Twenty Percent By 2020

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Abstract

Meaningful reductions in greenhouse gases are thwarted in large part due to our urban form, or lack thereof. Significant land use and transportation policies, along with a variety of other solutions, can cut greenhouse gas emissions in time to stave off the worst changes in the climate. While many climate researchers tackle the various pieces of the carbon emissions puzzle, few address the land use and transportation aspects of the problem. New Mexico aims to reduce energy use 20 percent by 2020. This paper addresses land use and other policy options for achieving that goal.

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Introduction

This report offers ten policy options the State of New Mexico is considering that can cut both energy use and carbon emissions:

1 Direct state funding to communities adopting land use plans that incorporate best energy efficiency practices;

2 Invest in urban and rural transit, including transit villages surrounding major stops;

3 Adopt decoupling and other incentives to stimulate full utility support for energy efficiency improvements;

4 Adopt innovative electricity rates to stimulate greater electricity conservation and peak demand reduction;

5 Develop new energy efficiency programs that address the needs of the poor;

6 Incorporate carbon neutrality design into new neighborhood and building energy codes;

7 Require aggressive energy efficiency updates when a home is up for sale;

8 Set industry energy efficiency goals that compel commitments to implementing cost-effective energy efficiency projects;

9 Increase energy efficiency of local government and public school buildings by 50 percent by 2012, thence zero net energy use by 2020; and

10 Assess carbon fees and offer carbon rebates to stimulate purchase of more efficient motor vehicles and homes.

New Mexico Governor Bill Richardson issued in November 2007 an energy efficiency executive order that requires a ten percent energy reduction in 2005 per capita levels by 2012 and twenty percent by 2020. The State of New Mexico has also produced a climate action plan that quantifies potential

reductions in greenhouse gas emissions and measures cost effectiveness of a range of policies. Meeting these carbon and energy reduction targets require bold, aggressive measures to be adopted soon. Given a range of policy alternatives, New Mexico communities can choose options best suited to their local circumstances. New Mexico's goals meet those set by over 1,700 top U.S. scientists and economists, whose May 2008 declaration urges a 20 percent reduction in greenhouse gases by 2020 as a mid range step toward an 80 percent reduction by 2050 (Union of Concerned Scientists, 2008).

The energy efficiency executive order represents the latest in a series of measures taken by Governor Richardson to transform New Mexico into the "Clean Energy State". These measures include: utilities must generate fifteen percent of their electricity from renewable sources by 2015 and twenty percent by 2020; establishment of the country's first renewable energy transmission authority, designed to deliver New Mexico's wind and solar energy to other states; a commuter rail link is being built between Albuquerque and Santa Fe, making the trip easily accessible to half of the state's population; as a condition to permitting, proposed coal plants must evaluate gasification as a best available technology; economic incentives attracted innovative renewable energy businesses from around the world, starting with Schott and Advent Solar. Tesla Motors is scheduled to build all-electric, high-performance cars in New Mexico by 2010; the Western Climate Initiative seeks agreement among Western states and provinces in the United States, Canada and Mexico on a market-based cap-and-trade aimed at reducing greenhouse gas emissions fifteen percent below 2005 levels by 2020; and New Mexico's clean cars program conforms with California's fuel economy standards.

Governor Richardson's proposed state, national and international initiatives emphasize low- and zero-petroleum plug in vehicles; push fuel economy standards for conventionally fueled vehicles to 50 miles per gallon (21 km per liter) by 2020; sharply advance the most energy-efficient renewable fuels as well as plug-in hybrid technologies to power not only cars but trains, planes, ships, and heavy trucks;

emplace smart growth and transit options to create more energy efficient and livable communities; diversify our electrical sector; create a national energy innovation trust fund; and return to the international negotiating table as a responsible and leading nation and supporting mandatory limits on global warming pollution.

New Mexico, with Native American communities tracing back to time immemorial, was sparsely settled for much of its history. New Mexicans before World War II sustained themselves with crops grown in fields, timber cut from woods, and prayers offered in chapels. Snowmelt fed into fields by acequias helped moderate the climatic extremes of intense droughts and epic floods, just as adobe homes moderated daily swings in temperature. Today, much of New Mexico's economy is based on silicon and scenery. Urban, rural and suburban interests do not always coincide in an era of a larger and increasingly diverse population. The glue that binds together our society and culture is under great challenge from growth and change.

