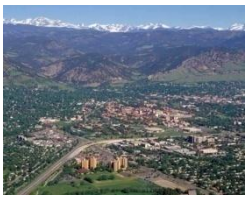
Boulder Valley School District

SUSTAINABILITY MANAGEMENT SYSTEM DOCUMENT



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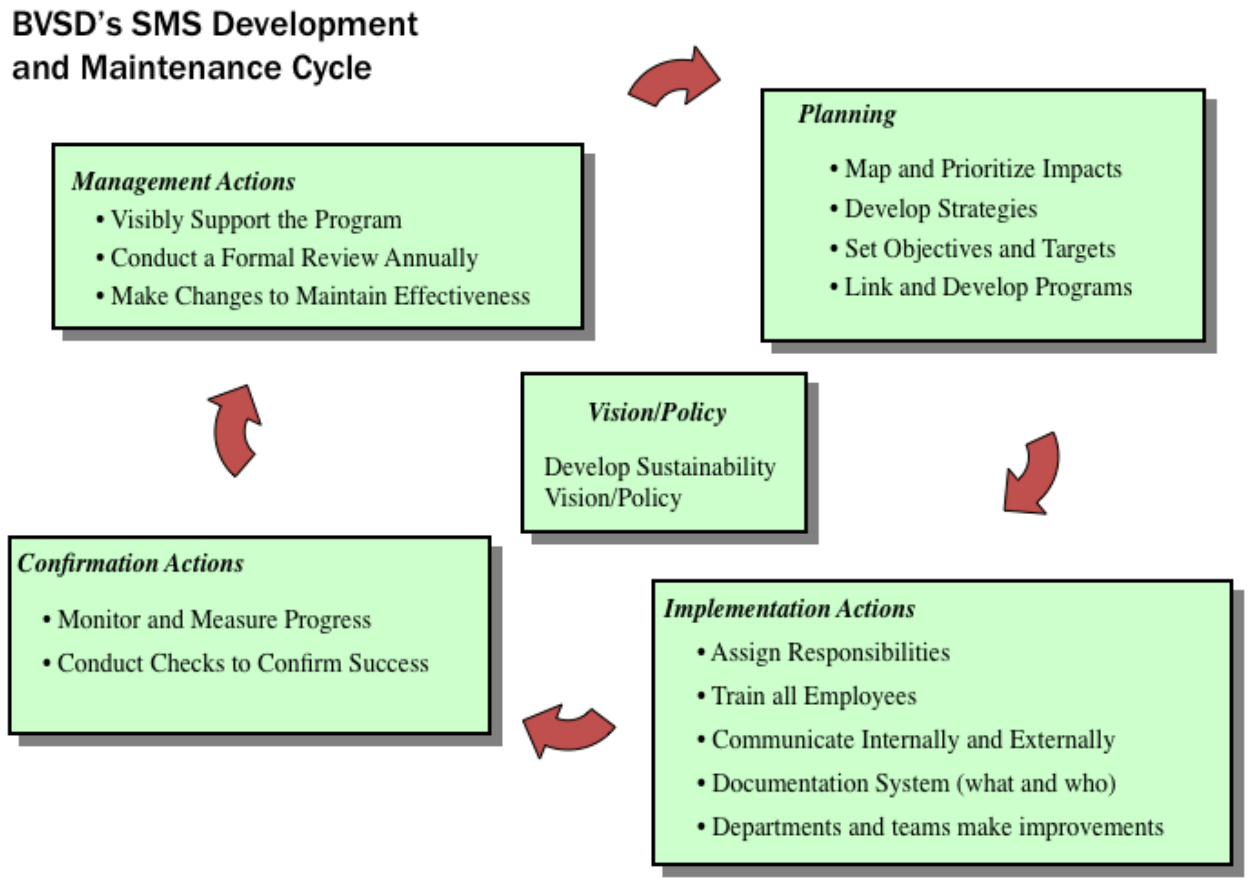
Executive Summary

In developing this Sustainability Management System (SMS), Boulder Valley School District (BVSD) is creating a vehicle that moves the District systematically toward sustainability, focusing attention at all levels on critical environmental, economic, and social issues. This SMS is designed to build off a platform of existing practices and work toward continuous improvement. It is a living system, not simply a document, and will evolve over time as goals are achieved and new challenges are addressed. The figure below presents the flow of the process, indicating the cycle of planning, doing, checking, and acting – all of which inform the next annual cycle around the longer-term sustainability policy and vision.



The District's SMS is guided by a vision statement intended to describe the ultimate outcome of the SMS and answer the question, "What does success look like?" The statement, presented below, is purposefully brief but impactful so that it can be can be taken up by champions throughout the District in a concise and consistent manner.

> "The Boulder Valley School District is committed to becoming a leader in environmental sustainability by creating healthy learning environments while providing students with the skills to address the systemic challenges faced by the world in this new century."

The SMS itself is comprised of this vision implemented across four focus areas identified during the SMS process – Buildings, Material Flows, Transportation, and Education. These focus areas are joined by the single cross-cutting theme of climate protection that reflects not only BVSD's goals in this area, but integrates with those of Boulder County and cities within the District's boundaries. In each of the four focus areas, both short- and long-term goals are identified, along with strategies for achieving these goals and metrics for measuring progress. The framework on the following page illustrates these elements of the SMS and is a snapshot of BVSD's SMS today. Parts of this framework are static (vision/policy and focus areas) and parts will continue to evolve over time (goals and metrics) as BVSD moves forward with its sustainability endeavors.

The SMS was developed using an initial process of conducting a baseline inventory, interviewing staff members, assessing six District buildings, developing a vision statement, and crafting strategies. However, the SMS is intended to be maintained using a consistent cyclical process of re-evaluating goals and strategies, leading to implementation of further practices. Furthermore, the SMP process was deliberately collaborative and included meetings and workshops with BVSD's Sustainability Task Force Committee, comprised of District and community stakeholders. These stakeholders will continue to play an important role in engaging the wider District community as it strives for greater sustainability.

To demonstrate BVSD's ongoing commitment to collaboration on the topic of climate and environmental sustainability, the Board of Education approved a resolution in May 2009 teaming the District with the City of Boulder, Boulder County, and the University of Colorado at Boulder to advance the cause of environmental sustainability. This resolution, along with the resolutions of the other organizations, establishes a framework and sets expectations for future collaboration and contains a substantive commitment to prioritize collaborative efforts in the areas presented below:

- Creating a green job workforce through technical education, teaching and internships
- Reducing greenhouse gas emissions, planning for climate change, and developing unified carbon tracking and reporting
- Identifying large-scale renewable energy opportunities
- Pursuing initiatives to achieve zero waste goals
- Exploring joint funding opportunities to implement preceding efforts

The full resolution can be found on BVSD's web site (http://bvsd.org/news/Pages/EnviroSustainabilityRes.aspx).

Vision and Policy						
Long-Term		**Focus Areas**				**Cross-Cutting Theme**
		Buildings (see Section 3.4.1)	**Material Flows (see Section 3.4.3)**	**Transportation (see Section 3.4.4)**	**Education (see Section 3.4.2)**	**Climate**
	Stretch Goals	• Net zero energy use in all new construction • No potable water used for irrigation • 100% reuse of indoor water	• Majority school foods organic • Purchases follow best green practices • Zero waste at all sites • Non-toxic environment • Hazardous end products safely managed	• Zero-based emissions • Alternative fuel use • Hybrid buses • All students on bus/walking/biking	• All students literate in sustainability • All staff incorporate sustainability into their positions and practices	• 80% reduction or climate neutral by 2050
Short-Term	5-Year Goals	• 5% improvement in energy operating efficiency (per square foot) of existing buildings • All projects follow LEED for Schools or CO-CHPS checklists • New spaces 30% more energy efficient than IECC 2006 • Remodeled spaces 15% more energy efficient than IECC 2006 • IPM in buildings • Reduced indoor air pollutants and asthma triggers • Natural weed and pest management • Non-potable use where possible • In new, remodeled spaces 30% reduction in indoor water consumption (per LEED calculator) • For new construction, 50% reduction in irrigation (per LEED	• RFPs contain sustainability criteria for products/services where appropriate • Most centrally purchased items achieve third-party sustainability certification where applicable or meet District guidelines • Quantity of unused donated items reduced 20% • Increase reuse of products/equipment by 10% • Increase specific materials (e.g. furniture, books) recycling by 20% • Diversion rate of 50% on C&D waste • Green Star at 50% or more of schools • Increase district wide diversion rate to 50% • Ed Center pilot for zero waste/80% diversion rate • Reduce hazardous/higher impact chemical products	Fleet Goals • Decrease average age of fleet to 7.5 years • Reduce VMT by 5% • Increase hybrids and alt fuel vehicles in support fleet Community Goals • Increase bus ridership by 2% • Increase walking/biking • Increase RTD ridership for non-qualified students • Decrease community VMT by 10%	• Sustainable curriculum standards • 50% of schools have active green teams • Green job training programs • Staff competency in sustainable practices • Percent of employees trained through orientation • Percent reduced energy use reflective of individual school efforts	• 10% below baseline • Minimum of 100 kW increase in renewables (consider 3rd party financing for larger projects)

		calculator) • 10% water use improvement in existing spaces (per square foot) • Energy modeling for new construction • Mechanical system commissioning • New roofs solar-ready for minimum 10kW PV	by 5% annually • School foods purchases as close to source and organic as possible			
	Strategies/ Initiatives	(see pages 18-37)	(see pages 49-57)	(see pages 58-61)	(see pages 39-48)	
Annual	Actions Practices Opportunities	(see Section 3.4.1)	(see Section 3.4.3)	(see Section 3.4.4)	(see Section 3.4.2)	
	Metrics	(see pages 25, 29, 33, 37)	(see pages 51, 53, 55, 57)	(see pages 59, 61)	(see pages 41, 45, 46, 48)	
Ongoing		**Implementation Platform** Organizational Elements: Sustainability Coordinator - Department Leaders - Staff Champions - Sustainability Task Force Committee Monitoring and Reporting: Key Metrics - Progress to Goals - Success Stories - Next Meaningful Paths				

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Figures and Tables

Acknowledgements

We would like to acknowledge the efforts of those who participated in developing this SMS.

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1.0 Introduction

Numerous school districts throughout Colorado and beyond are embracing sustainability as a tool to enhance the viability of their organizations, reduce costs, enhance the learning environment, drive innovation, and preserve valuable environmental qualities. Adopting sustainability as a mission enables a school district to minimize the negative impacts of unsustainable practices while simultaneously motivating employees and students to embrace innovative changes in practice that often lead to improved performance and cost savings. Specifically, embracing sustainability through a sustainability management system (SMS) has several benefits:

- Provides guidance for decision-making
- Provides a foundation for planning and action
- Influences changes in the workplace and classroom
- Creates efficiencies, synergies, and consistencies among programs leading to cost savings
- Shifts thinking from incremental to breakthrough
- Inspires commitment
- Creates visible management support and a unifying theme
- Reflects organizational style and culture
- Positions school districts to adapt to changes and take advantage of emerging opportunities
- Provides an example for the community and other school districts nationwide

This document provides the foundation and framework for BVSD's SMS. It includes a baseline inventory of the District's environmental footprint and practices related to sustainability, benchmarks the District against other schools and school-related performance metrics, provides a framework for the SMS, and identifies strategies as well as methods for implementing the SMS.

