2018: Review and Update of
MAYORS' CLIMATE AGREEMENT RECOMMENDATIONS

Prepared by the City of Norman

ECAB
Environmental Control Advisory Board

Executive Summary

On August 9, 2005, Mayor Haralson signed the United States Mayors' Climate Protection Agreement. The Mayors' Climate Protection Agreement consisted of 12 elements or recommended action items designed to reduce global warming emissions and increase energy conservation. Mayor Haralson charged the City of Norman Environmental Control Advisory Board (ECAB) with studying the agreement and proposing a general plan of action to be implemented by the City of Norman. Initial recommendations were provided in March 2007 and formally adopted by the City Council of Norman, Oklahoma on February 10, 2009, under Mayor Rosenthal. The document was intended to serve as a reference tool for The City of Norman to implement a climate protection plan

The initial ECAB document addressed the elements and recommended actions items found within the Mayors' Climate Protection Agreement including:

- Inventorying emissions to establish a baseline and an emissions reduction target including an action plan to achieve the reduction target;
- Adopting policies to reduce sprawl and preserve open space within the community while maintaining a healthy urban forest;
- Development of infrastructure and promotion of alternative transportation methods including carpooling and public transit;
- Increasing the use of alternate energy sources;
- Improving energy efficiency through renovations of existing facilities, building code modification, promoting the use of the U.S. Green Building Council's LEED Program or a similar system, and a commitment to purchase Energy Star equipment when appropriate;
- Increasing fuel efficiency of the City of Norman's fleet including reducing the total number of vehicles, establishing anti-idling policies, and purchasing alternative fuel vehicles;
- Evaluating pump efficiencies at the City's water and wastewater treatment plants;
- Increasing recycling within the community;
- Develop educational programs for the community to promote good environmental stewardship.

In February 2017, The Environmental Control Advisory Board, after consultation and encouragement by Mayor Lynne Miller, began the process of reviewing the original recommendation document to determine if the recommendations needed to be updated. Throughout the review process, it became evident the City of Norman has accomplished many of the recommendations outlined in the original ECAB document. However, while considerable progress has occurred, ECAB believes additional improvements are possible. Accordingly, ECAB has updated the original 12 elements or recommended actions contained in the Mayors' Climate Protection Agreement adopted in 2005. Action items are consolidated where appropriate when a common theme is present. Future environmental recommendations include, but are not limited to:

- Conducting an inventory of greenhouse gas emissions to measure potential reductions from the 2000 baseline;
- Expansion of alternative vehicle infrastructure including construction of additional bike routes and expanded CART bus service;
- Increase renewable energy throughout the city with a goal of reaching 100% renewable energy consumption by the year 2050;
- Invest in infrastructure to increase renewable-friendly vehicle use within the City of Norman;
- Explore apartment and business recycling;
- Update the Forestry Master Plan and Community Forest Management Plan;
- Increase environmental educational opportunities for the community.

The remainder of this document addresses and describes the 12 “Recommended Actions” outlined in the original ECAB Document. Each action item includes general information about the subject, the benefits and need for adopting it, Norman accomplishments since the last ECAB document, and specific recommendations for action the City should strive to achieve over the next five years. Appendix A contains a copy of the original report adopted in 2009 for reference. ECAB has invested a significant amount of time researching and gathering information and hopes this document exceeds expectations and serves as a tool for directing future environmental efforts within the City of Norman. The Environmental Control Advisory Board would also like to remain active in the program and willingly offers its assistance in any form. Further, ECAB would like to collaborate as an active participant and also serve as a monitor or in some program review capacity. Finally, ECAB suggests a review of the action items occur every five years to promote the City of Norman’s progress and potentially modify action items in response to changes in law, environmental regulation, and technology.

The City of Norman remains a leader in environmental stewardship. From being the first municipality in the State of Oklahoma to formally adopt the Mayors’ Climate Protection Agreement, to being the first city in the United States to have a “Water’s Worth It” proclamation, the importance of protecting the environment is evident. Striving to achieve the recommended action items found in the following document can help Norman maintain its leadership in Oklahoma as a forward-thinking and progressive community.

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2018

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ACTION ITEM #1

INVENTORY GLOBAL WARMING EMISSIONS OF CITY OPERATIONS

INTRODUCTION

An inventory identifies and quantifies the global warming pollution produced by both government operations and the community at large in a particular year. The inventory and forecast provide a benchmark against which Norman can measure the progress in terms of its operations and that of its citizens. The emissions analysis identifies the activities that contribute to emissions and the quantity of pollution generated by each of activities. Establishment of an inventory occurs by collecting data about energy management, recycling and waste reduction, transportation, and land use. A local government can calculate global warming pollution for both a base year (e.g., 2000) and a forecast year (e.g., 2025). Expertise in climate science is not necessary; City staff members (e.g., public works, environment or facilities departments) could conduct an inventory.

The inventory and quantification of existing climate protection measures will help guide the City of Norman to understand where they can get the most significant emissions reductions. The majority of measures in the City of Norman's Climate Action Plan (CAP) (see Appendix A), which is a customized roadmap to reduce global warming pollution, fall into energy management, transportation, waste reduction, and land use. Standard measures include energy efficiency improvements to municipal buildings and water treatment facilities, streetlight retrofits, public transit improvements, installation of renewable power applications, and methane recovery from waste management.

BENEFITS AND NEED

Conducting a greenhouse gas emission inventory is the first and fundamental step in developing a plan to meet Mayors' Climate Protection Agreement goals. The inventory provides the baseline information needed to set emission reduction targets and the preparation of a plan to achieve the target. Without an inventory, it will be exceedingly difficult, if not impossible, to meet reduction targets. Much of the information needed to conduct an inventory already exists. These include electricity usage; the purchase and consumption of natural gas, diesel, and gasoline; recycling rates; etc.

A community inventory of greenhouse gas emissions will require additional efforts but could be a more macro level analysis. This inventory would require the cooperation of utility companies (OG&E, OEC, ONG, petroleum companies, others) to provide information on the usage of electricity, fuel, natural gas, and other greenhouse gas emission sources. A reasonably accurate inventory based on energy consumption could provide adequate information to allow establishing emission reduction targets and an action plan.

NORMAN ACCOMPLISHMENTS (SINCE ORIGINAL DOCUMENT)

- *The City of Norman established a greenhouse gas emissions baseline for the year 2000 for City buildings, fleet, employee commute, water/wastewater facility, compost, and recyclables (Appendix B)*

RECOMMENDATIONS

- The City of Norman should inventory greenhouse gas emissions to determine if there has been a reduction based on results from the 2000 greenhouse gas emissions inventory and continue this evaluation every five years.

ACTION ITEM #2

ADOPT & ENFORCE LAND-USE POLICIES THAT REDUCE SPRAWL, PRESERVE OPEN SPACE, & CREATE COMPACT, WALKABLE URBAN COMMUNITIES

INTRODUCTION:

Traditional development practices in Norman have continued to be reviewed for appropriateness and consistency with the plans for the City's residential and commercial growth. Norman is not unique in this approach. Many cities have adopted growth plans that are intended to limit the effects of urban sprawl. Sprawl tends to reduce population densities and create transportation dependence on private vehicle transportation, among other impacts. The effects of sprawl are also manifested in terms of increased consumption of farmland and wildlife habitat, local infrastructure strain, flooding due to increased impervious surfaces, and per capita costs of infrastructure.

Planned growth that manages the sprawl in the community has been identified in studies nationwide also to be an important factor for human health[1]. Planned growth today in Norman, Oklahoma should continue to consider thoughtful planning and consideration of the future as well as the health and safety of our citizens. The suggested term used most frequently is to employ "smart growth" when planning the future growth policies for a community. Norman has implemented such plans and has an active citizenry to ensure public involvement in these areas.

BENEFITS AND NEED

A significant advantage to managing growth and avoiding sprawl is reducing the impacts associated with the increased transportation need and the environmental impacts of emissions from burning fossil fuels. This, together with the safety and health issues noted, causes and identifies the direct and indirect benefits of employing smarter growth efforts such as Center City Form Based Code (CCFBC) for core Norman and finalizing the Comprehensive development process (PlanNorman). By creating compact, mixed use neighborhoods (i.e., residential and commercial) Norman can profit by reducing fuel consumption and by cutting utility, infrastructure, and service delivery costs. Studies show that it is more efficient to operate, maintain, and replace infrastructure in more compact and densely populated communities.

NORMAN ACCOMPLISHMENTS (SINCE ORIGINAL DOCUMENT)

- *Nearing approval of Plan Norman to manage development and sprawl well into the future.*
- *Retain rural nature of east Norman by restricting development acreage east of 48th Avenue East.*
- *Approved CCFBC to encourage non-vehicular traffic in core Norman*

RECOMMENDATIONS

- Finalize and adopt PlanNorman to encourage growth around the urban core and on suitable lands;
- Refine CCFBC to enhance walkable, bikeable areas of core Norman, and continue efforts to connect downtown with Campus Corner to reduce demand for vehicle traffic. Apply these same principles throughout the community;
- Expand and refine development rules to encourage Low Impact Development (LID);
- Norman Area Land Conservancy (NALC)—continue to involve non-government organizations to provide assistance with protecting open space through conservation easements and other mechanisms.

[1] Pollard, Trip (2003) Policy Prescriptions for Healthier Communities, The Science of Health Promotion. September/December 2003 Vol. 18, No. 1, pp.109-113

ACTION ITEM #3

PROMOTE ALTERNATIVE TRANSPORTATION

INTRODUCTION

A typical passenger vehicle emits about 4.7 metric tons of carbon dioxide per year[2]. Although new technologies can lower vehicle emissions, reducing the use of passenger vehicles is a straightforward means of containing greenhouse gasses and air pollution. Over the last few decades, the City of Norman has made reasonable investments in alternative transportation infrastructure, given the extent to which Normanites are likely to use trails, sidewalks, and busses. Unfortunately, the traffic volume in Norman has increased every year since 2010[3], and the CART system is underused except within the OU campus area. Although, while investments in alternative transportation infrastructure should continue, getting people out of their cars will require a cultural change to go along with improvements to the civic landscape.

BENEFITS AND NEED

The benefits of using forms of transportation other than the personal automobile are many and extend into the areas of public health, street maintenance, roadway congestion, public safety, and air quality. A substantial increase in the use of alternative forms of transportation will require both sufficient infrastructure to allow for effective mobility without a car and willingness among the population to forgo the convenience of the personal vehicle. Norman has focused its efforts on infrastructure but has not addressed the need to change attitudes and behaviors. We suggest the City of Norman couple improvements to infrastructure associated with alternative transportation with campaigns and incentives to get people to leave their cars in the driveway regularly.

NORMAN ACCOMPLISHMENTS (SINCE ORIGINAL DOCUMENT)

- *Extensions of bicycle and multi-modal trails throughout much of the City core (Appendix C).*
- *Commitments to alternative transportation infrastructure (Appendix D)*
    - *Funding for CART and periodic support for CART route extensions.*
    - *Bike trails incorporated into road construction/renovation projects.*

RECOMMENDATIONS

- Continue support for CART with the goal of expansion of service to Southeast Norman, a densely populated area without bus service, as soon as possible;
- Explore opportunities to extend service hours of CART during community events;
- Continue efforts to expand bicycle routes and connection of preexisting routes to make bicycling a safe and practical means of transportation;
- Pair efforts to expand infrastructure with campaigns and incentives to get people to use sidewalks, trails, and buses
    - Enact a “Boots, Bikes, & Busses” campaign to promote the use of alternative transportation.
    - Work with employers and community groups in creating incentives to get people out of their cars.
    - The City Council and City employees should make every effort to set an example by leaving their cars at home whenever possible.

[2] Environmental Protection Agency “Greenhouse Gas Emissions from a Typical Passenger Vehicle.” https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle.

[3] Association of Central Oklahoma Governments, Transportation Data Management system: http://www.acogok.org/transportation-planning/congestion-management/traffic-counts/

ACTION ITEM #4

(Formally Action Item 4, 5, 6)

INCREASE THE ACCESS AND USE OF RENEWABLE ENERGY WHILE MAKING ENERGY EFFICIENCY A PRIORITY THROUGHOUT PURCHASING AND CONSTRUCTION PROCESSES

INTRODUCTION

Energy efficiency programs offer one of the best ways to reduce global warming emissions. One example is the EPA's Energy Star Program, which includes equipment and building efficiency. Energy Star equipment is competitively priced and readily available. A significant share of fossil fuel use occurs during the electricity generation process with the majority of energy produced consumed in cities. Decreasing the dependence on fossil fuels occurs through the use of renewable energy sources and the incorporation of energy conservation practices. Solar and Wind power are two primary renewable energy sources decreasing the dependency on fossil fuel usage for electricity generation. Designing construction projects with energy efficiency in mind may reduce energy demands having a direct effect on emissions while also saving on energy costs. There are no current policies in Norman to encourage the use of distributed or renewable energy generation, nor are there any municipally-owned projects for renewable energy generation.

BENEFITS AND NEEDS

The City of Norman can provide leadership to the community by making energy efficiency and the use of renewable energy sources a priority. Energy efficient equipment and systems incorporated into buildings and City infrastructure (lighting, heating and air conditioning) saves money and helps to reduce greenhouse gas emissions. Solar and wind power systems could further reduce air pollution.

