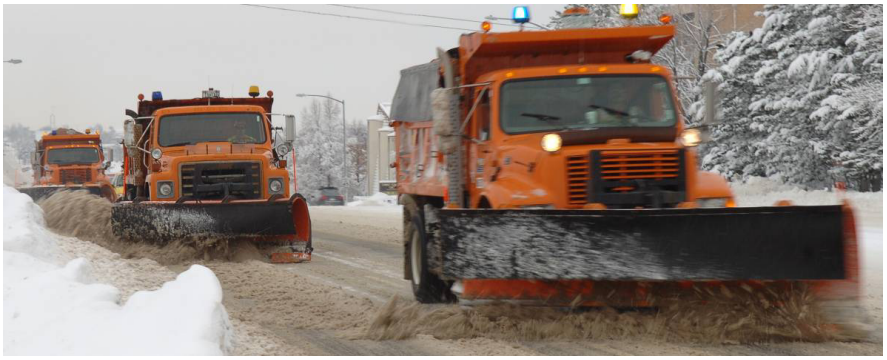
Colorado Department of Transportation

4201 East Arkansas Avenue
Denver, Colorado 80222

Statewide Energy Management Plan

CDOT's Vision for Coordinated Statewide Energy Management and Conservation



DRAFT – NOT REVIEWED OR APPROVED BY DEPARTMENT EXECUTIVE MANAGEMENT

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Executive Order D 0012 07 (4/16/07) Governor Ritter, Greening of Government" set ambitious, but achievable energy management goals for all Colorado State Government Agencies. Efficient use of energy and water resources plays an important role in support of the Colorado Department of Transportation's primary missions. In contrast the inefficient use of energy wastes limited transportation funds, diverting those funds from other essential mission requirements. CDOT within its daily operations is focused on improving energy efficiency, reducing energy demand, eliminating waste, and enhancing quality of life while meeting mission requirements.

The following Energy Management Plan is intended to provide an outline of those key areas from which more targeted programs will evolve. For the energy management program to mature it must involve every energy user within the Department from the Executive Director to CDOT's newest entry-level employee.

The plan contains key components for CDOT facilities statewide, general energy usage on a day-to-day basis, as well as outreach to effect organizational change within CDOT and its staff statewide. Other areas will be added as a need is recognized and areas of potential opportunity are identified.

Implementation will be a mix of assignments to existing staff, utilization of outside professional resources and budgetary commitment to projects that show potential for a positive return through life cycle cost analysis and re-investment of realized savings for future energy efficiency and renewable energy opportunities.

Governor Ritter's Executive Order D 0011 07 (4/16/07), "Greening of Government: Goals and Implementation" and Executive Order D 0012 07 (4/16/07) "Greening of Government;" establish core performance measures for agencies to achieve. As individual programs evolve additional measures will likely emerge.

Use of energy saving performance contracts, utility energy service contracts, power purchase agreements, and other alternative financing mechanisms are encouraged to the greatest extent provided they are life cycle cost effective.

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Introduction to Colorado Department of Transportation (CDOT) Energy Management Plan

1) Key Points

a) Energy and water conservation deliver a wide range of benefits, including energy, energy cost-related, and ancillary savings, infrastructure improvements, reduced pollutant emissions, improved energy security, and in some cases, increased productivity.

b) Each property manager faces the challenge of promoting energy and water efficiency as much as possible while maintaining the core purpose of the facility and improving the comfort and quality of life of CDOT personnel.

c) Successful energy conservation programs require top management support and communicate through education programs the cost savings and benefits that can be realized through energy and water conservation.

d) The State of Colorado has initiated the following promulgations. A brief description of the objectives of these actions are as follows;

i) C.R.S. 24-103-207: All state agencies are required that 50% of their paper purchases have at least a 30% recycled paper content.

ii) Executive Order D 014 03 Governor Owens (7/16/03): Requires all State agencies to initiate energy performance contracts where opportunity exists to better utilize budgets; a feasibility study should be submitted to the Department of Personnel and Administration by July 2004. (CDOT conducted and submitted this study by July 2004.)

iii) Executive Order D 005 05 Governor Owens (5/15/05): To the extent applicable and practical, requires state agencies to adopt LEED-EB in operating, maintaining, and managing existing buildings and incorporate LEED-NC when designing new construction.

iv) Senate Bill 06-016 (2006): Alternative Fuel Use Requirement: By January 1, 2007, the Department of Personnel must adopt a policy that requires all state-owned diesel vehicles and equipment to be fueled with a fuel blend of 20% biodiesel and 80% petroleum diesel (B20), subject to the availability of the fuel and so long as the price is no greater than $0.10 more per gallon than the price of conventional diesel; By July 10, 2010, adopt a policy requiring that at least 10% of all state-owned bi-fuel vehicles be fueled exclusively with an alternative fuel.