1.1 What is an SMS?

Broadly speaking, an SMS is a vehicle that moves an organization systematically toward sustainability. It provides an opportunity for a comprehensive and coordinated approach to sustainability that is integrated with standard metrics of performance. It serves to focus attention at all levels on critical environmental, economic, and social issues. An SMS also creates efficiencies and consistencies among programs and provides a shared decision-making and problem-solving framework for all employees.

Figure 1 diagrams and describes the overarching tenants of an SMS, including policy, planning, actions of implementation, confirmation, and management. Built from the Demming quality model of plan-do-check-act, the SMS is an ongoing cyclical process aimed at both continuous improvement and long-term thinking surrounding sustainability goals.

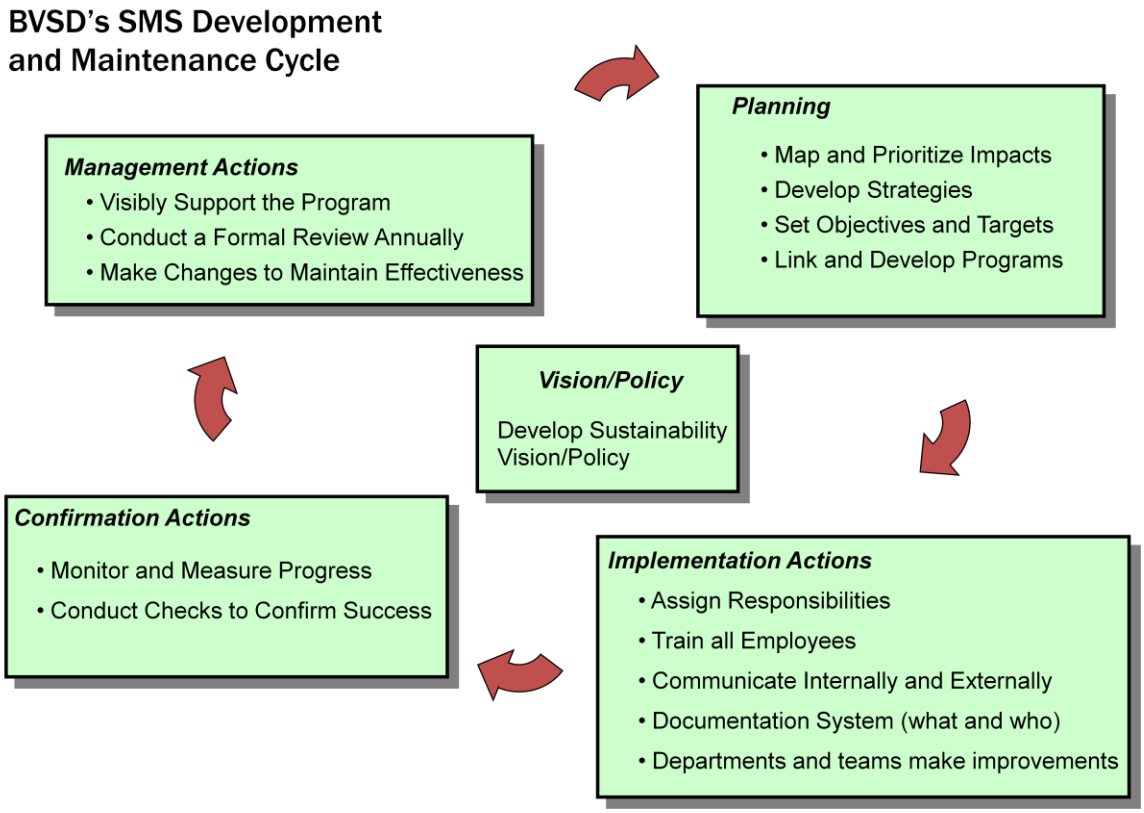


FIGURE 1. SMS CYCLE

This SMS provides a framework for BVSD to work toward greater sustainability in its buildings, operations, and educational mission. It builds from the momentum of programs and activities already in place within the District and acknowledges its unique qualities while integrating best practices from research and the experience of other school districts in their development of sustainability management systems and plans.

Specifically, the SMS will allow BVSD to:

- Highlight successes of existing internal sustainability efforts.
- Walk the talk.
- Use BVSD resources strategically.

- Adapt to changes as they arise.
- Benefit from emerging opportunities.
- Create efficiencies, synergies, and consistencies among programs leading to cost savings.

1.2 BVSD's SMS Development Process

The process for developing this initial version of BVSD's SMS involved conducting a baseline inventory and high-level building assessments, reviewing technical specifications for school construction with an eye toward sustainability, formulating a vision statement and goals that support sustainability, and developing strategies informed by these elements and the baseline inventory.

As shown in Figure 2, the SMS was developed using both a top-down and bottom-up approach. A vision, draft policy, and goals were developed from the top down to guide the process and inform strategies; while the results of the inventory, building assessments, and workshops were used to build a bottom-up foundation for implementing the strategies, including action steps and partnerships. The top-down and bottom-up approach allows full vertical integration, linking grassroots efforts in daily operations to cumulative goals in District policy in sustainability.

FIGURE 2. BVSD SMS APPROACH

1.3 Collaboration Process

Development of this SMS included collaboration with BVSD's Sustainability Task Force Committee. Members consisted of knowledgeable and interested stakeholders from within and outside of the District able to validate the inventory process, identify data sources, document existing District sustainability practices, and develop next steps. This advisory committee met to achieve the following:

- Kick off the project and establish a forum for the collaborative tasks ahead
- Recommend vision and goals that are uniquely suited to BVSD and that will guide forward progress on sustainability
- Recommend and prioritize strategies for reaching established goals and measuring success

In addition to the Task Force Committee meetings, six interviews (documented in Appendix A) spanning all District departments were conducted with BVSD staff members and parent/community representatives. These interviews were designed to engage staff from all departments and to give them a forum to discuss good things already happening as well as opportunities for improved sustainability in their unique areas of work.

The District also created a dedicated web page on the BVSD web site (**http://www.bvsd.org/GREEN/Pages/sms.aspx**) to provide transparency during development of the SMS and to facilitate the awareness and involvement of a larger group in the process. This web page houses meeting notes, presentation materials, interview notes, and other SMS resources so that staff and community members can be informed throughout the process.

And finally, as part of the SMS review process, BVSD made a draft SMS available on its web site during development for those interested in providing comment. The District appreciates the feedback it received as a result of this public review and has given all comments careful consideration as it moves forward. Comments received on this draft are documented in Appendix B of this SMS.

1.4 Scope of the SMS

The SMS involves all of BVSD's operations, departments, and academic programs to achieve a cohesive focus on environmental, economic, and social sustainability. This means moving beyond basic compliance with standards and regulations into areas such as green building construction, resource conservation, emissions reduction, transportation efficiencies, material flows, and curriculum development that supports sustainability. Through the SMS, BVSD is striving to ensure positive impacts for students and staff members, as well as the environment, while reaping the economic benefits of conservation and efficiency.

2.0 Baseline Environmental Inventory

To compile a baseline environmental inventory for the District, Brendle Group collaborated with BVSD to collect data and compile information on existing practices and develop a baseline characterization of District-wide energy and water consumption, solid waste generation and diversion rate, and fuel consumption from fleet transportation activities. The inventory also includes calculation of greenhouse gas (GHG) emissions. Collecting this information establishes a baseline from which to measure BVSD's progress toward sustainability from year to year. The fiscal year 2007/2008 was selected as the baseline year as it was the most recent year for which complete data were available.

2.1 Methodology

Sources of information for the inventory included utility records and BVSD databases. Associated GHG emissions were calculated using methodologies that are in alignment with published information on the University of Colorado and Boulder County GHG inventories or using nationally accepted factors, primarily from The Climate Registry, where the other inventories did not indicate the necessary factors. Data were normalized by square footage and by number of students for purposes of benchmarking BVSD's inventory with other school districts. The following specific data were collected to develop the inventory:

Energy

- Monthly electricity consumption (kilowatt hour [kWh]) and cost
- Monthly natural gas consumption (therms) and cost
- Monthly propane consumption (gallons [gal]) and cost

Water

- Monthly water consumption (gallons [gal]) and cost

Waste

- Annual solid waste generation (tons) and cost
- Annualdiversion to recycling (tons) and cost

Transportation

- Monthly fuel consumption (gallons [gal]) and cost

The GHG inventory includes carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Units of carbon dioxide equivalent (CO_2e) are used to normalize the global warming potential (GWP) of the various GHGs. As portrayed in Figure 3, the emission of 1 ton of N_2O has a GWP 310 times larger than that of the emission of 1 ton of CO_2. Similarly, the emission of 1 ton of CH_4 has a GWP 21 times that of CO_2. To avoid confusion between emissions of the different types of gases and their respective GWPs, all emissions are reduced to the common unit of CO_2e. Thus, the emission of 1 ton of N_2O is expressed as the emission of 310 tons of CO_2e. Tons of CO_2e will be labeled as tCO_2e.

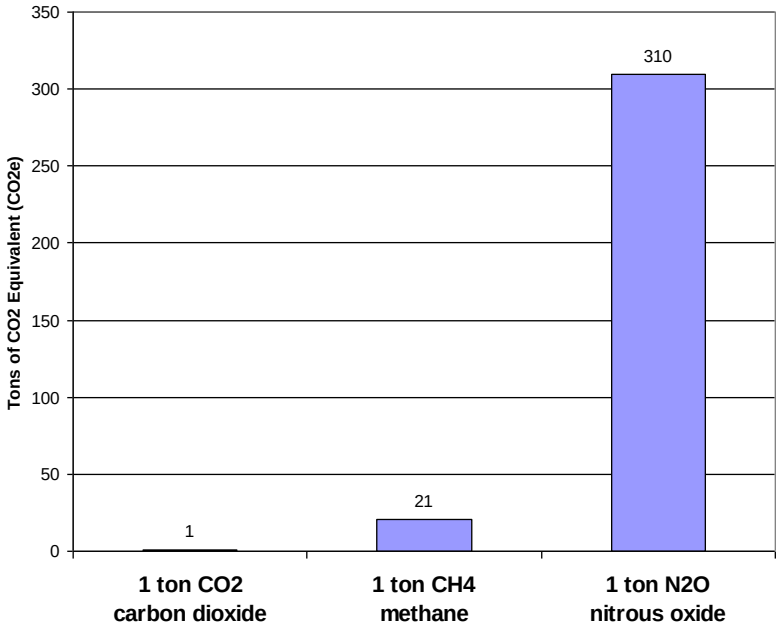


FIGURE 3. UNITS OF GHG REPRESENTATION

2.2 Baseline Inventory

Table 1 summarizes the findings of the BVSD baseline inventory.

Recycling is represented as an activity that avoids GHG emissions at the landfill by diverting materials that would potentially decompose from the waste stream.

The carbon dioxide emissions from using biodiesel in fleet vehicles are separated from the inventory total because they are treated as a biogenic emission source. Biogenic carbon dioxide emissions are those that arise from the combustion of biofuels or biomass.