NORMAN ACCOMPLISHMENTS (SINCE ORIGINAL DOCUMENT)

- *Total solar and wind capacity in Norman is estimated to be around 350kW, including the 250kW solar array near I-35.*
- *Since 2013, Norman has three local renewable energy businesses - Bergey Wind Power, Delta Solar Energy and Design, and Off Grid Enterprises, LLC.*
- *The City installs Energy Star rated appliances and equipment, where possible. Although while City policy, rules, etc. do not require energy Star equipment, virtually all new appliances purchased are Energy Star rated. Both Fire Stations # 8 and #9 used Energy Star appliances as part of their LEED certification.*
- *The City adopted the 2006 International Energy Conservation Code (IECC).*
- *LED lighting and occupancy sensors are now common in new commercial construction, and the City includes them on retrofit projects, where possible.*
- *All Norman traffic signals have LED displays. Norman adopted LED as a standard when the technology became viable, and all signals have been retrofitted. As of April 2018, this included 153 traffic signals, 93 flashing beacons, and 10 Actuated Crosswalks.*
- *The City Water Reclamation Facility installed LED outdoor lighting*
- *Refer to Action Item 5 for sustainable design (LEED) related responses and Action Item 7 for Water Reclamation Facility energy reductions.*
- *The City decreases the volume use of major systems during electrical peak demand hours.*
- *Norman Public Schools (NPS) has created Energy Guidelines that address most concerns in this Action Item (see Appendix E).*

ACTION ITEM #4

(Continued)

RECOMMENDATIONS

- Conduct an energy audit analysis of municipal energy use;
- Develop City of Norman Energy Guidelines, similar to that created by NPS (Appendix E) to measure and analyze energy efficiency and sustainability;
- All future equipment purchases/leases shall be Energy Star-certified if an Energy-Star model is currently manufactured;
- Request expedited LED streetlight replacement of the approximately 6,565 OGE streetlights throughout the City. Currently, very few streetlights (approximately 200) are LED, and OG&E plans to replace upon failure which will take substantial time;
- Reduce behavioral waste by 50% by the year 2035 through public education initiatives;
- Pursue opportunities to increase renewable energy throughout the City through collaboration with industry and community partners with the goal of reaching 100% renewable energy consumption by the year 2050;
- Compile an advanced smart-grid[4] development plan to upgrade infrastructure and maximize conservation;
- Explore the creation of a renewable energy employment initiative to help bring jobs to Norman within the renewable energy sector;
- Adopt the latest version of the International Energy Conservation Code (IECC);
- Continued encouragement of light-colored roofing materials;
- Encourage Chamber of Commerce to reactivate the "Greenovation" committee to promote energy and water conservation;
- Refer to Action Items 1, 5, 6 and 7 for additional recommendations.

[4] Smart-grids are defined by Title XIII of the Energy Independence and Security Act of 2007 (EISA 2007) as an electrical grid including a variety of operational and energy measures including smart meters, smart appliances, renewable energy resources, and energy efficiency resources.

ACTION ITEM #5

(Formally Action Item 7)

PRACTICE AND PROMOTE SUSTAINABLE BUILDING PRACTICES USING THE U.S. GREEN BUILDING COUNCIL'S LEED PROGRAM OR A SIMILAR SYSTEM

INTRODUCTION

Cities across the country are passing ordinances to mandate municipal buildings meet green building standards. Some of the most frequently cited standards are those set by the Leadership in Energy and Environmental Design (LEED) program of the U.S. Green Building Council (USGBC) and the U.S. EPA's Energy Star Program. These programs provide a framework for implementing energy efficiency and sustainable design techniques for public and private buildings, homes and neighborhoods that could save money, reduce water and energy consumption and greenhouse gas emissions.

BENEFITS AND NEEDS

The City of Norman has an opportunity to lead by example through the implementation of sustainable design principles. The City also has some influence with private and public sector entities that build the majority of the homes and buildings in Norman.

NORMAN ACCOMPLISHMENTS (SINCE ORIGINAL DOCUMENT)

- *15 completed LEED-certified projects in Norman and 7 in progress (usgbc.org), which include two fire stations and the new central and east branch libraries. The central library is situated in an established pedestrian-friendly neighborhood along the Legacy trail and is in close proximity to public transportation. It is an outstanding example of sustainable development.*
- *ECAB Members offer a wide variety of skills and experiences that span from business, design, academia, and science, as well as a LEED accredited professional. Many ECAB activities and programs are centered on LEED principles, such as:*
    - *Promotion of recycling and waste reduction through public education.*
    - *Water conservation and quality measures, such as the promotion of rain barrels, drought-tolerant landscaping through the "waterwise" yard-of-the-month award program, fertilizer education programs, clean up programs and the grade-school "water's worth it" poster contest.*
- *Norman has adopted the 2006 International Energy Conservation Code and Appendix (IECC).*
- *Norman requires an energy compliance report for commercial projects. Follow-up occurs through mandatory inspections. The City also inspects single-family residential projects for compliance.*
- *Norman has considered and studied programs that incentivize above minimum code construction, particularly residential, such as the Home Energy Rating System (HERS).*

RECOMMENDATIONS

- The City should consider LEED, Living Building Challenge (LBC) or WELL building standard certification for City projects, where feasible and appropriate;
- The City should strongly recommend that all commercial and residential project teams, both public and private, review LEED, LBC, WELL, and Energy Star program goals and design principles and encourage incorporation into projects to the fullest extent possible. Consultation with a licensed design professional should be recommended. These recommendations and resources should be included on the Planning and Development website;
- Norman should specifically recommend and encourage:
    - Higher quality building envelopes (air sealing and insulation), HVAC systems, efficient lighting and water-efficient fixtures for all projects.
    - Single-family wood-framed homes exceed minimum IECC requirements for insulation through the addition of 1" to 2" of continuous exterior rigid insulation, which would increase the effective R-value by 35% to 65% according to greenbuilding.com;
- Adopt the latest version of the International Energy Conservation Code (IECC).

ACTION ITEM #6
(Formally Action Item 8)

INCREASE THE AVERAGE FUEL EFFICIENCY OF MUNICIPAL FLEET VEHICLES AND INCREASE THE USE OF RENEWABLE FRIENDLY VEHICLES

INTRODUCTION

Automobiles are a leading cause of global warming. Nationally the transportation sector is one of the most significant sources of U.S. emissions, representing nearly one-third of total emissions. Every gallon of gasoline burned emits 20 pounds of carbon dioxide—the principal global warming pollutant. Hybrid vehicles offer one solution to reduce greenhouse gas emissions, however their use within the City of Norman is limited primarily due to the significant infrastructure investments made by the City to support CNG vehicles, the low fuel cost for CNG vehicles, and the inability for hybrid vehicles to meet the capability standards required by most City departments.

BENEFITS AND NEED

Actions that reduce global warming also reduce fuel use, minimize costs for local governments, help cities comply with federal air quality regulations, and improve community livability.

NORMAN ACCOMPLISHMENTS (SINCE ORIGINAL DOCUMENT)

CNG Station/New Vehicle Purchasing Protocol

- *In 2009, City Council approved an alternative fuel program which established a purchasing protocol for new vehicles*
- *Compressed Natural Gas (CNG) vehicles are preferred, and if a CNG option is not available, the City will pick from top 3 fuel class.*
- *Norman has gone from having 3 CNG vehicles to 120 across the board (including 22 sanitation trash trucks). These are not new additions to the fleet, but instead replacements for old or under-used vehicles. The total fleet size is 897 vehicles, including police cruisers and fire trucks, which are still standard-fuel vehicles.*
- *The City has built a CNG facility which is utilized by both City staff and the public.*
    - *The station has compressed 1.48 million gallons of CNG, displacing an estimated 745,000 gallons of diesel and gas.*

Public Education/Anti-Idling

- *Implementation of Anti-idling restrictions for the Municipal Fleet. The City has modified its employee manual to prohibit vehicle idling unless there are extraordinary circumstances.*

RECOMMENDATIONS:

- Implement a Public Education Outreach Program to reduce fuel usage;
- Perform a study to gather the data needed to account for overall fuel efficiency gains;
- Continue to monitor the renewable-friendly vehicle industry;
- Invest in infrastructure to support renewable-friendly vehicles, and establish a purchasing protocol to make renewable-friendly vehicles the preferred option for the municipal fleet;
- Install electric charging stations at municipal buildings;
- Create preferred parking spaces throughout the City for renewable-friendly vehicles.

ACTION ITEM #7

(Formally Action Item 9)

EVALUATE OPPORTUNITIES TO INCREASE PUMP EFFICIENCY IN WATER AND WASTEWATER SYSTEMS; RECOVER WASTEWATER TREATMENT METHANE FOR ENERGY PRODUCTION

INTRODUCTION

Nationwide, drinking water and wastewater systems cost more than $4 billion a year in energy costs to pump, treat, deliver, collect, and clean water—with the majority of this cost borne by municipalities. The energy cost to run drinking water and wastewater systems can represent as much as one-third of a municipality's energy bill, and this is often the single most significant utility expenditure for a city. Water conservation plays a big part in reducing energy costs for the water and wastewater treatment facilities. If less water is used, not as much water will need to be treated by either the water treatment facility or the wastewater treatment facility, therefore reducing electricity needs.

BENEFITS AND NEEDS

By increasing pumping efficiencies and reducing the energy usage at water and wastewater treatment facilities, less electricity will be used resulting in a decrease in emissions and a decrease in the amount of electricity purchased. A plant that converts methane into electricity, generating its own source of power, is a virtually pollution-free operation. Added benefits are manifold-methane and air pollutants are reduced, as is the amount of electricity purchased from utilities that operate fossil fuel burning power plants, and the fuel is free because methane is produced during the wastewater treatment process.

NORMAN ACCOMPLISHMENTS (SINCE ORIGINAL DOCUMENT)

Wastewater Treatment

- *Variable frequency drives were added to the blower motors at the aeration basins reducing the energy consumption at these basins by 30%*
- *Two high-efficiency turbo blowers were installed at the aeration basin reducing the energy consumption by an additional 25%*
- *Reuse wastewater for cleaning weirs, reducing the need for potable water – averaging seven million gallons a month*

Water Treatment

- *Switched to using ferric sulfate as a coagulant instead of lime. This system is more efficient and produces less sludge*
- *Replaced two main high service pumps with variable frequency drives*

RECOMMENDATIONS

Wastewater Treatment

- Utilize a gas scrubber to remove contaminants from the methane gas so it is usable to heat the bio-solids for the digestion process;
- Install a cogeneration system, including a storage unit, for recovery of the methane gas generated at the plant to be used for energy generation;
- Perform an engineering study to evaluate the efficiencies of all areas with a focus on areas containing blowers and the UV system and replace inefficient systems;
- Evaluate the efficiencies of the pumps and motors of the lift stations and replace inefficient systems;
- Continually evaluate energy consumption and efficiencies and make improvements as necessary.

Water Treatment

- Perform an engineering study to evaluate the efficiencies of the entire plant and wells, which will include pumps, motors, operational equipment and plant wiring;
- Assess the efficiencies of the chemical feed facilities; this includes reviewing the chemical feed equipment for proper sizing, flow-pacing, chemicals, as well as introducing possible new processes to treat the water;
- Continually evaluate energy consumption and efficiencies and make improvements as necessary.

ACTION ITEM #8:

(Formally Action Item 10)

INCREASE RECYCLING RATES IN CITY OPERATIONS AND THE COMMUNITY

INTRODUCTION

Recycling plays an important role in reducing global warming emissions. Because recycling saves energy, conserves resources, lower emissions from incinerators, reduces landfill methane releases, and increases carbon storage in trees, it is effective in reducing greenhouse gases. Also, the steps in supplying recycled materials to industry (including collection, processing, and transportation) typically use less energy than supplying virgin materials (including extraction, refining, transportation, and processing).

BENEFITS AND NEED

In general, manufacturing using recycled materials requires markedly less energy than when virgin materials are used. For instance, it takes 95% less energy to recycle aluminum than it does to make it from raw materials. Other materials requiring less energy to recycle include steel (60%), paper (50%), newsprint (40%), plastics (70%), and glass (40%). In addition to energy savings, there can be a direct benefit realized in terms of reduced carbon dioxide emissions from fossil fuel combustions and reduced methane generation from decomposing organic matter in landfills.

NORMAN ACCOMPLISHMENTS (SINCE ORIGINAL DOCUMENT)

- *90% of residential customers utilized the mandatory curbside recycling program in 2016*
- *23% of the waste stream, by tonnage, was diverted in 2016*
- *Public education increased through partnerships with ECAB, Greenovation, and City publications & website*

RECOMMENDATIONS

- Explore and implement opportunities for apartment and business recycling;
- Explore ways to reduce consumption of non-recyclable materials within the City (e.g., plastic bags);
- Establish a permanent site to recycle household items considered hazardous (TVs, computers, etc.);
- Partner with local environmental groups and the Chamber of Commerce to promote recycling at special events (football, music festivals, etc.);
- Set goals to reduce waste and improve recycling rates;
- Adopt EPA procurement guidelines for recycled content in new products;
- Expand public information on what can be recycled, where and how to recycle, and the costs and benefits of recycling;
- Install recycling bins at City Hall and public parks and venues.

ACTION ITEM #9

(Formally Action Item 11)

MAINTAIN HEALTHY URBAN FORESTS; PROMOTE TREE PLANTING TO INCREASE SHADING AND ABSORB CO2

INTRODUCTION

Ideally, carbon dioxide (CO_2) production by animals is balanced plants. As the population grows worldwide, industry and agriculture also expand. Consequently, forests and vegetation are removed and this balance is lost, causing an increase in CO_2. An average of 40% of a residential lot is covered by structures and paving with commercial coverage even higher.

BENEFITS AND NEEDS

Trees are capital assets to the City and must be regarded as an investment in infrastructure comparable to streets, sidewalks, utilities, and buildings. Trees provide a variety of direct and indirect benefits, including: increased property values, increased economic development, reduced surface water runoff and volume, increased energy conservation, increased production of oxygen and clean air, reduced noise pollution, provides wildlife habitat and diversity, increased aesthetic quality, and provides overall good for human health, wellness and quality of life.

Norman is historically well poised to meet this challenge. The lists of community- and Council- mandated volunteer groups are outstanding in our City. However, while Norman has made progress, our community has also suffered some setbacks. For example, Norman no longer has a Forester on staff, and has not made much forward progress on its Urban Forest Master Plan and Community Forest Management Plan.

NORMAN ACCOMPLISHMENTS (SINCE ORIGINAL DOCUMENT)

- *Creation of a Tree Board*
- *Awarded grants for trees and landscaping*
- *Established a tree-planting program that planted 450 trees, inventoried 1,654 trees*
- *Adopted an Urban Forest Master Plan and established a Community Forest Management Plan*
- *Recognized as a Tree City USA for 13 years*

RECOMMENDATIONS

- Hire and retain a full-time Forester to assist the City and citizens in development and planning;
- Adopt ordinances requiring commercial and residential property owners to plant and maintain trees, including redevelopment in central Norman as appropriate;
- Develop guidelines for maintenance of existing trees and tree-trimming practices;
- Develop chemical spraying guidelines and restrictions;
- Establish funding for and conduct a tree inventory on City property every ten years;
- Update the Forestry Master Plan and Community Forest Management Plan;
- Require registration for tree service providers;
- Update the “Planting Guide” and other necessary information on the Forestry webpage on Normanok.gov to provide education information for residents including “planting the right tree in the right place.”

