

Carbon Neutral Buildings



The following principles guide the Carbon Neutral Buildings workgroup:

- Because buildings account for an estimated 37% of the nation's greenhouse gas emissions, carbon-efficient buildings are critical. (Source: *Emissions of Greenhouse Gases in the United States 2007*, U.S. Energy Information Administration, November 2008.)
- Mandated benchmarks for reducing carbon emissions are problematic when technological avenues to meet those mandates do not exist.
- Technology always improves. As technology improves, carbon neutral buildings become more technologically and economically viable.
- Short- and long-term goals provide a workable framework for the City and the public to achieve carbon neutrality.

Strategies at a Glance

Residential Buildings

1. Reduce energy consumption in residential new construction.
2. Reduce energy consumption in existing housing stock.
3. Create City programs that provide sustainable development incentives and streamline building processes.

Commercial Buildings

1. Increase energy efficiency of buildings.
2. Implement incentives to increase energy savings and reduce greenhouse gas emissions.
3. Provide funding mechanisms to achieve carbon neutral buildings, in both new development and retrofits.

Onsite Power Generation

1. Provide low- or no-interest loans to building owners to install onsite renewable energy systems for existing buildings.
2. Provide new construction loan guarantees to commercial and residential lenders for onsite renewable energy systems.
3. Add renewable energy and energy efficiency data to the Multiple Listing Service format.
4. Encourage state tax credits for installing onsite renewable energy systems on commercial buildings.
5. Encourage Bernalillo County to reduce property taxes for properties that have renewable energy systems installed on site.
6. Support the continued elimination of gross receipts taxes / sales taxes for purchasing and installing onsite renewable energy generation systems.
7. Encourage the NM Public Regulation Commission to approve solar photovoltaic power purchase agreements for commercial buildings.
8. Encourage the NM Public Regulation Commission to allow third-party companies to lease onsite power generation equipment to commercial and residential property owners.
9. Reduce impact fees for qualified solar energy projects.
10. Retrofit City buildings with onsite renewable energy systems.

Green Grid

1. Partner with the State of New Mexico and the federal government to establish an initiative to develop, prototype and demonstrate green grid technology in New Mexico.



About the Albuquerque Energy Conservation Code (AECC)

The City of Albuquerque, the Mayor's Office and the City Council are pleased to have developed the first comprehensive energy conservation code in the State of New Mexico. The 2007 Albuquerque energy conservation code reflects a concerted, combined effort between local government and those in the building and building-related industries to develop a code acceptable to all. An effective energy conservation code is essential to reduce the amount of greenhouse gases generated by buildings. It is estimated that the building industry generates 39% of carbon dioxide (CO₂) emissions and 48% of all greenhouse gas (GHG) emissions in the United States.

The 2007 Albuquerque Energy Conservation Code is one of the Mayor's efforts to achieve the Architecture 2030 Challenge goals to ensure that new buildings are carbon neutral by the year 2030. Green building standards reduce greenhouse gas emissions by advancing energy efficiency and renewable green energy. Green buildings are cost-effective, provide healthy places for people to live, learn and work while supporting municipal conservation and environmental goals.

The City will be developing incentives through its Green Building Program to encourage building designs that exceed the level set by the 2007 Albuquerque Energy Conservation Code. With guidance from the Green Ribbon Task Force, the 2007 Albuquerque Energy Conservation Code will be regularly amended to keep pace with new energy conservation technologies.

(Source: The Albuquerque Energy Conservation Code, Volume II, September 27, 2007.)



Carbon Neutral Buildings: Residential Buildings

Residential buildings emit greenhouse gases by burning fossil fuels that are used to heat and light buildings and power mechanical and other building operations.

We must thoroughly address energy consumption of existing housing stock. As with new construction, the best way to create significant energy reductions and code compliance is through incentives that provide economic assistance to builders and homeowners. This is the framework for our recommendations.

As the City of Albuquerque Climate Action Task Force has not been given a defined greenhouse gas emissions baseline upon which emissions reductions can be based, the Residential Subcommittee does not recommend a specific energy savings percentage goal or target.

