



Los Alamos Study Group

Nuclear Disarmament • Environmental Protection • Social Justice • Economic Sustainability

Economic Benefits of Renewable Energy & Energy Efficiency for New Mexico

By Jason Murray, Climate & Solar Ambassador, July 31, 2017

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- NM is geographically well-suited to expand its RE industry.
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- Community-scale RE is a form of distributed RE which is well-suited for transforming the energy and economic landscapes of rural electric cooperatives and other utilities in the state, as well as the communities they serve.
- RE is in increased demand by businesses and is becoming essential to attract a talented workforce.
- NM is well-situated to educate a new generation of “green collar” workers.
- Large-scale grid penetration of RE has proven far more reliable than previously thought, and with less money required for operating costs than fossil fuels.
- RE offers greater price stability than fossil fuel power, as well as a cost-effective means to create grid diversity.
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- RE can be developed in ways that help address social inequity, while simultaneously attracting energy-conscious companies.
- RE projects on marginal or vacant agricultural land can benefit struggling families and communities.

II. Some Economic Benefits of Renewable Energy Experienced in New Mexico Thus Far

- RE incentives in NM have helped result in 452 MW of solar capacity and over one gigawatt of wind capacity.
- The NM Renewable Energy Production Tax Credit (REPTC) has supported \$1.6 billion in economic activity in the state, and helped foster investments which have supported about 11,800 full- and part-time jobs over the last 13 years.
- RE tax credit programs in NM have had a “multiplier effect” on job growth by increasing demand in supply chain businesses, thereby increasing the amount of money spent in the regional economy.
- NM experienced a 54% growth in solar jobs during 2016, with 1029 new jobs created.

III. Economic Benefits of Energy Efficiency Retrofits

- Even in an otherwise static or declining construction sector, energy efficiency (EE) retrofits create jobs.
- In addition to having less environmental impact than new “green” construction, EE retrofits can offer higher returns on investments.
- NM can play a more proactive role for training workers in EE skills.
- With some careful planning, retrofitting older buildings can result in significant energy and financial savings.
- Installing new window frames and glass for better insulation are ways to significantly lower energy demands.
- EE upgrades inspire a more productive workforce and increase building values.
- “Deep” energy retrofits result in even greater energy-savings than more conventional retrofits.
- NM has established important EE initiatives which can provide the basis for further measures.
- NM has required utilities to invest in EE by imposing a fixed tariff rider on sales revenue from natural gas and electricity. This was achieved with the “Efficient Use of Energy” Act in 2005, and has been followed by subsequent EE related amendments.
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- Climate change will increasingly impact crop production and damage NM’s agricultural sector. By taking a lead in the transition towards renewables, NM can play a role to reduce the severity of these economic effects.
- Larger and more frequent fires, as a result of climate change, will make communities more flood-prone and result in infrastructural damage. This will add economic burdens to NM communities.

V. Conclusion: Obstacles and Opportunities for the Future of Renewable Energy and Energy Efficiency in New Mexico

- RE and EE offer a beacon of hope at this critical moment for the state.
- Expanding RE and EE can be part of a strategy to address multiple problems at once.
- The current lack of interest in RE at the federal level puts greater responsibility on cities and states.
- Supporting RE development at the local level could help lead the way forward.
- Whether evaluating energy policy in terms of economic, environmental, or social metrics, RE is central to the solution.

I. Economic Benefits of Renewable Energy

A concerted shift to renewable energy (RE) can help NM address its current economic crisis. According to a study by the Brookings Institution, of the 100 largest metropolitan centers in the U.S. the Albuquerque metropolitan area ranked 97th for both overall economic growth and economic prosperity for the years 2010 to 2015. It also ranked 97th for its employment rate and standard of living, as well as 98th for job growth.¹

Economic stagnation has similarly been evident at the state level, amidst which the clean energy sector has been a contrasting bright point. For example, while NM experienced only 0.4% overall job growth during 2016,² there was a 54% growth in solar jobs, which grew 179 times faster than the overall state economy for the year.³

NM is geographically well-suited to expand its RE industry. With 320 to 340 days of sunshine each year,⁴ New Mexico policy makers would be wise to take advantage of our unique geography – as well as the increased national and global demand for RE – and enjoy the wide range of benefits that would likely result from a concerted effort to more fully transition to solar and wind.