v) Senate Joint Resolution SJR 06-032 (2006) The General Assembly supports the use of LEED as design and construction guidelines for public and private facilities and urges the state of Colorado and its agencies and departments to design and construct facilities to achieve LEED silver certification.

vi) Senate Bill 07-051 (4/16/07): High Performance State Buildings: Requires any new or renovated building whose total project cost includes 25 percent or more in state funds to be designed and built to a high performance green building standard; requires third party certification to a green standard such as LEED and that increased initial costs are regained through decreased operational costs within 15 years.

vii) Executive Order D 0011 07 (4/16/07) Governor Ritter: Greening of Government: Goals and Implementation. Establishes within the GEO a Greening Government Manager and a Greening Government Council. Each Agency shall have a representative on the Green Government Council. By FY 2011-12, (using a baseline of Fiscal Year 2005–06) State agencies are required to:

(1) For Energy Management:
   (a) Reduce energy consumption by 20 percent at all state facilities
   (b) By January 2008 develop or update an energy management plan
   (c) On an ongoing basis assess and implement where effective, the development of state renewable energy projects with the support of the GEO

(2) For Materials and Resource Management:
   (a) By FY 2008-09 develop purchasing policies to reduce state's environmental impact as a consumer of products. Policies to be developed by DPA.
   (b) Adopt a "zero waste" goal from construction of new buildings and renovation of existing buildings.
   (c) Achieve a paper-use reduction of 20 percent
   (d) Achieve a reduction of water consumption of 10 percent.

(3) For Vehicle Petroleum Consumption:
   (a) By June 30, 2012 achieve a reduction in petroleum use by 25 percent in state vehicles;
   (b) By 12/1/07, state agencies are required to complete a transportation efficiency audit addressing methods for improving the environmental efficiency of the state fleet; elements of D 005 05 remain in place and are to be read in conjunction with this Executive Order.

viii) Executive Order D 0012 07 (4/16/07) Governor Ritter, Greening of Government: Reiterates the use of energy performance contracting from EO 014 03; if performance contracting is not feasible, state agencies must reduce energy consumption by 10% from the Fiscal Year 2005-06 baseline. Requires agencies to develop and implement materials management, purchasing, and resource management policies.

Requires working with the Greening Council (as formed and facilitated by the Governor's Energy Office) to adopt a goal of "zero waste." It also requires following a DPA / DPHE purchasing policy that will include the purchase of products to consider recycled content, toxicity, and impact on air and water resources; energy star. The EO requires that electronic equipment purchases consider life-cycle and energy impacts.

The EO requires the Greening Council to develop standards for the leasing of state buildings that will address water, energy, recycling, and access to public transportation; requires restrictions in purchase of 4WD, replacement of pre-1996 light duty trucks that get <25 miles to the gallon, and annual reporting to Greening Council on petroleum reduction; requires use (when available) of a minimum of 20% bio-diesel blend for diesel vehicles, fueling flex-fuel vehicles with alternative fuels 50% of the time.; elements of D 005 05 remain in place and are to be read in conjunction with this Executive Order.

ix) Since the mid-1970s, the President and Congress have promoted energy efficiency in Federal Agencies. The following is directly applicable:

(1) Energy Policy Act: State & Alternative Fuel Provider Rule -EPAct 507 (1996) For state agencies that have more than 50 light-duty vehicles (LDV) (excluding emergency vehicles, law enforcement, vehicles parked at personal residences) and 20 of them are primarily used in metropolitan areas and those 20 vehicles are centrally fueled or capable of being centrally fueled, those agencies are required to comply with the Alternative Fueled Vehicle Acquisition Mandate; states are required to purchase an increasing amount of Alternatively Fueled Vehicles (AFV) starting in 1996. The following is the required schedule of AFV purchases as a percentage of total new LDV purchases by State fleets: 10

percent for model year (MY) 1996, 15 percent for MY 1997, 25 percent for MY 1998, 50 percent for MY 1999, and 75 percent for MY 2000 and beyond.

x) Executive Order D 2010-006 (4/22/10) Governor Ritter: Greening of State Government: Earth Day 2010. Requires further reductions in state agency consumption of water, energy, petroleum, and paper in addition to the collection of reduction data. By FY 2011-12, (using a baseline of Fiscal Year 2005–06) State agencies are required to:

(1) For Recycling:
   (a) Develop and implement a plan for recycling by June 30, 2011.

(2) For Paper
   (a) Develop and implement a plan for consumption reduction by December 31, 2010.

(3) For Purchasing
   (a) Amendment to existing Preferable Purchasing Plan; avoid purchase of bottled water.

