meaningful gains for the world's environment and Utah's citizens. Measuring what matters, not merely what is easy to measure, is paramount in ensuring that Utah's energy system remains strong and reliable.

After billions of dollars in incentives for production, investment, and research, what has Utah obtained? Industry groups regularly point to the growing installation capacity of wind and solar. Wind and solar are, after all, often the fastest growing by that metric. Unfortunately, however, the skyrocketing nameplate capacity has not entailed comparatively more energy from wind or solar.[18] The economic argument for subsidies is clear and simple — relying only on principles any Econ 101 student learns. Reality is, however, not always as simple as the stylized examples from an introductory class. Ultimately,

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[12] Energy Information Administration (EIA). March 2015. "Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2013." Retrieved from: https://www.eia.gov/analysis/requests/subsidy/pdf/subsidy.pdf

[13] Energy Information Administration (EIA). March 2015. "Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2013." Pg. 19. Retrieved from: https://www.eia.gov/analysis/requests/subsidy/pdf/subsidy.pdf

[14] U.S. Department of Energy (DOE). 2015. "Clean Renewable Energy Bonds (CREBS). Retrieved October 18, 2016, from: http://energy.gov/savings/clean-renewable-energy-bonds-crebs

[15] U.S. Environmental Protection Agency (EPA). June 15, 2016. "Renewable Fuel Annual Standards." Retrieved from: https://www.epa.gov/renewable-fuel-standard-program/renewable-fuel-annual-standards

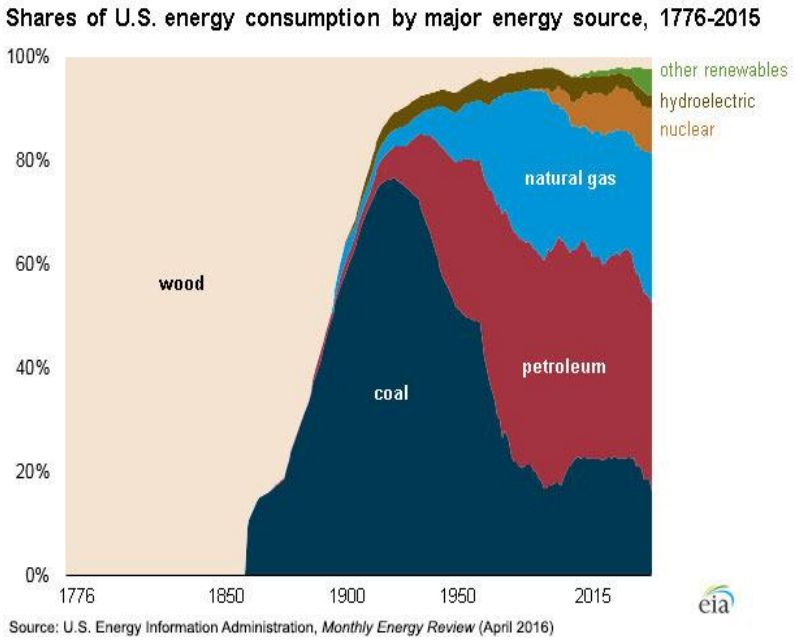
[16] Center for American Progress (CAP). May 26, 2016. "It is Time to Phase Out 9 Unnecessary Oil and Gas Tax Breaks." Retrieved from: https://cdn.americanprogress.org/wp-content/uploads/2016/05/23134458/OilSubsidies-factsheet.pdf

[17] Institute of Political Economy. 2015. "Unseen Costs of Solar-Generated Electricity." Retrieved from: http://www.strata.org/pdf/unseencosts/unseen_solar_full.pdf

[18] Energy Information Administration (EIA). September 2016. "Monthly Energy Review." Retrieved from: http://www.eia.gov/beta/MER/index.cfm?tbl=T07.02A#/?f=A&start=1949&end=2015&charted=1-2-3-5-8-14; Energy Information Administration (EIA). September 2, 2016. "Renewable Energy Explained." Retrieved from: http://www.eia.gov/energyexplained/index.cfm?page=renewable_home

subsidies for any energy source, fossil fuel or renewable, distorts the energy market and causes more harm to consumers than simply letting the market play out naturally.

Figure 1: U.S. Energy Consumption by Source Throughout Time[19]



The Economic Argument for Subsidies

Economics is generally interested only with private individuals buying and selling goods amongst themselves and generally assumes that there are no effects on anyone outside of the transaction. This is obviously a simplification as many of our choices have real impacts on others. The economic argument for subsidies, perhaps most famously elucidated in 1920 by Arthur C. Pigou, centers on these third-party effects that cause market failures.[20]

In the case of energy production, buying coal-powered electricity means that others also suffer from the pollution it creates. These costs on others may not factor into how individuals make decisions. The economic argument for subsidies is that subsidies can be leveraged to make individuals consider both the private costs and benefits of their actions and the social costs and benefits by taxing goods that harm others and subsidizing goods that help them. Otherwise, economic theory suggests goods that cause negative effects on third parties, will be over-provided by the market because individuals do not take into account their full cost to society. In comparison, goods that create positive effects on third parties, will be underprovided because individuals do not take into account the benefits that also accrue to other members of society.