ACTION ITEM #10
(Formally Action Item 12)

EDUCATE THE PUBLIC, SCHOOLS, PROFESSIONAL ASSOCIATIONS, BUSINESSES AND INDUSTRY, AND OTHER JURISDICTIONS ABOUT ENVIRONMENTAL DISCIPLINES

INTRODUCTION

Today one cannot read a newspaper or news feed, science or political blog, or listen to or view news programs without hearing about climate change. Some people are interested, and some are worried. They want to know how their local, state and federal governments are responding. More importantly, many need to be informed, to know more about what they can do to help. The City of Norman has been a leader in environmental stewardship in Oklahoma. In 2005, the Mayor of Norman was the only mayor in Oklahoma to sign the U.S. Mayors' Climate Control Agreement. The creation of numerous environmentally focused citizen boards and committees demonstrates the continued emphasis placed on environmental issues by the City. The City can continue to lead by example, inform the community of what it has done to reduce carbon emissions, what it plans to do in the future, and how citizens can participate.

BENEFITS AND NEEDS

A reduction in electricity consumption saves money and enhances our environment. Reductions in both electricity and fuel consumption yield subsequent declines in greenhouse gases. Many people do not know how they can easily reduce their personal contribution to greenhouse gases. The City can demonstrate its leadership by setting the example, filling in the blanks, and providing guidance for average citizens to leverage opportunities for success.

NORMAN ACCOMPLISHMENTS (SINCE ORIGINAL DOCUMENT)

- *The City of Norman Environmental Control Advisory Board (ECAB) has made public education and outreach a primary function including:*
  - *conducting an annual elementary school poster contest focused on water quality and conservation themes, such as Water's Worth It™*
  - *sponsorship of a monthly "Water's Worth It™" landscape award in the City, to draw attention to both water conservation and nutrient reduction in landscaping*
  - *ECAB leadership has participated in public and panel discussions over water quality and presented multiple rain-barrel workshops while also giving away over 1,000 rain-barrels, cumulatively*
  - *ECAB participates in community events such as The Big Event at OU and Earth Day events*
- *The City annually proclaims July Water's Worth It month and was the first in the country to do so*
- *The City of Norman's Environmental Services Division*
  - *conducts an annual household hazardous waste collection event and has increased the type of wastes collected to include not only chemical waste but pharmaceuticals, electronics, sharps, and appliances*
  - *distributes educational materials regarding household hazardous waste disposal options, water conservation, and recycling at various venues*
  - *organizes the annual Earth Day Festival with the Parks Department and the Cleveland County Conservation District*
  - *serves on the OU Earth Month Committee, the Chamber of Commerce Greenovation Committee, chairs the Oklahoma Water Environment Association's Public Education Committee, serves on the National Water Environment Federation Public Outreach Committee and is on the board for the North Area Land Conservancy*
  - *developed a GreenNorman website*
  - *partners with ECAB, other Utility Divisions, Stormwater Division, Department of Environmental Quality, and Keep Oklahoma Beautiful on educational events and activities*
  - *provides pollution prevention information to businesses in Norman*

ACTION ITEM #10
(Continued)

- *The City of Norman's Stormwater Division:*
  - *places environmental education advertisements in various publications, sends environmental education materials as inserts in utility bills, and creates and issues a quarterly email newsletter to self-selected recipients, as well as demonstrates their EnviroScape watershed model for children and adults at events like Irving Middle School's Climate Change Expo, Sam Noble Summer Sleuth Program, Pioneer Library's Touch-a-Truck, as well as to students in classrooms as invited by teachers.*
  - *distributes promotional items and education materials, and discusses environmental issues and solutions, at events like Second Friday Art Walk, Downtown Norman Fall Festival, Norman's Earth Day celebration, and the Lake Thunderbird Watershed Workshop, while also organizing and facilitating community cleanups at various locations throughout the City which incorporate education about our watersheds and their protection*
  - *provides targeted educational outreach to the building and development community and the landscape community about requirements to protect stormwater runoff from sediment and nutrients, as well as other pollutants that can enter our waterways*
  - *partners with other agencies and organizations such as ECAB, Blue Thumb, Keep Oklahoma Beautiful, the Oklahoma Water Survey, the Lake Thunderbird Watershed Partnership, and the Central Oklahoma Stormwater Alliance on educational events and activities*

RECOMMENDATIONS

Although ECAB members, staff, and many citizens have actively advocated for greenhouse gas reductions, many other citizens are unaware or only vaguely aware of the issues. City of Norman management and leadership can greatly expand the impact and benefit of public education by addressing the primary shortfall of citizen efforts to date: expertise and resources.

- Hire a full-time sustainability coordinator;
- Engage or employ contract professionals with specific expertise in public education and/or public relations to expand and enhance the extensive efforts of many volunteer boards and City employees;
- Address the shortfall of commonly available environmental information on City websites;
- Continue to utilize social media to promote environmental disciplines;
- Challenge and engage local businesses, organizations, and other communities to become partners in environmental public education.

Appendix A

Original 2007 ECAB Document Adopted by the Norman City Council in 2009

BACKGROUND

On August 9, 2005, Mayor Haralson signed the US Mayors' Climate Protection Agreement. Since then the City of Norman joined over 418 other communities across the country in pledging to reduce global warming emissions. Mayor Haralson charged the Environmental Control Advisory Board (ECAB) with the task of reviewing the agreement and proposing a general plan of action to be implemented by the City of Norman. ECAB undertook the task and researched each of the 12 elements or recommended action items listed in the Climate Protection Agreement. Based on this review, ECAB has produced a document to serve as a reference tool for both the mayor and the city council to implement a climate protection plan.

CLIMATE CHANGE

As has become evident recently, global climate change is a prominent issue that cannot be ignored any longer. Recent research and data have resulted in agreement among the scientific community that global climate change is a real threat with potentially disastrous consequences to the human and natural environment. Climate change refers to an alteration of weather patterns and climes related to anthropogenic emissions. Release of carbon dioxide, methane, and other gaseous compounds fuels the increase in temperature, which in turn affects the current cycles and conditions of the globe. Changes of this scale and magnitude could results in a dynamic chain of events with potentially dire consequences.

MAYORS' AGREEMENT

At the time the US Mayors' Climate Protection Agreement initiative was started, a consensus by the scientific community on the validity and causes of climate change had not been reached. Consequently, a few nations opted not to ratify the United Nations treaty (i.e., Kyoto Protocol) that included mandatory reductions in greenhouse gas emissions. The United States (US) was one of those nations that chose not to ratify the agreement. Since the US did not assume the lead role, communities led by Seattle Mayor Nickels decided to address the issue independently of US national policy. This agreement includes a voluntary 7% reduction in greenhouse gas emissions based on 1990 levels and requests mayors and communities around the country develop an action plan that addresses 12 fundamental issues or items. Most of the communities that have joined the program have more than doubled the target goal to 15% to be reached within 12-15 years.

Local governments have direct influence over activities that significantly contribute to climate emissions—waste, transportation, consumption, urban growth, and energy. Consequently, meaningful change can be realized at the community level without waiting for federal support or approval. More important to the local community is that this agreement will provide tangential benefits besides reducing greenhouse gas emissions. In 2005, 160 communities implemented specific actions that prevented 23 million tons of emissions, but also realized a $600 million saving in energy and fuel by implementing the agreement. This manifests itself in terms of direct and indirect taxpayer savings, improved health and environmental conditions, jobs and business benefits, and enhanced community livability.

Undertaking an endeavor such as this may appear to be overwhelming and potentially restrictive at first glance. However, there are tools and resources available to assist local governments with implementing the agreement. Software, case studies, and guidebooks have been developed and are readily available for immediate use and are relevant to the City of Norman. More importantly, there is a 5-step program already designed to help fledgling communities succeed. ECAB has reviewed various aspects of the agreement and feels that this is an achievable venture with limitless possibilities. Norman is the only city in the State of Oklahoma whose mayor has signed this agreement. By enacting it Norman can maintain its leadership in Oklahoma as a forward-thinking and progressive community.

CLIMATE PROTECTION PROGRAM

The Climate Protection Program's five milestones provide a simple, standardized means to enable the City of Norman to effectively reduce the emissions from both government operations and the community as a whole. Engaging in the five-step process means that Norman is making a commitment to reduce global warming emissions as financial and staff resources allow. The process of completing the five milestones is not necessarily linear. The milestones can be undertaken concurrently, and the specific target and contents of the local Climate Action Plan are up the City to determine. The amount of time needed to complete the milestones also depends on the availability of data, staff, and resources.

A local Climate Action Plan (CAP) is a customized roadmap to reduce global warming pollution by the target that Norman identifies and adopts. The CAP includes an implementation timeline for reduction measures, costs and financing mechanisms, assignments to city departments, and actions Norman must implement to achieve its target.

RECOMMENDATIONS

After reviewing the information available on Mayors' Climate Protection Agreement and assessing the recommended actions specifically mentioned in the language of the proclamation, ECAB has developed a list of top recommendations.

1. Assign adequate staffing to fulfill Norman's obligations. The amount of time required and the continuity necessary to undertake this challenge obligates a paid staff position. Volunteers can provide a meaningful supportive role, but in order to develop, implement, track, and monitor a program of this scope, a dedicated individual or group or individuals will be needed. This position could be a City employee or a contractor with a defined set of goals and objectives.

2. Financially support the effort with sufficient funds. Provisions within the agreement will require the expenditure of funds to implement and maintain the program. Although there should be a significant financial benefit realized by adopting certain aspects outlined in this agreement, an operations budget will still be required. Savings in terms of energy efficiency, operating budgets, and overall cost avoidance is anticipated to far outweigh the costs of implementing and maintaining the program.

3. Commit to the Cities for Climate Protection (CCP) Campaign. The CCP provides a five-step methodology to reduce global warming pollution. The 5 Milestones articulated by the CCP can be implemented independently or comprehensively. The CCP offers a proven reference point to cities newly engaging in climate protection actions and has resources available to foster fledgling communities.

4. Adopt a 20% emissions reduction goal by 2020. Setting a reduction target for global warming pollutants creates a tangible goal and metric to guide the planning and implementation of Norman's action. The target in the U.S. Mayors' Climate Protection Agreement is to reduce emissions by a minimum of 7 percent below 1990 levels by 2012. Almost all of the local governments participating in campaign establish reduction targets of global warming pollution at 15 percent or higher to be met within a 10 year period. It is reasonable for Norman to reach the 7% goal by 2012 with an added reduction goal totaling 20% by 2020.

In addition to these recommendations, ECAB has embraced some specific actions and ideas as having immediate and significant benefits. By adopting the following suggestions, ECAB believes there can be tangible reductions in global warming emissions. These include:

- Conducting an initial city-wide emissions inventory and periodically reevaluating the status.
- Requiring Energy Star-certified equipment on all new purchases and leases.
- Performing energy audits on all city facilities and implementing cost-effective retrofits and upgrades.
- Reducing City of Norman vehicles' emissions via alternative energy sources, fuel efficiency, alternative modes of transportation, and sprawl reduction efforts.
- Committing to purchase renewable energy by establishing a goal a 20% renewable target by 2010 and 33% renewable target by 2020 (on par with California's policy).

- Adopting LEED certification (refer to Recommended Action #7) in all new City of Norman buildings and construction.

The remainder of this document addresses and describes the 12 "Recommended Actions" outlined in the agreement. ECAB has distilled the information into 12, one-page synopses. Each page includes generic information about the subject, the benefits and need for adopting it, the applicability to Norman, and specific recommendations. ECAB has invested a significant amount of time researching and gathering information and hopes this exceeds the Mayor's expectations and serves as a tool for directing future efforts. ECAB would also like to remain active in the program and willingly offers its assistance in any form. ECAB would like to collaborate as an active participant and also serve as a monitor or in some type of program review capacity.

RECOMMENDED ACTION #1:
INVENTORY GLOBAL WARMING EMISSIONS IN CITY AND IN THE COMMUNITY, SET REDUCTION TARGET, AND CREATE AND ACTION PLAN

INTRODUCTION

An inventory identifies and quantifies the global warming pollution produced by both government operations and the community at large in a particular year. The inventory and forecast provide a benchmark against which Norman can measure the progress in terms of its own operations and that of its citizens. This emissions analysis identifies the activities that contribute to emissions and the quantity of pollution generated by each of activities. An inventory is established by collecting data about energy management, recycling and waste reduction, transportation, and land use. A local government can calculate global warming pollution for a base year (e.g. 1990) and for a forecast year (e.g. 2012). Expertise in climate science is not necessary; city staff members (e.g., public works, environment or facilities departments) could conduct an inventory.

The inventory and quantification of existing climate protection measures will help guide the City of Norman to understand where they can get the largest emissions reductions. The majority of measures in CAPs fall into energy management, transportation, waste reduction, and land use. Common measures include energy efficiency improvements to municipal buildings and water treatment facilities, streetlight retrofits, public transit improvements, installation of renewable power applications, and methane recovery from waste management.

BENEFITS AND NEED

Conducting a greenhouse gas emission inventory is the first and fundamental step in developing a plan to meet Mayors' Climate Protection Agreement goals. The inventory provides the baseline information needed to set emission reduction targets and the preparation of a plan to achieve the target. Without an inventory, it will be exceedingly difficult, if not impossible, to achieve reduction targets. Much of the information needed to conduct an inventory already exists. These include electricity usage, purchase and consumption of natural gas, diesel, and gasoline, recycling rates, etc.

A community inventory of greenhouse gas emissions will require additional efforts but could be a more macro level analysis. This inventory would require the cooperation of utility companies (OG&E, OEC, ONG, petroleum companies, others) to provide information on usage of electricity, fuel, natural gas, and other greenhouse gas emission sources. A reasonably accurate inventory based on energy consumption could provide adequate information to allow establishing emission reduction targets and an action plan.

APPLICABILITY TO THE CITY OF NORMAN

As with all other participating communities, an inventory of greenhouse gas emissions by the City of Norman is the critical first step in meeting the requirements of the Mayors' Climate Protection Agreement.

RECOMMENDATIONS

It is recommended that the City of Norman inventory greenhouse gas emissions from City operations. To the extent possible, the inventory should provide emission data at the department or major operational unit level. For example, inventory data would be provided for wastewater collection and treatment operations, facilities, water treatment and distribution, etc.

City staff should determine if the availability and accessibility of data needed to inventory community-wide greenhouse gas emissions. Private companies providing energy to the City of Norman should be contacted to determine if data are available for the inventory. Existing information and resources (e.g., software) developed specifically for this program should be evaluated and utilized for this aspect.

RECOMMENDED ACTION #2:
ADOPT & ENFORCE LAND-USE POLICIES THAT REDUCE SPRAWL, PRESERVE OPEN SPACE, & CREATE COMPACT, WALKABLE URBAN COMMUNITIES

INTRODUCTION:

Current development practices in Norman have resulted—to varying degrees—in the loss of open space and a dispersed community. Norman is not unique in this predicament; development across North America tends to be low density and car dependent. The effects are manifested in terms of increased economic and health costs to citizens, loss of revenue to business, consumption of productive farmland and wildlife habitat, local infrastructure strain, adverse aesthetics effects, and climate change.