1. Reduce energy consumption in residential new construction.

- Evaluate the Albuquerque Energy Conservation Code (AECC) every three years to ensure the code is updated to reflect new technology and to ensure that it complies national and international code standards. In the next AECC evaluation, add language that requires all newly constructed homes to post a Home Energy Rating System (HERS) rating and install energy monitors and feedback systems.
- Reduce impact fees based on HERS ratings. For example, HERS 60-rated projects (40% energy reduction) receive a 25% reduction of impact fees. HERS 50-rated projects and above (50% energy reduction or greater) receive a 50% reduction of impact fees.
- Provide 50% density bonuses for projects that fall within the boundaries defined by the City's Planned Growth Strategy and exceed the minimum zoning requirements for Green Path-permitted homes (homes built to green standards beyond the Albuquerque Energy Code Minimum standards) at the time the permit is given.
- Provide incentives to builders to stimulate green development projects for single- and multi-family workforce housing.

Position Statement Regarding the Albuquerque Energy Conservation Code

In 2007, the City of Albuquerque and stakeholders from the building development industry worked to create a comprehensive green building code. This code, the Albuquerque Energy Conservation Code (AECC), is expected to reduce the building sector's energy consumption by 20-30%.

The Residential Subcommittee urges the City to implement the AECC without the HVAC requirements in order to accrue, measure and monitor energy reductions in support of greenhouse gas reduction goals.



2. Reduce energy consumption in existing housing stock.

- Partner with Bernalillo County to create a Sustainable Remodeling Property Tax that is based on a sliding scale point system and includes a bonus to homeowners for bringing homes up to minimum AECC code requirements. The tax provides an incentive for homeowners to remodel existing homes (based on sustainable principles), decreases homeowners' energy usage and helps achieve the City's Architecture 2030 Challenge goals to reduce carbon emissions. A property tax reduction combined with energy reduction could create real savings.
- Create a gross receipts tax incentive based upon City inspections of residential buildings to ensure that energy-saving items, such as windows, lighting, appliances and some types of insulation are purchased and installed properly.
- The City of Albuquerque's Affordable Housing Program will create a soft second mortgage program that serves homeowners who meet the Mortgage Finance Authority's criteria for affordable housing. Participants will benefit from the ability to remodel their homes based on sustainable

3. Create City programs that provide sustainable development incentives and streamline building processes.

- Create a Sustainable Building Tax Increment Development District (TIDD) and enhance existing neighborhood Public Improvement District (PID) programs.
- Implement an annual awards program for "greenest home," "greenest remodel" and "greenest neighborhood" categories.
- Develop giveaway programs to encourage energy efficiency through distribution of compact fluorescent light bulbs and lighting fixture motion monitors for homes.
- Appoint a Code Review Task Force to identify and resolve potentially conflicting codes developed by different entities (City planners, City Councilors, Bernalillo County authorities and so on) within the same jurisdiction. For example, if a sector plan conflicts with a building code change, the Code Review Task Force would identify the conflict and recommend resolutions to the two regulating bodies. The Code Review Task Force will ensure that conflicting codes do not adversely impact the implementation of the Albuquerque Energy Conservation Code.



Carbon Neutral Buildings: Commercial Buildings

Our framework for reducing greenhouse gas emissions and achieving carbon-neutral buildings is threefold: increase energy efficiency in buildings, switch energy consumption to renewable and carbon-neutral sources as technology and transmission infrastructure allows and develop an emissions offset strategy.

To achieve carbon-neutral buildings, we strongly support efforts to promote financing conditions that encourage green building, building retrofits and efficiency management of existing buildings. Green building incentives should be implemented coextensively with the green building codes, not only to aid compliance, but more importantly, to reward those who proactively move beyond mandated building codes.

Rebates and other up front payments or discounts are proven means to increase market adoption of green building practices, and we encourage the City to expand these offerings to the commercial real estate sector. (Source: *Green Building Incentives That Work: A Look at How Local Governments Are Incentivizing Green Development* (2007) by Jerry Yudelson, Yudelson Associates.)