The New Mexico Energy Conservation and Management Division contracted with the Southwest Energy Efficiency Project, or SWEEP, a Colorado-based think tank, to report on a strategy on how to meet the twenty percent goal. While this paper addresses ten similar policy options, the 22 options analyzed by SWEEP are:

- Option 1: Expand Electric Utility Energy Efficiency Programs
- Option 2: Decouple Utility Profits from Energy Sales
- Option 3: Adopt Innovative Electricity Rates
- Option 4: Expand Natural Gas Demand-Side Management Programs
- Option 5: Upgrade Building Energy Codes
- Option 6: Adopt Energy Conservation Ordinances for Existing Homes

- Option 7: Increase Support for Low-Income Energy Programs
- Option 8: Offer Tax Credits for High Efficiency Appliances
- Option 9: Provide Industrial Energy Efficiency Initiatives
- Option 10: Provide Oil and Gas Sector Initiatives
- Option 11: Initiate a Combined Heat and Power Initiative
- Option 12: Initiate a Local Governments and K-12 Schools Initiative
- Option 13: Conduct a Public Education Campaign.
- Option 14: Provide Energy Efficiency Training and Certification
- Option 15: Adopt Clean Car Standards
- Option 16: Adopt Motor Vehicle Efficiency Incentives Such as Feebates
- Option 17: Offer Pay-as-You-Drive Insurance
- Option 18: Reduce Growth in Vehicle Miles Traveled
- Option 19: Better Enforce Speed Limits
- Option 20: Improve Freight Transport Energy Efficiency
- Option 21: Set Replacement Tire Efficiency Standards
- Option 22: Initiate a Car Clunker Retirement Program

SWEEP's report for the State of Utah analyzed energy efficiency savings potential, cost effectiveness, environmental and social benefits, political viability, and high/medium/low priorities. Among the high priority options: demand side management; natural gas energy efficiency program; better building codes; lamp and appliance standards; increased weatherization in homes of the poor; pay-as-you-drive insurance; feebates; clean car standards; and smart growth that cut vehicle miles driven. Utah stands to gain over $7 billion (€4.5 billion) in net economic benefits, over half from transportation, and an 8 million ton carbon dioxide reduction per year by 2015.

The remainder of the paper explains ten policies that show great promise in achieving energy efficiency gains in New Mexico. Emphasis is placed on land use and transit options, though the policies together offer synergistic possibilities toward an energy efficient economy in the State.

Policy 1 Land Use – Direct state funding to communities adopting land use planning that incorporate best energy efficiency practices.

Climate change adds another dimension to the role of land use planners in determining the future of New Mexico. Land use-related climate change practices and policies offer some of the most cost effective and efficient ways of reducing greenhouse gas emissions. Addressing how land is used when adapting to climate change is particularly important in New Mexico, part of the Intermountain West where, with the exception of Alaska, climate change is most visibly evident.

A review of recent research confirms that replacing exurban sprawl with compact development patterns reduces driving by up to 40 percent. If three out of five new developments shifted from sprawling to compact designs, household travel could be reduced by about 20 percent and 85 million metric tons of carbon dioxide per year by 2030 could be saved (Ewing, 2008).

Recognizing that most planning decisions are made at the local level, state policies can influence development decisions through infrastructure investment and incentive programs. In Maryland, for example, state funds target projects consistent with statewide growth management policy. Massachusetts' Smart Growth Zoning Incentive offers municipalities about $6,000 (€3,876) per residential unit built in any transit-accessible area rezoned to increase density (SWEEP, 2007).

The dominance of sprawl and its attendant carbon-intensive lifestyles, far-flung exurbs tethered to jobs and stores by taxpayer funded roads, are antithetical to traditional New Mexico lifestyles that focused growth inward. The standardized American dream saps the strength from native pueblos, Hispanic villages, urban compounds, and rural towns. Demographics, lifestyle preferences, record gasoline prices, and increased incidents of wildfires threatening stand-alone McMansions, all wrapped up in the overriding climate change issue, foretell the end of sprawl. It also allows us to place a healthy demand on underused urban lands such as parking lots at abandoned strip malls to accommodate new growth. Thus, land use decisions need to take a back to the future approach and stress efficiency not only with land but also with buildings, water, landscaping, urban forms, and proximity to facilities to meet our daily needs.

There is a direct correlation between the rate of energy use and urban form. American conventional development demands more energy use than any lifestyle ever devised in human history. Overreliance on electricity and gasoline from far flung sources confines exurbanites to symbolic reductions in energy use, that is, they are stuck in a high energy vicious cycle. A land use form that places people in sight of neighbors, preferably where walls touch and within walking distance of a transit stop, can greatly reduce energy use and at the same time bring back a sense of humanity to a community.

While New Mexico's population has increased by 48 percent, the state's vehicle miles traveled has increased more than 112 percent. The state ranked 6th in the nation for annual vehicle miles traveled per driver in 2005, at 18,369 miles (29,562 km) (Ewing, 2007). Based on current development and transportation spending trends, the amount of driving will increase 55 percent more than will population increase in and around Albuquerque, New Mexico's largest city, according to the Mid Region Council of Governments.