Within the context of this report, the most significant issue associated with sprawl is emissions from vehicles that burn fossil fuels. Low density developments—some distance away from work, school, and services—cause inefficient use of energy and necessitate the reliance on private vehicle transportation. Sprawl requires disproportionately higher vehicle miles than compact, high density areas. This is of importance since transportation accounts for roughly 25% of the emissions related to climate change. Sprawl consumes productive farmland and open space and virtually eliminates the possibility of a compact urban area with access to stores and shops within walking or biking distance.

BENEFITS AND NEED

By far the biggest advantage to preventing sprawl is eliminating or reducing the direct and indirect impacts associated with transportation. From a climate perspective there is a tangible reduction in carbon dioxide emissions from burning fuel—approximately 20 pounds per gallon. There are also indirect benefits associated with the ancillary reductions from fuel exploration and production, vehicle manufacturing and infrastructure development—realized on the local and international levels. By creating compact, mixed use neighborhoods (i.e., residential and commercial) Norman can profit by reducing fuel consumption and by cutting utility, infrastructure, and service delivery costs. It is cheaper to operate, maintain, and replace infrastructure in compact communities—one estimate reported a ~9% savings. By preserving open space Norman can reduce temperatures commonly associated with urban areas and save emissions associated with energy consumption. These areas can also serve as carbon sinks as well as for habitat, recreation, and water quality protection purposes.

APPLICABILITY TO NORMAN

Norman has the ability to adopt, implement, and/or enhance practices to immediately address sprawl and promote compact development and the preservation of open space. Norman is a relatively large city from a land area perspective with a significant percentage yet to be developed. This affords the City time to develop efficient transportation strategies, optimize community planning, and reduce sprawl. Also, the Greenbelt Commission is uniquely suited to promote open space and greenway corridors.

RECOMMENDATIONS

The fundamental objectives can be achieved, in part, through the:

- Greenbelt Commission—proceed with stated goals/objectives and support ongoing projects;
- Norman 2025 Plan—maintain development densities to encourage growth around the urban core and on suitable lands;
- Storm Water Master Plan—adopt practices to preserve open space and discourage sprawl;
- Norman Area Land Conservancy (NALC)—involve non-government organizations to provide assistance with protecting open space through conservation easements and other mechanisms;
- Development Codes/Planning Requirements—provide incentives for compact cluster development and encourage development in suitable areas through tax breaks, subdivision regulations, and building codes.

RECOMMENDED ACTION #3:
PROMOTE TRANSPORTATION OPTIONS SUCH AS BICYCLE TRAILS, COMMUTE TRIP REDUCTION PROGRAMS, INCENTIVES FOR CAR POOLING AND PUBLIC TRANSIT

INTRODUCTION

Nearly half of the average Oklahomans' contribution of carbon dioxide (CO_2) to the atmosphere is derived from vehicle emissions. In addition to reducing our contribution to global warming, using less fuel has important economic and national security implications for the United States. We are all aware of programs designed to reduce our use of gasoline, from the manufacture of hybrid vehicles to mandated mileage standards. Reducing America's use of fossil fuels, including gasoline, can and should start at home; and as THE university town in Oklahoma, Norman has an excellent opportunity to lead the way in reducing gasoline usage for the rest of the State.

BENEFITS AND NEED

In addition to reducing Norman's CO_2 emissions, instituting these programs have additional benefits. Using Cleveland Area Rapid Transit (CART) and car-pooling reduces traffic congestion (a primary concern of many Normanites) on Norman's streets; this reduces the need for more and wider roads and other traffic-related infrastructure, thereby allowing our tax dollars to be devoted to more worthwhile uses. The development of bicycle and walking trails realizes all these benefits plus encourages a healthy lifestyle.

APPLICABILITY TO NORMAN

Norman already has the beginnings of a bicycle trail network, several bicycle clubs and organizations, and a City bicycle committee. Norman also has a viable public transportation system that transports 900,000 riders. Information from these could form the basis for substantially improving Norman's commitment to reducing gasoline usage.

For each mile we drive in our car, we emit one pound of CO_2 into the atmosphere. Norman has the opportunity to lead the State in reducing unnecessary CO_2 emissions, reducing traffic congestion, reducing the need for traffic-related infrastructure, affording an independent lifestyle for our disabled citizens, and promoting a healthy lifestyle for all of us. And Norman already has active, committed groups and constituencies whose expertise can be utilized to realize the Mayor's action item on transportation options.

RECOMMENDATIONS

In order to implement the mayors' action item on transportation items, the City of Norman should work with interested and knowledgeable parties to complete a number of initiatives.

- Norman should develop an extensive system of bicycle and walking trails and support facilities such as bike racks and road signs (see www.ci.norman.ok.us/parks/bike_program.htm). Bike trails should be developed to connect schools, parks, OU, shopping areas, and Lake Thunderbird. Norman should work towards becoming a "Bike Friendly Community" (see www.bikeleague.org/programs/communities/); this designation would be yet another factor that would attract people to live in Norman.
- Norman should continue to support and possibly expand the CART system. An additional benefit of the system is that disabled riders are able to use the lift-equipped buses, affording them a more independent lifestyle.
- Norman should encourage car pooling to work. This is an old, but viable, way for individuals to save gas.

RECOMMENDED ACTION #4:
INCREASE THE USE OF CLEAN, ALTERNATE ENERGY

INTRODUCTION

More than 50% of our electricity in Oklahoma comes from burning coal, most of which is imported from Wyoming. Both of Norman's suppliers, OG&E and OEC, have plans to build sizable new conventional coal-burning power plants. Oklahoma has significant wind resources and our 675 MW of wind projects ranks 5th nationally (Texas is #1). Approximately 2% of Oklahoma's electricity comes from wind power. In Denmark approximately 20% of the electricity comes from wind, and in several German provinces wind power provides over 40% of the electricity. A recent draft report from the U.S. Department of Energy's (DOE) National Renewable Energy Laboratory showed that with proper transmission line construction (which is the limiting factor for increased wind energy in the state) Oklahoma could have over 25,000 MW of installed wind capacity, representing a $35 billion investment, by 2030. Oklahoma is also the technology and manufacturing leader in the area of geothermal heating and cooling.

BENEFITS AND NEEDS

There are environmental, health, and economic benefits to substituting a combination of conservation, renewable energy, and natural gas for coal. The environmental benefit is in the reduction of CO_2, sulfur oxides (SO_X), nitrogen oxides (NO_X), mercury, and particulates. Coal burning power plants are the single largest contributors to greenhouse gas emissions. Natural gas also contributes, but at a specific pounds/kWh rate approximately half that of coal. Conservation and renewable energy have no emissions. The particulates from coal burning contribute to respiratory health problems and mercury deposition from power plant effluent has emerged as a significant health concern. From an economic standpoint increased coal usage means more money slips out of the Oklahoma economy to import fuel. Coal imports currently cost approximately $300 million a year. If, as many people expect, the federal government imposes some sort of a carbon tax or limit in the future, Oklahoma ratepayers will likely bear this burden through the fuel adjustment clause pass-through. If natural gas stays above $6/MCF wind power will actually save money for consumers. In fact, OG&E customers that signed up for 100% wind power realized a savings of ~5-10% last summer when natural gas reached record highs.

APPLICABILITY TO NORMAN

Norman has the highest subscription rate in the State to the voluntary OG&E wind power program. It is also home to Bergey Windpower, a leading worldwide manufacturer of small wind turbines. OG&E promotes geothermal heatpumps and offers financing. There seems to be significant interest in alternate energy in Norman. Norman does not have a municipal electric system, however, so it does not have direct control of its sources of electricity, but the City could still purchase some portion of its electricity from renewable sources.

RECOMMENDATIONS

The most effective way to increase the use of alternate energy is to implement two programs, a Renewable Portfolio Standard (RPS) and a Systems Benefit Fund (SBF). Twenty-four states and 3 cities have enacted RPSs, which mandate a certain percentage of renewable energy by certain deadlines. Eighteen states and 1 city have enacted SBFs, which add a small surcharge on electricity sales and use the collected funds to provide rebates for conservation and/or renewable energy investments.

After gaining support from the City Council, the City of Norman, with ECAB's assistance, should enter into discussions with OG&E and OEC towards adopting and implementing the following:

- For city facilities and operations, adopt the California RPS mandates of 20% renewable energy by 2010 and 33% by 2020. Set a similar, but voluntary, goal for Norman.
- Create a SBF (Norman Clean Energy Fund) program to help fund small scale renewables and energy efficiency rebates in Norman.

RECOMMENDED ACTION #5:
MAKE ENERGY EFFICIENCY A PRIORITY THROUGH BUILDING CODE IMPROVEMENTS, RETROFITTING CITY FACILITIES WITH ENERGY EFFICIENT LIGHTING AND URGING EMPLOYEES TO CONSERVE ENERGY AND SAVE MONEY

INTRODUCTION

Energy efficiency programs offer one of the best ways to reduce global warming emissions. A large share of fossil fuel use is dedicated to generating the electricity that powers almost all aspects of our daily lives. Globally, 75 percent of all energy is consumed in cities. In addition, state and local governments spend upwards of $40 billion a year on energy consuming products and equipment.

BENEFITS AND NEEDS

The City of Norman can provide leadership to the community by making energy efficiency a priority. Through phased purchases of energy efficient equipment, lighting, heating ventilation and air conditioning (HVAC) equipment, etc., the City will be able to reduce demand for energy (e.g., natural gas and electricity). Reductions in demand will save limited tax dollars and will reduce greenhouse gas emissions. Building code improvements requiring the use of high R-value insulation, double/triple pane windows, and other construction practices have been shown to have a quick return on investment—typically less than 5 years. These improvements result in more energy efficient buildings, which translates into reduced energy consumption and greenhouse gas emissions.

APPLICABILITY TO NORMAN

The following recommendations are listed in the Climate Change Handbook published as a guidance document for the Mayors' Climate Agreement. The list is not exhaustive, but it provides common sense and easily implemented recommendations (assuming there is political leadership and will) that can be adopted. All of these recommendations are applicable to the City of Norman as well as communities throughout the United States.

RECOMMENDATIONS

Municipal Short Term Goals

- Install energy-efficient exit sign lighting;
- Perform energy-efficient building lighting retrofits;
- Institute a "lights out at night" policy;
- Institute a "lights out when not in use" policy;
- Install building/office occupancy sensors;
- Purchase only ENERGY STAR equipment and appliances for City use. Negotiate prices by purchasing in bulk where feasible.

Municipal Long Term Goals

- Conduct an energy audit of municipal facilities;
- Implement an energy tracking and management system;
- Perform heating, cooling and ventilation system retrofits (e.g. chillers, boilers, fans, pumps, belts, fuel-switching from electric to gas heating);
- Install ENERGY STAR appliances – and require this and the following in specs/purchasing RFPs;
- Install green or reflective roofing;
- Improve water pumping energy efficiency;
- Install energy-efficient vending machines;
- Install energy-efficient traffic lights;
- Install energy-efficient street lights (e.g., high pressure sodium);

- Decrease average daily time for street light operation.

Community Short Term Goals

- Adopt stringent residential or commercial energy code requirements;
- Promote energy conservation through campaigns targeted at residents and businesses.

Community Long Term Goals

- Implement a low-income weatherization program;
- Implement district heating and cooling;
- Implement time-of-use or peak demand energy pricing;
- Install energy-efficient co-generation power production facilities;
- Launch an “energy efficiency challenge” campaign for community residents;
- Promote participation in a local green business program;
- Promote the purchase of ENERGY STAR appliances;
- Promote water conservation through technological and behavioral modification.

RECOMMENDED ACTION #6:
PURCHASE ONLY ENERGY STAR EQUIPMENT AND APPLIANCES FOR CITY USE

INTRODUCTION

The Energy Star Program, initiated in 1992, is a public-private partnership led by the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA) to bring the value of energy efficiency to their customers, the public, and themselves while helping to protect our environment. More than 8,000 Energy Star partner organizations have committed to improving and promoting energy efficiency of products, homes, and businesses. The Energy Star Program includes equipment and building efficiency. The Energy Star Program is a major component of EPA's climate change program by encouraging energy efficiency. Most electricity in Oklahoma is generated by burning fossil fuels (i.e., natural gas and coal) that result in greenhouse gas emissions. Energy efficiency that reduces electricity demand has a direct effect on emissions and saves money.

According to the EPA, many industries and commercial building owners have achieved 30 percent reductions in energy use through cost-effective investments in energy efficiency. These reductions have occurred without a loss in service compared to standard technology. Typically, Energy Star-certified equipment is either very competitive in price with or is the same price as non-certified equipment. Energy Star-certified equipment must meet eligibility criteria issued by EPA and DOE and generally is at least 15 to 25 percent more efficient than minimum government standards.

BENEFITS AND NEEDS

Purchase of Energy Start-certified equipment will result in reduced electricity consumption and has a direct effect on greenhouse gas reductions. A reduction in electricity consumption saves money. Thousands of businesses and government agencies at the local, state, and federal levels have implemented policies that require all Energy Star-certified equipment. These policies have applied to both purchased and leased equipment. Very few equipment types do not include Energy Star certification.

There are numerous examples where use of Energy Star-certified equipment has resulted in significant savings. For example, replacement of conventional traffic signals with those using light emitting diodes (LEDs) at 100 intersections saved one community $132,000 per year in energy and maintenance cost. Over the life cycle of these signals, approximately $1.1 million will be saved and 12,356 tons of carbon dioxide (CO_2) emission reductions will be achieved.

APPLICABILITY TO THE CITY OF NORMAN

Use of Energy Star-certified equipment by the City of Norman can be easily implemented through the procurement process. Other cities and businesses throughout the United States have implemented policies requiring the purchase and/or lease of equipment that carries the "Energy Star" certification. Examples of some of the Energy Star-certified equipment categories include: office equipment (computers, copies, fax, etc.), vending machines, heating ventilation, air conditioning (HVAC) systems, audio-visual equipment, lighting (including replacement with compact fluorescent bulbs), appliances, windows, thermostats, pumps, motors, and other industrial equipment.

RECOMMENDATIONS

- It is recommended that all future equipment purchases/leases shall be Energy Star-certified. If Energy Star-certified equipment is not specified, a department manager shall provide a written justification why Energy Star-certified equipment is not proposed prior to the purchase or lease.

- The City should maintain a record of the anticipated energy savings as non-Energy Star-certified equipment is replaced. This will allow for determining greenhouse gas reductions attributable to reduced electricity consumption.