Promoting distributed rather than utility-scale RE in the state can greatly enhance local economic benefits, as well as deter monopolies in our clean energy sector. While utility-scale RE may more readily fit our traditional image of large, centralized power stations, moving in favor of more *decentralized*, distributed RE can make our clean energy transition an opportunity to democratize our energy systems as a whole. A focus on utility-scale RE projects increases the likelihood that developers will pursue cost-cutting measures that squander the vast potential RE development has to benefit communities. Such measures often include importing workers from out-of-state and externalizing project costs onto rate-payers – which are in line with the conventional energy model of privatizing profits.⁵

Distributed generation, by contrast, generates power at locations in close proximity to their end-use.⁶ For example, rather than aiming to build a large, centralized solar array to generate a desired amount of power, that capacity can be achieved through smaller arrays spread out close to substations in the communities they serve. Distributed RE often results in energy that is produced, owned, and consumed locally.⁷ As former president of the World Wind Energy Association, Preben Maegaard, has described, there is a strong correlation between the amount of community support for RE projects and the degree to which community-members are consulted and benefited by those projects.⁸ In this way, distributed RE is much more effective than utility-scale RE in winning the support of communities, as the former approach depends upon a close coordination with various community interests and concerns – as has been well exemplified in Denmark.

Community-scale RE is a form of distributed RE which is well-suited for transforming the energy and economic landscapes of rural electric cooperatives in the state, and the communities they serve. With NM's 19 rural electric cooperatives (RECs), community-scale RE may hold particular promise for promoting local economic growth. Usually involving mid-size installations between 0.5 - 5 MW close to their points of consumption, community scale RE is grid connected and can be locally-owned or obtained through a power purchase agreement (PPA).⁹ While community-scale RE can entail various forms of energy generation such as micro-wind or small biomass facilities, it most commonly involves solar photovoltaic (PV).¹⁰ Community-scale RE increases local tax revenues and can play a vital role to promote job growth among NM's 102 solar companies.¹¹

While utility-scale solar has tended to be more cost-effective than distributed solar in the past, recent research by the Rocky Mountain Institute has shown that community-scale solar “can achieve prices comparable to utility-scale solar,” as “developers and installers improve operations” and refine their processes.¹² And as pointed out in a report by the Post Carbon Institute, distributed RE such as community-scale solar significantly reduces the need for new transmission infrastructure, as well as heat losses from long power lines that centralized RE often requires. They also describe that when these expenditures are factored in, distributed solar PV can effectively compete with utility-scale solar in terms of efficiency and cost – and can outdo utility-scale solar in terms of the speed it can be brought online and the creation of local jobs.¹³

The expectation that governments and businesses should play a proactive role in environmental issues is rapidly becoming a new cultural paradigm, and has increasingly become a deciding factor among young people regarding where to live and work.

RE is in increased demand by businesses and is becoming essential to attract a talented workforce. The demand for clean energy among retailers and technology companies in the U.S. is projected to skyrocket to 60 gigawatts by 2025. As a state, we could take advantage of this trend by further investing in strong clean-energy programs, which could attract businesses, stimulate economic growth, and create jobs.¹⁴

Furthermore, a promising “green” economy and green practices among businesses have proven essential to attracting and retaining a talented, young workforce. According to a report by Governance Studies at Brookings, millennials are projected to comprise 75% of the U.S. workforce by 2025.¹⁵ Also, as shown in a study by

the MSL Group – a public relations network of companies – millennials rank the environment as one of their top five most important concerns.¹⁶ The expectation that governments and businesses should play a proactive role in environmental issues is rapidly becoming a new cultural paradigm, and has increasingly become a deciding factor among young people regarding where to live and work. Investing in RE could thus help counter the “brain-drain” in New Mexico.

There Are More Jobs in Solar than Oil and Gas, Coal Extraction in the U.S.

Employment grew 6 percent in solar and slumped 18 percent in upstream oil and gas and support services

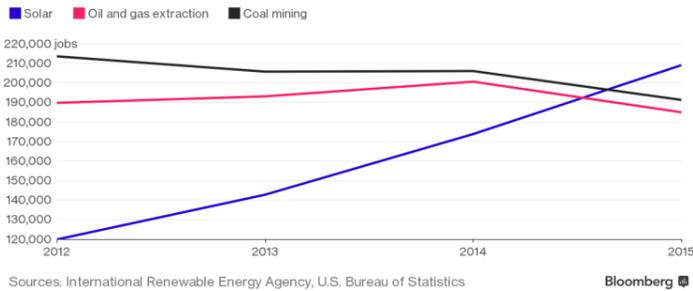


Figure 1

NM is well-situated to educate a new generation of “green collar” workers. With the increased demand for green energy there has been an increased demand for workers with “green skills.” Overcoming the resultant skills gap has proven an important issue to address in the expansion of RE, even with successful situations like in Germany.¹⁷ While there is significant skills overlap between many conventional energy and RE jobs, and certain green skills are often learned through apprenticeships on-the-job, training programs are important for developing the knowledge base for many RE jobs and improving RE installation outcomes and efficiency.¹⁸

New Mexico has great potential to accommodate the skills training for expanded RE. Tucumcari has a school for training technicians in wind power, at Mesalands Community College. In Española, Northern New Mexico College is developing BA and MA programs for mechanical engineering that focus on solar and storage technologies, and San Juan Community College in Farmington has a solar PV technician program.¹⁹ These, as well as other RE-centered programs at NM colleges – such as at Santa Fe Community College – can help develop an expanded workforce that is skilled in RE systems.