Land use decisions will become increasingly important is tackling climate change in New Mexico. Identified in the state's climate change study were recommended land use-related actions that, together, comprise a significant 17.5 percent of potential emissions reductions (CCAG, 2006). These strategies include:

- Reuse land that is already developed but is now vacant, underused, or even mildly polluted, and meet the growing demand by a larger number of households comprised of singles, working parents and single parents for housing located close to services, jobs and transit.
- Build compact development around transit stops and cluster employment centers around transit in ways that allow the foot, bicycle, or transit to meet most daily transportation needs.
- Allow, support, and encourage location-efficient growth of jobs, shopping, school, services, entertainment and recreation close to home, and discourage growth that is auto dependent. Smart growth cuts carbon and gives tools needed to shift growth back to town.
- Design and implement the statewide multimodal transportation plan in a manner that reduces greenhouse gas emissions, with a shift of focus from roads to an integrated, multimodal system.
- Promote energy and location efficient neighborhood development: integrate the principles of smart growth, urbanism, and green building into neighborhood design standards, as measured by a development's compact design, proximity to transit, mixed use, mixed housing type, and pedestrian- and bicycle- friendliness.
- Direct and coordinate state spending to communities that adopt land use and transportation practices that contribute to VMT performance standards. State governments should inventory all available discretionary funds in such areas as housing, economic development, infrastructure, schools transportation, and state facilities, and allocate these funds to communities that adopt best practices in land use planning and regulation that meet performance standards related to climate and VMT reduction goals. The Massachusetts Commonwealth Capital Fund uses a scorecard system to

award funding for communities that align their development rules and funding streams to encourage compact, mixed-use communities (McEntire, 2008).

- Designate priority areas for energy-efficient growth: downtowns, centers, and corridors. Localities create a designation for mixed use commercial centers and corridors that achieve carbon reductions. These areas could be eligible for certain types of funding that could be used for building rehabilitation, mixed use development, transportation improvements, and other strategies that reduce global warming emissions (McEntire, 2008).
- Provide zoning for mixed use development in priority areas. Despite the market demand for smart growth, one of the biggest hurdles to climate-friendly development patterns is the myriad of outdated local land use policies that effectively prohibit mixed use and more compact development. New Mexico's major jurisdictions should reform zoning to incentivize the right things and discourage or prohibit sprawl, and the state should enhance technical assistance to small communities (McEntire, 2008).

Policy 2 Transit – Invest in urban and rural transit, with transit villages surrounding major stops.

As gasoline and diesel prices soar, New Mexicans buy less, drive less in favor of the bus or train, with some home buyers increasingly choosing locations near major transit lines. The coming of new commuter rail service between Albuquerque and Santa Fe comes at an auspicious time. Increasingly New Mexicans are asking for relief from the motor vehicle as the only arrow in the transportation quiver. On the land use side of the tracks, transit oriented development planning, or TOD, is proceeding, giving local communities the needed tools and technical assistance. The hope is that, with updated plans in place, they will build compact development around transit stops to meet daily needs by foot or transit.

A community that links transit and land use through TODs benefits by fewer cars on its streets. New

research shows that TODs cut motor vehicle trip by an average of fifty percent from levels predicted if one merely goes by the manual, in this case, the Institute for Traffic Engineers' green book (Arrington 2007). In addition to expanding systems, funding transit improvements to increase the frequency and hours of service and improving transit facilities also increases ridership and reduces driving (McEntire, 2008).

A local government may adopt a transit village plan that permits a significantly higher density of development than previously permitted. The transit village development district plan should address a neighborhood centered around a transit station that is planned and designed so that residents, workers, shoppers, and others find it convenient and attractive to patronize transit; a mix of housing types, including apartments; other land uses, including a retail district oriented to the transit station and civic uses, including day care centers and libraries; pedestrian and bicycle access to the transit station, with attractively designed and landscaped pathways; a transit system that encourages and facilitates intermodal service, and access by modes other than single occupant vehicles; and installation of needed public improvements.

Upon adoption of a transit village plan a community should update existing zoning, building codes and other land use regulations to ensure consistency with the plan. The local government shall also allow use by right for multifamily residential uses on each parcel designated for multifamily residential development.

Funding mechanisms and or incentives include a state transit village fund, to provide funding to local governments who adopt and implement a transit village plan for public improvements around transit stops; priority funding from other state and local capital outlay funds for pedestrian improvements, bicycle facilities, housing projects, and parking facilities within walking distance of transit stations; tax

increment financing for certified TOD districts; and transportation improvement districts that would use funds generated by land uses that demand lots of motor vehicle trips.

Changes to zoning must be accompanied by changes in design standards, ideally combined into a design based form code, so that a TOD district offers ample cycling and walking with adequate facilities and attractive street conditions. Streets need good connectivity and traffic calming features to control vehicle traffic speeds. Mixed-use development includes shops, schools, green space and other public services, and a variety of housing types and prices, within each neighborhood.

The State of New Mexico could help prioritize housing and job opportunities adjacent to RailRunner stations, beyond the Governor's new directive to state agencies to locate new facilities within RailRunner walking distance. Criteria for transportation project funding could include setting miles traveled/climate targets, evaluating funding through a mode-neutral lens, and adopting a 'Fix it First' infrastructure policy.