The Economic Argument Against Subsidies

This economic argument for subsidies is important, and is still rightly featured in every principles of economics course and book. As applied by alternative energy advocates, however, it overlooks and overextends what it can actually prove. There are serious concerns about whether or not governments know enough about the marginal value and marginal cost of pollution and energy production to correctly

[19] Energy Information Administration (EIA). September 2, 2016. "Renewable Energy Explained." Retrieved from: http://www.eia.gov/energyexplained/index.cfm?page=renewable_home

[20] Pigou, A. C. 1920. *The Economics of Welfare*. http://www.econlib.org/library/NPDBooks/Pigou/pgEW31.html

set taxes and subsidies to produce a better result than the market failure. In sum, advocates have forgotten that governments can also fail.

When Pigou wrote *The Economics of Welfare* in 1920, he included an important qualifier; governments, in order to fix the market failures caused by externalities, must know the marginal social benefits and marginal social costs of the externalities. In Pigou's own stylized theory, it is theoretically possible for governments to correct for externalities through tax-funded subsidies, but that was not an easy task. Unlike his present-day descendents, however, Pigou argued for the utmost skepticism with regard to intervention by public authorities.

Pigou's position was one full of nuance and it is important that policymakers understand those subtleties. Pigou cautioned, for example, that the public authorities may not be perfectly selfless, and thus might pursue private gain for themselves instead of for the society as a whole. Or they may simply not be able to answer the big "if" he prefaces his argument for intervention with — they may not know what level to set the subsidy or tax at. Pigou argued,

> It is not sufficient to contrast the imperfect adjustments of unfettered private enterprise with the best adjustment that economists in their studies can imagine. For we cannot expect that any public authority will attain, or will even whole-heartedly seek, that ideal. Such authorities are liable alike to ignorance, to sectional pressure and to personal corruption by private interest. A loud-voiced part of their constituents, if organised for votes, may easily outweigh the whole.[21]

In particular his comments about making unfair comparisons between the seemingly clean and clear calculations of economists and the blurry mess of reality are paramount in the public policy process. It is difficult to overstate just how unlikely it is that policymakers will be able to improve on the market failure.

Given these limitations, even though it is true that some activities have third-party effects, it is not necessarily true that government can actually improve on the results the market provides. Policymakers are unlikely to know the “right” amount of subsidy for something like renewable energy to create positive externalities.

Costs and Benefits of Alternative Energy Programs

When determining the return on alternative energy investments made by the federal and state government, it is vital to measure what actually matters. A full analysis of policies requires that all relevant costs are considered in addition to relevant benefits. Much of my own academic work has been focused on identifying the unseen costs that are absent from most policy-making discussions.[22] In part this is because the benefits of programs are more obvious than are the costs. For example, there are obvious jobs created by building wind farms and solar arrays. People driving by can see the people constructing them and confirm for themselves that renewable energy projects create jobs and watch the turbines create renewable energy. Those same people, however, are unlikely to understand that those jobs in the renewable sector are in part funded by taxes that necessarily distort other markets and may cause job losses in other sectors.[23]

One example of this is found in renewable portfolio standards (RPS), which require that certain amounts of a state's electricity come from renewable sources. Twenty-nine states have renewable portfolio standards, but Utah, along with seven other states, has an RPS goal, which means it is not

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[21] Pigou, A. C. *The Economics of Welfare*. Part 2, Chapter 20, "Intervention by Public Authorities." http://www.econlib.org/library/NPDBooks/Pigou/pgEW31.html

[22] Institute of Political Economy. 2015. "Unseen Costs of Electric Energy". Retrieved from: http://www.strata.org/unseencosts/

[23] Bastiat, Frédéric. 1850. *That Which is Seen and that Which is Unseen*. Retrieved from: http://bastiat.org/en/twisatwins.html

legally mandated that the standard is met but that there is a general public policy orientation towards the goal.[24] I, with my colleagues, have done extensive work estimating the effects of RPS on state economies. For example, our models estimate that states lose out on job growth, in ranges from about 5,500 to 50,000 jobs. Household and personal income also see lower growth of about $1,500 lost income per person or about $4,000 lost income growth per household. Pennsylvania, for example, is predicted to have lost out on $19.8 billion in income statewide by 2009 as a result of their RPS.[25]