TABLE 1. BVSD BASELINE INVENTORY

Emission Source	Quantity	Unit	Cost	Emissions (tons CO2e)
Electricity	30,266,316	kWh	$2,488,282	28,638
Natural gas	176,440	MMBtu	$1,443,452	10,585
Propane	8,432	gallons	$17,932	54
Fleet fuels	372,536	gallons	$1,064,299	3,746
Solid waste	1,802	tons	$130,999	67
Water	211,878	thousand gallons	$1,100,758	313
TOTAL			$6,245,722	43,403

Other Factors	Quantity	Unit	Cost	Emissions
Recycling	410	tons	$58,771	14 (avoided)
Biodiesel (5% biodiesel [B5] treated at B100 equivalent) - biogenic CO2 not included in inventory	16,469	gallons	unknown	172

2.2.1 Greenhouse Gas Emissions

Figure 4 below shows the sources for BVSD's GHG emissions for Fiscal Year 2007-2008, which are estimated at 43,403 tons CO_2e. Electricity comprises the largest share of emissions, followed by natural gas and fleet fuels. Solid waste, water, and propane comprise relatively smaller portions of total emissions.

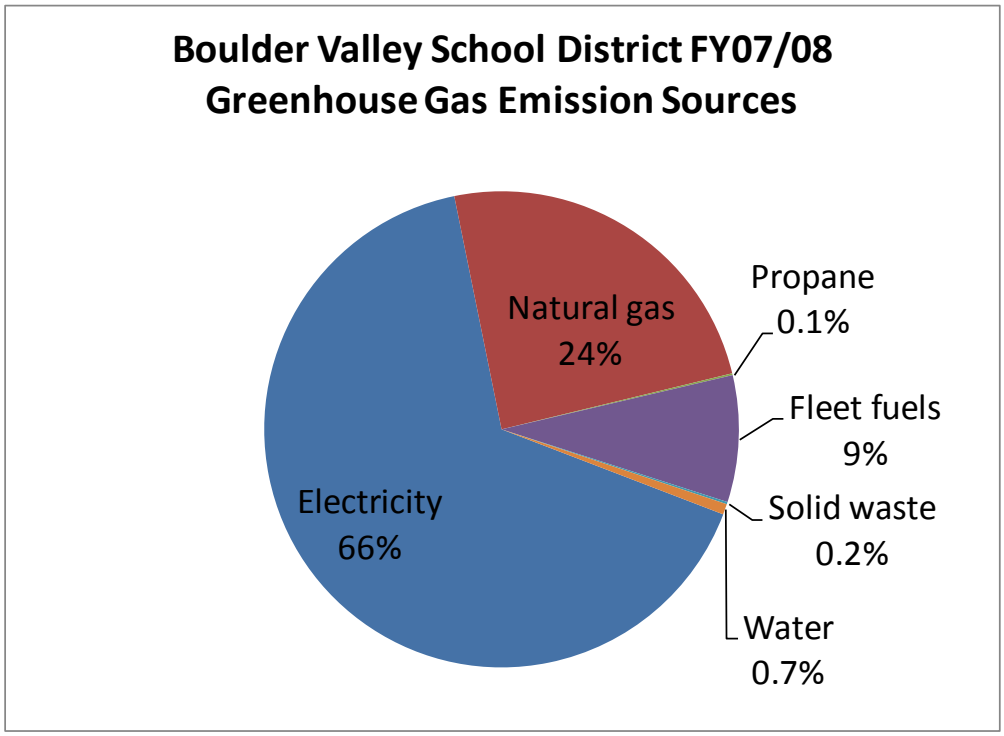


FIGURE 4. BVSD GHG EMISSIONS

2.3 Benchmarks

The following benchmark information compares BVSD's sustainability performance relative to another Colorado school district as well as more general benchmarks for schools.

In summary, BVSD schools use more energy, expressed on a kBtu per square foot basis, than relevant benchmarks, but slightly less on a per student basis (Table 2). Benchmarks from the Federal Energy Information Agency (EIA) include only school buildings, while information from the Poudre School District, like the data on which BVSD's performance is based, includes other District facilities (e.g., operations buildings, etc.) as well. Poudre School District is used in this analysis as the District has completed and implemented an SMS, which includes managing energy and water use. It also should be noted that approximately 14 percent of Poudre School District's electricity is purchased from green energy programs, but total energy consumption is used in benchmarking. BVSD has over 32 kW of solar PV and wind installed, but renewable energy credits (RECs) are sold for most of these systems so climate benefits are not reflected in the inventory.

TABLE 2. BVSD'S ENERGY PERFORMANCE

Benchmark	kBtu/SF of building space	kBtu/ student
Average of schools in this climate from EIA	83.7	n/a
Poudre School District	60.2	10,140
BVSD	**68.3**	**9,845**
Comparison to EIA	18% ↓	n/a
Comparison to PSD	13% ↑	3% ↓

Table 3 indicates BVSD's water use compared to available benchmarks, which include data on water consumption for 182 schools in Northern Colorado.

TABLE 3. BVSD'S WATER USE

Benchmarks	Thousand gallons/SF of building space	Thousand gallons/student
182 northern Colorado schools	0.045	5.7
Poudre School District	0.0353	6.0
BVSD	**0.0515**	**7.4**
Comparison to 182 N. Co. Schools	15% ↑	30% ↑
Comparison to PSD	46% ↑	25% ↑

Table 4 shows BVSD's fuel use compared to available benchmarks. It should be noted that Poudre School District serves 1,856 square miles, while BVSD serves approximately 500 square miles.

TABLE 4. BVSD'S FUEL USE

Benchmark	Gallons of fuel/SF of building space	Gallons of fuel/student
Poudre School District	0.09	15.5
BVSD	**0.09**	**13.1**
Comparison to PSD	1% ↓	16% ↓

Because of differences in solid waste and recycling rate estimations, direct comparison between BVSD and Poudre School District is difficult. The waste generation rate for BVSD is estimated from the level of service described in the purchase order for waste hauling services and available data on quantities of recycled material through Eco-Cycle, including e-scrap and books. Poudre School District's rates originate from an internal waste audit and records provided by waste haulers. As a result, it is more consistent to compare the diversion rates for each district. In fiscal year 2007, Poudre School District diverted approximately 15 percent of solid waste from the landfill to recycling. The diversion for BVSD District-wide is estimated at 17 percent.

2.4 Building Assessments

The results from a number of District building assessments were considered as part of the inventory and strategy development aspects of SMS development (eight resulting from Xcel Energy assessments and one District-wide energy engineering study through the Governor's Energy Office). These assessments looked at a number of BVSD buildings (Table 5).

TABLE 5. BUILDINGS EVALUATED

Xcel Energy Assessments – 2009	GEO Energy Engineering Study - 2008	Xcel Energy Design Assistance Studies – 2007/2008
Boulder High School	Aurora 7 Elementary	Casey Middle School
BVSD Ed Center	Centaurus High School	Louisville Middle School
Centennial Elementary	Lafayette Elementary	Broomfield High School
Coal Creek Elementary	Louisville Elementary	
Eisenhower Elementary	Louisville Middle School	
Horizon Charter School	Summit Middle School	
Nederland Middle/High School		
Peak to Peak Charter School		

Building from existing practices, a number of building-related themes emerged from the assessments that inform the strategies outlined in Table 6. These themes are prioritized inside the topics according to how universal they are across buildings assessed.

TABLE 6. ASSESSMENT THEMES

Topic	Themes/Opportunities
Lighting	Replace high-bay high-intensity discharge, or HID, fixtures (e.g., metal halide fixtures) in gyms and cafeterias with high-intensity fluorescent, or HIF, fixtures.
	Begin transition to super T8 lamps and ballasts in standard fluorescent fixtures.
	Take advantage of daylighting and delamping, where possible.
IT	Implement computer power management throughout BVSD.
HVAC	Optimize boilers (expand applications of air-fuel ratio controls, outdoor air resets, annual boiler tune-ups, etc.).
	Implement demand control ventilation in targeted applications (gyms, etc.).
	Install variable frequency drives on applicable air handling and/or rooftop units.
	Install boiler and hot water piping insulation.
	On a replacement basis, install high-efficiency equipment (boilers, roof top units, etc.).
General	Re/retro-commission buildings.
	Purchase Energy Star™ appliances and office equipment at time of replacement.
	Replace traditional space heaters with radiant space heaters.
	Eliminate personal appliances.

2.5 Existing Practices

The GHG inventory, interviews and buildings assessments were used to collect information on BVSD's existing practices. The District already has undertaken a number of efforts to make its operations more efficient:

2.5.1 Energy

- District-wide automation and controls system and good associated schedule control
- Upgraded lighting (standard T8 fluorescent, LED exit signs District-wide; upgrades in

select gyms)

- Ceiling-mounted occupancy sensors in hallways and classrooms
- Outdoor air reset controls and interlocking flue dampers controls on select boilers
- Air-side economizing in many applications
- Some ceiling fans in cafeterias and hallways
- High-efficiency equipment replacements
- Some virtualized servers
- Some personal computer power management
- Select ground source heat pump installations
- Daylighting

2.5.2 Solid Waste

- District-wide recycling (single stream comingled paper, plastic, glass, aluminum, steel, cardboard)
- Select set of Green Star schools through Eco-Cycle program
- Composting at some locations
- Computer recycling
- Book reuse and recycling
- Furniture take back
- Bundled purchases for reduced packaging
- Progress toward paperless applications (IEP system, household surveys, employment applications, direct deposit, etc.)
- Reduced hard copy publications (more e-newsletters, fewer copies)
- Electronic purchasing practices

2.5.3 Water

- Sub-metering for irrigation

- Low-flow fixture replacements
- Select synthetic athletic fields

2.5.4 Transportation

- Trip routing optimization
- Anti-idling policy for buses and other district vehicles
- Bus upgrades and timed block heaters
- B5 diesel in all diesel vehicles
- Safe Routes to School Program
- Regional Transportation District (RTD) Eco-passes

2.5.6 Renewables

While these practices are not widespread across the District, they have been implemented at select locations and are illustrative of opportunities available to BVSD moving forward:

- Solar photovoltaic
- Wind generation

3.0 BVSD's SMS

3.1 Vision and Policy

During the development of this SMS, BVSD and its collaborating stakeholders discussed the benefits of a District sustainability vision, a policy, or both. While visions and policies both serve to guide the SMS process, they differ in their purposes. Visions are outcomes-based and answer the question, "What does success look like?" Visions are considered a beneficial component of SMSs to motivate employees and students with a positive, forward-looking outlook.

Policies, in contrast, are formalized commitments that answer the question, "What are our intentions and beliefs?" A strong policy provides visible management support, reflects organizational culture and style, is consistent with other organizational policies, provides

direction for decision-making, provides a foundation for planning and action, is documented and communicated clearly, and drives change in the workplace.

For school districts, policy typically follows a required protocol for formal adoption by the school board. During the initial inception of this SMS, BVSD was in a parallel process of evaluating and updating its policies. Thus, the Sustainability Task Force Committee elected to create a vision statement to guide the SMS, with the longer term intent of eventually formalizing sustainability policy, but through the separate protocol and process of the broader policy initiative.

A draft policy statement as a proposed placeholder was developed by the Task Force:

> "The Boulder Valley School District is committed to becoming a leader in environmental sustainability by limiting our negative effect on the environment and using natural resources wisely and in a manner which meets the needs of the community today and in the indefinite future. We commit to working within our community, and the community at large to integrate sustainability into our operations and curriculum. We will focus on education, creating healthy buildings and environments, limiting our impact on the climate, promoting alternative transportation and diverting materials from the landfill. We believe education institutions have a responsibility to engage in these practices, and in doing so, will provide students and citizens with the on-going knowledge and skills needed to address the critical, systemic challenges faced by the world in this new century."