The state could direct spending to communities adopting land use planning and regulations that reduce VMT and meet other energy efficiency performance standards, as done in Massachusetts and California. State financial support for housing and other private development could go toward projects in locations where driving is minimized. And incentives such as discounted mortgages or tax deductions could be provided to homeowners or businesses that choose to locate in transit-rich, mixed-use, energy-efficient development.

New Mexico is exploring setting a goal to reduce the percent growth in vehicle miles traveled, or VMT, from three times greater to no more than the same growth in population by 2012 through a requirement in the State Transportation Improvement Plan. Reducing driving would be achieved through a

combination of actions. First, set targets for that are allocated to local and regional governments, who would submit VMT reduction plans to the state. Financial and/or technical assistance could be provided to localities to help achieve these reductions. This would be similar to how Albuquerque submits to EPA an inventory of their emissions sources and develop plans to bring air pollutants in line with Clean Air Act standards. Second, invest in new transit and significantly expand and improve existing mass transit systems. Third, change zoning to prevent sprawl and foster infill development and higher densities in urban areas. Fourth, designate priority downtowns and mixed use commercial centers that are willing to meet high environmental and economic benchmarks set by the state, similar to the idea of Leadership in Energy and Environmental Design – Neighborhood Development (LEED-ND). These areas could be eligible for certain types of funding that could be used for building rehabilitation, mixed use development, transportation improvements, and other strategies that reduce global warming emissions.

Policy 3 Decoupling – Adopt decoupling and other shareholder incentives to stimulate full utility support for energy efficiency improvements. The aim is to encourage utilities to maximize the amount of cost-effective energy savings they can achieve.

Utilities increasingly are acting within a regulatory structure that decouples how they make money from how many kilowatt hours they sell. This is a most important breakthrough, for not only can homeowners figure out what to do about energy efficiency, they can be given the tools on how to do it and how to pay for it. Decoupling incentivizes utilities to become major players in energy efficiency by making it in their financial interest to do so.

New Mexico in 2008 adopted decoupling policies that break the link between electric or natural gas utility sales and recovery of fixed costs. The amount of allowed fixed cost recovery is determined ahead of time in a rate case, and a true-up mechanism is used to ensure the utility received no more (or no less)

than the determined amount. This removes the financial incentive that utilities traditionally have of promoting more energy consumption – and ineffective conservation programs – in between rate cases. Decoupling also removes the disincentive that utilities have for supporting adoption of combined heat and power systems by their customers. To address those who feel decoupling excessively rewards utilities for doing what should be part of normal business operations, regulators can make shareholder incentives performance-based and limit profits to a small portion of the net economic benefits provided by energy efficiency programs. (Geller, 2007).

While rules have yet to be written and hearings yet to be held in implementing decoupling in New Mexico, programs in place elsewhere prove illustrative. One performance-based approach known as Conservation Enabling Tariff rewards utilities heretofore resistant to implementing effective energy efficiency programs. Incentive approaches include allowing utilities to earn a higher-than-normal rate of return on some or all energy efficiency program costs; to earn a bonus if they meet certain targets; or to keep a portion of the net economic benefits from programs. Given the ease of implementation of performance incentives, according to analysis by SWEEP, more states have adopted this approach than decoupling (Geller, 2007).

Utility demand side management programs in the Rocky Mountain region of the United States are up 35 percent in the past year, with a 2010 goal of $200 million (€129 million). States are setting aggressive goals, such as Utah's 20 percent efficiency increase by 2015 and Colorado's adoption of the Western Governor Association's goals. Of new homes constructed, 71 percent are Energy Star rated in Nevada, 50 percent in Arizona, Nevada and Texas; 36 percent in Arizona, 16 percent in Utah; Colorado 7 percent; and New Mexico is last at 5 percent (SWEEP, 2007).

Nevada Power, which serves Las Vegas' 1.2 million customers, is working to cuts it three percent

annual growth rate and meet one-fifth of a renewable portfolio standard through efficiency. The utility trained 150 builders in Energy Star standards, resulting in 74 percent Energy Start market penetration in 2006. The selling feature was a combination of market expectation and builder competition. Nevada Power is pursuing air conditioner programmable thermostats; controls on the 1000 escalators on the Las Vegas Strip, which now run 24/7 as if they are 100 percent full; highly efficient air conditioners; duct sealing; home energy display; adsorption chillers; night breeze ventilation system; solar heating; swap out all lights in homes; emplace high efficient motors and chillers into contractor warehouses, so when the old ones conk out customers will choose the right ones; motel window system that sets temperature for occupied units using room keys, then defaults when key removed; zero energy homes; refrigerator recycling, with a goal of 14,000; Energy Star manufactured homes; Energy Star lighting; and Sure Bet commercial incentive, a set of prescriptive measures that are directly installed in less profitable businesses. With a focus on poorer customers, compact fluorescent light bulbs, or CFL's, rule Las Vegas; Nevada Power markets the CFL as "the bulb that looks funny, saves money." The one day record: 10,000 at a Costco superstore, part of the 2008 compact fluorescent sales goal of two million (SWEEP, 2007).