(4) For the Climate Action Plan
   (a) Achieve reductions in greenhouse gas emissions of 20% below 2005 levels by 2020 and a reduction of 80% below 2005 levels by 2050.
   (b) Achieve waste diversion from landfills of 75% by 2020.
   (c) Provide information for annual greenhouse gas emission reporting on an annual basis.

(5) For Renewable Energy
   (a) New construction and renovations shall request a review of renewable energy systems and related opportunities to optimize savings.

(6) For Petroleum Reduction
   (a) Adherence to State Fleet Management vehicle replacement plan.
   (b) Develop a plan to improve employee commuting plan options by December 31, 2010.

(7) For Smart Use of Energy and Water
   (a) Update Energy management Plans prepared under EO D 0011 07 by March 31, 2011.
   (b) Use EnergyCAP software to track utility bill information.
   (c) Have utility bill data input into EnergyCAP for calendar year 2009 by June 15, 2010, for calendar year 2005-2006 forward by December 31, 2010.
   (d) Develop a system for future ongoing input by December 31, 2010.
   (e) Conserve energy at employee workstations.

(8) For Greening Government Council
   (a) Coordinate and collaborate with the Council and the Executive Director shall review greening results on an annual basis.

e) In order to establish and maintain a successful energy program, the Department shall name an energy management director. The energy management director either, directly or through delegation shall possess key competencies in the technical, behavioral, and managerial aspects of energy management.

2) Energy Management Challenges

a) Efficient use of energy and water resources plays an important role in support of CDOT's organizational Mission. The inefficient use of energy wastes limited transportation funds, diverting those funds from other essential requirements to unnecessarily excessive monthly expenditures on energy. To reduce monthly energy expenditures life-cycle cost analysis, effective energy efficiency and renewable energy measures requiring little to no upfront capital cost should be used to the maximum extent practicable.

b) Develop Integrated Conservation Program:
   i) A major challenge facing the energy manager is to promote efficiency and reduce costs as much as possible without jeopardizing the core facility capabilities or reducing the quality of life for CDOT personnel. The energy manager must develop and orchestrate the implementation of an integrated energy and water conservation program. That program must involve every energy user within the Department from the Executive Director to the most recent entry level employee.

c) Obtain Top Management Support

   i) While some improved efficiency can be obtained at little or no cost, fully successful conservation programs need top management support. There are ways to obtain those needed resources, but to do so, energy managers must collaborate with top management to identify and implement projects that realize cost savings and benefits through energy conservation and the implementation of renewable energy. Taking full advantage of energy efficiency and renewable energy opportunities requires that management place priority on energy efficiency and renewable energy projects and staffing. To the extent that this can be done without reallocation of funds, it should be completed and the resulting savings shall be set aside for re-investment in energy efficiency and renewable energy savings measures.

   The Energy Management Director shall assemble key staff to implement the Department's Energy Management Plans.

d) Select Optimum Strategies

   i) The energy management director shall coordinate with others to implement life cycle cost effective conservation projects, since the application of conservation technologies and their payback and savings-to-investment ratio (SIR) can vary widely. Numerous conservation opportunities exist at facilities statewide. To achieve maximum energy and cost savings, opportunities should be ranked by appropriate life-cycle cost statistics and projects shall be bundled together with their combined total investment averaged to determine the overall comprehensive project return on investment.

e) Obtain Project Funding

   i) There are various methods of financing projects including the traditional use of CDOT Operations and Maintenance (O&M) funds. Existing funding venues and programs at the Federal level may provide additional funding for state level applications such as, the Energy Conservation Investment Program (ECIP), Federal Energy Management Program (FEMP) funds, Energy Savings Performance Contracts (ESPC), and utility Demand Side Management (DSM) or energy services programs. O&M funds should be reserved for operations and maintenance to the greatest extent practicable.

   ii) The Governor's Energy Office Management has provided support through a program that allows state agencies to more easily engage in an Energy Performance Contract. CDOT is encouraged to participate in this program.

f) Manage Risk and Responsibility

i) Like all managers, the energy management director must deal with uncertainty. For example, fluctuating energy prices change the return on investment of energy projects. The Energy Management Director should appropriately account for risk in contracts implemented. Changing technologies and gained efficiencies may also make projects more attractive. Staff needs to stay abreast of changes in the energy field and take advantage of newer, more efficient technologies as they become available, provided they are life cycle cost effective.

g) Obtain Necessary Training

i) There is no substitute for a well-trained, competent, and dedicated energy management director and staff. Professional development is an important part of each energy management program. Attendance at professional forums and seminars is a good way to be informed of continued technological improvements and exchange useful ideas. Energy Management Directors are encouraged to seek out and request necessary training to fulfill the requirements of their position effectively. Where appropriate energy management staff are encouraged to become Certified Energy Manager (CEM) and LEED Accredited Professionals and/or are encouraged to obtain similar training and professional accreditations.