A shorter outcomes-based version of the draft policy was created as the working vision for the SMS. The idea was to create a vision statement that could be easily remembered, even recited, as a driving force for the SMS:

> "The Boulder Valley School District is committed to becoming a leader in environmental sustainability by creating healthy learning environments, while providing students with the skills to address the systemic challenges faced by the world in this new century."

In addition, to demonstrate BVSD's ongoing commitment to collaboration on the topic of climate and environmental sustainability, the Board of Education approved a resolution in May 2009 teaming the District with the City of Boulder, Boulder County, and the University of Colorado at Boulder to advance the cause of environmental sustainability. This resolution, along with the resolutions of the other organizations, establishes a framework and sets expectations for future collaboration and contains a substantive commitment to prioritize collaborative efforts in the areas presented below:

- Creating a green job workforce through technical education, teaching, and internships

- Reducing GHG emissions, planning for climate change, and developing unified carbon tracking and reporting
- Identifying large-scale renewable energy opportunities
- Pursuing initiatives to achieve zero waste goals
- Exploring joint funding opportunities to implementation the preceding efforts

The full resolution can be found at (http://bvsd.org/news/Pages/EnviroSustainabilityRes.aspx).

3.2 Framework

Table 7 (on the following page) summarizes this SMS into a framework that organizes BVSD's approach to sustainability into four focus areas joined by the cross-cutting theme of climate. The framework offers a snapshot of these focus areas, along with short-term (5-year) and long-term (stretch) goals, strategies, funding, and external partnerships that will enable BVSD to achieve these goals.

It is also important to note that the initial version of the SMS was developed using a linear process of conducting a baseline inventory, developing a vision/policy, and crafting strategies. However, the SMS is intended to be maintained using a cyclical process of annually re-evaluating goals and strategies, leading to implementation of further practices (Figure 5).

FIGURE 5. SMS DEVELOPMENT AND MAINTENANCE PROCESS

		Vision and Policy				
Long-Term		**Focus Areas**				**Cross-Cutting Theme**
		Buildings (see Section 3.4.1)	**Material Flows (see Section 3.4.3)**	**Transportation (see Section 3.4.4)**	**Education (see Section 3.4.2)**	**Climate**
	Stretch Goals	• Net zero energy use in all new construction • No potable water used for irrigation • 100% reuse of indoor water	• Majority school foods organic • Purchases follow best green practices • Zero waste at all sites • Non-toxic environment • Hazardous end products safely managed	• Zero-based emissions • Alternative fuel use • Hybrid buses • All students on bus/walking/biking	• All students literate in sustainability • All staff incorporate sustainability into their positions and practices	• 80% reduction or climate neutral by 2050
Short-Term	5-Year Goals	• 5% improvement in energy operating efficiency (per square foot) of existing buildings • All projects follow LEED for Schools or CO-CHPS checklists • New spaces 30% more energy efficient than IECC 2006 • Remodeled spaces 15% more energy efficient than IECC 2006 • IPM in buildings • Reduced indoor air pollutants and asthma triggers • Natural weed and pest management • Non-potable use where possible • In new, remodeled spaces 30% reduction in indoor water consumption (per	• RFPs contain sustainability criteria for products/services where appropriate • Most centrally purchased items achieve third-party sustainability certification where applicable or meet District guidelines • Quantity of unused donated items reduced 20% • Increase reuse of products/equipment by 10% • Increase specific materials (e.g. furniture, books) recycling by 20% • Diversion rate of 50% on C&D waste • Green Star at 50% or more of schools • Increase district wide diversion rate to 50%	Fleet Goals • Decrease average age of fleet to 7.5 years • Reduce VMT by 5% • Increase hybrids and alt fuel vehicles in support fleet Community Goals • Increase bus ridership by 2% • Increase walking/biking • Increase RTD ridership for non-qualified students • Decrease community VMT by 10%	• Sustainable curriculum standards • 50% of schools have active green teams • Green job training programs • Staff competency in sustainable practices • Percent of employees trained through orientation • Percent reduced energy use reflective of individual school efforts	• 10% below baseline • Minimum of 100 kW increase in renewables (consider 3rd party financing for larger projects)

		LEED calculator) • For new construction, 50% reduction in irrigation (per LEED calculator) • 10% water use improvement in existing spaces (per square foot) • Energy modeling for new construction • Mechanical system commissioning • New roofs solar-ready for minimum 10kW PV	• Ed Center pilot for zero waste/80% diversion rate • Reduce hazardous/higher impact chemical products by 5% annually • School foods purchases as close to source and organic as possible			
	Strategies/ Initiatives	(see pages 18-37)	(see pages 49-57)	(see pages 58-61)	(see pages 39-48)	
Annual	Actions Practices Opportunities	(see Section 3.4.1)	(see Section 3.4.3)	(see Section 3.4.4)	(see Section 3.4.2)	
	Metrics	(see pages 25, 29, 33, 37)	(see pages 51, 53, 55, 57)	(see pages 59, 61)	(see pages 41, 45, 46, 48)	
Ongoing		**Implementation Platform** Organizational Elements: Sustainability Coordinator - Department Leaders - Staff Champions - Sustainability Task Force Committee Monitoring and Reporting: Key Metrics - Progress to Goals - Success Stories - Next Meaningful Paths				

TABLE 7. BVSD'S SMS FRAMEWORK

3.3 Goals

Important components of the framework presented in Table 7 are the goals that BVSD developed for marking progress toward sustainability. These goals will serve as yardsticks to which the District will strive, both over the near term as well as into the future. These goals have been developed to address areas that contribute to GHG emissions, including the use of electricity and natural gas, transportation, solid waste and recycling, water consumption, and GHGs themselves. Together, these goals helped guide the development of specific strategies for the focus areas at the top of Table 7. As goals are revisited in the future, additional topics can be added to the framework.

Goals are further distinguished between 5-year goals and stretch, or long-term, goals that embody achieving true sustainability around the District. While stretch goals may not conceivably be reached in the foreseeable future, they are intended to keep BVSD on a continual path of improvement toward sustainability, employing new methodologies and technologies as they evolve.

3.4 Strategies

The SMS focus areas presented in Table 7 reflect results from BVSD's baseline inventory and building assessments, input from District staff during interviews (notes in Appendix A), and best practices from other districts and organizations. It should be noted that the topic of climate evolved as a cross-cutting element that is a factor and consideration among the four main focus areas.

Within each focus area, strategies were developed to address the goals also identified in the framework as well as specific opportunities for BVSD and its operations. Some of these strategies are aimed at the organization as a whole, while others are directed at specific programs or projects. For example, a project-level strategy might include energy improvements for a specific building, while reallocating energy savings back to building occupants is considered a program-level strategy. An example of an organizational-level strategy would be District-wide sustainability training.

The subsections that follow are organized by the four focus areas of the SMS framework. Within these focus areas, strategies are identified for meeting related goals. Each strategy includes a description of the strategy, responsible party, implementation steps, and supporting partners/resources.

3.4.1 Buildings

Categorically, this focus area takes into consideration the need to reduce energy and water consumption in existing buildings through greater efficiencies, but the topic also involves increased renewables for sustainable building operations; sustainable design and construction; and healthy working and learning conditions for students and staff through better indoor air quality, lighting, temporal comfort, and overall wellness.

3.4.1.1. Building Efficiency Improvements

A number of building efficiency-related themes emerged from the assessments, which are described in the list of potential actions included in the Implementation Steps section below.

Responsible Parties

Responsible parties for building efficiency improvements are primarily Maintenance Department staff members.

Implementation Steps

High-bay High Intensity Discharge (HID) to High-intensity Fluorescent Fixtures
Lighting fixtures in rooms with high ceilings (high bays), such as athletic facilities and warehouses, often are attractive opportunities to reduce energy costs by retrofitting existing equipment with new technologies. Improvements in fluorescent lamp and ballast technology now enable banks of fluorescent lamps to perform lighting tasks previously served only by metal halide or sodium lamps. The retrofit involves replacing existing metal halide fixtures with high-bay fluorescent fixtures containing numerous T8 lamps (or T5 lamps) with high output ballasts. High-bay fluorescent fixtures have many advantages over HID fixtures:

- Use 40 to 50 percent less electricity
- Have longer life, higher light output, and better color rendering
- Are instant-on, dimmable, and controllable with multi-level switching
- Offer avoided risk of catastrophic failure, which can potentially reduce the facility's insurance cost

Note that in applications where linear fluorescents are not appropriate, pulse start metal halide fixtures can often be implemented at lower wattage due to better lumen maintenance over the life of the ballast and lamp.

Super T8 Fluorescent Fixtures
Fluorescent lighting technology has achieved new levels of efficiency, color quality, and longevity in a class of products commonly termed high-performance T8 or super T8 systems. High-performance T8 distinguishes an evolving family of new high-efficiency T8 lamps and ballasts that significantly outperform conventional T8 systems. High-performance T8 systems offer the highest mean efficacy of all light sources (lumens per watt). What gives these T8 lamps and ballasts their super status are several technical improvements that combine to provide higher initial lamp output, a higher color rendering index, better lumen maintenance, and improved ballast efficiency. Another recent development in fluorescent lighting is the low wattage lamp, whereby a standard 32-watt 4-foot fluorescent lamp can be replaced with a 30-watt, 28-watt, or even 25-watt replacement lamp. The 28-watt high color-rendering index lamp now is available that has nearly the same lumen output as a commodity 32-watt lamp. These technological changes present an opportunity for the District to retrofit standard T8 lighting when replacement becomes necessary.

Daylighting and Delamping
Daylighting sensors yield energy savings when a space has sufficient access to daylight such that artificial lighting can be reduced or eliminated for periods during the day. This daylight may exist in the room or may be introduced through the addition of light tubes or other daylighting technologies.

Cafeterias and entryways are ideal locations to take advantage of natural daylight. Because of the large windows found in these locations, it is usually unnecessary to have perimeter lights on during the day. An adjustable photocell with manual override can be used to control the perimeter bank of lighting. When the photocell senses that luminance is greater than a pre-set level, it turns off some or all of the perimeter lights.

Some spaces may be overlit according to the standards of the Illuminating Engineering Society of North America (IESNA). IESNA provides light level recommendations based on space use. Spaces that are overlit can be delamped, with one or more of the linear fluorescent tubes removed from the light fixture to reduce light levels and associated energy consumption.

IT/Power Management

There are a number of software and hardware IT power management opportunities that may apply to the District, which are described below:

- Power Management Software: An inexpensive combination of education and software management can save an average of more than $25 per year for each computer in the District. The education component consists of informing users of the energy impacts of leaving on computers, combating myths about the impact of powering on and off computers (it does not harm them), and showing users how to adjust software settings to save energy. Often, software that can reduce a computer's energy use resides on the computer but has not been enabled or has not been fully utilized. Some power management features can be installed and managed over the network. **Furthermore, there are strategies that will allow power management features to function without interfering with backup and updates that may be scheduled.** ENERGY STAR™ has some good resources on available tools and strategies.

- Use of Thin Clients: A thin client is a computer that is connected to a server on which it relies for processing activities. It acts more as a conveyor of data between the server and the user. Because thin clients have no processors, fans, or hard drives, they use about 40 percent less energy than desktop computers. In addition, it is easier for IT departments to manage security and software updates on just a few servers compared to many desktops.

- Server Virtualization: Historically, school districts and companies have run one application per server, which is not efficient because that application rarely taps the processing capability of the server but uses proportionally more energy. Virtualization software partitions a server into multiple virtual machines that act like separate servers. Each virtual machine, housing its own operating system and application, shares the same server resources, such as processing power and memory, but the virtual machines operate independent of each other. The greatest benefit is improved server utilization, which results in server consolidation and cost savings: a two-processor server running virtualization software can support 8 to 12 applications. Each virtualized server can save the District 7,000 kWh annually.