RECOMMENDED ACTION #7:
PRACTICE AND PROMOTE SUSTAINABLE BUILDING PRACTICES USING THE U.S. GREEN BUILDING COUNCIL'S LEED PROGRAM OR A SIMILAR SYSTEM

INTRODUCTION
Cities across the country are passing ordinances to mandate that municipal buildings meet green building standards. One of the most frequently cited standards are those set by the Leadership in Energy and Environmental Design (LEED) program of the U.S. Green Building Council and the U.S. EPA and the Department of Energy's ENERGY STAR program. This series of programs for new and existing buildings, as well as community design, provides a framework for cities to begin implementing energy efficiency and green building techniques that save thousands of dollars and reduce greenhouse gas emissions.

LEED was created to:

1. define "green building" by establishing a common standard of measurement
2. promote integrated, whole building design practices
3. recognize environmental leadership in the building industry
4. stimulate green competition
5. raise consumer awareness of green building benefits
6. transform the building market

BENEFITS AND NEEDS
LEED provides a complete framework for assessing building performance and meeting sustainability goals. Based on well-founded scientific standards, LEED emphasizes state of the art strategies for sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

APPLICABILITY TO NORMAN
The City of Norman occasionally builds facilities that could be designed to meet LEED accreditation standards. Examples are the new convention center (indirectly) and the upcoming new library. The City also has some influence with the private and public sector entities that build the majority of the homes and buildings in Norman. The OU School of Architecture has people with expertise in LEED and they would welcome an opportunity to work with the City in this area.

RECOMMENDATIONS
Short term, the City should:

- Encourage modest and reasonable (due to construction schedule) LEED interventions for the new convention center;
- Encourage public and private sector adoption of LEED in new construction;
- Add LEED expertise to the ECAB and/or City staff;
- Cultivate a relationship with LEED practitioners at the OU School of Architecture.

Long term, the City should:

- Require some or all new city government construction projects be LEED certified;
- Require some or all retrofit city government projects become LEED certified;
- Encourage incentives or mandate developers to construct LEED certified or ENERGYSTAR homes.

RECOMMENDED ACTION #8:
INCREASE THE AVERAGE FUEL EFFICIENCY OF MUNICIPAL FLEET VEHICLES; REDUCE THE NUMBER OF VEHICLES; LAUNCH AN EMPLOYEE EDUCATION PROGRAM INCLUDING ANTI-IDLING MESSAGES; CONVERT DIESEL VEHICLES TO BIO-DIESEL

INTRODUCTION
Automobiles are a leading cause of global warming. Nationally the transportation sector is one of the largest sources of U.S. emissions, representing nearly one-third of total emissions. It is hard to visualize, but every gallon of gasoline burned emits 20 pounds of carbon dioxide—the principal global warming pollutant.

BENEFITS AND NEED
Actions that reduce global warming also reduce fuel use, minimize costs for local governments, help cities comply with federal air quality regulations, and improve community livability.

APPLICABILITY TO NORMAN
The City of Norman has instituted many programs to assist in meeting the goal of increasing fuel efficiency. These include:

- A 30% reduction in fuel consumption has been established.
- A Fuel Review board has been created consisting of five Department Heads of the largest fuel consuming departments.
- Fleet has been asked to evaluate administrative vehicles that get up to 25-30 mpg.
- Hybrid vehicles have been purchased for the Environmental Services Section and the Water Treatment Facility.

RECOMMENDATIONS
It is important that the above items be reviewed and implemented. A 30% reduction in municipal fleet fuel consumption can be accomplished by adopting many practices, including but not limited to:

- Restrict idling of municipal vehicles;
- Retire old and under-used vehicles;
- Purchase fuel efficient (e.g., hybrid) and/or smaller fleet vehicles;
- Perform regular preventative maintenance on vehicles;
- Utilize fuel efficient vehicles for parking enforcement;
- Utilize alternative fuel vehicles (e.g., biodeisel, ethanol, electric, compressed natural gas) for city fleet;
- Adopt a public education outreach program for reducing fuel usage.

RECOMMENDED ACTION #9:
EVALUATE OPPORTUNITIES TO INCREASE PUMP EFFICIENCY IN WATER AND WASTEWATER SYSTEMS; RECOVER WASTEWATER TREATMENT METHANE FOR ENERGY PRODUCTION

INTRODUCTION
Nationwide, drinking water and wastewater systems cost more than $4 billion a year in energy costs to pump, treat, deliver, collect, and clean water—with the majority of this cost borne by municipalities. The energy cost to run drinking water and wastewater systems can represent as much as one-third of a municipality's energy bill and this is often the single largest utility expenditure for a city. Water conservation plays a big part in reducing energy costs for the water and wastewater treatment facilities. If less water is used, not as much water will need to be treated by either the water treatment facility or the wastewater treatment facility, therefore reducing electricity needs.

BENEFITS AND NEEDS
By increasing pumping efficiencies and reducing the energy usage at water and wastewater treatment facilities less electricity will be used resulting in a decrease in emissions and a decrease in the amount of electricity purchased. A plant that converts methane into electricity, generating power is a virtually pollution free operation. Added benefits are manifold-methane and air pollutants are reduced, as is the amount of electricity purchased from utilities that operate fossil fuel burning power plants, and the fuel is free because methane is produced during the wastewater treatment process.

APPLICABILITY TO NORMAN
The wastewater plant has a co-generator (co-gen) unit which is set up to recover methane (bio-gas) for energy production. Currently the wastewater plant has no means of compressing and storing bio-gas which means the co-gen needs to be fueled by bio-gas and natural gas as a blend. The high cost of natural gas makes the system cost prohibitive unless a bio-gas storage sphere and gas compression equipment can be purchased and utilized. In addition, many of the newer additions to the wastewater facility are not tied directly to the co-gen. It would be important to tie these units into the co-gen to utilize as much of the energy on site as possible (which maximizes the value of the electricity produced).

The water treatment plant is undergoing a thorough engineering review. The City will be reviewing the electrical efficiency of the entire plant, which will include pumps, motors, operational equipment and plant wiring. In addition, the efficiencies of the chemical feed facilities will be assessed; this includes reviewing the chemical feed equipment for proper sizing and flow pacing to save chemicals, as well as introducing possible new processes to treat the water. Power costs and pump efficiencies will be evaluated when the SCADA system is up and operating at the water treatment facility.

The Central Oklahoma Master Conservancy District is in the process of gaining City's approval for issuing $2.3 million in bonds. A large part of the money will be to update the pumping facilities. They will purchase more efficient pumps and new variable frequency drive motors. The new pumps and motors should save approximately $100,000 per year in electrical costs alone.

RECOMMENDATIONS
The above items should be reviewed and the viable energy efficient alternatives should be implemented including the purchase of a bio-sphere, gas compression equipment, and energy efficient pump and motors.

RECOMMENDED ACTION #10:
INCREASE RECYCLING RATES IN CITY OPERATIONS AND IN THE COMMUNITY

INTRODUCTION
Recycling plays an important role in reducing global warming emissions. Because recycling saves energy, conserves resources, lower emissions from incinerators, reduces landfill methane releases, and increases carbon storage in trees, it is effective in reducing greenhouse gasses. Also, the steps in supplying recycled materials to industry (including collection, processing and transportation) typically use less energy than the steps in supplying virgin materials to industry (including extraction, refining, transportation, and processing).

BENEFITS AND NEED
In general, manufacturing using recycled materials requires markedly less energy than when virgin materials are used. For instance, it takes 95% less energy to recycle aluminum than it does to make it from raw materials. Making recycled steel saves 60%, recycled paper 50%, recycled newsprint 40%, recycled plastics 70%, and recycled glass 40%. These savings far outweigh the energy created as by-products of incineration and landfilling. Consequently, there can be a direct benefit realized in terms of reduced carbon dioxide emissions from fossil fuel combustions and reduced methane generation from decomposing organic mater in landfills. In 2005 recycling was projected to have saved the equivalent amount of energy as needed for 9 million homes or 900 trillion BTUs. Another estimate claims that a national recycling rate of 30% would equate, in terms of reduced greenhouse emissions, to saving the emissions from 25 million cars.

APPLICABILITY TO NORMAN
Norman utilities superintendent Scottie Williams estimated that Norman residents throw away 350-400 tons of solid waste per day of which 33% could be recycled. In 2005 the three Norman recycling centers and the compost facility diverted approximately 2,117 tons of solid waste and composted 7,317 tons of green waste, respectively. This amount could be increased significantly if recycling was made a bigger priority. Within the Norman community, there are resources and strong support to expand recycling efforts—based on the results of the C.O.R.E. survey. Local schools, churches and other organizations actively participate in Abitibi-Consolidated's recycling fundraising program, and the University of Oklahoma administers its own recycling program. More telling is that fact that Tulsa, Oklahoma City and Edmond already provide curbside recycling services, while Norman lags behind.

RECOMMENDATIONS
With the growing public concern over global warming, the City should go public with the mayor's endorsement of the U.S. Mayors' Climate Protection Agreement and challenge residents, businesses and organizations to join the effort. The City should:

- Set goals to reduce waste and improve recycling rates (e.g., 20% by 2020 with a 30% overall goal);
- Require mandatory recycling in all City offices;
- Adopt EPA procurement guidelines for recycled content in new products;
- Add more recycling centers and provide curbside pickup;
- Educate the public on the high costs of solid waste through press releases and announcements in utility bills and on its website;
- Partner with local environmental groups and the Chamber of Commerce to promote recycling;
- Disseminate information on what can be recycled, where and how to recycle, and the costs and benefits of recycling;
- Advertise through multiple media campaigns, utility bill inserts, news articles, flyers, etc.; and
- Develop a Norman Green Page or a dedicated page for recycling and other environmental issues.

RECOMMENDED ACTION #11:
MAINTAIN HEALTHY URBAN FORESTS; PROMOTE TREE PLANTING TO INCREASE SHADING AND ABSORB CO_2

INTRODUCTION

Ideally, carbon dioxide (CO_2) production by animals is balanced by use by plants. As the population grows world wide, so industry and agriculture expand. Consequently, forests and vegetation are removed and this balance is lost, causing an increase in CO_2. Calculations show an average of 40% of a residential lot is covered by structures and paving with commercial coverage even higher.

BENEFITS AND NEEDS

American cities have a history of establishing for themselves the sheltered environment of shade trees. Norman has a long tradition as a tree-planting community having been established on the barren edge of the southwestern plains. The maintenance and continuance of this tradition will need to expand as the city grows. Urban growth in Norman has reduced the percentage of tree canopy from 34.5% to 17%. Healthy, older trees and new canopy growth will prevent heat absorption by structures, streets and parking lots which in turn reduce emissions associated with air conditioning. Norman needs to address adequate replacement of vegetation lost to expansion.

APPLICABILITY TO NORMAN

Norman is historically well established to meet this challenge. The lists of community- and Council-mandated volunteer groups are outstanding in our City. The city government has created a Tree Board that is currently working with developers on a suggested policy goal for minimum tree-planting requirements in new residential developments. The City has a full-time Forester and a City Forestry Division. The Parks Department has been awarded grants for trees and landscaping. A Norman Neighbor Woods tree-planting program implemented and planted 450 trees. A Big Tree contest brought attention to some of our aging trees. An ongoing Tree Tenders Program was initiated to utilize volunteers to identify tree needs and offer their expertise. The City has organized Arbor Day celebrations and Norman has been awarded Tree City USA status for four years. The Tree Board is producing an Urban Forestry Master Plan. In conjunction with the Norman Developers Council, the Board is formulating a Heritage Tree Program that will grow seedlings from older parts of Norman to be distributed free of charge to neighborhoods.

RECOMMENDATIONS

Norman City policy makers must continue and <u>increase</u> the level of support shown above. Public moneys must be allocated to help achieve a 35% of tree canopy for Norman. Money will be needed to provide for the care of trees in public places. Innovative financing should be sought to provide for the care and replacement of trees on public lands and commercial sites. The health of existing trees needs to be monitored and tree-trimming practices regulated more carefully. The City must also recognize that some trees are more appropriate for Norman's climate than others. In addition, the City should consider xeriscaping wherever possible.

Norman has worked hard to create a beautiful city. The tree canopy we achieved in the past was part of that effort. Now we have a more urgent need - the reduction of CO_2. We can be a model for slowing this increase. We need to expand efforts and address all the costs of development and the related removal of vegetation. That removal must be addressed. This is ours to do, locally, so that we can have our beauty and breathe in it, too.

RECOMMENDED ACTION #12:
HELP EDUCATE THE PUBLIC, SCHOOLS, OTHER JURISDICTIONS, PROFESSIONAL ASSOCIATIONS, BUSINESSES AND INDUSTRY ABOUT REDUCING GLOBAL WARMING POLLUTION

INTRODUCTION

A recent MIT survey reported that Americans rank climate change as the most pressing environmental problem. "Almost 3/4ths of those surveyed felt that government should do more to deal with global warming, and individuals were willing to spend their own money to help." You can't read a newspaper, e-zine, or listen to news programs on television or the radio without hearing about global warming. While the record setting crowd at Al Gore's recent visit to OU may have been due in small part to instructors promising students extra credit to attend, it did not account for the thousands of non-students in the audience. People are interested and worried. They want to know how their local, state and federal governments are responding to global warming. More importantly, they are eager to help and want to know more about what they can do.

BENEFITS AND NEED

The benefits of reducing greenhouse-gas emissions are well known and generally accepted by the public, but many people do not know how they can easily reduce their personal contribution to global warming. A number of websites have been established to assist the layperson in this endeavor (e.g., 2006 Survey of Public Attitudes on Energy and the Environment (http://sequestration.mit.edu/research/survey2006.html), Yale School of Forestry & Environmental Studies Project: Americans and Climate Change (http://environment.yale.edu/climate/), Oklahoma Office of the Secretary of State Environmental Education Resource Guide (http://www.deq.state.ok.us/pubs/lpd/EEguide04.pdf), U.S. Environmental Protection Agency Educational Resources http://www.epa.gov/epahome/educational.htm), Sierra Club's Ten Things You Can Do To Help Curb Global Warming (http://www.sierraclub.org/globalwarming/tenthings/), Oklahoma Department of Environmental Quality Environmental Education Resources (http://www.deq.state.ok.us/mainlinks/eepage.htm), Union of Concerned Scientists What You Can Do (http://www.ucsusa.org/global_warming/solutions/ten-personal-solutions.html?print=t), and U.S. Public Interest Research Group Fact Sheet 10 Things You Can Do (http://uspirg.org/uspirg.asp?id2=7629&id3=USPIRG&ID4=fs&).