RE offers greater price stability than fossil fuel power, as well as a cost-effective means to create grid diversity.

The costs of electricity from RE tend to be stable or decrease over time, in contrast to the market volatility and fluctuating prices of fossil fuels.²⁰ Wind and sunlight are free and thus aren’t subject to market variations in commodity prices.²¹ Today, as compared to five years ago, wind and solar are outcompeting the costs of new nuclear, coal, and gas plants, as well as operating costs of old

plants – due in large part to their long-term fixed prices. Throughout the history of grid systems, a portfolio of diverse energy sources has always been the most cost-effective way to ensure reliability. While in the past this diversity was derived largely from fossil fuel sources, with the sharp drop in prices for RE systems, major utilities across the country have been recognizing the obvious benefits of integrating RE into the grid – even in purely market terms.²²

Large-scale grid penetration of RE has proven far more reliable than previously thought, and with less money required for operating costs than fossil fuels.

Numerous regional transmission organizations and utility operators have demonstrated through integration studies, as well as operational practices, that integrating higher levels of RE can be accomplished regionally without affecting grid reliability.²³ According to the Department of Energy’s national laboratories, grids with moderate-to-high (30-80 percent) shares of RE perform as reliably – and at least as resiliently – as fossil-fuel based power systems, but with *lower risks and operating costs*.²⁴

The National Renewable Energy Laboratory (NREL) has shown that some of the world’s largest power systems currently have the potential to accommodate 30% wind and PV power.²⁵ Notably here in NM, the Taos-based Kit Carson Electric Cooperative (KCEC) has developed their highly innovative Solar Plan. This plan includes gradually transitioning from being an “intermittent” to “firm” provider of solar power, through *substation solar arrays* and the eventual development of storage systems which would enable them to provide “100% of peak demand during the day year-round” to co-op members – as well as potentially sell excess power to third parties.²⁶

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RE creates more jobs for equivalent energy and dollar amount invested as compared to fossil fuels.

Whereas fossil fuel energy production is highly mechanized and *capital* intensive, the RE industry is significantly more *labor* intensive – creating more jobs on average for each unit of electricity generated as compared to fossil fuels.²⁷ In terms of dollars invested, a study by the Political Economy Research Institute states that investing a given amount of money in a RE agenda creates about 3.2 times more jobs than investing that same money in the fossil fuel sector. A primary reason for this is that the RE industry requires less expenditures on acquiring machines, supplies, land, and energy to create energy – freeing a greater portion of RE investments to be directed towards hiring workers.²⁸

Jobs created by RE span all pay scales and levels of required credentials. Investments in RE also create more jobs at all pay levels as compared to investments in fossil fuels, thus expanding employment opportunities throughout the labor market.²⁹ While nearly half of RE jobs employ people with less than a 4-year college degree, the RE industry has also been creating twice as many medium- and high-credentialed jobs as the fossil fuel industries.³⁰

As described in an article by Fortune, at the national level the solar and wind industries are creating jobs 12 times faster than the rest of the U.S. economy,³¹ and with RE careers having median wages 13% higher than the national economy average.³²

RE projects on agricultural land benefit struggling families and communities. Wind and solar installations on agricultural land offers landowners a vital stream of revenue with few if any drawbacks. Amidst commodity prices reaching decade lows, many farmers are struggling to make ends meet. Leasing land for RE projects can make all the difference for such families between being able to

II. Some Economic Benefits of Renewable Energy Experienced in New Mexico Thus Far

RE incentives in NM have produced many economic benefits. In the early 2000s NM began developing initiatives to facilitate the growth of our RE industry. These have been very successful in fostering the development of wind and solar power in the state, for instance leading to the installation of over a gigawatt of wind capacity between 2003 and 2016.³⁵ A vital part of this rapid development has been incentive programs like the Renewable Energy Production Tax Credit (REPTC), which was implemented in 2003. REPTC-certified power producers have since invested over \$1 billion in New Mexico to “construct, equip, operate, and maintain” 31 RE generation facilities. These expenditures have supported about 11,800 full and part-time jobs, and \$1.6 billion in economic activity statewide.³⁶