h) Benefits Of Energy Conservation

i) CDOT's size and various locations provide it with a unique opportunity to shape an energy conservation strategy to serve as an example for other state DOTs. By providing leadership and using strategic partnerships, CDOT can provide real project experience and an n effective template for other agencies follow.

i) Improved Use of Resources

i) Conservation can be accomplished in part through improved daily management practices. Conservation does not mean simply turning off the switch and doing without. Rather, it means using resources more efficiently to provide the same or even an improved level of benefits at a lower cost. Conservation helps agencies deal with resource limitations without reducing the agency's core capabilities, productivity, or the quality of life for its personnel. Resource-saving upgrades to facilities help provide needed improvements to infrastructure. On a global basis conservation also improves national energy security and reduces the need for imported energy sources.

j) Cost Savings

i) The primary tangible benefit of energy conservation is the dollar savings resulting from improved operating efficiency. This savings accrues to the benefit of the taxpayer through providing additional value. Projected cost savings for utility costs are utilized in supporting energy performance contracts by paying in part for the retrofits, the associated M&V, O&M, repair and replacement, and cost of financing the project. Should further savings be documented, a retention of savings model in the CDOT budget, if implemented, could provide additional incentives to save and fund improvements that benefits infrastructure and management alike. When measures fund themselves and additional savings are allowed to fund future measures, management can be partially relieved of the full burden of sudden replacement costs and upgrades paid through capital funds or budget allocations, and additional time and costs are saved. This is a thought for review. In practice, the resource savings vary and the model should not be used as justification to decrease or limit anticipated budgets.

k) Environmental Benefits

i) Energy efficiency directly benefits the environment, helping agencies meet their environmental goals. Reducing energy use reduces the amount of air pollutants resulting from the direct burning of fossil fuels and indirect burning when generating electricity. Less electricity consumption means less air pollution; a 10% reduction in US electricity use would cut annual carbon dioxide emissions by over 200 million tons, sulfur dioxide emissions by 1.7 million tons, and nitrogen oxide emissions by 900 thousand tons. Use of less fuel to produce steam on facility complexes means less worry about the cost of meeting legally permitted emissions levels.

l) National Energy Goals And Policies

i) Most experts agree that an aggressive drive to use energy more efficiently can significantly reduce energy costs without any adverse operating impact. Estimates of technically feasible, cost-effective reduction of electricity by organizations such as the Electric Power Research Institute (EPRI) and the Rocky Mountain Institute range from a low of 25% to as much as 75% of existing use. Combining electricity savings with the tremendous potential for non-electric energy savings, can result in significant savings which can be used to fund other important energy reduction initiatives.

3) Organizing for Energy Management

a) Energy management begins by establishing a set of energy reduction and cost-savings goals to which top management must be committed. The goals are followed by the creation of an organizational structure and the allocation of sufficient resources, usually beginning with a staff allocation. Once the new organizational structure (and the effective use of existing structures) is in place, the energy management director should implement an organization-wide energy management program that makes all agency personnel the manager's energy allies.

b) While the energy management director is uncovering and ranking major energy and water projects, all personnel shall participate in saving energy using no-cost or low-cost techniques and are encouraged to identify and notify the energy management director of any additional energy-saving opportunities not being utilized.

4) Specific to the Colorado Department of Transportation:

a) The Mission of the Colorado Department of Transportation is, "To provide the best multi-modal transportation system for Colorado that most effectively moves people, goods and information."

b) In Fiscal Year 2005 CDOT's actual maintenance commitments amounted to 23,030 lane miles of State and Interstate systems and 3,757 bridges. Vehicle miles of travel on this system amounted to 28.5 Billion. More than 70 percent of CDOT's approximately 3,100 staff has hands-on responsibilities that are directly related to providing for the well being and safety of the traveling public.

c) With regard to real property, CDOT utilizes more than 600 structures located at more than 200 locations statewide. With a goal to improve the efficient operation of these facilities the following objectives have been identified followed by potential implementation strategies.

i) An objective to include energy efficiency in the identification and design of facility construction and renovation projects.

(1) The energy management director will make energy efficiency a primary consideration in the design or replacement of HVAC systems and related mechanical equipment.

(2) The energy management director will develop a space management plan that establishes criteria for minimum energy use and cost per square foot and benchmark where applicable using the Energy Star Portfolio Manager or GEO utility management tools.

(3) The energy management director will secure technical assistance to identify and evaluate potential energy efficiency upgrade projects. This technical assistance will be shared with engineering, architectural, and other support contractors to ensure that all project feasibility studies address energy related issues accurately and comprehensively.