Boiler Optimization
The following efficiency upgrade options should be considered for existing boilers and for new boilers on installation:

- Outdoor Air Reset: A hot water reset control scheme improves boiler efficiency and reduces heat losses from the hot water distribution system by automatically adjusting water supply temperature set points based on outside temperatures. As outdoor temperatures increase, the associating boiler water supply set point temperature decreases, permitting a reduction in energy usage as the overall heating load decreases.

- Air-Fuel Ratio Controls: The operating efficiency of a boiler system is directly related to how efficiently the fuel is burned. Ensuring complete combustion through the proper ratio of air-to-fuel can result in efficiency improvements ranging from at least 1 percent to up to 7 percent per boiler. (This opportunity is not applicable to natural draft boilers.) This ratio can be optimized manually or automatically. Manual adjustments by in-house staff are the most cost-effective approach for this opportunity. These adjustments can be completed on a regular basis (e.g., biannually) to optimize ratios. Inexpensive flue gas analysis/testing kits and devices are available (or testing services can be procured).

- Interlocked Flue Damper: Installing a motorized flue damper interlocked with the firing of the boiler will save on gas usage and costs. When the boiler is not firing, this damper will minimize the heat loss through the internal flue due to natural convection.

Demand Control Ventilation
Any space served by a dedicated roof-top unit (RTU) or air-handling unit (AHU) and having a variable occupancy schedule may be a good candidate for demand control ventilation. Typical candidate spaces include theaters, locker rooms, study rooms, libraries, and cafeterias. The use of these various spaces can vary significantly from hour-to-hour, day-to-day, and week-to-week as various events and activities occupy the space, and it is difficult to schedule the operation of the units to match these highly variable schedules.

These areas present a potential opportunity to use carbon dioxide demand control ventilation (DCV) to modulate outside air based on real-time occupancy. Measuring carbon-dioxide levels in a room has proven to be an accurate account of room occupancy. Outdoor air levels can then be modulated to meet required ventilation on a real time, per-person basis. According to an ASHRAE Journal article from February 2001, ideal applications are areas of higher density spaces that are subject to variable occupancy and normally have a fixed ventilation strategy – such as those mentioned.

The benefits of a carbon-dioxide ventilation system include energy savings from reduced demand on the associated RTUs and AHUs. If air intakes on the units are currently set to provide ventilation for a maximum assumed occupancy, the carbon dioxide system will eliminate unnecessary over-ventilation and associated heating or cooling of outdoor air.

Demand control ventilation has also been applied successfully to units that are not dedicated to a specific space and instead serve multiple spaces. Carbon dioxide monitoring and control strategies can be more complex under these circumstances.

Variable Frequency Drives and Premium Efficiency Motors on Air Handling Units
The District has the opportunity to implement a number of variable frequency drives (VFDs) in AHUs and RTU applications. Energy savings are achieved by efficiently unloading the motors during periods when building heating, cooling, and/or ventilation loads are less than the maximum required.

Some motors may need to be upgraded to premium efficiency motors to be appropriate for VFD application. National Electrical Manufacturers Association (NEMA)/Consortium for Energy Efficiency (CEE) premium efficient (PE) motors can provide up to 3 percent efficiency improvement when compared to new standard-efficiency Energy Policy Act (EPACT) of 1992 compliant motors through reduced resistive losses and improved manufacturing tolerances. Furthermore, compared to older efficiency motors that precede EPACT standards, PE motors can have 3 to 12 percent higher efficiencies. NEMA has created a standardized definition for PE motors. Thus, while many manufacturers claim high levels of efficiency, purchasing motors labeled "NEMA Premium" will guarantee the higher efficiency.

In addition, higher efficiency electronically commuted motors (ECMs) are available for motors less than 1 horsepower (hp). For example, a standard shaded pole motor less than 1 hp draws an average of 105 watts (ranging from 80 to over 130 watts). An ECM can deliver the same power as a comparable shaded pole motor while consuming only one-third as much energy, or about half the energy of a comparable permanent split capacitor motor.

Boiler and Hot Water Piping Insulation
Uninsulated boiler and hot water piping leads to unnecessary heat loss. Installing piping insulation on the boiler and domestic hot water lines will reduce heat loss and natural gas costs.

High Efficiency HVAC Equipment
The time of equipment replacement is the best time to consider energy-efficiency features for heating and cooling equipment (boilers, RTUs, etc.). Regardless of the equipment type, the most fundamental consideration is rightsizing. Selecting a correctly-sized replacement unit is important to minimize capital costs as well as energy efficiency. Rather than simply replacing the existing equipment with a new unit of the same size (or using standard rules-of-thumb to size the unit), the installer/contractor should consider the various factors that influence the building's load and determine the size of a unit, including the building's construction/envelope (insulation, windows, etc.), occupancy, etc.

In addition to the rebate requirements for efficiency, the following organizations also provide information on high-efficiency equipment ratings:

- Xcel Energy
- ENERGY STAR™
- Consortium for Energy Efficiency (CEE)
- Gas Appliance Manufacturers Association (GAMA)

- American Council for an Energy-Efficient Economy (ACEEE)
- Air Conditioning, Heating, and Refrigeration Institute (AHRI)
- U.S. Department of Energy

For boilers, consider the following efficiency upgrade options at the time of unit replacement, including:

- Non-condensing, high-efficiency boiler: Non-condensing boilers are a similar technology to standard-efficiency boilers, only with a higher efficiency rating. Non-condensing boilers typically have a minimum efficiency rating of 85 percent, while the minimum standard efficiency ratings are typically 80 percent.
- Condensing, high-efficiency boiler: Condensing boilers have unique technology characteristics compared to standard-efficiency boilers and much higher efficiency ratings. Condensing boilers typically have a minimum efficiency of 90 percent, while some models' efficiencies exceed 95 percent. These boilers incorporate features that minimize cycling by modulating fuel and air flow to the combustor and recover heat from condensing moisture in the flue gas stream. Other unique technology characteristics can include unique venting requirements.

For RTUs, select high-efficiency units – those that have a high energy efficiency ratio (EER) or seasonal energy efficiency ratio (SEER). The following table shows the necessary EER or SEER (based on RTU size) that qualify for Xcel Energy incentives for the sizes that are most likely applicable for the Education Center:

RTU Size	Minimum Efficiency	Base Incentive	Incremental Rebate
5.5 – 11.3 tons	11.0 EER	$50/ton	$4/ton/.1 EER
11.4 – 19.9 tons	10.8 EER	$50/ton	$4/ton/.1 EER

Building Re-commissioning

Re-commissioning or retro-commissioning of existing buildings optimizes building systems so that they operate efficiently and effectively, resulting in reduced energy use and increased occupant comfort. Retro-commissioning is especially effective in situations where the function of a space has changed, which affects the HVAC system and occupant comfort (e.g., a classroom has been converted to a computer lab). Commissioning can be thought of as the step that bridges the gap between a building on paper and the fully functional, energy efficient building in practice. The benefits of commissioning are considerable and include the following:

- Larger and more sustained energy savings
- Reduced maintenance costs

- Better building systems operation
- Greater budgeting accuracy

Commissioned building systems can include the following:

- Lighting and lighting control systems, including daylighting controls
- Mechanical and control systems (including test and balance)
- Electrical
- Irrigation

The District can evaluate the following aspects to prioritize buildings for this effort:

- The quantity, diversity, and complexity of building mechanical systems
- The existence of a building automation system
- The potential for simultaneous heating and cooling
- The need for test and balance (comfort issues)

ENERGY STAR™ Appliances and Office Equipment
The District should always consider purchasing ENERGY STAR labeled equipment for new and replacement equipment – including computers, monitors, printers, televisions, copiers, commercial kitchen equipment, and water coolers. Newly labeled ENERGY STAR equipment options are added to the program on a regular basis. For an updated and detailed listing of all ENERGY STAR appliances and equipment, visit www.energystar.gov.

Radiant Space Heaters
As an alternative to standard electric space heaters, BVSD should consider radiant heaters for a more comfortable, safe, and energy-efficient solution. Though space heaters are small, they can have a big impact on electricity bills. Standard space heaters are estimated to use 1,500 Watts each (the same amount of energy needed to operate twenty 2-lamp T8 light fixtures), while radiant space heaters use 35 to 135 Watts (about one-tenth of the power of a standard space heater). In addition, standard heaters can overload electrical circuits because they have a considerable initial demand. Finally, traditional heaters present a safety hazard associated with tipping. Conversely, radiant heaters can deliver better comfort using a fraction of the electricity in a form that is free from tipping dangers.

Occupant Personal Appliance and Equipment Use
School and other building occupants should be aware that any small efforts by individuals to conserve energy and other resources can collectively add up to significant cost savings. The following simple guidelines will go a long way toward conserving energy district wide:

- Avoid personal refrigerators, microwaves, and coffee pots.
- Turn off the lights when leaving a room, even if it is for just a few minutes. Turn off lights in unoccupied areas.
- Have occupants contact facility managers if they feel their area is too bright or the lighting control system is not working properly.
- Turn off coffee/tea pots at 10 a.m.
- Do not change thermostat settings from the proposed standards.
- Replace incandescent lamps with compact fluorescent lamps.
- Building temperatures will vary depending on weather conditions and time of day; dress accordingly.
- Turn off any equipment that is not required. The easiest way to save energy is with careful attention to operate equipment only when required.
- Maintain all equipment as suggested by the manufacturer. Equipment maintenance generally improves energy performance, such as cleaning filters and coils on air conditioning and refrigeration equipment.
- When occupants are faced with equipment replacements or upgrades, provide the most up-to-date information on the most efficient options.

Partners/Resources

Potential partners and resources for building energy efficiency upgrades include:

- Xcel Energy
- Colorado Association of School District Energy Managers
- Colorado Governor's Energy Office
- Municipal governments in Boulder Valley School District
- ENERGY STAR™
- Poudre School District

Goals and Metrics

Note that the goal and select metrics of this strategy have overlap by nature with the Utility Management Structure information that follows. The goal related to this strategy is:

- Five percent improvement in energy operating efficiency of existing buildings over the next 5 years on a per square foot basis

Potential metrics, or ways to measure sustainability with respect to building efficiency, include the following:

- Quantity of energy reductions from implemented projects
- Paybacks for implemented energy projects (e.g., most of the above-mentioned actions will have typical paybacks of 1 to 5 years).
- Reduced energy intensity of buildings on a per square foot basis
- Number of schools rated and qualified for ENERGY STAR™ status

3.4.1.2 Utility Management Structure

Description

In addition to technology-specific solutions for building efficiency, BVSD has structural opportunities related to utility management that can improve efficiency. These structural opportunities range from (1) organizational functions to (2) district wide programs to (3) staff and students inspired to be mindful of their energy and water use and rewarded for efforts toward greater sustainability. Along with capital efficiency projects for existing buildings and design guidelines for new construction, energy management strategies can help protect occupant health, reduce operating costs, and reduce environmental impacts, including GHG emissions.

Responsible Parties

The Director of Sustainability, as well as appropriate staff members within the Maintenance Department and Bond Planning, Engineering, and Construction will implement strategies related to the energy management structure.