Charging polluters for the right to emit carbon dioxide is a new way to pay for energy efficiency. According to the May 2008 Energy Design Update, Maryland will take revenue from a carbon credit auction, likely in the $100 million (€64.7 million) annual range, to fund new investments in energy efficiency. Vermont, another member of the Regional Greenhouse Gas Initiative for many Northeastern states, plans to take $2.4 million (€1.55 million) from emissions credits sold through the initiative to invest in improved space heating efficiency.

Policy 4 Rate Restructuring – Adopt innovative electricity rates to stimulate greater electricity conservation and peak demand reduction – critical peak pricing or real-time pricing for residential

customers with all electric homes or central air conditioning. This is a distinct policy, separate from expanded utility demand side management.

There are a number of ways to use electricity rates to stimulate electricity conservation and peak demand reductions. One way is to adopt time-of-use rates that have higher charges during peak demand periods compared to off-peak periods. Another strategy is to adopt inverted block rates, whereby the price per kWh increases as electricity consumption increases. A third way is to adopt some sort of demand response pricing strategy such as real-time pricing or critical peak pricing.

Two pilot programs illustrate how rates can directly entice customers to cut back energy use while continuing to meet energy demands, only more efficiently. California's Automated Demand Response System placed households with central air conditioning on time of use rates. Rates tripled during certain critical peak periods. Customers used program controls to change thermostat and other settings during peak periods. Participating households cut summertime electric use by five percent, however, peak use in homes with automated controls was shaved by up to one-half. In the Chicago-based Energy Smart Pricing Program, utility prices were communicated by phone or web to participants on a day-ahead basis. Participating households cut summertime electric use by three to four percent, with peak demand reductions of about 20 percent (Geller, 2007).

A fitting way to use funds generated from innovative electricity rate is to impose a systems benefit charge. For states such as New York, the system benefits charge funds energy efficiency promotion, alternative fuel vehicles, building audits and retrofits, green building installations and clean energy R&D, among other programs. Together the programs result in $480 million (€310 million) per year in energy savings for New Yorkers, a two million ton reduction in CO2, and a 1.2 – 1 investment to avoided cost ratio. Project examples include start up funding and financial bridges to commercialization,

an inefficient appliances exchange campaign, green workforce training, hybrid buses, and plug-in hybrid cars (Energy Efficiency Forum, 2008).

Pay as You Save System is a utility program for energy efficiency retrofitting in use in New Hampshire, Kansas and Hawaii. Under the system, the utility bills and collects payments for up to 75 percent of estimated annual energy savings over 75 percent of the measures' life. Payments are less than savings and stay with the house. The vendor guarantees the product for the term of the savings. This program offers immediate positive cash flow and overcomes the barriers of high first cost, getting information on energy efficient equipment, and transaction costs. And it is getting customers to install more energy efficiency measures than they otherwise would have done. According to Mark Berman of Advanced Energy Products, for low hanging fruit, $1,500 (€971) per home saves 1,000 kWh/year. For healthy retrofits, $10,000 (€6470) per home saves 4,000 kWh/year. A extensive retrofit costing $50,000 (€32,250) saves 7000 kWh/year; and adding a 3 kilowatt PV system for another $25,000 (€16,175) actually produces 4300 kWh/year (Energy Efficiency Forum, 2008).

Geller stresses the role of education of low-income households in making pricing an effective tool. "Education should be carried out to inform customers about opportunities to reduce electricity use during peak demand periods... Adopting critical peak pricing could benefit low-income households since these households tend to have below average electricity use in general and less electric air conditioning in particular. These households would benefit both from the lower rates during non-critical periods and from the reduced investment in new power plants and/or distribution system upgrades as a result of attenuating peak load growth (Geller, 2007)."

Policy 5 Low-Income Energy Framework – Develop new energy efficiency programs that address the needs of the poor.

Those who can least afford to pay high heating and cooling bills often live in the most energy leaking dwellings. The poor spend fifteen percent of their income on home energy needs, compared to three percent for the average family. Coupled with gasoline purchases, fully one out of every three of their dollars are spent by poor New Mexicans on energy bills. Only one percent of eligible households receive weatherization assistance, and 40 percent get help with their fuel bills. Providing energy efficiency services is therefore critical to reducing energy expenditures for the households of New Mexico's poor.

Savings follows waste, thus those who consume large amounts of energy have great energy efficiency potential. Key are energy audits, when performed by trained diagnosticians, to get cost effective weatherization and energy efficiency improvements installed in low-income families' homes. Without energy efficiency measures installed in their homes, low income families will continue to suffer from high home heating bills and need home heating utility assistance. Gaps – in windows and walls, in income, and in the capacity of programs to respond – are fiscally and morally untenable. Energy efficiency investments must start with those most in need.

One avenue to actively pursue is a low-cost, high-volume energy efficiency program for existing homes in low-income neighborhoods. Program activity options include in-home weatherization, reduced costs on materials and training of energy efficiency providers. Low cost programs that can deliver cost effective results include neighborhood energy swings, that is, going door-to-door through low-income neighborhoods.