We recommend a 20% reduction of 2000 greenhouse gas levels by 2020. This recommendation aligns with New Mexico reduction goals, the Western Climate Initiative goals and greenhouse gas reduction goals set by cities such as Chicago and London. (Sources: *Environmental News Service*: <http://www.ens-newswire.com/ens/sep2008/2008-09-19-092.asp> and *Siemens Releases Study on Sustainable Infrastructure in London*: http://www.siemens.co.uk/en/news_press/index/news_archive/siemensreleasesstudyonsustainableinfrastructureinlondon.htm)

1. Increase the energy efficiency of buildings.

- Remove the requirement to have furnace types with a Seasonal Energy Efficiency Ratio (SEER) rating over the federal levels from the Albuquerque Energy Conservation Code (AECC) and implement the modified code.
- Establish a building sector greenhouse gas emissions baseline and review the AECC every three years from implementation to measure and verify subsequent greenhouse gas reductions that occur as a result of the new code.
- Require that commercial retrofits and remodeling projects that impact 50% or more of the building's square footage bring the entire building into compliance with the AECC.
- As part of the three-year AECC evaluation process, review the phase-in percentages for bringing existing buildings up to AECC code and develop phase-in periods for certain standards. Some examples include phase-in periods for replacing major mechanical systems such that they meet the newest American Society of Heating, Refrigerating and Air Conditioning Engineers' (ASHRAE) standards and/or the AECC. ASHRAE develops standards for both its members and others professionally concerned with refrigeration processes and the design and maintenance of indoor environments, and these are referenced in most state building codes and used as the code standard.

What is a SEER Rating?

The efficiency of air conditioners is often rated by the Seasonal Energy Efficiency Ratio (SEER). The SEER rating is the Btu of cooling output during a typical cooling season divided by the total electric energy input in watt-hours during the same period.

(Source: wikipedia.org)

According to the Energy Efficiency & Renewable Energy Clearing House's "Solar Energy" report (published by U.S. Department of Energy's National Renewable Energy Laboratory), solar hot water systems cost twice as much or more to install in existing buildings as compared to new construction.

For this reason, we recommend that initial efforts to encourage solar hot water are restricted to new buildings.



What is LEED?

Leadership in Energy and Environmental Design (LEED): LEED is a third-party certification program for the design, construction and operation of high performance green buildings.

LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

(Source: *What is LEED?*, US Green Building Council website, www.usgbc.org)

DOE Carbon Neutral Definition

“Carbon neutral” means that—through a transparent process of **measuring** emissions, **reducing** those emissions and **offsetting** any unavoidable emissions—the net calculated carbon emissions of a building equals zero.

(Source: <http://www.energy.gov/6454.htm>)

- Initiate a study of commercial-scale tankless and solar hot water heaters to evaluate the potential energy savings, cost-payback and dependability of commercial-grade systems. Should these approaches prove viable, either phase in tankless and solar hot water heaters during code reviews or provide financial incentives for buildings to use the technology.

2. Implement incentives to increase energy savings and reduce greenhouse gas emissions.

- For new development, provide incentives for achieving LEED New Construction (NC) ratings of LEED-NC Gold or higher through reduced impact fees, density bonuses or density credit trading.
- For remodeling and retrofit projects, provide incentives for LEED Commercial Interiors (CI) ratings of LEED-CI through waived permit fees or “fast track” approvals.
- Develop an annual recognition program for buildings that achieve LEED Gold ratings for LEED-NC, LEED Existing Buildings (EB) and LEED CI categories and an innovative, non-LEED category. Recipient projects are those that surpass basic code compliance and demonstrate the highest levels of energy efficiency and measurable greenhouse gas reductions.
- This recognition program could include a “parade of efficient energy buildings” including commercial and residential buildings, and perhaps an “X-Prize” for master-planned communities. The City could use its own buildings as models to illustrate the cost-benefit and to provide cost analyses of the upgrades, types of products and measurable GHG reductions.
- Create a partnership between the City and the local electric utility to do free energy audits of buildings and promote energy efficient methods of building and retrofitting.
- Partner with the State to influence the real estate appraisal and financing industries to factor green building benefits into its valuation methodologies, licensing and continuing education requirements. Modernized real estate valuation methodologies will largely aid new construction.