APPLICABILITY TO NORMAN

Norman has always possessed a rare and positive quality of life that continues to bring people back to it. Visitors and college students often return to make their homes here. It has the reputation of being one of the most, if not the most, progressive and livable cities in Oklahoma. With the University of Oklahoma, the National Weather Center and other research institutions located here, Norman has the resources to take a leadership role in improving environmental literacy throughout Oklahoma.

RECOMMENDATIONS

The Mayor of Norman is the only mayor in Oklahoma to sign the U.S. Mayors' Climate Control Agreement. The City needs to lead by example, inform the community of what it has done to reduce carbon emissions and what it plans to do in the future. This is particularly critical in the Midwestern part of the U.S., where climate change education seems to be lagging compared to that on the coasts. The City needs to challenge and engage local businesses and organizations and other Oklahoma cities to become partners in the effort because this issue is one that demands collective action. It needs to tell its citizens what they can do to help using the City's website, utility bill inserts, press releases, the annual household hazardous waste collection events, and active participation and sponsorship of local and state environmental events and initiatives.

Appendix B

City of Norman 2000 Greenhouse Gas Emissions Inventory

Government Greenhouse Gas Emissions in 2000
Detailed Report

	Equiv CO 2 (tons)	Equiv CO 2 (%)	Energy (MMBtu)	Cost ($)
Buildings				
OEC Consumption				
Electricity	29	0.0	87	27,747
Subtotal OEC Consumption	29	0.0	87	27,747
OGE Consumption				
Electricity	14,120	16.2	42,476	904,241
Subtotal OGE Consumption	14,120	16.2	42,476	904,241
ONG Consumption				
Electricity	5,126	5.9	15,421	90,668
Subtotal ONG Consumption	5,126	5.9	15,421	90,668
Subtotal Buildings	19,275	22.1	57,984	1,022,657
Vehicle Fleet				
Gasoline	2,978	3.4	34,732	220,081
Diesel	3,063	3.5	35,026	205,245
Subtotal Fleet	6,040	6.9	69,758	425,326
Subtotal Vehicle Fleet	6,040	6.9	69,758	425,326
Employee Commute				
City of Norman Employees				
Gasoline	380	0.4	4,432	
Subtotal City of Norman Employees	380	0.4	4,432	

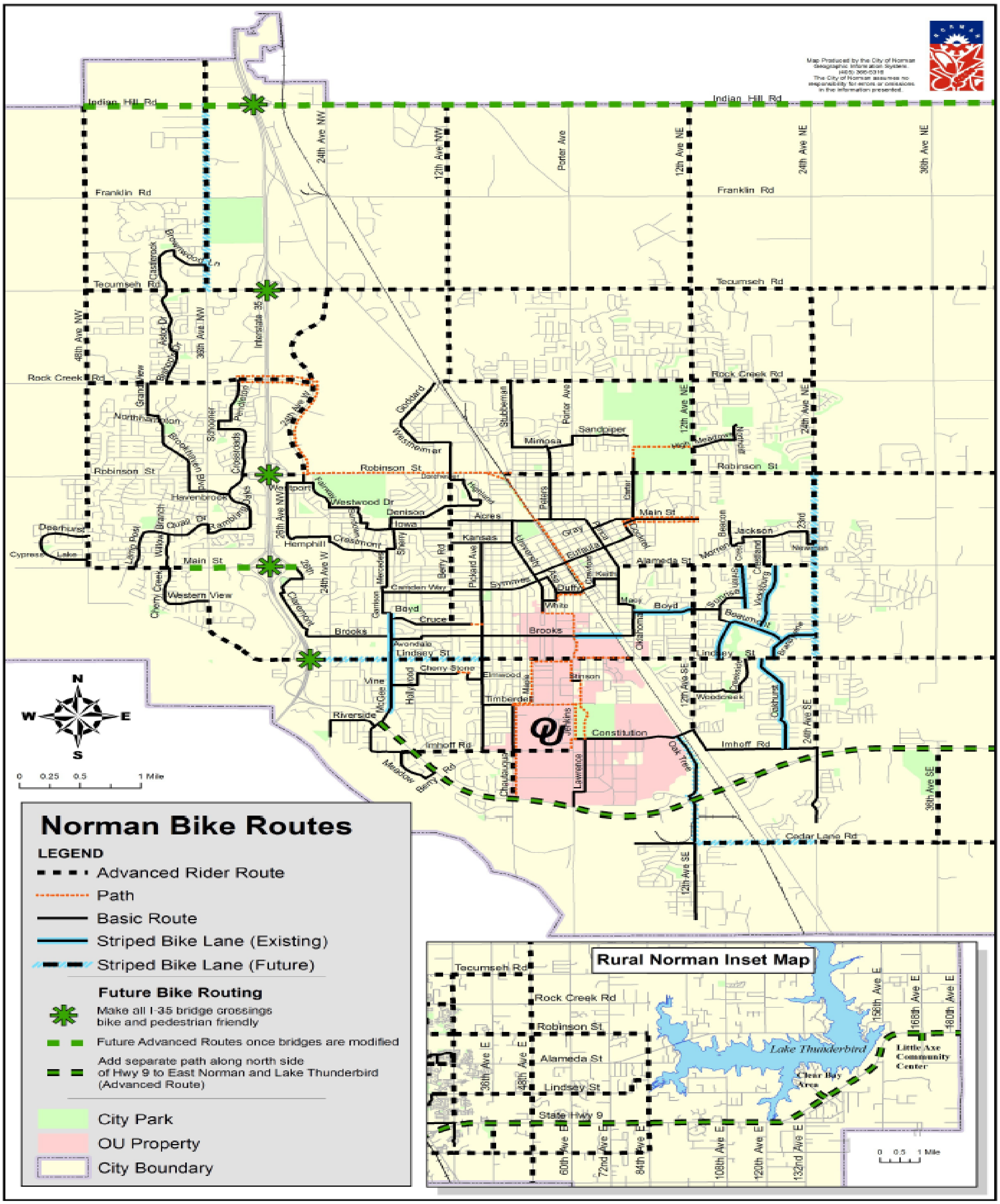
Water/Sewage				
Wastewater-OGE				
Electricity	2,982	3.4	8,970	129,228
Subtotal Wastewater-OGE	2,982	3.4	8,970	129,228
Wastewater-ONG				
Electricity	304	0.3	913	103,564
Subtotal Wastewater-ONG	304	0.3	913	103,564
Water-OEC				
Electricity	426	0.5	1,283	29,967
Subtotal Water-OEC	426	0.5	1,283	29,967
Water-OGE				
Electricity	8,494	9.7	25,550	383,956
Subtotal Water-OGE	8,494	9.7	25,550	383,956
Subtotal Water/Sewage	12,205	14.0	36,716	646,715
Waste				
Compost			Disposal Method - Compost	
Plant Debris	-2,048	-2.3		0
Subtotal Compost	-2,048	-2.3		0
Recyclables			Disposal Method - Uncollected	
Paper Products	0	0.0		28,085
All Other Waste	0	0.0		28,085
Subtotal Recyclables	0	0.0		56,171
Total waste sent to landfill			Disposal Method - Managed Landfill	
Paper Products	36,635	42.0		418,276
Food Waste	17,508	20.1		214,175

Plant Debris	-1,452	-1.7		124,376
Wood/Textiles	-1,290	-1.5		73,631
All Other Waste	0	0.0		412,928
Subtotal Total waste sent to landfill	01	58.9		1,243,387
Subtotal Waste	49,353	56.6		1,299,558
Total	87,254	100.0	168,890	3,394,256

This report has been generated for Norman, Oklahoma using STAPPA/ALAPCO and ICLEI's Clean Air and Climate Protection Software developed by Torrie Smith Associates Inc.

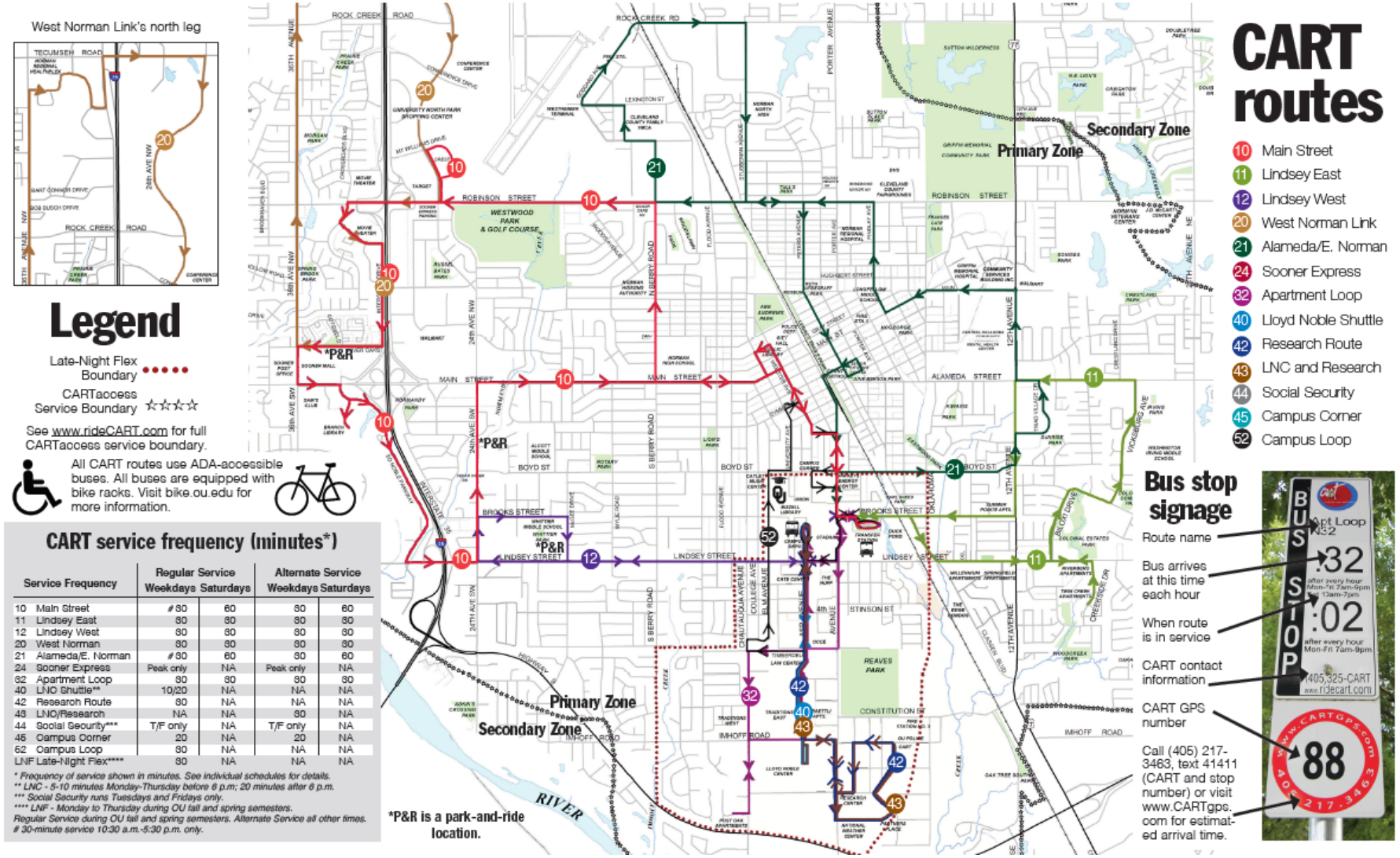
Appendix C

City of Norman Bike Paths


Norman Bike Routes
LEGEND
Advanced Rider Route
Path
Basic Route
Striped Bike Lane (Existing)
Striped Bike Lane (Future)
Future Bike Routing
Make all I-35 bridge crossings bike and pedestrian friendly
Future Advanced Routes once bridges are modified
Add separate path along north side of Hwy 9 to East Norman and Lake Thunderbird (Advanced Route)
City Park
OU Property
City Boundary
Rural Norman Inset Map
Lake Thunderbird
Tecumseh Rd
Rock Creek Rd
Robinson St
Alameda St
Lindsey St
State Hwy 9
Indian Hill Rd
Franklin Rd
Tecumseh Rd
Rock Creek Rd
Robinson St
Main St
Lindsey St
Imhoff Rd
Cedar Lane Rd
24th Ave NW
12th Ave NW
Porter Ave
12th Ave NE
24th Ave NE
36th Ave NE
48th Ave NW
36th Ave NW
Interstate 35
N
W
E
S
0 0.25 0.5 1 Mile

Appendix D

CART Routes and Public Transportation Needs


West Norman Link's north leg
Legend
Late-Night Flex Boundary
CARTaccess Service Boundary
See www.rideCART.com for full CARTaccess service boundary.
All CART routes use ADA-accessible buses. All buses are equipped with bike racks. Visit bike.ou.edu for more information.
CART service frequency (minutes*)
Service Frequency
Regular Service Weekdays Saturdays
Alternate Service Weekdays Saturdays
10 Main Street # 30 60 30 60
11 Lindsey East 30 30 30 30
12 Lindsey West 30 30 30 30
20 West Norman 30 30 30 30
21 Alameda/E. Norman # 30 60 30 60
24 Sooner Express Peak only NA Peak only NA
32 Apartment Loop 30 30 30 30
40 LNC Shuttle** 10/20 NA NA NA
42 Research Route 30 NA NA NA
43 LNC/Research NA NA 30 NA
44 Social Security*** T/F only NA T/F only NA
45 Campus Corner 20 NA 20 NA
52 Campus Loop 30 NA NA NA
LNF Late-Night Flex**** 30 NA NA NA
* Frequency of service shown in minutes. See individual schedules for details.
** LNC - 5-10 minutes Monday-Thursday before 6 p.m; 20 minutes after 6 p.m.
*** Social Security runs Tuesdays and Fridays only.
**** LNF - Monday to Thursday during OU fall and spring semesters.
Regular Service during OU fall and spring semesters. Alternate Service all other times.
30-minute service 10:30 a.m.-5:30 p.m. only.
*P&R is a park-and-ride location.
Primary Zone
Secondary Zone
CART routes
10 Main Street
11 Lindsey East
12 Lindsey West
20 West Norman Link
21 Alameda/E. Norman
24 Sooner Express
32 Apartment Loop
40 Lloyd Noble Shuttle
42 Research Route
43 LNC and Research
44 Social Security
45 Campus Corner
52 Campus Loop
Bus stop signage
Route name
Bus arrives at this time each hour
When route is in service
CART contact information
CART GPS number
Call (405) 217-3463, text 41411 (CART and stop number) or visit www.CARTgps.com for estimated arrival time.
BUS STOP
:32
:02
405.325-CART
www.rideCART.com
88
405-217-3463