There are certainly environmental benefits of renewable energy, but they are not as clear cut as they initially seem. Because of the realities of the electricity grid, most power is supplied by baseload sources of coal and natural gas. Natural gas and to a lesser extent coal can be ramped up and down according to energy needs. Solar and wind, absent efficient and scalable energy storage which does not currently exist, are intermittent sources and cannot be controlled to supply energy needs in line with changing demand. Thus, introducing renewable sources to the grid means that coal and natural gas have to ramp up and down more to account for the unreliable nature of wind and solar. This is known as baseload cycling and it decreases the environmental benefits provided by using wind and solar-generated electricity. Researchers at Carnegie Mellon University estimated the average amount of this offset of CO_2 due to baseload cycling is about 76 to 79 percent of what policymakers assume and the offset for nitrous oxide (NOx) is 30 to 50 percent of what policymakers expect — meaning the benefits of introducing wind and solar to the grid are often overestimated.[26]

Ultimately, it is likely that current policies overestimate the benefits of renewable energy incentives while also underestimating the costs of those programs.

Measure What Matters

Research like this calls into question the value of the investments being made by the federal and state governments, but there is also a question if policymakers are paying attention to the right measures. For example, the amount of "installed generating potential" of renewables, while a politically useful advertising slogan, is not a good metric compared to actual generation by renewables. Wind added the most electric generation capacity in 2015, followed by natural gas and solar.[27] The EIA reported in March that solar is in the lead followed by natural gas and wind for 2016. The EIA notes that natural gas additions are largely driven by developments in hydraulic fracturing, while wind's capacity growth is due to the PTC.[28]

Data from the Energy Information Administration and summarized by the Institute for Energy Research clearly shows electricity generated from wind has increased over the past decade — and a similar story holds for solar power. In 2006, just more than half a percent of US electricity was generated by wind (0.65%) compared to about 5 percent in 2015 (4.7%).[29] In the end, these returns should be

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[24] U.S. Department of Energy. Database of State Incentives for Renewables and Efficiency (DSIRE). August, 2016. Retrieved from: http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2014/11/Renewable-Portfolio-Standards.pdf

[25] Simmons, Randy T; Yonk, Ryan M.; Brough, Tyler; Fishbeck, Jacob. 2015. "Renewable Portfolio Standards (RPS). *Strata Policy*. Retrieved from: http://www.strata.org/rps/

[26] Katzenstein, Warren; Apt, Jay. 2009. "Air Emissions Due to Wind and Solar Power." *Environmental Science Technology*. Pg. 253-258. Retrieved from: http://pubs.acs.org/doi/pdf/10.1021/es801437t

[27] Energy Information Administration (EIA). March 23, 2016. "Wind adds the most electric generation capacity in 2015, followed by natural gas and solar." Retrieved from: http://www.eia.gov/todayinenergy/detail.php?id=25492

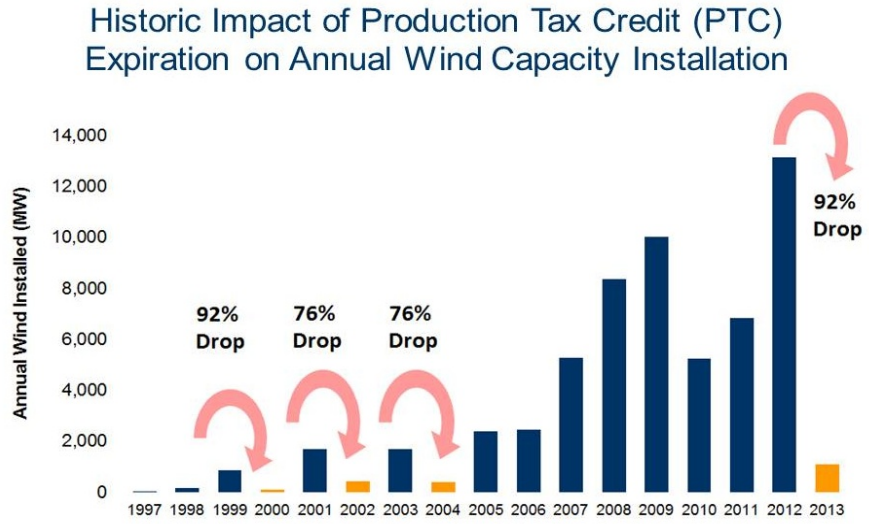
[28] Energy Information Administration (EIA). March 1, 2016. "Solar, natural gas, wind make up most 2016 generation additions." Retrieved from: http://www.eia.gov/todayinenergy/detail.php?id=25172; Energy Information Administration (EIA). November 21, 2012. "Wind energy tax credit set to expire at the end of 2012." Retrieved from: https://www.eia.gov/todayinenergy/detail.php?id=8870