3. Develop funding mechanisms for achieving carbon neutrality in new and retrofitted buildings.

- Encourage City and State government to provide incentives for net metering systems for all buildings that generate onsite renewable energy so that excess electricity production can be exported back to the grid.
- Expand the Department of Energy’s carbon neutral definition so that single projects can offset their excess energy purchases by financing offsite renewable energy installations. This would make the program more cost effective by helping finance large, utility-scale renewable energy installations to serve as zero net energy banking operations. Economies of scale would provide these larger systems at a much lower cost-per-watt than the alternative of numerous, small rooftop systems.
- Research a market-based strategy to improve energy efficiency in the built environment through green building carbon credits that could be used as emission reduction credits or offsets within a carbon cap-and-trade compliance market. Review comparable programs such as the Demand Side Abatement program of the Australian State of New South Wales, the Chicago Climate Exchange and Western Climate Initiative efforts as they relate to the building sector. (See greenhousegas.nsw.gov.au/acp/energy-efficiency, chicagoclimatereaction.org and westernclimateinitiative.org for more information about these programs.)



Carbon Neutral Buildings: Onsite Power Generation

According to the Parliamentary Office of Science and Technology, the burning of fossil fuel for electricity generation creates the largest carbon footprint of any fuel source available for electric power generation. (Source: *Parliamentary Office of Science and Technology, Post note*, October 2006, No. 268 available at <http://www.parliament.uk/documents/upload/postpn268.pdf>.)

All buildings—commercial and residential—are significant users of electricity generated from fossil fuels. It is important, then, that buildings are able to produce their own electricity through carbon efficient means.

This, however, cannot be achieved in the near future without significant incentives from the United States Government, the State of New Mexico, Bernalillo County and the City of Albuquerque.





1. Provide low- or no-interest loans to building owners to install onsite renewable energy systems for existing buildings.

- Offer loans to building owners who install onsite, renewable power generating equipment. In exchange, owners repay the loan over twenty- to thirty-years as part of their property taxes.
- This loan structure eliminates the need for building owners to pay up-front cash to install renewable energy systems.
- If the owner sells the building before the loan is fully repaid, the new building owner assumes the loan repayments as well as the electricity savings.
- The City of Santa Fe has adopted, but not yet implemented a similar program in which the loan money is generated from municipal bond sales.

2. Provide new construction loan guarantees to commercial and residential lenders for purchasing onsite renewable energy systems.

- Provide lenders for commercial and residential properties with loan guarantees for any loan used to purchase onsite renewable power generation equipment.
- Provide loan guarantees for the additional amount of financing required to purchase properties with onsite power generation as compared with a property without renewable power. Without financing, it is almost impossible to purchase onsite renewable power generating equipment or to finance any green property that costs more than its appraised value. (Source: globest.com/news/1179_1179/insider/171766-1.html)

3. Add renewable energy and energy efficiency data to the Multiple Listing Service format.

- Encourage or mandate the Multiple Listing Service (MLS) listings to include comprehensive data regarding a home's energy efficiency and onsite renewable energy generation. MLS disclosures allow prospective buyers to compare potential home purchases based on the amount of onsite renewable energy generated and the estimated annual energy bill for the prop-

4. Encourage state tax credits for installing onsite renewable energy systems on commercial buildings.

- Encourage the State to offer income tax credits for commercial entities that install onsite renewable energy systems such as solar photovoltaic or solar thermal systems. If the commercial entity leases a building that has existing onsite renewable energy generation, offer income tax credits equal to the amount of the additional expense incurred by leasing a green building as compared to a traditional building.

(For more information about cost comparisons between green and traditional leases, refer to: purechoice.com/downloads/industrynews/in_green-staying-power.pdf)



7. Encourage Bernalillo County to reduce property taxes for properties that have renewable energy systems installed on site.