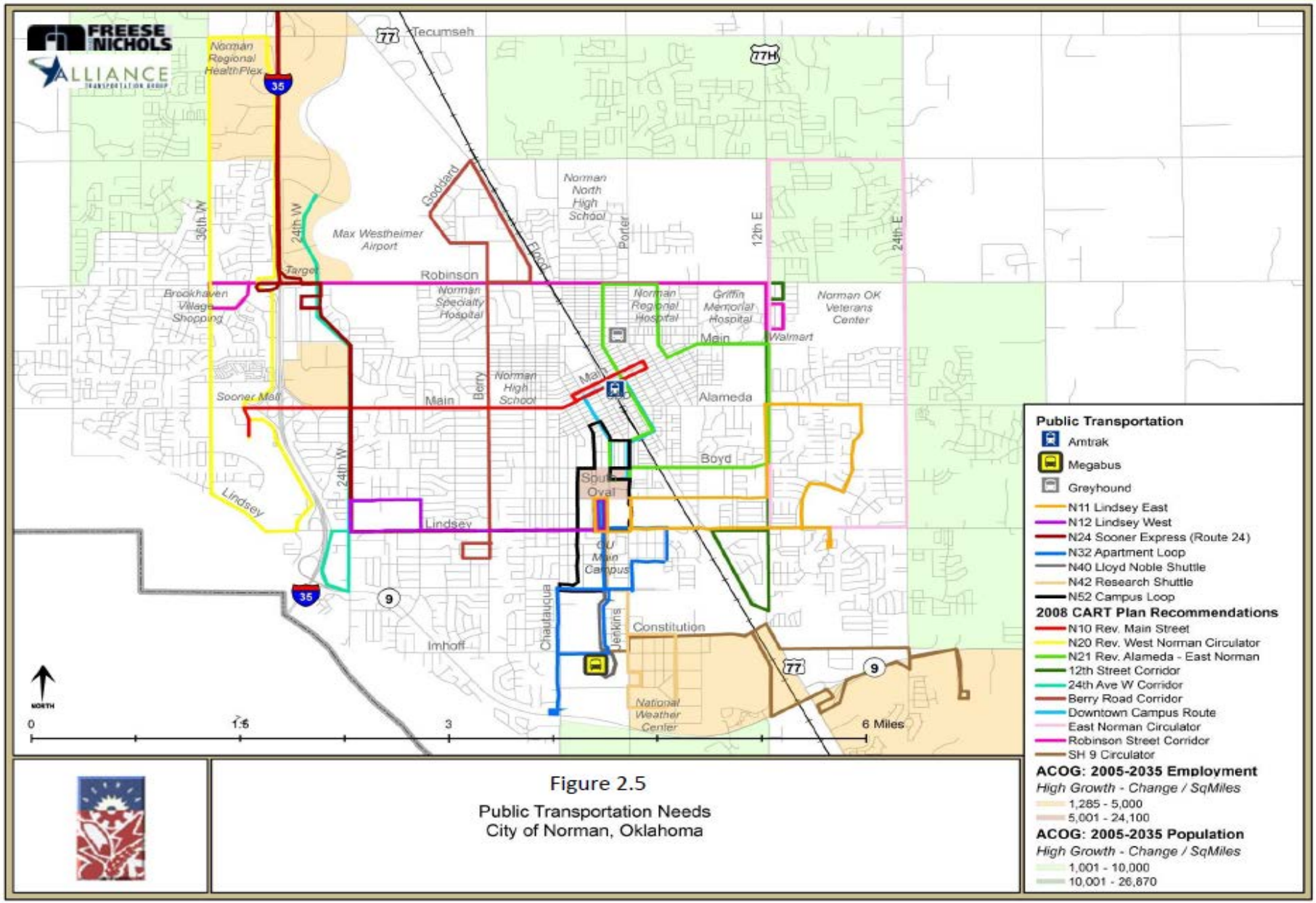
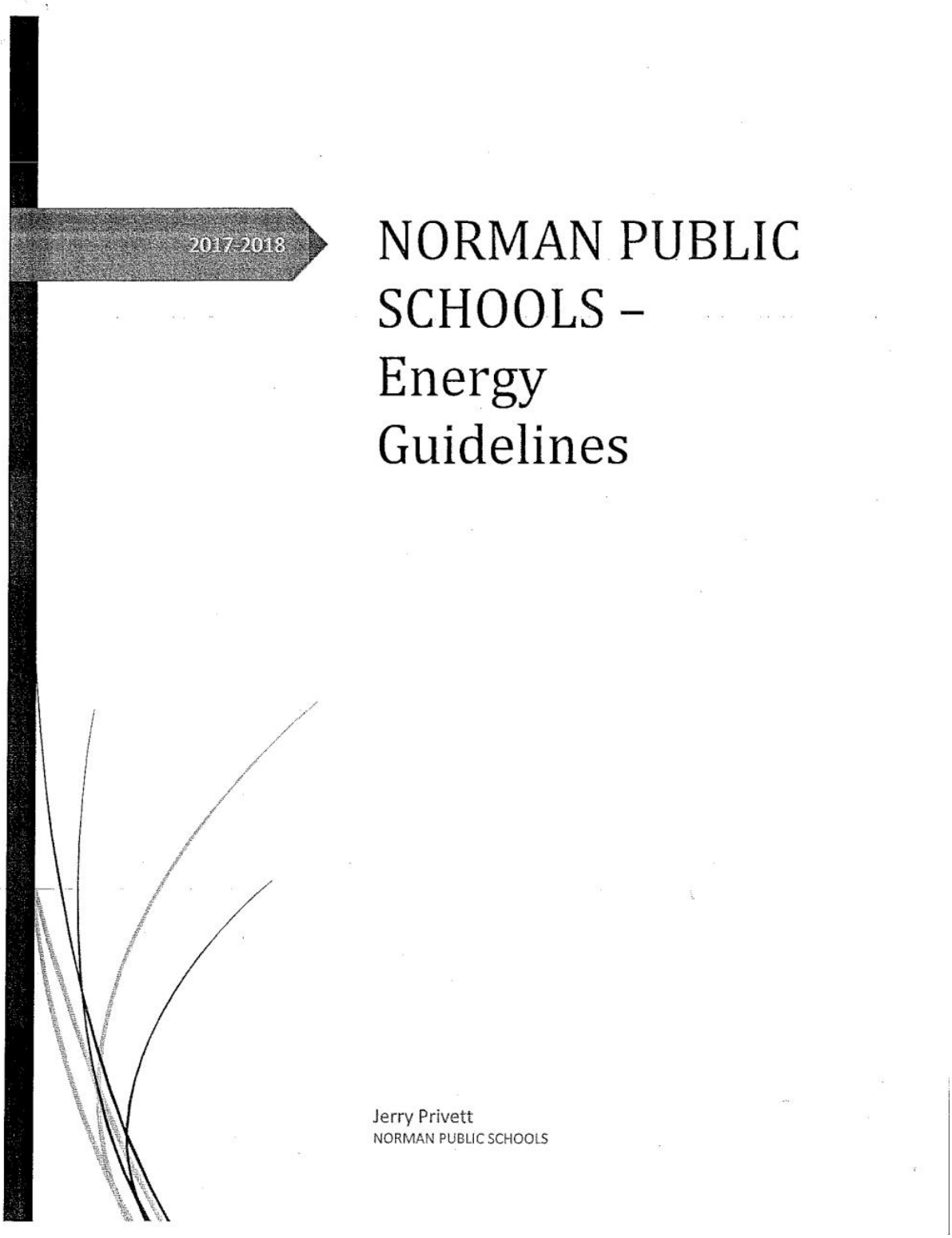


Figure 2.5

Public Transportation Needs
City of Norman, Oklahoma

Appendix E

Norman Public Schools – Energy Guidelines



The Norman Public Schools Board of Education embraces energy conservation and believes that it is our shared responsibility to conserve energy and natural resources while exercising sound financial management. To this end the Board of Education has adopted an energy conservation policy in an effort to manage the District's energy resources.

To ensure the success of this policy the following areas are emphasized:

1. Each campus will have an Administrator/Designated Staff Member who will be accountable for energy conservation on his/her campus. Along with the Energy Education Specialist, will conduct energy audits and provide timely feedback to the faculty and staff of a site.
2. All personnel at each campus are expected to make positive contributions to maximize energy conservation and produce real energy savings.
3. The Energy Education Specialist under the advisement of Cenergistic (Formerly Energy Education, Inc.) will implement the District's Energy Program in accordance with the District "Energy Guidelines".
4. Accurate records of energy consumption and cost will be maintained by the Energy Education Specialist to provide verifiable performance results on the goals and progress of the energy conservation program.

The goal of the energy conservation program is to make good use of our resources while providing students a safe and comfortable environment in which to study and grow.

Keeping the preceding in mind, each of us has the shared responsibility to use our resources wisely and efficiently. This responsibility makes it essential that energy conservation be practiced in all phases of energy use. Air conditioning, heating, and lights typically account for 70 to 80 percent of the energy consumed in the district, therefore, it is especially critical that the following guidelines be adhered to when operating air conditioning and heating equipment and when using lights.

Each employee of the District will be responsible for implementing these guidelines in his/her respective areas. The principal will be responsible for the total energy usage of his/her building. The Energy Specialist will provide the principal monthly information reflecting the energy consumption of his/her site.

Any exceptions or changes to these guidelines must be approved by the Assistant Superintendent for Administrative Services/Chief Operating Officer (Justin Milner) or the District Energy Specialist (Jerry Privett).

RESPONSIBILITIES

- Each individual is expected to become an "ENERGY SAVER" as well as an "energy consumer"
- Staff members are responsible for implementing the guidelines during the time that he/she is present in the classroom or office.
- The custodian is responsible for control of common areas. i.e. halls, cafeteria, etc.
- Staff members are responsible for ensuring that the classroom or office is shut down at the end of each day.
- Custodians are responsible for verifying that classroom or offices are shut down at night.
- The facility administrator is responsible for the total energy usage of his/her facility.
- The Energy Education specialist provides regular program updates to the Norman Public Schools Board of Education.
- The Energy Education Specialist performs routine audits of all facilities and communicates the audit results to the facility administrator.
- The Energy Education Specialist is responsible for directly or indirectly making adjustments to the District's Energy Management System.
- District and Site administration will regularly communicate the importance and impact of the energy conservation program to its internal and external constituents.
- The Energy Education Specialist provides monthly energy savings reports to facility administration.

GENERAL

1. Classroom doors will remain closed when Heating and Air Conditioning (HVAC) are operating. Doors between conditioned spaces and non-conditioned spaces should be kept closed, unless passing from one to the other.
2. Exhaust fans should be turned off each day.
3. Office machines (copiers, laminating equipment, etc.) should be switched off each night.
4. All computers, including monitors, local printers, and speakers should be switched off each night.
5. All capable PC's should be programmed for the "energy saver "mode, ensuring that the monitor "sleeps" after 10 minutes of inactivity.
6. General occupied settings for Heating and Air are as follows:
    a. Cooling Occupied Set Points: 73 – 76 Degrees Fahrenheit
    b. Heating Occupied Set Points: 68 – 72 Degrees Fahrenheit
7. General Unoccupied set points:
    a. Cooling Unoccupied Set Point: 85 Degrees Fahrenheit
    b. Heating Unoccupied Set Point: 55 Degrees Fahrenheit

SPECIFICS

AIR CONDITIONING PROCEDURES

While it is obvious that not everyone is comfortable at the same temperature, it is important that we strive for a temperature range that is considered fair to the majority of the individuals who occupy an area. Substantial savings can be achieved by maintaining uniform, consistent, but fair temperature ranges in all buildings across the district. Even greater savings can be realized by readjusting thermostat settings during the hours that buildings are not being used by students, teachers, and office personnel. Temperature levels for air conditioning of 73 to 76 degrees and for heating of 68 to 72 degrees are considered by industry standards to be appropriate for comfort.

The following procedures should be observed in all phases of heating and air conditioning use:

1. Occupied cooling set points shall be set to maintain occupied temperatures between 73 – 76 Degrees.
2. Not all units are controlled by an Energy Management System (EMS). In these locations the teacher or staff member occupying the space is responsible for turning his/her own air conditioner on when he/she arrives at school in the morning and should turn the unit off or set up to 85 degrees 30 minutes after the end of the student day or when he/she leaves at the end of the day, whichever occurs earliest.
3. Unless otherwise stated during unoccupied times, air conditioning equipment shall be set up to 85 degrees or turned off. Unoccupied periods begin when students leave the area at the end of the day.
4. Air conditioning start times may be adjusted (depending on weather) to ensure classroom and office are within the occupied parameters at the start of the student day.
5. The custodial staff is responsible for controlling thermostats in common areas, i.e. hallways, cafeterias, etc.
6. At sites, where applicable, the kitchen manager will be responsible for controlling thermostats in the kitchen area.
7. Except for approved school functions, air conditioning should not be used in the evenings, on weekends or during summer shutdown.
8. Staff and students should be encouraged to dress appropriately for current weather conditions. Staff and students should also be informed to expect slightly warmer or cooler conditions to exist in buildings after a long shutdown.
9. While teachers and staff have primary responsibility for ensuring appropriate shutdown each day, night custodial staff is responsible for ensuring that each manual thermostat is properly adjusted for the night settings. It is important that teachers adjust his/her thermostat appropriately, it may be several hours between the time a teacher leaves and night custodial staff cleans.
10. Outside air dampers are closed during unoccupied times.
11. Ceiling fans should be operated in areas that have them. Fans should be shut off at the end of the day.

12. During summer shut down, air-conditioning should be utilized only in areas being used for summer school or other approved programs.
13. In areas where cross-ventilation is available during mild weather, HVAC should be shut down and outside ventilation should be allowed.
14. Designated startup days for air conditioner equipment will be the last three work days prior to the day teachers are scheduled to report for service. Teachers who wish to work in their rooms prior to school starting are encouraged to take advantage of these days. Rooms that are not being used should remain shut down until needed. All guidelines apply when using the air conditioning equipment during these days. Teachers are encouraged not to use the air conditioning after 3:00 pm on these days because of peak charges that are incurred.