The NM Renewable Energy Production Tax Credit (REPTC) capitalizes on our “underappreciated assets.” According to a 2017 study by O’Donnell Economics & Strategy, for every dollar in state tax expenditure, REPTC-certified projects generated over \$5 in labor income. While \$120 million in tax credits were claimed between 2003 and 2016, certified projects have generated state and local tax revenue totaling \$74.6 million during that period,³⁷ in addition to the many benefits for workers and overall economic health of the state. As described by Kelly O’Donnell – research professor at University of New Mexico who conducted the study – the REPTC program is “a nice fit for the

support themselves or not. Additionally, wind farms increase property values in low-income rural communities, and provide an infusion of local tax-revenue which can then go towards public sector expenses like schools and repairing infrastructure, creating a variety of induced jobs in the process.

RE can be developed in ways that help address social inequity, while simultaneously attracting energy conscious companies to communities. While having significant upfront costs, distributed RE can reduce economic burdens on community members in a relatively short time frame. For example, KCEC members are expected to save \$50 million dollars over the next decade as a result of their co-op’s Solar Plan.³³ That breaks down to an average of about \$170 in savings for each customer per year. The plan will also address social inequity by offering RE to power homes of co-op members regardless of income. Implementation of the plan – which includes integrating electric and telecommunications networks – is expected to attract energy conscious companies to do business in the area. It will also serve as a model for RECs and small utilities in the state, and across the country, that are interested in transitioning to RE.³⁴

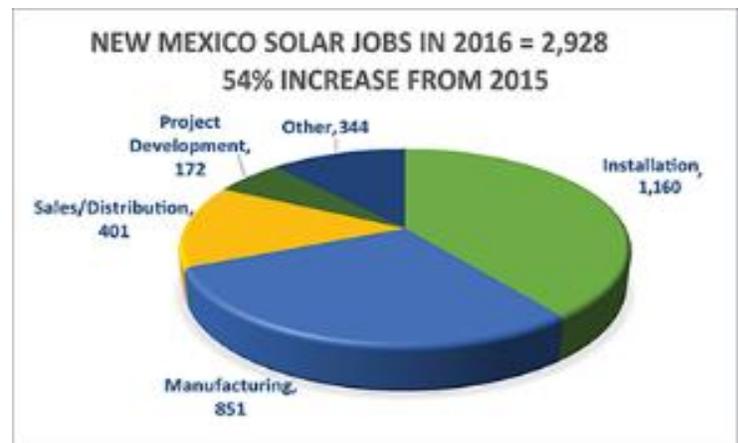


Figure 2

state, because it capitalizes on some of our underappreciated assets,” such as open space, sunshine, and wind.³⁸ The study also points out how production tax credits like the REPTC encourage the development of RE projects by offsetting the cost of scaling up production in the project’s early years.³⁹

RE tax credit programs in NM have had a “multiplier effect” on job growth. By incentivizing the development of RE generation facilities, these tax credit programs have helped directly create jobs – such as on-site at generation facilities – as well as indirectly, by increasing demand upon supply chain businesses. Major

induced impacts of these RE investments have also been generated, as employees of direct and indirect jobs use their wages and salaries to buy goods and services in the regional economy.⁴⁰ Clean energy incentives like the REPTC have thus been helping New Mexico take advantage of its unique geographical attributes, and create an RE industry which is poised for further tremendous growth – given a political leadership that is committed to enthusiastically exploring that potential.

NM continues to experience rapid growth in solar jobs. As illustrated by the Solar Foundation in its 2016 Solar Jobs Census, New Mexico experienced remarkable growth in solar jobs last year. There were 1,029 new solar jobs created in 2016, which when added to pre-existing solar jobs put NM as #8 among states for solar jobs per capita. These jobs fall across various sectors, which include installation, manufacturing, sales/distribution, and project development, the breakdown of which in terms of numbers of jobs created

III. Economic Benefits of Energy Efficiency Retrofits

Even in an otherwise declining construction sector, energy efficiency (EE) retrofits and remodeling create jobs. Like investing in RE, investments in improving energy efficiency (EE) offer excellent potential for promoting job growth. While there has been a national decline in the construction sector – particularly in parts of New Mexico such as the Santa Fe and Las Cruces areas⁴⁴ – investments in retrofitting and remodeling older buildings can help create jobs, while providing reliable returns on investments (ROIs) to building owners.