Colorado's First Response initiative has delivered cost-effective and easy-to-install energy saving devices to over 21,000 households, saving $2.33 (€1.5) for each dollar spent. The initiative used four service delivery channels: home visits via Youth Corps; interactions with clients during their request for

energy assistance; mailing efficiency devices to low-income energy assistance program recipients; and on-site electric use audits.

At the community level, Boulder CO supplements state support with $1 million (€647,000) annually generated from its carbon tax on electricity sales to provide a full range of energy efficiency services, including as an initial step the neighborhood energy sweep. The staff goes door to door and gives residents conservation kits of efficient light bulbs, low flow showerheads and caulk. Interested residents can then receive a climate smart visit, a simplified version of an energy audit. Houston TX city staff goes door-to-door in neighborhood sweeps, installing an average of $940 (€608) per unit in energy efficiency measures, saving 12 percent on average and 20 percent from peak demand.

Based on Colorado's 2.33 to 1 ratio and applying similar service delivery mechanisms, coupled with aggressive outreach and education programs – media PSAs, utility bill inserts, local government outreach, weatherization workshops, hardware store promotions – New Mexico could expect to see a $700,000 (€452,900) return on a $300,000 (€194,100) investment. That is, low-income recipients of $1.00 (€0.65) worth of energy efficiency assistance can be expected to benefit by another $2.33 (€1.5) to in reduced energy bills. Low income energy funding in existing homes could leverage funding from federal, legislative, nonprofit, utility and for profit sources.

For new affordable homes, state grants could buy down the value of home loans equivalent to the extra costs associated with making homes thirty percent more energy efficient. This subsidy would be part of a package offered to homebuilders intended to entice them to build more green affordable homes. Beyond this enticement, the state's sustainable building tax credit could be offered to homebuilders who achieve a home energy rating of 60 on affordable homes, worth an extra $4,000 (€2,588) per home. By combining programs to build affordable housing for working families and to increase residential energy

efficiency, New Mexico could become a leader in green affordable housing.

Two potential sources of new funding can augment state support for green affordable housing. One is the Clean Energy Block Grant program, authorized when the National Energy Act was signed into law in December 2007. Increasing energy efficiency in the homes of the poor should be a high priority when that block grant is appropriated. The second is the cap and trade program under the Western Climate Initiative. Projects with low costs and high energy/carbon savings will be sought after by those needing carbon credits. A Green Communities Offset Fund would attract investments from polluters seeking to buy carbon offsets. They could get credits by funding energy efficiency improvements on new or existing low-income homes. With carbon at $36 (€23) per ton in Europe, many projects can potentially attract significant sources of financing.

Policy 6 Carbon Neutral Neighborhoods and Codes – Design carbon neutrality into new neighborhood and building energy codes.

Given how buildings are responsible for such high levels of greenhouse gases, it is vital to build future and renovated homes energy efficiently. Santa Fe's Ed Mazria, founder of Architecture 2030, estimates that 75 percent of all buildings will be either new or renovated by 2030, hence the urgency. A high energy efficiency scenario addresses infiltration, insulation, ducts, and lighting so well that these homes see the majority of electricity demand from plug loads, lighting and appliances.

Austin, Texas' Zero Energy Capable Homes Initiative, according to the May 2008 Energy Design Update, will require new single-family homes to be zero net-energy capable by 2015. These homes will be 65 percent more efficient than homes built to the city's energy code that it adopted in 2006. The expectation is that it will be cost effective to install solar heat and electric panels on roofs to allow them

to become zero energy homes. And Massachusetts Governor Patrick aims to set a goal of zero net energy use for new buildings in the state.

Policy 7 Efficiency at Time of Home Sale – Before a home can be sold, it must be brought up to a certain level of energy efficiency.

Energy efficiency is the top priority for green homebuyers: one-half are willing to pay $2500 (€1,615) or more for energy efficiency features. Homebuilders, no matter the state of the economy, are seeing better sales of energy efficient homes. Four states emulate many parts of Europe and post energy ratings at time of sale. A new Nevada state law requires an energy inspection at time of home sale, using a rating system of A,B,C,D,E. The expectation is that few if any homes will get an 'E.' Boulder's green points program set an energy efficiency goal of 50 percent for homes somewhat larger than most homes in that city.

Opportunity points for increasing energy efficiency in existing homes in New Mexico are few. Utility and municipal programs, often geared toward low-income residents, cover a small fraction of the market. One avenue that has worked in areas such as water efficiency is to require that existing homes achieve a certain level of energy efficiency before they can be put on the market for sale.

A less stringent yet useful alternative is to post in the home sale ads a home energy rating. Typically, in America an existing home's HERS rating is 140, compared to rating of 100 for a new home built to current code. If, as many predict, information on how well a home is insulated and other efficiency measures matters to homebuyers, bringing homes energy efficient will become commonplace.