Implementation Steps

Energy Management Staffing

BVSD will address energy management in two phases. Phase 1 will establish an interdepartmental task force that supports both short- and long-term operational and planning goals. Phase 2 will move the staffing structure beyond a task force structure to a dedicated staff that will offer increased capacity and responsibility. Responsibilities will include the following:

- Benchmark energy performance and water use at least annually using Energy Star™ benchmarking or a similar tool.
- Provide ongoing utility tracking to optimize systems and highlight cost savings of efficiency measures. Review data relating to operational benefits and outcomes of projects and process changes throughout the District.
- Inspect facilities for operating efficiency, comfort level, and utilization.
- Initiate new energy programs and goals through a technical evaluation of ongoing or new activities and consensus development.

- Review and provide recommendations for other proposed energy management-related projects and proposals.
- Develop specifications and designs for new energy projects and systems, including renewable energy projects.
- Develop specifications and designs for commissioning, re-commissioning, and retro-commissioning projects.
- Support development of new construction specifications related to energy management.
- Review individual school energy management ideas, plans, and programs to develop greater awareness and create synergy across the District.
- Act as liaisons for partnerships with utilities and local, state, and federal agencies.
- Identify rebates, grants, and other funding options for energy projects.
- Educate staff, faculty, and students about energy-saving opportunities and promote conservation-minded behaviors.
- Manage school energy challenges and incentive programs.
- Coordinate with school-specific champions, helping energy managers stay connected to building challenges and needs.

School Incentive Program

A school incentive program can be established that combines awareness and education of energy use with tangible monetary incentives to encourage participation and action. Such programs have been used in the Poudre School District and other education institutions to achieve measurable savings in energy use and costs.

Participating schools that achieve energy reductions could receive monetary incentives. After a baseline of energy use is developed for each school, schools should set a goal to reduce electric energy use by 10 percent. A fixed monetary incentive could then be provided based on the size and electric cost of the school. This structure can provide both an incentive for the school and a sizeable reduction in District energy costs. As an example of this type of program's effectiveness, Poudre High School in Fort Collins has reduced electric energy use by 20 percent, resulting in a savings of over $32,000 per year for the District.

Building Re/Retro-commissioning

Section 3.4.1.1, Building Efficiency Improvements, covers re/retro-commissioning in detail. However, when possible, the District is encouraged to continue its commissioning activities by directly engaging in-house staff based on availability and/or required expertise to cover the breadth and depth needed for a thorough commissioning effort. These efforts may require partnering with third parties for portions of the commissioning process.

Utility Tracking and Benchmarking

Utility data management is collecting and managing utility meter and billing data for the purposes of bill auditing, informing building management decisions, and providing a more transparent connection between building utilities and building occupants. BVSD has the opportunity to better utilize installed hardware and software, to increase the resolution of utility data available at the building level, to streamline the processes of utility data tracking and auditing, and to provide more of the real-time and report outputs that are of interest to the District's diverse stakeholders.

Once utility tracking is established, benchmarking can be used to establish performance targets for new construction or existing building operations. Benchmarking can be used to identify inefficient buildings or, conversely, high performing buildings. Benchmarking is a useful tool to estimate energy cost savings potential or to track progress against identified goals or performance targets[1]. Completing annual ENERGY STAR™ benchmarks is also a great mechanism to communicate the District's energy management successes in a way that is recognizable to the public.

There are a variety of ways benchmarking may be approached and applied. The federal ENERGY STAR™ program, for example, uses Portfolio Manager for existing buildings to employ a numerical rating or ranking, such as a 0-100 index or a percentage, comparing a building to a population or group of similar buildings. Similarly, ENERGY STAR's Target Finder also uses, for new construction, the 1 to 100 scale to establish a rating for a design's energy performance compared to the U.S. commercial building population of similar buildings.

Increased use of Renewable Energy

Over 90 percent of Colorado's energy is produced from fossil fuels — coal, oil, and natural gas[2]. Renewable energy sources, including wind, solar, and biomass, are constantly replenished and do not have the environmental consequences associated with combustion. Recent market developments have strongly encouraged the expanded use of these resources. Renewable energy also provides an educational opportunity for students to understand the earth's natural processes and how to put them to work for humans. BVSD has successful pilot renewable projects in place already and will continue to expand these projects.

Partners/Resources

- Colorado Association of School District Energy Managers
- Colorado Governor's Energy Office
- Municipal governments in Boulder Valley School District
- ENERGY STAR™

[1] John Phelan, City of Fort Collins, Energy Benchmarking Presentation, September 2007.

[2] U.S. Department of Energy National Renewable Energy Laboratory. April 2000. "Colorado's Clean Energy Sources" pamphlet. Available from the Governor's Office of Energy Management and Conservation, 303-620-4292.

Goals and Metrics

Note that the goal and select metrics of this strategy have overlap by nature with the building efficiency improvements strategy presented in Section 3.4.1.1. The goal related to this strategy is as follows:

- Five percent improvement in energy operating efficiency of existing buildings over the next 5 years on a per square foot basis

Potential metrics, or ways to measure sustainability with respect to energy management, include the following:

- Percent full-time equivalent (FTE) staffing dedicated to energy management
- Number of schools participating in energy challenges and incentive programs
- Dollars re-directed to schools through incentive program
- Percent reduction in energy costs from re- and retro-commissioned buildings (District wide and for individual schools)
- Number of schools rated and qualified for ENERGY STAR™ status
- Percent energy use generated from renewable energy

3.4.1.3 Sustainable Design and Construction

Description

BVSD embraces the philosophy of green building and sustainability. This is not only fiscally prudent, but is part of the District's responsibility as a good global citizen. The benefits of green building are many-fold, from reducing negative environmental impacts and increasing cost effectiveness to improving the health, well-being and performance of building occupants and users.

Responsible Parties

Responsible parties include the Sustainability Coordinator and Bond Planning, Engineering, and Construction.

Implementation Steps

Guiding Principles

BVSD developed the guiding principles detailed below in coordination with GEO staff. The District will strive to implement the guiding principles in the Bond projects to the extent feasible within the identified work and available funds set forth for each project in the Educational Facilities Master Plan. However, it may not be possible or prudent to achieve every principle in every case. Strategies and products must be evaluated in terms of first costs, life-cycle costs, maintenance requirements, etc., and how they support BVSD's ultimate educational mission. Included in Appendix C is a report on the

green building strategies that have been implemented in the first phase of the Bond. It provides a good example of the types of things BVSD is able to achieve with existing funding and other project constraints.

- New spaces should be 30 percent more energy efficient, and remodeled spaces (remodeled spaces generally involving change of use and significant energy system work) 15 percent more efficient than IBC Energy code (IECC 2006, equal to ASHRAE 90.1-2004) and 30 percent more water efficient than code.
- All projects over 50,000 square feet construction impacted area and new construction should complete energy modeling. Projects under 50,000 square feet and remodels should complete energy modeling if budget allows. If not, these projects should perform a basic energy audit of the building (or use information from existing audits of district buildings if available and relevant) and develop a baseline before construction.
- Projects that include new roof structures with adequate sun exposure for solar power should be built so they are solar ready by adding infrastructure for roof support where necessary, and allowing space for the necessary electrical equipment and hook ups. Projects should scope for a minimum of a 10 kW solar photovoltaic system.
- All projects should commission mechanical systems upon completion. New building projects should strive to have a commissioning agent included early in the design phase and throughout construction, project closeout, and through the warranty period (referred to as "full" or "enhanced" commissioning) to maximize benefits. Very small projects may not justify being commissioned.
- All projects should follow the LEED for Schools or Colorado's Collaborative for High Performing Schools (CO-CHPS) (when adopted) checklists and strive to achieve as many points as possible, particularly in the Water Efficiencies, Energy & Atmosphere, and Indoor Environmental Quality categories. These checklists should be used to help guide and influence green building strategies included in the design. The checklists also will be used as a reporting mechanism upon project completion. Strategies should include maximizing daylighting and increasing insulation.
- Where these alternatives exist, all projects should use materials that are durable, repairable, and reusable or recyclable; limit toxins and indoor air pollutants; are made with high post consumer recycled content; and are resource and energy efficient in their manufacturing, use, and disposal.
- All projects should divert at least 50 percent of the construction waste from the landfill. Demolition waste including ACM (asbestos-containing materials) cannot be recycled.
- Project design and construction should allow for teachable moments. Examples

include displays about the construction work in the school and energy efficient or sustainable features; designing features that teach, such as a truth wall; and including interested student groups and classes in the design and construction process.

Technical Specifications

In addition to the guiding principles and as part of the SMS development process, the District has reviewed its technical specifications for school construction with an eye toward sustainability. The technical specifications were revised to support the guiding principles and the SMS, and are based on a number of sources, such as CO-CHPS, and other school and university as well as federal sustainable design guidelines. The specifications provide specific guidance for school construction across a number of divisions (electrical, mechanical, etc.). Click here to view the technical specifications (http://bvsd.org/bondproject/Documents/BVSD%20New%20Technical%20Specification%20complete%20document.pdf).

Partners/Resources

A key partner and resource for the sustainable design guidelines is the GEO.

Goals and Metrics

Goals related to sustainable design include the following:

- All projects follow LEED for Schools or CO-CHPS checklists.
- New spaces are 30 percent more energy efficient than International Energy Conservation Code 2006 (IECC).
- Remodeled spaces are 15 percent more energy efficient than EICC.
- Energy modeling is performed for new construction greater than 50,000 square feet and if budget allows for projects below this threshold.
- Mechanical systems in new construction are commissioned upon completion.
- New roof structures are solar-ready for minimum 10kW PV if sun exposure is adequate.

Potential metrics, or ways to measure progress, include the following:

- Number or square feet of new schools built to CO-CHPS standards
- Number or square feet of schools performing 30 percent better than IECC

3.4.1.4 Water Conservation and Efficiency

Description

Water is a precious resource that should be used efficiently indoors and out, especially in Colorado. Furthermore, conserving water in schools saves money, but also has ramifications of water efficiency that go far beyond lower water bills. Whenever water can be saved, so can energy. And the energy

savings often financially dwarf the water savings. While harvesting rainwater or collecting and treating stormwater runoff via constructed wetlands and on-site biological wastewater treatment systems may seem like attractive water-saving strategies, they are not feasible for BVSD because of Colorado water rights laws and code restrictions for on-site wastewater treatment. Therefore, the emphasis for BVSD should be on water conservation through landscape design and efficient fixtures within school buildings.

Responsible Parties

The Sustainability Coordinator, as well as appropriate staff members within the Maintenance Department will implement strategies related to reducing water consumption.

Implementation Steps

Conservation of Potable Water
As previously stated, saving water saves energy. Water treatment especially consumes significant energy. A large percentage of the treated water ends up being flushed in toilets and used to water landscaping. As such BVSD will focus on conserving potable water in particular. In addition to BVSD's existing practices (e.g., conversion to a centralized water control system with evapotranspiration (ET) based algorithms), steps to achieve this intent are as follows:

- Eliminate or minimize water use through xeriscape and other practices where possible.
- Evaluate remaining water uses, distinguishing those that can be performed using raw (untreated) water versus those requiring treated water.
- Convert potential raw water uses where possible.

For remaining potable use in irrigation:

- Use native or climate-tolerant plants to reduce maintenance, conserve water, prevent erosion, and reduce the need for chemicals – with attention to durability and wear.
- Refine the relationship between irrigation cycles and available ET information.