(4) The energy management director will work closely with architects and engineers during the design phase of new construction and major renovation projects to ensure that short term project cost containment does not override the goal of minimizing long term operating costs and will help achieve a green building rating (i.e., USGBC LEED: Silver, GBI Green Globes: 2 Globes, etc).

ii) An objective to incorporate alternative and renewable energy sources where economically feasible in facility construction and renovation projects.

(1) The energy management director shall be responsible for maintaining an ongoing awareness of sources of renewable and alternative energy technology and working with the facility operators to determine if applications for these technologies exist and can be combined or bundled with energy efficiency opportunities in a life cycle cost effective manner.

(2) New construction project managers will require that the architect/engineer address options for incorporating passive solar design into a new facility or major renovation project.

(3) New construction project managers will consider the feasibility of incorporating a photovoltaic (PV) energy system into the design of any new facility with anticipated high summertime air conditioning loads or other heavy electric daytime loads that would contribute to high utility demand costs.

(4) New construction project managers will compare the life cycle cost of purchasing a photovoltaic energy systems with that of new or upgraded electric service when planning a new small load facility (under 100 Kwh per month) such as an equipment storage shed, communications system, exterior lighting, or other small load applications

(5) The energy management director will compare the life cycle cost of using PV for the agency's existing battery loads, battery banks, or portable generators which are either used regularly or for emergencies.

(6) The energy management director will compare the life cycle cost of replacing any of the agency's permanent generators for which fuel delivery or transportation may be troublesome (or which may be in locations where noise is undesirable) with a PV system. Include the savings in reduced manpower to maintain and service the generator in the life cycle cost analysis

(7) New construction project managers will request that the architect/engineer assess the life cycle cost of incorporating a solar thermal water heating system for any new facility which will have a fairly large and constant water heating load and natural gas service is not readily available.

(8) The energy management director will consider solar thermal technology for any existing facilities which have a fairly large and constant water heating load, and the water is currently being heated using electricity.

(9) The energy management director will assess the economic feasibility of installing a geothermal system in any existing buildings where there currently exists a water source heat pump system in need of renovation.

(10) New construction project managers will request that the architect/engineer assess the economic viability and technical feasibility of incorporating a geothermal system when planning construction of a new small to medium-size office buildings (less than 4 stories), or other housing type facility. Utilize the local electric utility provider to determine what technical assistance they may be able to provide in conducting the assessment.

iii) An objective to reduce the energy used for heating and cooling facilities.

(1) The agency will replace existing outdated HVAC systems and related equipment with energy efficient systems whenever life cycle cost effective.

(2) The facilities manager will conduct preventative maintenance on the air handling system by: completing a daily visual inspection; changing filters monthly; checking and adjusting belts monthly; greasing bearings annually; cleaning humidifier monthly, checking pipes weekly; and checking glycol and water.

(3) The facility manager will set heat thermostats so that the conditioned space temperature is maintained at 68 F with a sensitivity of 3 degrees during the daytime in the winter and 75 F with a sensitivity of 3 degrees in the summer when the space is occupied to the extent that it is life cycle cost effective for the HVAC equipment to handle the temperature requirements. Thermostats will be set to 55 and 83, respectively, when the space is unoccupied to the extent that it is life cycle cost effective for the HVAC equipment to handle the temperature requirements. On state holidays thermostats will be adjusted to a level practical for the seasonal heating or cooling demands for the month and level of holiday observance by employees.

(4) The facility manager will ensure that all thermostats are calibrated annually so that temperature settings can be accurately maintained.

(5) The facility manager will complete an energy audit for each facility and implement all no and low cost operations and maintenance improvements for the HVAC equipment.

(6) The facility manager will establish a preventative maintenance program and identify and provide or procure training for maintenance staff on the efficient operation of HVAC equipment.

(7) The energy management director will provide or procure professional engineer, architect, or energy technician services to complete a comprehensive energy analysis of each facility. The results and recommendations for improvements will be shared with agency decision makers.

(8) The energy management director will ensure that all energy conservation and efficiency measures with a simple payback of 5 years or less are implemented as stand alone measures OR are bundled with other projects to decrease overall return on investment for other measures under consideration provided the entire project portfolio is life cycle cost effective.

(9) The agency will consider upgrading HVAC system controls with life cycle cost effective direct digital controls, energy management control systems, or smart time clocks

(10) The facility manager and energy management director will evaluate installing HVAC economizer systems to take advantage of natural cooling cycles and heat reclamation from exhaust air streams.

(11) The agency will include duel fuel systems in the evaluation of central heating equipment so that the agency may qualify for interruptible rate utility service.

iv) An objective to reduce the energy used for lighting facilities.

(1) The facility manager will identify lighting upgrade opportunities (i.e., during renovation projects, when rooms are painted or when use schedules change) and evaluate the feasibility of energy efficient lighting upgrades at that time.