Policy 8 Industrial Efficiency – Undertake an industry challenge and recognition program to stimulate

industrial energy intensity reductions – encourage industrial firms to set voluntarily energy intensity reduction goals and to commit to increasingly implementing cost-effective energy efficiency projects.

While increasing energy efficiencies in New Mexico manufacturing, mining and natural gas processing facilities, productivity can similarly be increased. Standing in the way are heretofore low prices paid by industries for energy, relative inattention paid to cutting fuel bills compared to labor costs, staff not trained to act on energy efficiency measures and technologies, and a keen competition for capital. These barriers restrict industrial managers from investing much in energy efficiency projects, typically only those with payback of two years or less (Geller, 2007).

Technical assistance offered by states including Washington, New York and Wisconsin provides best practices training along with targeted technical assistance to individual companies. Canada's Industry Program for Energy Conservation offers a smorgasbord of technical assistance, networking, incentives, audits, and process efficiency studies. The Canadian program has yielded a nine percent reduction in industrial energy intensity between 1990 and 2004, saving over $3 billion (€1.9 billion) in fuel bills in 2004 (Geller, 2007).

If we captured waste heat we would have 19 percent more energy, equivalent to that which is currently produced by all existing nuclear power plants in the United States. A most promising area to promote, mostly in the industrial sector, is combined heat and power (CHP), or co-generation. CHP is an efficient distributed generation technology that produces both heat and power from a single fuel source. Such systems can have overall efficiencies of 80 percent or better. These systems also provide additional savings associated with reduced transmission and distribution, or T&D losses. Most commercial buildings and manufacturing firms purchase electricity for cooling, fans, pumps, equipment, lighting, processes, etc., and buy fuels to generate heat. The electricity generated at distant power plants is 30 to

40 percent efficient, so most of the energy content of the fuel is wasted as heat to the surrounding environment. Further energy losses occur in the T&D of electricity from the power plants to end users. By contrast, on-site thermal energy is produced at efficiencies up to 70 percent (Geller, 2007).

Barriers must be removed and incentives provided in order to stimulate greater adoption of combined heat and power systems, placed near buildings where the heat and power they produce is needed, rather than transmitting the power over long distances. Needed are appropriate environmental regulations, utility interconnection policies, and utility tariffs; promotion of fuels other than natural gas for fueling CHP systems; and reasonable financial incentives for high performance CHP systems. (Geller, 2007).

A number of steps can be taken to provide reasonable financial incentives and favorable market conditions for expansion of high performance CHP systems, meaning those with an overall efficiency of at least 60 percent. First, require utilities to pay a large fraction of full avoided costs for power supplied to the grid from high performance CHP systems. These full avoided costs should include avoided generation and T&D costs, not just fuel and operating costs. Second, encourage utility ownership or co-ownership of CHP systems, in effect converting the utility from an inhibitor to a proponent. Utilities should be allowed to earn their authorized rate of return on CHP investments at a minimum, and potentially a higher return if a CHP system provides significant net economic benefits for utility customers as a whole. For example, utilities could be allowed a bonus equal to 10-20 percent of the net economic benefits resulting from a CHP project, meaning consumers would receive 80-90 percent of the benefits. Third, give tax credits for non-utility owners of CHP systems, with the tax credit based on electricity output similar to renewable energy production tax credits. This policy would bring greater parity between tax treatment of utility-owned power plants and customer-owned CHP and renewable energy systems. Tax incentives are justified since many of the benefits of CHP accrue to society at large rather than to the individual CHP system owner (Geller, 2007).

Pacific Gas & Electric aims to tell data intensive industries, a major industry in California, that the utility will pay for Prius-like energy services but not if they want Hummer-type energy. To meet a goal of increasing by 50 percent data energy efficiency use, PG&E offers incentives for energy efficient computing equipment; virtualization and consolidation; airflow control systems (currently one half of air does not reach equipment); high efficient power distribution systems; high quality technical services for new and retrofitted cooling systems; energy efficiency data storage technologies, so old data are not read (reading uses energy); 80 Plus program that offer computer companies rebates for energy efficient computers; rebates for PC network management software, so one can't override power saving software; conversion to thin-client systems, to improve LCD monitors' energy efficiency by one-quarter; and drop cards that workers can insert into any computer in any work station anywhere (SWEEP, 2007).

Policy 9 Public Sector Zero Net Energy Use – Increase energy efficiency of local government and public school buildings by 50 percent by 2012, and set a 2020 target that all public buildings use no more energy than they produce.

California has set goals of net zero energy homes by 2020 and businesses by 2030. New technologies backed with performance incentives are emerging that can help meet these goals, including frictionless refrigerant compressors; addressable ballasts; dispatchable thermostats; bilevel stairwell lighting control; auto control sash fume hood; high output fluorescents; induction lamps; and automatic demand response. Southern Cal Edison already has 69 energy efficiency programs in place that are worth 9000gwh (Energy Efficiency Forum, 2008).