For remaining indoor potable use:

- Convert to ultra low-flow water end-use fixtures (toilets, urinals and restroom aerators).
- Install infrared controls for end-use fixtures.
- Convert to air-cooled (versus water-cooled) equipment.

Student Assessments of Water End-use Fixtures
To assess the magnitude of potential savings from water end-use fixtures, BVSD can engage student green teams to conduct assessments of indoor water fixtures. This approach would not only help the District to make informed decisions regarding fixture upgrades, it also would support the education goals of this SMS. To take advantage of this opportunity, BVSD can

leverage Denver Public Schools experiences with this approach. A sample assessment site survey sheet is included with the Individual School Sustainability Toolkit in Appendix D.

Partners/Resources

- Local water providers
- Northern Colorado Water Conservancy District
- Front Range Sustainable Landscaping Coalition
- EPA's Water Sense program
- Alliance for Water Efficiency
- ENERGY STAR™ (Portfolio Manager allows inclusions to monitor water use and costs)

Goals and Metrics

The goals related to this strategy are included here:

- Non-potable water use where possible
- Ten percent overall reduction in consumption for existing spaces on a per square foot basis
- Thirty percent reduction in indoor water consumption in new and remodeled spaces (per LEED calculator)
- Fifty percent reduction in irrigation consumption for new construction (per LEED calculator)

Potential metrics, or ways to measure sustainability with respect to water efficiency, include the following:

- Gallon use per square foot of irrigated area and/or per student (indoor) reductions in water use (District wide and for individual schools)
- Percent reduction in water costs (District wide and for individual schools)

3.4.1.5 Healthy & Safe Occupants

Description

As previously stated, buildings are key to healthy and safe working and learning conditions for students and staff through better indoor air quality (IAQ), lighting, temporal comfort, and security. In community interviews for BVSD's current bond projects, the greatest amount of feedback received related to issues of healthy and safe occupants.

Responsible Parties

The Sustainability Coordinator, as well as appropriate staff members within the Operations and

Environmental Services will implement strategies related to healthy and safe occupants.

Implementation Steps

Indoor Air Quality Baseline and Monitoring
Indoor air quality (IAQ) is a key component of indoor environmental quality. Environmental Protection Agency (EPA) studies of human exposure to air pollutants indicate that indoor levels of pollutants may be 2 to 5 times, and occasionally more than 100 times, higher than outdoor levels. These levels of indoor air pollutants are of particular concern because it is estimated that most people spend approximately 90 percent of their time indoors.

BVSD will accomplish the IAQ baseline and monitoring strategy in three phases. First, BSVD will establish a system to track both number of IAQ issues reported by building occupants, as well as its use of common substances that compromise IAQ, including common asthma triggers. These common substances include those listed below:

- Benzene found in synthetic fibers and plastics: highly toxic to red blood cells
- Acetone found in masonry, caulking, wall coverings, strippers, adhesives, polyurethane, stains and sealers: flammable and strong odor
- Toluene found in adhesives, paint remover, paint: flammable and may cause lung damage
- Dichloromethane found in solvent in paint remover and adhesive paint aerosols: may cause cancer, heart attacks; a known water pollutant
- Ethylene glycol found in solvent in latex paint: may cause damage to blood and bone morrow
- DEHP found in plasticizer used in wall covering and floor covering to keep vinyl flexible: known carcinogen
- Dioxin found in PVC products: very toxic; low levels cause cancer; disrupts endocrine functioning
- Formaldehyde found in plywood, particleboard, adhesives, fabric finishes, and carpet padding: known carcinogen; may cause allergic reactions or asthma attacks
- 4-PC, the natural result of binding latex to carpet: may cause allergic reactions

According to EPA, the following are common asthma triggers:

- Mold growing indoors when mold spores land on wet or damp surfaces
- Cockroaches and other pest body parts, secretions and droppings, and the urine, droppings and saliva of pests, such as rodents, found in areas where food and water

are present

- Warm-blooded pets' skin flakes, urine, and saliva found in homes where pets are allowed inside
- Nitrogen dioxide, a byproduct of indoor fuel-burning appliances, such as gas furnaces, and unvented space heaters, etc.

With this established tracking system in place, phase two of the strategy is to regularly monitor reported issues and products used with the intent of essentially reducing both aspects to a negligible quantity over a period of time.

Phase three of the strategy is to establish a metric that relates IAQ to absenteeism for students and staff. Such a metric would be a challenge to establish and leading edge in nature, as well as very impactful both within this District and school districts nationwide. (BVSD is encouraged to leverage resources through the University of Colorado for this phase of the strategy.)

Custodial

As previously referenced, BVSD has a number of sustainable custodial practices already in place, including the increasing use of reusable products, the reduction of related water use, etc. The District is also conducting related pilot tests at select schools. Steps to implement this strategy include the following:

- Standardizing product use and procedures
- Establishing an institutional process to evaluate new cleaning products, tools, and procedures as they become available, basing evaluation on performance, cost, and environmental impact
- Establishing a formal hands-on staff training program to implement and uphold sustainable practices and emphasize health benefits and environmental safety

School Security through Environmental Design

School buildings need to provide a safe and secure environment for students and teachers. This can be accomplished through aspects of the building design, including optimizing opportunities for natural surveillance, reinforcing a sense of territoriality, controlling access, and including security-focused design features. Aspects of the building that can be integrated after occupancy include the following:

- To increase opportunity for natural surveillance, minimize areas within the building that are hidden from view and use replacement doors and windows that provide view from classrooms into circulation.
- To reinforce a sense of territoriality, foster a sense of ownership of the school for students and teachers by clearly defining borders — what is part of the school and what is not.
- To also reinforce territoriality and control buildings/groups access, consider decorative

fencing and special paving treatments to delineate the boundaries of the school grounds.

- Consider graffiti-resistant materials and finishes in upgrades.
- Limit the number of entries to the building. Allow visual surveillance of all entries from inside the school.
- Provide the capability to lock down parts of the school when the facility is used for after-hours activities.
- Consider incorporating interior and exterior surveillance cameras.
- Ensure that all high-risk areas (office, cafeteria, shops, labs, etc.) are protected by high-security locks.
- Consider motion sensors for lighting that provide effective security control.
- Consider access control systems to keep unauthorized persons out.

Integrated Pest Management

EPA's definition of Integrated Pest Management (IPM) is, "an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices." IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment. Pests common in schools can include those listed below:

- Flies
- Cockroaches
- Yellow jackets
- Spiders
- Mice
- Termites
- Invasive weeds

BVSD currently is conducting an IPM pilot at three schools. The practices and lessons of these pilots will be extended District wide at the conclusion of the pilot.

Partners/Resources

- EPA's Healthy School Environments Assessment Tool (HealthySEAT) Program

- Green Seal

Goals and Metrics

The goals related to this strategy are:

- Reduced indoor air pollutants and asthma triggers
- Integrated weed and pest management

Potential metrics, or ways to measure sustainability with respect to healthy and safe occupants, include the following:

- Number of schools with completed HealthySEAT assessments
- Percent reduction in chemicals purchased/used
- Percent reduction of common IAQ-comprising substances, asthma triggers, pesticides
- Percent of budget used to purchase Green Seal certified products

3.4.1.6 Funding for Buildings Strategies

There are a number of strategies BVSD can use to fund energy projects and management activities, from internal funding and debt financing to rebates, revolving loans, grants, and performance contracts. As the District considers its options, it should be noted that BVSD can define its own parameters for success, such as rates of return on investment or limits on paybacks. A few of these options are described below.

- The Governor's Energy Office (GEO) offers support to businesses and institutions in their efforts to research and establish energy performance contracts. This support may include preliminary screenings, RFP tools, and other guidance. In addition, GEO screens and pre-approves energy contractors annually to make it easier for school districts to select an appropriate partner for projects. Visit GEO's web site (www.colorado.gov/energy/index.php?/commercial/category/performance-contracting) for information on GEO support and www.colorado.gov/energy/index.php?/commercial/pre-approved-energy-service-companies/for a contractor listing. With GEO assistance, the District could hire an outside energy services company (ESCO) under an energy performance contract. Once the ESCO is selected, it would perform a detailed investment-grade audit of facilities, guarantee costs and savings, and begin work immediately. Although the ESCO charges a percentage of project costs to manage the project and potentially guarantee the savings, this added expense is more than compensated for by not having to pay the cost of delay associated with investing nominally annually for a number of years to implement facility improvements. A performance contract structure allows a

customer to do wide-scale improvements in a relatively expedited time frame. Under a performance contract, it would take an estimated 2 years from hire to project completion. Performance contracting also would BVSD to consider all proposed strategies as a total package with a combined payback, with short payback items helping to support longer payback strategies. As noted previously, BVSD can set its own parameters in terms of goals for the term of a performance contract. For example, many institutions cap their time of payback at between 12 and 15 years.

- There are various rebates at the local level and grants at the federal and state level to support sustainability, energy efficiency, renewable energy, water conservation, and other projects, including pending funding from Recovery Act stimulus funds. Grants also are available from foundations, associations, and the private sector. As one example, Xcel Energy offers a number of technology-specific rebates (e.g., lighting, cooling, heating, control, etc.) as well as program rebates (e.g., re-commissioning, energy analysis studies, etc.) and custom efficiency rebates. Local jurisdictions in the District, such as the City of Boulder, also offer water rebates for water efficiency projects.

- To provide a consistent and sustained source for financing initiatives, BVSD could develop an energy and sustainability revolving fund to support innovative projects proposed by individual schools. Seeded with funds from the District and sustained with cost savings from completed projects, such a fund would provide the District with a long-term, stable source of income for a variety of ventures across the District, from energy and water savings projects to other resource efficiency initiatives that have the potential to result in cost savings over a reasonable period of time. Once capital costs are repaid to the fund from operational cost savings, extra savings could then be allocated to other budgets or funds as desired to support other sustainability efforts that have less emphasis on cost savings.

3.4.2 Education

BVSD believes that sustainability should become a fundamental aspect of how it educates students and how District staff members carry out their responsibilities. To this end, the District will strive to integrate sustainability both in staff development and training, as well as curriculum and extra-curricular opportunities for students. In addition, it is imperative to engage school communities in sustainability efforts and leverage both local and farther-reaching partnerships for the greatest effectiveness.

3.4.2.1 Curriculum

Description

Sustainability is a broadly defined concept, incorporating a number of social, cultural, economic, and environmental issues. The term sustainability can have widely different meanings for different individuals; as a result, sustainability can be a challenging subject to address in K-12 curriculum, particularly if it is approached as a singular, stand-alone concept.

The United Nations has declared 2005-2014 as the Decade of Education for Sustainable Development (www.unesco.org/education/desd). The purpose of the Decade is to help educators integrate the principles, values, and practices of sustainability into all aspects of education and learning. As part of the Decade, educators are focusing on equipping students with the skills, perspectives, and knowledge to live in a sustainable manner using methods that integrate across all aspects of the curriculum, rather than through a stand-alone class. Such whole school approaches to sustainability are increasingly being used to integrate the concepts of sustainability into classes such as science, geography, social studies, and others. A whole-school approach to sustainability also seeks to build active participation of students in real-world problem-solving in their own schools through participation in green teams and other projects, giving students direct responsibilities and leadership roles in making their own schools more sustainable.

The District already has many programs and practices in place that in some form address sustainability in the curriculum. These programs range from the CU Science Discovery program and Eco-Cycle programs to environmental field trips (e.g., Sombrero Marsh), and construction trades classes. Appendix E provides a comprehensive listing of existing BVSD sustainability-related curricular and extra-curricular programs and partners. The District also maintains education standards that are updated every 7 years by topic, offering opportunities to integrate concepts of sustainability.