[29] Institute for Energy Research. April 27, 2016. "Focus on Capacity Additions Ignores Wind's Scant Electricity Generation." Retrieved from: http://instituteforenergyresearch.org/analysis/focus-capacity-additions-ignores-winds-scant-electricity-generation/

considered in light of the billions in subsidies collected by the wind and solar industries over the past several decades.[30]

Wind in particular is an industry largely driven the subsidies provided — the production tax credit chief among those. Warren Buffett laid bare the reality of many wind farms in a 2014 interview with Fortune magazine saying, "...we get a tax credit if we build a lot of wind farms. That's the only reason to build them. They don't make sense without the tax credit."[31] Data on wind installations from the Energy Information Administration shows his investment strategy is common. Each time the PTC is being debated in Congress, there is a rush to complete qualifying projects.[32] As Figure 1 from the American Wind Energy Association shows, the amount of wind capacity drops until the credit is assured.[33] This is a phenomenon that industry groups, the Energy Information Administration, and researchers all agree on. It shows how dependent renewables are on the false market signals that government's interference in the energy market has sent to investors.

Figure 1: Boom and Bust of Wind Capacity Installation[34]



The Importance of Responsible Energy Development

Energy is an integral part of producing any other good consumers enjoy and the basic necessities of life. This means that irresponsible energy policy that grants politically-favored groups special privileges has negative implications throughout the entire economy. Worse still, renewable energy subsidies and tax credits are often regressive — they redistribute income from the poor to the wealthy. Take solar, for example. Only the most affluent Americans can afford the large initial investment to install a solar array, collect the tax credits and subsidies, and then wait out the years until it pays itself off.

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[30] Institute for Energy Research. March 18, 2015. "EIA Report: Subsidies Continue to Roll In For Wind and Solar." Retrieved from: http://instituteforenergyresearch.org/analysis/eia-subsidy-report-solar-subsidies-increase-389-percent/

[31] Gandel, Stephen. April 28, 2014. "Warren Buffett: We took a stand on Coke's pay package." *Fortune Magazine*. Retrieved from: http://fortune.com/2014/04/28/warren-buffett-we-took-a-stand-on-cokes-pay-package/

[32] Energy Information Administration (EIA). November 21, 2012. "Wind energy tax credit set to expire at the end of 2012." Retrieved from: https://www.eia.gov/todayinenergy/detail.php?id=8870

[33] Energy Information Administration (EIA). March 26, 2016. "Wind adds the most electric generation capacity in 2015, followed by natural gas and solar." Retrieved from: http://www.eia.gov/todayinenergy/detail.php?id=25492

[34] American Wind Energy Association (AWEA). "Federal Production Tax Credit for wind energy." Retrieved October 18, 2016, from http://web.archive.org/web/20140525195644/http://www.awea.org/Advocacy/Content.aspx?ItemNumber=797

This is a reverse Robin Hood effect of sorts — it takes from the poor to give to the rich.[35] Considering the wide and overwhelming agreement of the academic and policy literature that higher energy prices are regressive, that is, that they hurt low-income families the most, responsible energy policy must focus on providing affordable energy to the least well-off in society.[36]

To conclude, a more responsible energy system would include more competition, more innovation, less government support, and fewer subsidies and exemptions for politically favored groups, whatever their method of production. Less government intervention in the energy market would mean less expensive energy for consumers, which could have positive ripple effects throughout Utah's economy. If the goal is to develop an electrical grid based on "responsible" energy Utah would do well to minimize its intervention into the industry and instead allow market competition to serve Utah's consumers unimpeded.

[35] Institute for Energy Research. "Net Metering: False Free Market Claims and a Regressive Green Tax." August 20, 2013. Retrieved from: http://instituteforenergyresearch.org/analysis/net-metering-false-free-market-claims-and-a-regressive-green-tax/

[36] Speck, Stefan. 1999. "Energy and carbon taxes and their distributional implications." *Energy Policy*. Retrieved from: http://www.sciencedirect.com/science/article/pii/S0301421599000592?np=y; Flues, Florens. Thomas, Alastair. 2015, May 1. "The distributional effects of energy taxes." OECDiLibrary. Retrieved from: http://www.oecd-ilibrary.org/taxation/the-distributional-effects-of-energy-taxes_5js1qwkqqrbv-en; Mathur, Aparna. Morris, Adele C. March 2014. "Distributional effects of a carbon tax in broader U.S. fiscal reform." *Energy Policy*. Volume 66. Pgs. 326-334. Retrieved from: http://www.sciencedirect.com/science/article/pii/S0301421513011543; Congressional Budget Office (CBO). July 2003. "Shifting the Cost Burden of a Carbon Cap-and-Trade Program." Retrieved from: https://www.cbo.gov/sites/default/files/108th-congress-2003-2004/reports/07-09-captrade.pdf