- Encourage Bernalillo County to provide property tax reductions for commercial or residential properties that have installed renewable energy systems such as solar photovoltaic or solar thermal systems. Reduced property taxes could offset the additional loan money needed to purchase a commercial or residential building that has an onsite renewable energy system and could provide a basis for lending institutions to loan additional money above and beyond the property's appraised value.
(Source: purechoice.com/downloads/industrynews/in_green-staying-power.pdf)

6. Support the continued elimination of gross receipts taxes / sales taxes for purchasing and installing onsite renewable energy generation systems.

- Encourage the State to continue to waive gross receipts taxes and sales taxes for renewable energy systems sold and installed at a building site.

7. Encourage the NM Public Regulation Commission to approve solar photovoltaic power purchase agreements for commercial buildings.

- Support the solar industry at the PRC in their efforts to enter into long-term purchase power agreements to lease roof tops for the installation of City-owned and operated onsite renewable power generation equipment. These agreements will provide an avenue for commercial entities to profit from their rooftops and shade canopies while encouraging the use of renewable power.

8. Encourage the NM Public Regulation Commission to allow third-party companies to lease onsite power generation equipment to commercial and residential property owners.

- Support the solar industry at the PRC in their efforts to allow third-party companies to lease onsite power generation equipment to commercial and residential property owners and allow the companies to sell that power to the property owner or other electrical customers. This effort would greatly reduce the up-front cost associated with renewable power.

9. Reduce impact fees for qualified solar energy projects.

- Reduce impact fees for qualified solar projects in order to encourage private developers to install onsite renewable energy systems.



10. Retrofit City buildings with onsite renewable energy systems.

- Purchase onsite renewable energy systems for all City-owned buildings. Lead by example by providing a renewable energy showcase for the general public and private enterprise to demonstrate the advantages and disadvantages of onsite renewable energy systems.

Carbon Neutral Buildings: Green Grid

A green grid initiative could involve participation from universities, national laboratories, industry and developers, utilities and communities.

By partnering broadly with state, regional, and federal entities, Albuquerque could establish itself as a leader in adopting emerging green grid technologies that will be essential for the nation's future.

Readers may learn more about green grids by reviewing the technical report, *Renewable Systems Interconnection: Executive Summary*, published by the National Renewable Energy Laboratory. The report is available at nrel.gov/docs/fy08osti/42292.pdf.

While renewable sources of electricity contribute to an ever-increasing percentage of our electrical power generation, our aging electrical grid is not configured to support large amounts of renewable electricity sources.

The primary technical challenges lie in the need to store electricity for times when the sun is not shining and the wind is not blowing, and the need to transmit power bidirectionally, so that homes and or substations can both consume and produce grid-tied power.

New Mexico can become a national leader in developing the next generation of intelligent electric grid, or “green grid.” A green grid integrates renewable and often intermittent renewable energy sources, incorporates advanced control systems and utilizes a scalable and replicable architecture.

1. Partner with the State of New Mexico and the federal government to establish an initiative to develop, prototype and demonstrate green grid technology in New Mexico.

- Pilot green grid technology in a residential development of a few hundred homes. The pilot project would incorporate distributed solar photovoltaics; energy storage systems of several kilowatt-hours per home; next-generation load controls (such as smart inverters, smart appliances, smart metering and electrical management systems) and accommodations for plug-in hybrid and electric vehicles.
- Pilot a commercial-industrial distributed generation site that incorporates solar photovoltaic and solar heating systems as well as smart inverters and smart metering systems. Prototype energy storage systems sized at several hundred kilowatt-hours and demonstrate energy efficient construction at the site.
- Develop an electrical substation system that interfaces local grids to mid-range transmission systems. The substation would include a ground-based solar photovoltaic array of several hundred kilowatts, as well as smart switches and advanced micro-grid energy management systems. The substation would also incorporate feed protection circuitry, a communication infrastructure for security and would prototype energy storage systems sized at a few megawatt-hours.