(2) The energy management director will be responsible for maintaining an ongoing awareness of energy efficient lighting technologies, agency or facility upgrade preferences (i.e., retrofit existing fixtures instead of replacing), and agency upgrade goals (i.e., upgrade all facilities of one specific type or use within one year) and operating time.

(3) The energy management director will consult with the Governor's Energy Office and other available resources for information on energy efficient lighting technologies and conducting lighting surveys.

(4) The facility manager will conduct lighting surveys of their respective existing facilities to identify opportunities for light level reductions, lighting upgrades, task light applications, and lighting controls applications.

(5) The energy management director will provide occupants with information on the energy saving benefits and proper use of day lighting, task lighting, and lighting controls systems.

(6) The energy management director will assure that the agency takes advantage of all cost-effective lighting upgrade opportunities as resources are available.

(7) The energy management director will provide the designated vendor or Colorado agency with data on lighting upgrade projects as part of the energy plan status.

v) An objective to implement ongoing operations and maintenance (O & M) procedures to maximize energy efficiency.

(1) Facility managers with physical plant responsibilities will perform an inventory and audit of all electric motors; recording the horse power, revolutions per minute, enclosure ratings, connected load, and annual operating hours to establish a predictive failure and replacement schedule. New motors will be high efficiency motors.

(2) Facility managers with physical plant responsibilities will review and analyze the automated energy management system to verify proper program settings for temperature, night set-backs, load shedding and run-time and make necessary changes to optimize energy efficiency.

(3) As needed, facility managers with physical plant responsibilities will ensure that the appropriate staff receives sufficient training in the proper operation of all new energy conservation measures including HVAC and energy management controls systems.

vi) To meet these objectives CDOT has begun the initial stages of entering into an Energy Performance Contract that will be initiated for Real Property on a Department-wide basis. Within the implementation of this contract the following tasks will be performed:

(1) To provide a basis for determining potential savings utility invoices for all CDOT facilities will be collected and analyzed for usage and associated costs. This data once collected will be provided to the State Utility Database Management Vendor.

(2) This will allow the completion of surveys of all facilities to be conducted within 18 months and that a multi-year plan be undertaken to initiate renovations and improvements.

(3) Based upon Life Cycle Cost analysis, identified renovations and improvements will be prioritized and bundled for maximum potential benefit.

(4) Develop and implement programs to reduce use of petroleum-based fuels in buildings.

(5) Require that design and construction of new facilities minimize the Life Cycle Cost of the facility by utilizing energy efficiency, water conservation, or solar or other renewable energy technologies.

(6) Required that design and construction of facilities meet or exceed the energy performance standards applicable to Federal residential or commercial buildings as set forth in 10 CFR 435, local building standards, or other specified limits, whichever results in the lowest Life Cycle Cost.

(7) Required implementation of a new facility program that will insure that the construction of facilities meets outlined requirements before the facility is accepted into the facility inventory. The use of EPC for new facilities for infrastructure improvements, baselined against planned infrastructure, may also be considered.

(8) Required use of passive solar design and active solar technologies where they are life-cycle cost-effective.

(9) A review of the GEO's, "Report of the Task Force on Renewable Resource Generation Development Areas, December 21, 2007, indicates that wind power and solar power in particular may provide potential energy solutions to CDOT facilities in the eastern plains, southeast Colorado and the San Louis valley area.

(10) Through this effort design standards for new construction will be reviewed and designs will be incorporated that focus toward reducing the long term usage of energy instead of an immediate short term reduction in construction cost.

vii) An objective to fund energy efficiency projects.

(1) Target those facilities which consume the greatest energy, to evaluate which have the most to gain from implementation of energy efficiency improvements.

(2) Prioritize facilities in order of their energy savings potential, examine opportunities to make energy efficiency improvements, and explore technical and financial programs which will support these improvements.

(3) The energy management director will maintain a prioritized list of energy efficiency projects to be able to quickly respond to funding availability.

(4) Work with the Governor's Energy Office Management and other appropriate State and Federal agencies to prepare energy proposals to participate in State, Federal and other innovative financing mechanisms and grant programs.

5) To increase energy efficiency of CDOT within the agency operations and services.

a) An objective to integrate energy efficiency in internal operations and support services.

i) The agency will implement an updated agency energy management plan, and the agency Executive Director will designate an energy management director as the agency's central point of contact for energy management information.

ii) As an energy user CDOT is not a large consumer of water in general operations. However, improvements in water conservation can always be of focus to the general employee base through programs that communicate awareness, facilities program that monitor usage and reward programs for recognized improvements.

iii) Require that microcomputers, monitors, and printers meet EPA "Energy Star" requirements for energy efficiency as long as the additional costs of the equipment are offset by the potential energy savings.