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Also like investing in the RE industry, EE investments create job opportunities in more labor intensive industries, resulting in more jobs for money invested as compared to all-sector averages. Additionally, as described by the American Council for an Energy-Efficient Economy, the money saved by EE investments is put into the overall economy, which also creates comparatively more jobs for equivalent expenditure than the fossil fuel industries.⁴⁵

Many of the same “multiplier effects” produced in supporting RE industry are evident with EE investments as well. In addition to direct jobs created in performing the retrofits, there are also supply-chain jobs to accommodate increased demand by the building industry, and induced

is illustrated in Figure 2. According to a recent report by the Solar Energy Industries Association, NM currently ranks 15th in the nation for total installed solar capacity, with over 670 MW. That is enough power to run approximately 168,000 homes during peak daylight hours.⁴¹

Solar workers in NM are estimated to have spent 83% of their work time last year involved with residential solar, 16% with commercial solar, and 1% with utility-scale solar.⁴² The fact that the majority of solar capacity installed in NM during that time was at the utility-scale rather than commercial or residential⁴³ – despite such a small percentage of in-state solar worker’s time spent on utility-scale projects – may in part be attributed to the tendency for larger RE projects to bring in workers from out-of-state. If distributed solar had been pursued in favor of many of these large, centralized installations, jobs creation in the state, while already impressive, would likely have been far greater.

jobs created as a result of more workers being able to purchase goods and services in local economies.⁴⁶

In addition to having less environmental impact than new “green” construction, EE retrofits offer higher ROIs. With regard to incorporating economic interests with environmental considerations, new construction of green buildings has received much attention. On the environmental end, while new green buildings certainly outperform the energy efficiency of conventional buildings, it can take from 10 to 80 years for those EE gains to outweigh the environmental impacts involved with their construction. By contrast, pursuing EE retrofits is estimated to result in 4 to 46% less environmental impact than new green construction.⁴⁷

On the economic end of the spectrum, while both new green construction and EE retrofits offer substantial ROIs, the latter offers an average 19.2% increase in ROI compared to 9.9% for new buildings. Where new construction is necessary, green construction appears to be the economically and ecologically wise choice, but the best investment overall is proving to be in EE upgrades to our already existing building stock wherever possible.⁴⁸

NM can play a more proactive role for training workers in EE skills. As has been demonstrated by Santa Fe Community College’s EnergySmart Academy, EE training programs in the state can play a vital role in creating the skills and knowledge base to accommodate an expansion of EE projects. The EnergySmart Academy offers training in weatherization, retrofit installation, energy auditing, building analysis, renovation, building operation, as well as other valuable skills.⁴⁹

Less energy wasted, by retrofitting older buildings, means money saved. Due to the relatively low cost of energy during much of the second-half of the 20th century, as well as lack of environmental awareness, much of our current building stock has proven energy inefficient by today's standards. According to a study by the Rocky Mountain Institute (RMI) and American Institute for Architects, "as many as 72% of buildings in the U.S. are older than 20 years old," with billions of dollars wasted as a result of energy inefficient design, equipment, and programming. A joint report by the Rockefeller Foundation and Deutsche Bank Climate Change Advisors estimates that a 30% improvement in energy efficiency with buildings built before 1980 would result in about \$1 trillion worth of savings over a ten year period, providing a 358% simple return on investment for that time.⁵⁰

Installing new window frames and glass for better insulation is one way to significantly lower energy demands. A notable example of how older buildings can be made more energy efficient, is through better insulating windows. Since 1980, major improvements have been made with fenestration framing and glass. As the U.S. Department of Energy describes, inefficient windows can be responsible for up to 25% of a building's heating bill,⁵¹ and for half the electrical load to cool buildings in warm climates – as stated by the Environmental Protection Agency (EPA).⁵² Also, according to the National Institute of Building Sciences, fenestration systems have the potential to reduce HVAC and lighting costs by 10-40%.⁵³ Improving energy efficiency in windows prior to investing in more efficient systems or equipment, such as for HVAC and lighting, can allow building owners to purchase those systems with lower anticipated load requirements.⁵⁴

While replacing windows is one effective way to improve the EE of buildings, a variety of other types of insulation can also significantly cut down energy consumption. According to the EPA, insulation can reduce energy costs for some buildings by as much as one-half – granted proper installation to maximize thermal performance. They also specifically describe the addition of insulation to attics as "one of the most cost-effective and energy efficient steps" home-owners can take.⁵⁵ Other types of insulation include sealing air leaks, and insulating walls and floors. Insulating air ducts can also increase the EE of buildings, with leaking ducts capable of lowering efficiency by as much as 20%.⁵⁶

Similar to replacing windows, the energy saving potential of insulation is greatest among buildings which were built before the 1980s, and before public consciousness regarding energy efficiency really developed. By upgrading such older buildings to present-day insulation standards, heating and cooling costs can be reduced from between 10-50%.⁵⁷