HEATING PROCEDURES

1. Occupied temperature setting shall be set to maintain an occupied temperature of 72 degrees or less.
2. Unoccupied temperatures setting shall be 55 degrees. In the event of extreme cold weather the setback may be increased to 60 degrees. At no time during the heating season (winter) should the heat be turned completely off. Unoccupied periods begin when students leave the area at the end of the day.
3. During spring and fall when there is no threat of freezing, heating systems may be shut off.
4. Domestic hot water systems should be set to maintain 120 degree water. (140 degree for cafeteria use)
5. Domestic hot water re-circulating pumps should be switched off during unoccupied times.
6. Staff and students should be encouraged to dress appropriately for current weather conditions. Staff and students should also be informed to expect slightly warmer or cooler conditions to exist in buildings after a long shutdown.

LIGHTING PROCEDURES

Lights not only consume electricity they also give off heat which, in turn, places an additional load on the air conditioning equipment and increases the use of electricity necessary to cool the room.

1. Lights should be turned on only when definitely needed. Lights not only consume electricity but also give off heat that places an additional load on the air conditioning equipment.
2. All unnecessary lighting in unoccupied areas should be turned off. Staff should make certain that lights are turned off when the classroom or office is empty. Utilize natural lighting when and where appropriate.
3. All outside lighting should be off during daylight hours.
4. Gym lights should be off unless the gym is being utilized.
5. All lights will be turned off when students and staff leave for the day.
6. Custodial staff will turn on lights only in areas in which they are working.

7. During hours that school is not in session and there are no activities taking place the school building should appear to be in an energy conservation mode. The only lights being used should be those needed in individually occupied rooms and those needed for safe and secure passage through the building. Staff who start early and/or work late need to be instructed as to the location of hall light switches so they will be able to turn them on/off as needed to get to and from their classroom.
8. Coaches and teachers who have student activities scheduled before and after school should inform students that the main building may be dark before and after school. Insist that students use designated entrances and limit their access to the main building.

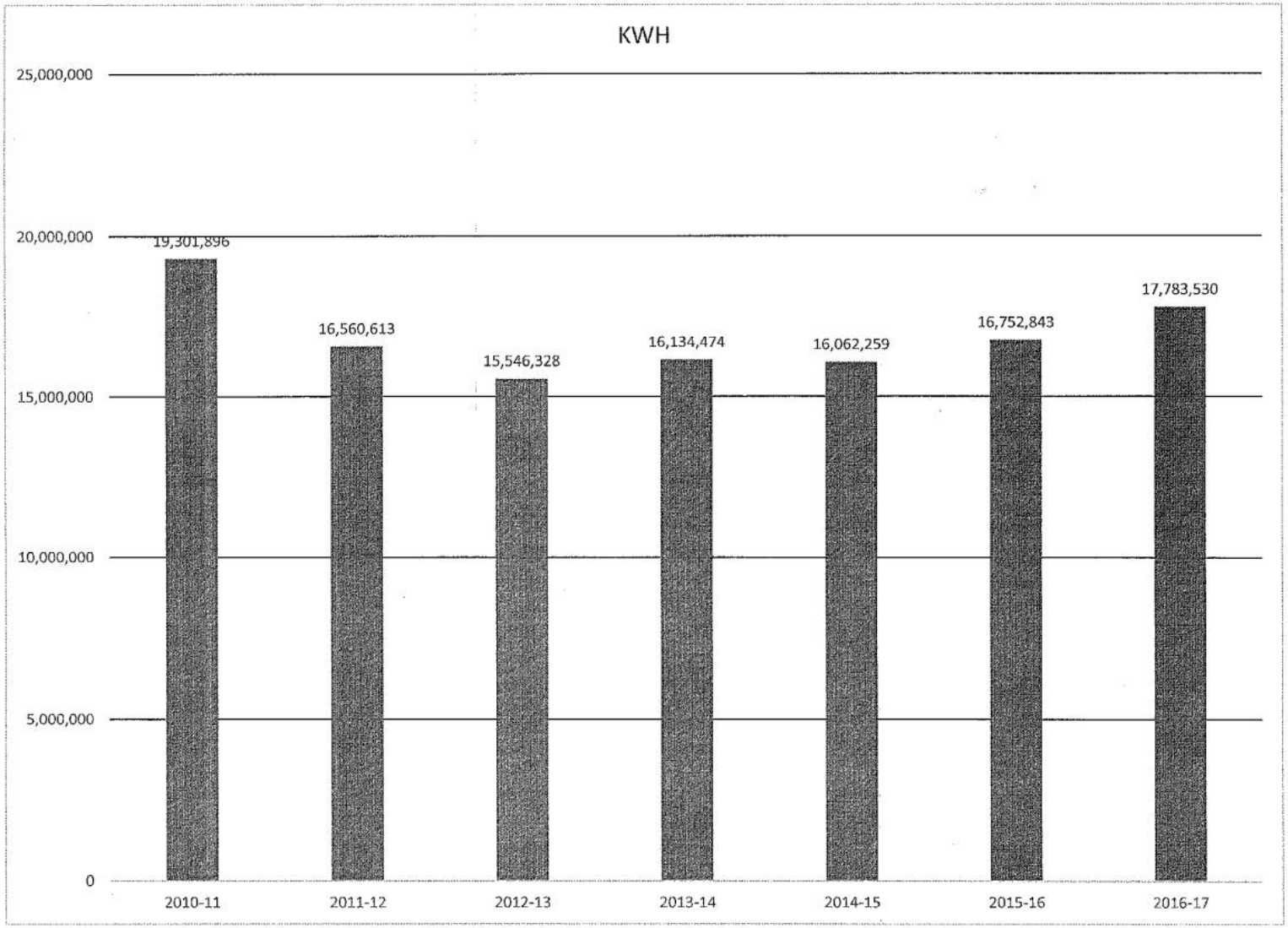
WATER PROCEDURES

1. All plumbing and/or roof leaks should be reported as soon as possible.
2. Sites with automated watering systems should schedule the watering to be done between 4 am-10 am.

MISCELLANEOUS PROCEDURES

1. Auditoriums – due to the size of most auditoriums it is very important that we carefully manage the heating and cooling of these areas. Unless being used for performances these areas will generally be kept in a "Stand-By Mode" at a higher or lower temperature depending on the season.
2. Vestibule Doors – Vestibule doors at the entrances of many of the District's buildings are designed to help keep the temperatures in the buildings stable. It is extremely important that these doors be kept shut at all times when using heat or air conditioning.
3. Classroom doors – generally speaking hallways will be warmer than classrooms during the cooling season and cooler than classrooms during the heating season. Therefore, it is important that classroom doors be kept closed when air conditioning and/or heat is being used.
4. Space Heaters – portable electric heaters are not to be used to warm a room or area. This type of heater is very expensive to operate and is extremely dangerous to use.
5. Personal refrigerators/microwave or other appliances – teachers and staff are not encouraged to bring personal appliances to school. Principals may allow teachers to use appliances in their classrooms as long as energy guidelines are adhered to. This guideline will be reviewed annually.
6. Copy Machines, Computers, Printers, Laminators and other electronic appliances – All machines should be shut down each day. Copy machines should be turned off at the end of the work day. Computers and printers should be turned off when not being used. Unless needed for recharging, this includes monitors, interactive white boards, speakers, etc. Even when these devices are in sleep mode there is a small electrical draw that occurs. This coupled with the fact that we now have thousands of computers, monitors, and projectors in the District provide us an opportunity for saving.
7. Weekends and Holidays – These are ideal opportunities for conservation to occur without affecting the learning or working environment. It is essential that all unnecessary lights and equipment be turned off during these times.

Please remember that each of us have the shared responsibility to use our resources wisely. By wisely using these limited resources we will be able to maximize our energy dollar and provide our students with the best possible learning environment.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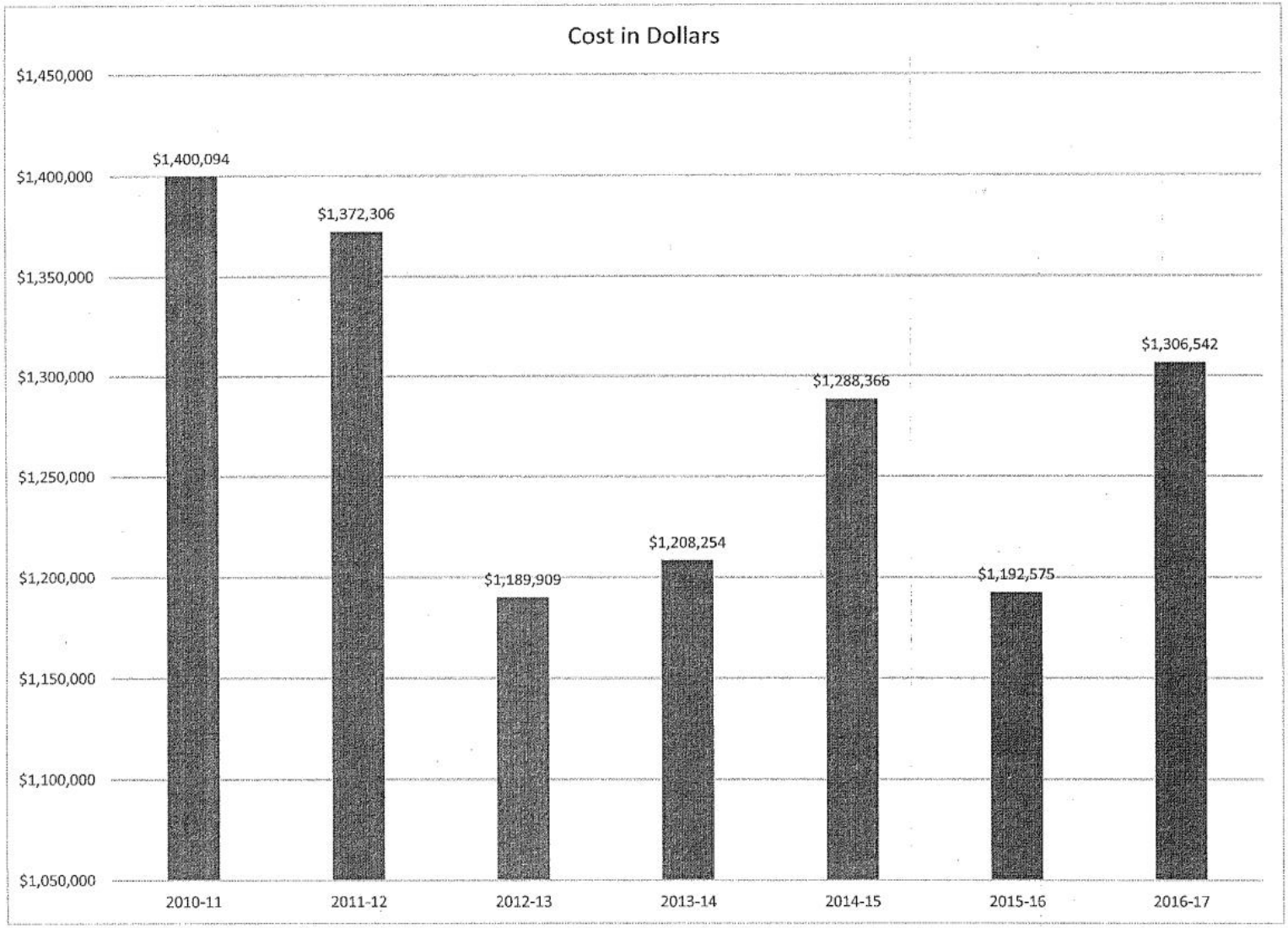
2015-16
2016-17


Cost in Dollars
$1,450,000
$1,400,000
$1,350,000
$1,300,000
$1,250,000
$1,200,000
$1,150,000
$1,100,000
$1,050,000
$1,400,094
$1,372,306
$1;189,909
$1,208,254
$1,288,366
$1,192,575
$1,306,542
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17

Appendix F

City Council Resolution Adopting ECAB Recommendations

R-1718-YYY

A RESOLUTION OF THE COUNCIL OF THE CITY OF NORMAN, OKLAHOMA, ADOPTING THE ENVIRONMENTAL CONTROL ADVISORY BOARD'S UPDATED RECOMMENDATIONS TO IMPLEMENT THE MAYORS' CLIMATE CONTROL AGREEMENT

§ 1. WHEREAS, Mayor Harold Haralson, in 2005, signed the Mayors' Climate Protection Agreement, the only mayor in Oklahoma to do so; and

§ 2. WHEREAS, Mayor Cindy Rosenthal and the City Council in 2009, recognized and received recommendations of the then serving Environmental Control Advisory Board; and

§ 3. WHEREAS, the current Environmental Control Advisory Board, after consultation and encouragement by Mayor Miller, studied the Recommended Actions adopted by Council in February 2009 to implement said Agreement by reducing emissions of the City and the community as a whole; and

§ 4. WHEREAS, the Environmental Control Advisory Board by assignment to the individual members and staff liaisons, evaluated progress made by the City to date, changes in the scientific information available, and updates of codes and standards for construction, planning and management; and

§ 5. WHEREAS, the Environmental Control Advisory Board then updated and consolidated recommended action items for the City to further reduce its CO_2 footprint and limit discharge of greenhouse gases; and

§ 6. WHEREAS, the Environmental Control Advisory Board finalized those recommendations in April 2018, and brought them forward to the Norman City Council; and

§ 7. WHEREAS, the Environmental Control Advisory Board further affirms and endorses said recommendations, and encourages the City of Norman, its leadership and all of its citizens to continue to make emissions reductions and energy conservation a priority.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF NORMAN, OKLAHOMA:

§ 8. To accept and promote the following recommendations of the Environmental Control Advisory Board as objectives for the City of Norman to reduce emissions and conserve energy:

- To inventory global warming emissions in the City of Norman;
- To adopt and enforce land-use policies that reduce sprawl, preserve open space, and create

compact, walkable urban communities;

- To promote alternative transportation;
- To increase the access and use of renewable energy, while making energy efficiency a priority throughout purchasing and construction processes;
- To practice and promote sustainable building practices using the U.S. Green Building Council's LEED Program or a similar system;
- To increase the average fuel efficiency of municipal fleet vehicles, and increase the use of renewable friendly vehicles;
- To evaluate opportunities to increase pump efficiency in water and wastewater systems and recover wastewater treatment methane for energy production;
- To increase recycling rates in city operations and in the community;
- To maintain a healthy urban forest, and promote tree planting to increase shading and absorb carbon dioxide; and
- To educate the public; schools; professional associations; businesses and industry; and other jurisdictions about environmental disciplines.

§ 9. To instruct the City Manager, in partnership with the Environmental Control Advisory Board, to prepare and implement an action plan for advancing these objectives;

§ 10. To instruct the City Manager to make semi-annual progress reports to the Norman City Council regarding the implementation of the action plan.

PASSED AND ADOPTED this _____ day of _____, 2018.

_____
Mayor

ATTEST:

_____
City Clerk