The agency staff will implement where available recycling programs for office paper, cardboard, newspaper, laser printer toner cartridges, glass and aluminum.

The energy management director will facilitate the efficient use of lights, appliances, and other energy-consuming equipment by posting signs reminding employees to turn-off equipment when not in use.

iv) The agency Executive Director will send a memo semi-annually reminding employees to keep windows closed during the heating and cooling season and to set thermostats so that the occupied space temperature is maintained at 68 F with a sensitivity of 3 degrees during the daytime in the winter and 75 F with a sensitivity of 3 degrees in the summer. Thermostats will be set to 55 F and 83 F, respectively, when the space is unoccupied to the extent that it is life cycle cost effective for the HVAC equipment to handle the temperature requirements. On state holidays thermostats will be adjusted to a level practical for the seasonal heating or cooling demands for the month and level of holiday observance by employees.

v) The agency Executive Director will communicate to the owners of leased facilities the State's commitment to energy efficiency and encourage the owners to implement energy conservation measures in their buildings.

vi) The agency Executive Director will encourage a review of lessor improvements that increase energy efficiency and consider the potential of excessive energy usage when negotiating leases.

vii) The agency staff will reduce the wasteful use of supplies and materials in the workplace, using techniques such as double-sided copying, reducing document reproduction, reusing materials, etc.

viii) The agency will purchase cost effective, energy efficient products to minimize life cycle costs.

ix) The procurement staff will emphasize the importance of energy efficiency when evaluating and securing services, by stressing that it is valued both as a part of the service provided and within service company operations.

x) The agency staff will utilize computer networks and electronic mail to reduce the use of paper products in the office.

xi) The agency energy management director will provide staff with information on the efficient operation of energy-using systems, such as computers or copiers.

xii) The agency will increase the purchase of recycled supplies, such as stationery, envelopes, photocopy paper, and business cards.

b) To reduce the work-related travel of agency employees.

i) The agency will expand the use of the telecommunications system to decentralize work and reduce the need to travel to meetings, conferences, and other offices.

ii) The agency Executive Director will encourage transportation demand management activities, including vanpooling, carpooling, public transportation, and telecommuting.

iii) The employee transportation coordinator will encourage transportation demand management activities by distributing rideshare program brochures annually to 100% of the agency's employees.

iv) The agency will consider participation in the Transit and Ridesharing Incentive Program to increase employees' use of public transportation and vanpooling.

v) The agency staff will use teleconferencing and other alternatives to centralized meeting locations when available and where appropriate.

vi) The agency staff will use public transportation for work related travel (to meetings etc.) where appropriate.

vii) The agency will adopt flex-time or staggered work schedules to reduce traffic congestion and to support public transportation and carpooling, when consistent with the agency's mission.

viii) The employee transportation coordinator will track and report the number of employees participating in transportation demand reduction programs.

c) With regard to the areas where motor pool vehicles are available on a reservation basis there is an objective to increase and maintain efficient and cost effective fuel usage within the agency fleet through enhanced fleet management and maintenance procedures.

i) The agency's fleet management staff will institute a formal program whereby state vehicle size and type (i.e. sport utility 4-wheel drive vehicle vs. a minivan) are assigned based upon travel requirements.

ii) The agency will practice generally established maintenance procedures to maintain the maximum fuel efficiency of all vehicles within the fleet.

iii) The agency fleet management staff will ensure that employees using fleet vehicles are trained to operate them efficiently, using strategies ranging from the use of efficient routing and scheduling, to using proper octane fuels.

iv) The agency fleet management staff will assess the availability of fuels for use in the alternatively fueled fleet equipment and vehicles purchased by the agency.

6) Monitor and evaluate the agency energy management plan.

a) To monitor energy cost and consumption.

i) Where appropriate agency will utilize energy management software to monitor the agency's energy cost and consumption.

ii) The agency will manage and maintain a database as assembled by the energy management software and will provide quarterly energy cost and consumption data.

iii) The energy management director will work to insure the accuracy of the energy management software data.

iv) The energy management director will work to document energy cost and consumption savings attributable to funded energy reduction initiatives.

v) The energy management director will share the agency energy use information with agency management to ensure that agency and facility decision makers are aware of the data available in the database for use in determining where to target facility energy reduction efforts.

b) To monitor and evaluate the progress of the Agency Energy Management Plan.

i) The energy management director will design an internal reporting system to monitor the progress of the agency energy management plan's implementation.

ii) The energy management director will promote the agency's energy management plan initiatives and successes to agency management and employees.

iii) The energy management director will provide feedback to agency management and employees on the results on energy conservation initiatives (i.e. include information in newsletters, e-mail etc).