Also, while insulation serves to reduce the exchange of heat through various building surfaces, with a careful approach it can yield exceptional results. For example, the Rocky Mountain Institute built their 15,600 square foot Innovation Center in Basalt, Colorado as a kind of prototype for such cutting edge approaches to EE. Similar in size to about 90% of commercial buildings across the country,⁵⁸ the Innovation Center was built with structural insulating panels, as well as roof materials, slabs, and windows that are highly resistant to heat transfer. As a result it has achieved more than 3 times the levels of insulation required by code.⁵⁹

Conventional retrofits save energy, and "deep" energy retrofits result in even greater savings. While conventional retrofits like upgrading HVAC and lighting systems are often cost-effective and reduce energy consumption, *deep energy retrofits* – while requiring more planning – offer a holistic approach to integrating building systems to maximize energy efficiency. This approach can reduce energy consumption by at least 50%,⁶⁰ as it goes beyond improving the efficiency of electrical and mechanical systems by employing a variety of design strategies to reduce loads expected of those systems.⁶¹ Such measures could include determining the amount of light and light fixtures needed in various rooms depending

With U.S. office buildings entailing about 10 times more expenses on labor than energy, the return on investment for EE improvements goes far beyond energy savings alone

on their uses, controlled daylighting,⁶² and installing new windows.

EE upgrades inspire a more productive workforce and increase building values. While most companies spend far more money on labor than the operations of buildings, investments in EE can significantly improve the performances and cost-effectiveness of both. Energy efficient buildings provide workers with pleasant conditions such as comfortable temperatures, better air quality, and more natural light – which, according to a study by RMI leads to improved work attendance and morale, as well as greater productivity.⁶³ With U.S. office buildings entailing about 10 times more expenses on labor than energy, the return on investment for EE improvements goes far beyond energy savings alone.⁶⁴

Additionally, studies have shown that higher energy efficiency improves the value and attractiveness of buildings. For example, RMI describes how owners of buildings with Energy Star Certification enjoy a variety of benefits, which include 1.3-11% higher occupancy rates, 3-15% increase in lease rates, and a 4.8-26% increase in property value.⁶⁵

NM has established important EE initiatives which can provide the basis for further measures. In 2006, Governor Bill Richardson issued an executive order which set EE standards on public buildings in NM for the first time. The order called for the adoption of LEED-Silver standards. This required that all construction and renovations of public buildings greater than 5,000 square feet achieve a delivered energy performance standard at least 50% below the average U.S. energy consumption for buildings of equivalent type.⁶⁶ New Mexico has also had the Whole-Building Investments in Sustainable Efficiency (WISE) program, which provides a step-by-step process for upgrading the systems of government facilities.⁶⁷ WISE was part of an effort to fulfill a 2007 executive order which called for a 20% reduction in the energy use of state agencies by 2015, relative to 2005 energy consumption levels.⁶⁸

According to the American Council for an Energy-Efficient Economy, as of July 2016 New Mexico had efficiency projects under construction worth a net total of \$15.7 million.⁶⁹ As will be described under a subsequent heading, further measures can be pursued by the state, local governments, and utilities to increase the accessibility of EE projects for a broader range of consumers.

NM has required utilities to invest in EE. Since 2005, NM has required utilities to invest in EE programs by imposing a fixed tariff rider on revenue from sales of natural gas and electricity. This was achieved with the “Efficient Use of Energy” Act and has been followed by subsequent amendments, creating requirements for utilities such as to achieve energy savings of at least 8% of their 2005 levels, by 2020. Such measures have boosted EE initiatives among utilities, with over \$35 million budgeted for such projects in 2013 – including load management and residential programs.⁷⁰

Utilities have created rebate and incentive programs for consumers. For homeowners and businesses, rebate and incentive programs offered by NM utilities have played an important role in encouraging EE upgrades to existing buildings, as well as for making new construction more energy efficient. For example, Southwestern Public Service Company of New Mexico (SPS) – a subsidiary of the utility owning company Xcel Energy, Inc. – offers rebate programs which will cover up to 60% of the costs for certain EE projects. Public Service Company of New Mexico (PNM) offers quarterly financial incentives to large companies through their Peak Saver program, in exchange for those companies opting to reduce energy consumption during days of peak demand.⁷¹

For small- and medium-sized facilities, PNM offers their Power Saver program, which entails an enrollment

bonus and annual payments for allowing PNM to conserve the air conditioner use of program participants during peak demand times – via wireless signals from a load control device which they would install on AC units. As the section below will discuss, there remains much room to develop a more comprehensive and focused approach that would remove the major barriers for consumers towards taking on EE upgrades.⁷²

By removing barriers and increasing incentives to participate in EE upgrades, New Mexico can more thoroughly take advantage of the many job-creating and energy reducing benefits of vibrant EE initiatives.