Colorado seeks to achieve 20 percent energy efficiency by 2020, with 20 percent of the renewable portfolio standards coming from energy efficiency, and LEED Gold for new state buildings. The state is

investing $500,000 (€323,000) per year for 3 years to upgrade school buildings, using performance contracting. Colorado's Clean Energy Fund, up to $10 million/yr, comes from gambling revenue. The State offers LEED design assistance grants and performance contracting for state agencies, local governments and K-12 schools. When applied to the Colorado capitol complex, the resulting $500,000 (€323,000) savings paid for PV panels on the governor's mansion.

The large regional utility Xcel currently offers its New Mexico customers home cooling, business lighting and custom efficiency programs, plus compact fluorescent lightbulb (CFL) discounts. Xcel soon may offer dual stage evaporative cooling rebates; refrigerator recycling; Energy Star new homes; and electric water heater rebates. In Colorado Xcel offers businesses design assistance, lighting efficiency, motor, cooling, custom, energy management, and energy analysis. For homes it offers air conditioner tune up, evaporative cooling, gas weatherization, and discounted CFL's that fly off the shelves: 50,000 distributed in 2006, 330,000 in 2007, and projected 500,000 in 2008. Xcel's best practices includes a focus on lighting; variable frequency drive rebates; growing interest in new kinds of evaporative coolers; and distribution of CFLs through buy down events, bus tours, and inserts (SWEEP, 2007).

Policy 10 Feebates – Apply a market based strategy that sends a price signal to buyers to choose items, cars or homes that are more energy efficient than they might otherwise choose. This market-based approach is called a "feebate," which assesses fees on energy intensive products and rebates those fees on energy efficient products.

The recent major increase in energy prices has accomplished much of what a feebate offers: get consumers to acknowledge fuel costs when making a purchase of their first of second most expensive items: the home and the vehicle. Assuming energy prices stabilize or otherwise return to levels consumers once again ignore them, a feebate policy can prove to be on ongoing prod to increase

decisions made on the basis of energy efficiency.

A feebate can be designed to be revenue-neutral, so that the implementing entity incurs no net cost or revenue. Or, to overcome resistance of sellers from changing how they profit from sales (bigger and less efficient has been hugely profitable for both auto dealers and realtors), the program could be modified to put some portion of the feebate in the hands of car dealers, as an incentive for them to sell more fuel economizing models. Several states are currently considering feebates. New Mexico could set up feebates to cover new light duty vehicles (cars and light trucks) sold in the state, setting the fee or rebate on its mileage.

The drive to set feebates for autos is only exceeded in need by a similar mechanism for America's homes, where smaller families are living in bigger houses. While it is obvious that motor vehicles have carbon emitting engines, less evident are the boilers, heaters, chillers, and electronics that together make the home the number one producer of carbon dioxide in the United States. And it is growing: two of every five homes being built in the United States have over 2,400 square feet (223 square meters) of floor space, compared with only 10 percent of 1970-vintage homes. So many Americans have vacation houses – 5.7 million units at a median size of 1,300 square feet (121 square meters) – that together this surplus living space could accommodate the nation's homeless population ten times over (Cox 2007).

Since 1970, the average number of people living in an American home has dropped from 3.1 to 2.6, but the average size of new houses has nearly doubled. Homebuilding and remodeling consumes 75 percent of America's lumber. Size matters: a typical energy using 1,500-square-foot (139 square meter) house uses far less energy for heating and cooling than a house twice its size yet comparable geometry with much better energy detailing. As Cox notes, "even if the mania for big houses fades, Americans will be stuck with heating, cooling and powering the millions of them already littering the landscape – not for

years like SUVs, but for decades (Cox, 2007)."

A home feebate system would send a price signal to homebuyers to more fully account energy costs into the purchase decision. It could be designed so that a residence not exceeding state energy efficiency standards would be assessed a carbon fee, with a rebate going to those who exceed the code by 30 percent (Wenz 2008).

Conclusion

This paper looks at ten policy options that can help the State of New Mexico meet its goal of twenty percent energy consumption reduction by the year 2020. The policies attempt to show the linkages of increased greenhouse gases to our lifestyle, especially as manifest in our urban form. These policies can only succeed if New Mexicans heed the advice of planning professor David Henkel: "In the very near future we are going to be called upon to make some difficult choices about how we live our lives, about how long we can continue to pursue our livelihoods as we have become accustomed in an age of subsidized natural resource consumption. Our focus should be on the future…several generations down the road. The challenge for us is to find ways to derive satisfaction and comfort from different ways of moving around, providing for our basic needs, and living together as members of a common community. Sustainability is not only about slowing down the rate of consumption; it is about rediscovering the common interests we have in sharing our space. We cannot expect to live long in our space unless our neighbors can live there too. New Mexicans have a long history of learning how to live with change, with different customs and values, and to be changed in the process. Our task now is to create a new understanding of common pool resources and neighborly interdependence, while maintaining our adaptability and self-reliant energies. We will succeed if we learn from each other (Henkel, 2008)."

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