1) To increase energy efficiency of CDOT within the agency operations and services.

   a) An objective to integrate energy efficiency in internal operations and support services.

      i) The agency will implement an updated agency energy management plan, and the agency Executive Director will designate an energy management director as the agency's central point of contact for energy management information.

      ii) The agency staff will implement where available recycling programs for office paper, cardboard, newspaper, laser printer toner cartridges, glass and aluminum.

      iii) The energy management director will facilitate the efficient use of lights, appliances, and other energy-consuming equipment by posting signs reminding employees to turn-off equipment when not in use.

      iv) The agency Executive Director will send a memo semi-annually reminding employees to keep windows closed during the heating and cooling season and to set thermostats so that the occupied space temperature is maintained at 68 F with a sensitivity of 3 degrees during the daytime in the winter and 75 F with a sensitivity of 3 degrees in the summer. Thermostats will be set to 55 F and 83 F, respectively, when the space is unoccupied to the extent that it is life cycle cost effective for the HVAC equipment to handle the temperature requirements. On state holidays thermostats will be adjusted to a level practical for the seasonal heating or cooling demands for the month and level of holiday observance by employees.

      v) The agency Executive Director will communicate to the owners of leased facilities the State's commitment to energy efficiency and encourage the owners to implement energy conservation measures in their buildings.

      vi) The agency Executive Director will encourage a review of lessor improvements that increase energy efficiency and consider the potential of excessive energy usage when negotiating leases.

      vii) The agency staff will reduce the wasteful use of supplies and materials in the workplace, using techniques such as double-sided copying, reducing document reproduction, reusing materials, etc.

      viii) The agency will purchase cost effective, energy efficient products to minimize life cycle costs.

      ix) The procurement staff will emphasize the importance of energy efficiency when evaluating and securing services, by stressing that it is valued both as a part of the service provided and within service company operations.

      x) The agency staff will utilize computer networks and electronic mail to reduce the use of paper products in the office.

      xi) The energy management director will provide staff with information on the efficient operation of energy-using systems, such as computers or copiers.

      xii) The agency will increase the purchase of recycled supplies, such as stationery, envelopes, photocopy paper, and business cards.

   b) To reduce the work-related travel of agency employees.

i) The agency will expand the use of the telecommunications system to decentralize work and reduce the need to travel to meetings, conferences, and other offices.

ii) The agency Executive Director will encourage transportation demand management activities, including vanpooling, carpooling, public transportation, and telecommuting.

iii) The employee transportation coordinator will encourage transportation demand activities by distributing rideshare program brochures annually to 100% of the agency's employees.

iv) The agency will consider participation in the Transit and Ridesharing Incentive Program to increase employees' use of public transportation and vanpooling.

v) The agency staff will use teleconferencing and other alternatives to centralized meeting locations.

vi) The agency staff will use public transportation for work related travel (to meetings etc.) where appropriate.

vii) The agency will adopt flex-time or staggered work schedules to reduce traffic congestion and to support public transportation and carpooling, when consistent with the agency's mission.

viii) The employee transportation coordinator will track and report on the number of employees participating in transportation demand reduction programs.

c) With regard to those areas where motor pool vehicles are available on a reservation basis there is an objective to increase and maintain efficient and cost effective fuel usage within the agency fleet through enhanced fleet management and maintenance procedures.

i) The agency's fleet management staff will institute a formal program whereby state vehicle size and type (i.e. sport utility 4-wheel drive vehicle vs. a minivan) are assigned based upon travel requirements.

ii) The agency will practice generally established maintenance procedures to maintain the maximum fuel efficiency of all vehicles within the fleet.

iii) The agency fleet management staff will ensure that employees using fleet vehicles are trained to operate them efficiently, using strategies ranging from the use of efficient routing and scheduling, to using proper octane fuels.

iv) The agency fleet management staff will assess the availability of fuels for use in the alternatively fueled fleet equipment and vehicles purchased by the agency.

2) Monitor and evaluate the agency energy management plan.

a) To monitor energy cost and consumption.

i) Where appropriate agency will utilize energy management software to monitor the agency's energy cost and consumption.

ii) The agency will manage and maintain a database as assembled by the energy management software and will provide quarterly energy cost and consumption data.

iii) The energy management director will work to insure the accuracy of the energy management software data.

iv) The energy management director will work to document energy cost and consumption savings attributable to funded energy reduction initiatives.

v) The energy management director will share the agency energy use information with agency management to ensure that agency and facility decision makers are aware of the data available in the database for use in determining where to target facility energy reduction efforts.

b) To monitor and evaluate the progress of the Agency Energy Management Plan.

i) The energy management director will design an internal reporting system to monitor the progress of the agency energy management plan's implementation.

ii) The energy management director will promote the agency's energy management plan initiatives and successes to agency management and employees.

iii) The energy management director will provide feedback to agency management and employees on the results on energy conservation initiatives (i.e. include information in newsletters, e-mail etc).