Removing financial barriers and simplifying the process can greatly increase participation in EE projects. While programs such as those described have been beneficial in reducing the energy consumption of buildings in the state, there are a host of other measures which can be pursued to make the process more simple, affordable, and accessible to homeowners and businesses. Additionally, while EE investments save money over time in themselves, they also further increase the economic feasibility of a full-scale transition to RE by reducing the electrical loads required of grids, and thus reducing the amount of investment required in RE systems.⁷³

A pioneer in tapping into such potential has been Fort Collins Utilities (Utilities) in northern Colorado. Prior to their successful Efficiency-Works Neighborhood Pilot program, polls conducted by the American Public Power Association showed that while 90% of people responded being interested in EE upgrades, once the prices became known that figure fell to less than a few percent. They additionally found that a major deterrent for many potential participants was how complicated the process was. In response, Utilities developed a plan that enabled people to essentially choose among 3 package options, and speak with a third-party, home-energy auditor for advice on which would best suit their needs.

During that 1 ½ year pilot program, Utilities financed the efficiency projects, allowing customers to pay them off by continuing their typical utility bill payment each month – with the difference between it and the cost of the reduced energy use covering the expense over about 20 years. The program resulted in 3 times more customers for EE and RE projects. As described by Utilities’ resource conservation manager John Phelan, their previous approach of “providing rebates and a list of contractors” hadn’t been enough to get the levels of involvement in EE projects they were aiming for.⁷⁴ NM utilities and local governments could develop similar initiatives to encourage and facilitate greater participation in EE projects.

IV. Taking a Proactive Stance to Mitigate the Economic Effects of Climate Change in New Mexico

Climate change will increasingly impact crop production and damage NM's agricultural sector. By taking a lead in the transition towards renewables, NM can play a role to reduce the severity of these economic effects. New Mexico is the 6th-fastest-warming state in the nation, with an average temperature increase of 0.6 degrees Fahrenheit each decade since 1970.⁷⁵ As a result of this warming and broader climate changes in the region, NM is experiencing decreased snowpack, more severe droughts, and increased water evaporation. All of these factors will contribute to decreased water availability in the coming years, which will adversely impact our agricultural sector.⁷⁶

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A study by the U.S. Global Change Research Program describes that irrigation-dependent crops in the Southwest are expected to have reduced yields as a result of increased temperatures and more frequent water shortages. For certain rural communities this will likely result in displaced jobs.⁷⁷ Higher temperatures will also increase the reproduction of pests, which can further adversely impact crop production.⁷⁸

V. Conclusion: Obstacles and Opportunities for the Future of Renewable Energy and Energy Efficiency in New Mexico

RE and EE offer a beacon of hope at this critical moment for the state. As this report has sought to illustrate, New Mexico is at a very important crossroads. It has been suffering from economic stagnation at the same time that investment in developing its RE industry has resulted in remarkable growth. Many benefits have already accrued from RE and EE initiatives, and the vast potential for further and more profound benefits are still yet to be explored. At the same time, the many serious drawbacks that have been involved in maintaining the state's dependency on the fossil fuels and nuclear industries are also important to acknowledge in seeking to move forward. Between these considerations, there is ample basis to believe that a more comprehensive, far-reaching effort to transition NM towards distributed RE is central to any agenda for developing the economic health of the state.

Another implication of climate change on agriculture is more frequent severe-weather events. As described by the U.S. Bureau of Reclamation, more intense thunderstorms will expose crops to "higher winds, larger hail, and more flooding."⁷⁹ As the effects of climate change go well beyond state and national boundaries, addressing it will require the conjoined efforts of many governments to reduce greenhouse gas (GHG) emissions. While RE can offer many direct economic benefits to NM, it can also be part of a global effort to mitigate the negative economic and other impacts that are projected to result from our fossil-fuel economy.

Larger and more frequent fires, as a result of climate change, will make communities more flood-prone and result in infrastructural damage. This will add economic burdens to NM communities. Increasingly severe droughts that result from climate change are expected to result in more frequent and intense fires. Large fires can affect the hydrologic cycle by destroying vegetation and plugging soil pores with ash, which can both lead to increased rainwater run-off.⁸⁰ The way that infrastructural damage can result from a severe forest fire and subsequent flooding has been illustrated in the years following the 156,000 acre Las Conchas fire of 2011.⁸¹

While pursuing forms of energy that reduce GHG emissions increasingly makes good business sense, acknowledging the broader, long-term ramifications of not doing so – economic or otherwise – can add further impetus in terms of a basic commitment to serving the public interest.

Expanding RE and EE can be part of a strategy to address multiple problems at once. Like the nation and world as whole, we have essentially been cornered by the realities of climate change and social inequity. Our profit-driven fossil fuel economy has been a central factor in bringing us to this critical juncture, where we are challenged to find innovative ways to simultaneously address both of these problems, among many others. By further travelling the promising path of clean energy and energy efficiency, which now have an excellent foundation in NM, we can create and implement a more holistic vision of the state that reduces the environmental impact of our energy consumption at the same time that it creates more jobs, moves towards providing affordable clean energy to all citizens, and attracts more bright-minded young people to want to live here and enter the workforce.

The current lack of interest in RE at the federal level puts greater responsibility on states. There are many obstacles that will have to be overcome to make this RE transition a reality. Amidst the efforts of the current federal administration to revitalize the fossil fuel industries, cities and states will have to shoulder a greater amount of responsibility for finding ways to promote green technologies and practices. State-level incentives like the REPTC, which have recently become threatened in NM politics, are all the more important to want to protect. At the same time, as Kelly O'Donnell points out, budgetary challenges in the state may make it very difficult to gain support for renewing tax credits. If incentives like the REPTC are eliminated, companies that were attracted by such programs may find themselves in a political and economic environment that no longer seems compatible with their interests. Similarly, citizens of communities that benefited from the revenue boosts of investments in RE may find themselves going back to leaner times.⁸²

...today's low natural gas prices don't reflect the enormous externalities imposed by this fuel source, particularly with regards to exacerbating climate change. The potent contributions of methane leakage towards increasing global temperatures have been frequently overlooked in mainstream energy policy.

Supporting RE development at the local level could help lead the way forward. In the present political and economic environment, it's very conceivable that local initiatives to transition to RE will have to play a more pivotal role. Perhaps RECs, small utilities, and municipalities in the state could follow the example of KCEC in pursuing the development of community-scale, substation solar. By building solar arrays which are spread out across communities and close to power stations, KCEC is demonstrating how to connect solar power to the grid in a way that is more affordable and technically feasible. Dispersed solar arrays also increase energy reliability, since if some array locations are expecting cloud cover, others may not be.⁸³ But as the KCEC initiative has also illustrated, making such a transition at the local level comes with its own formidable challenges, which they spent 10 years working to overcome.

The majority of RECs in NM have contracts with the wholesale energy provider Tri-State Generation and Transmission Association (Tri-State), which puts a 5% cap on electricity not purchased from them.⁸⁴ KCEC had to

buy their way out of a contract with Tri-State in order to expand their solar power generation, taking on \$37 million in debt as a result.⁸⁵ Initial investments by RECs in RE projects would add to any debt created in the case of similar separation agreement with their wholesale energy provider. Fortunately for KCEC, their new provider Guzman Renewable Energy Partners has covered those costs and created a reimbursement plan with the co-op to be fulfilled over the coming years.

While returns on RE investments would be expected to go far beyond repaying these debts in the long run, finding ways to address the many economic, legal, technical, and regulatory challenges imposed on communities in the start-up years⁸⁶ will be of critical importance towards promoting and further establishing the viability of this exciting and community-empowering approach. If RECs, small utilities, and municipalities in the state could manage to tread a similar path to KCEC, this would likely result in a great proliferation of RE projects, as well as a dramatic increase in the number of homes and businesses powered by clean energy.

Whether evaluating energy policy in terms of economic or other costs, RE is central to the solution. A core problem that will have to be addressed is that today's low natural gas prices don't reflect the enormous externalities imposed by this fuel source, particularly with regards to exacerbating climate change. The potent contributions of methane leakage towards increasing global temperatures have been frequently overlooked in mainstream energy policy. Although CO₂ is correctly pointed to as being a GHG of primary concern, as Cornell University professor of ecology Robert Howarth describes, the heat trapping capacity of methane is 86 times greater than CO₂ "when averaged over a 20-year period following emission."⁸⁷ While there may be recurring temptations to continue relying on natural gas based on short-term monetary gains, the need to safeguard a viable future is essential to any serious cost-benefit analysis that aims to serve the public.

Even as the economic benefits of investing in distributed RE provide a strong case for moving away from fossil fuels, being continually mindful of other kinds of costs involved with those latter energy sources – such as in terms of public health, quality of life, and preserving an inhabitable environment – can help establish a more comprehensive and reality-based context in which to develop policy. Whether it be in terms of economic development, addressing social inequity, or environmental sustainability – distributed RE and EE have proven themselves to be indispensable for responsibly confronting the serious challenges that lie ahead.

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