Responsible Parties

Strategies related to curriculum will be implemented by the Board of Education, Assistant Superintendents of Curriculum and Instruction and School Leadership, Curriculum Directors, external curriculum partners, and curriculum workinggroup (faculty, staff, parents).

Implementation Steps

Suggested strategies for further incorporating sustainability into the curriculum include the following:

- Convene a faculty/staff/parent Sustainability Curriculum Working Group to identify opportunities and discuss options for integrating sustainability into the BVSD curriculum.
- Engage the Sustainability Curriculum Working Group to explore two curriculum approaches; a more formal education standard approach, and a curriculum strand approach similar to how health is addressed in the BVSD curriculum.
- Develop guidelines and provide teachers with lesson plans and other resources to integrate sustainability into existing classes.
- Encourage schools to identify specific sustainability initiatives, such as those discussed under Extra-Curricular Involvement (see below), in which the whole school can participate and provide hands-on leadership roles for students.
- Consider convening an annual sustainability summit for students from different schools to come together and share their sustainability projects and progress.

- Support existing partner organizations (Appendix E) and continue to seek out new community partner organizations that can support student school initiatives and provide additional resources and opportunities for student participation.
- Update District standards for high schools and middle and elementary schools to include concepts of sustainability.
- Provide more training for staff in the concepts of sustainability, leveraging the expertise of Eco-cycle and other community partners.

Partners/Resources

BVSD can take advantage of existing relationships with the following organizations and programs to implement curriculum strategies:

- University of Colorado (CU Science Discovery, CU Environmental Center)
- Eco-Cycle
- Governor's Energy Office
- Garden to Table Program
- City of Boulder/Boulder County
- Colorado Alliance for Environmental Education

In addition to the local resources listed in Appendix E, additional resources include the following:

- Australian Sustainable Schools Initiative: A whole school approach to sustainability education: www.sustainableschools.com.au
- Enviroschools New Zealand: A globally recognized education for sustainability Program. www.enviroschools.org.nz
- Facing the Future: Sustainability curriculum resources being used in hundreds of schools throughout the U.S.: www.facingthefuture.org.

Goals and Metrics

Goals related to sustainability curriculum development include the following:

- Develop sustainable curriculum standards in 5 years.

Potential metrics, or ways to measure sustainability in the curriculum, include the following:

- Student technical knowledge of sustainability issues
- Student participation in their own school sustainability initiatives

3.4.2.2 Extra Curricular Involvement

Description

In addition to formal curriculum related to sustainability, extra-curricular activities play an important part in BVSD's sustainability-related programs for students. Along with the many organizations offering extra-curricular and curricular learning programs to BVSD students (Appendix E), there are also many opportunities to involve students in hands-on sustainability projects and initiatives in their own schools.

Motivating and empowering individual schools and students to improve their sustainability performance with tools and incentives can be a significant part of achieving BVSD's education and sustainability goals. School green teams in particular can be an effective mechanism for involving schools, while resources such as individual school sustainability checklists and progress reporting templates can provide schools with valuable guidance for prioritizing actions and measuring results (Appendix D).

Green teams are dedicated groups of faculty, staff, and students in individual schools that are committed to sustainable operations for their school. Green teams can range from the informal – a few teachers and students working together to reduce their school's energy consumption, to the formal – a group specifically chartered by District leadership or a group such as the Student Accountability Advisory Committee to promote and foster sustainable operations to reduce a school's environmental footprint. The issues green teams choose to work on are typically meaningful to their specific school. What is feasible in one school may be very different than in another school because the school facilities and grounds, culture, and economic situations differ.

Green teams can choose to focus on one area of sustainability (waste reduction/recycling, energy consumption, water conservation, alternative transportation, etc.) or address sustainability for their school more broadly (total environmental footprint). Green teams may start with energy and resource reduction to realize early wins through cost savings and support BVSD's overall progress toward sustainability. Green teams can then expand to take on other sustainability initiatives as the team develops.

Other ways to involve students in school-based sustainability projects is through challenges, such as an energy challenge that allows schools to compete with one another to realize the greatest energy savings over a period of time. Such programs have become popular on higher education campuses across the country, including CU - Boulder. A school incentive program can be established that combines awareness and education of energy use with tangible monetary incentives to encourage participation and action (see Section 3.4.1, Buildings). Such programs have been used in the Poudre School District and other education institutions to achieve measurable savings in energy use and costs.

Such a program could include hands-on energy labs in individual schools that reinforce the science standards specific to different grade levels. Teachers are good choices to become school energy champions and form energy challenge teams. These teams, which may be the same as the school's green team, can take charge of energy use in their schools and earn rebates for saving energy. Depending on grade level, students can help in a number of important ways. Some examples are included below:

- Use their own energy to power lights
- Learn about energy use by handling watt meters
- Discover how electricity is generated from a mixture of fossil fuels and renewable energy sources
- Explore wind power through inquiry lessons
- Learn about the use of LED lights, incandescent bulbs, and compact fluorescent bulbs in classrooms to provide a hands-on energy conservation learning opportunity

Responsible Parties

A wide range of individuals and organizations can be involved in championing and developing green teams, challenges, and other extra-curricular programs related to sustainability. These include the following:

- Student Accountability Advisory Committee (to help organize green teams and challenges)
- Sustainability Coordinator to champion participation of individual schools in green team and energy challenge initiatives
- Motivated individual school teachers or staff to serve as champions for green teams

Implementation Steps

Suggested strategies for further incorporating sustainability into extracurricular activities include the following:

- Provide a presence in one location on the District's student-parent web page or the Green BVSD web page for information on organizations that offer BVSD students extra-curricular and curricular resources related to sustainability (Appendix E).
- Link students to community service opportunities through programs such as the International Baccalaureate, the National Honor Society, Advanced Placement-Environmental Science, and other similar programs.

- Expand partnerships between BVSD and technical education programs, community schools, the City, Boulder County, employers, the U.S. Department of Labor, and others to develop a District green collar jobs initiative.

- Identify a champion teacher or staff person in each school interested in or responsible for the management of the school's energy efficiency, water conservation, solid waste, and other environmental initiatives. A champion should be someone who is familiar with the school's details and knows how to meet sustainability goals in the most effective way.

- Convene individual school green teams with a cross section of staff and students to create a school-wide stewardship culture and promote programs, such as Energy Challenges. Identify existing eco-clubs, science classes, or enrichment groups interested in taking on sustainability as a more formalized green team.

- Develop a mentoring program for green teams, pairing up experienced and established green teams from BVSD schools with such teams with schools having newly formed green teams.

- Fill out an individual school sustainability checklist (Appendix D) and set and communicate specific performance goals (e.g., x percent reduction) to all students and staff.

- Use performance goals to invite student, teacher, and staff ideas on developing specific strategies to meet percent reduction targets and convey to all building occupants.

- Hold quarterly school green team meetings to review school resource use and progress toward meeting goals.

- Recognize students and staff for success with meaningful rewards and incentives to encourage the entire staff to develop ideas for improving performance, such as parties or funneling money from energy savings back into department initiatives.

- Ask students and staff to take a pledge to personally commit to a particular challenge, whether it is for energy, water, or other resources.

- Provide information on specific actions individual students and staff can take.

- Encourage student participation in energy challenges by planning activities, such as energy scavenger hunts with devices such as Kill-A-Watt meters, to track school energy consumption.

- Offer clear, visible indicators of progress, such as posters or charts prominently posted in a central location in each school.

- Create a venue for students and staff to share their success stories, such as a

central post-it board or space on the student portion of the web site to share results.

- Use a reporting template (Appendix D), newsletters, e-mail, and web sites to share progress and show side-by-side performance of different schools.
- Expand the number of BVSD Green Star schools.
- Provide opportunities for interested parents to volunteer in-kind with green teams, energy challenges, or other individual school sustainability initiatives.

Partners/Resources

Logical partners for engaging at the extracurricular level include the following:

- City of Boulder/Boulder County
- University of Colorado
- Eco-Cycle
- Cal-Wood School Program
- Gardens to Table
- Thorne Ecological Institute
- UCAR
- Cottonwood Institute
- Colorado Alliance for Environmental Education

Goals and Metrics

Goals related to extra-curricular involvement are listed below:

- Fifty percent of schools have an active green team in 5 years.
- See Healthy Buildings/Environment for goals related to school energy challenges.
- Develop formal green jobs training program in 5 years with community partners.

Potential metrics, or ways to measure sustainability with respect to individual school participation and performance, include the following:

- Percent reduction in energy use, water consumption, etc., by school
- Number of active green teams
- Number of students and staff participating in programs

3.4.2.3 Communications

Description

There's significant opportunity for educating not only students, faculty, and staff but also parents, community partners, and communities at large by sharing information about BVSD's SMS. As a result, an important component of the SMS is branding BVSD's sustainability program and methods to communicate progress to the outside world. This communication can take place through a number of channels, from BVSD's web site and newsletters to community events and less formal student-parent interaction.

Responsible Parties

Responsible parties will largely be the District's communications team:

- Director of Communications
- BVSD Communications Team
- Information Technology - Web Site

Implementation Steps

- Continue to expand the dedicated Green BVSD portal on the District's web site and consider adding a prominent sustainability section on the site's main sub-pages (students, parents, community, employees, etc.) that links to the Green BVSD page to provide information on the District's various sustainability programs and initiatives.
- Develop a Green BVSD e-newsletter to periodically communicate to the community existing practices, the latest news, and accomplishments of the District's sustainability program.
- Incorporate general outreach materials regarding the District's commitment to sustainability into communications, including new employee orientation packets and presentations.
- Consider developing a community subgroup to the Sustainability Task Force Committee to tap the significant sustainability expertise in the community and provide a channel for two-way learning and disseminating information about the District's sustainability programs.
- Develop guidelines for using the new Green BVSD logo in all sustainability-related District news and materials.

Partners/Resources

Potential partners and resources for communication support include the following:

- SMS Task Force Members
- Existing Curricular/Extra-Curricular Partners (Appendix E) to assist in disseminating

information

Goals and Metrics

Successful communications will support all of BVSD's sustainability goals, both short and long term.

Potential metrics for communications include:

- Level of community knowledge of the District's sustainability programs
- Public attendance at advisory board meetings

3.4.2.4 Staff Development and Training

Description

To ensure integration of sustainability throughout the organization, training staff in sustainability practices is another key component of the SMS. There are many opportunities and points of contact with District staff to providing training and education, from new employee orientation meetings and materials to ongoing formal trainings and information education meetings.

Responsible Parties

Staff development and training will require support not only from human resources staff but also key department leaders to engage employees in training:

- Human Resources
- Various Department Heads

Implementation Steps

- Develop a District practice that requires hiring criteria to include sustainability skills/experience where relevant (e.g., maintenance, IT, procurement, some faculty positions, etc.).
- Develop training materials with a particular focus on facilities staff that turn the switches of various appliances, lights, and buildings on campus, including both online materials and written materials. Provide a particular focus on those areas that align with the goals of the SMS. Training materials can start with simple best practices checklists tailored to staff type. Training materials should be included in new hire orientations, both in written form (training materials) as well as in-person orientations. In Colorado, a valuable resource in developing training materials particularly related to energy is the Colorado Association of School District Energy Managers (CASDEM). Some examples include the following:
    - Computer Labs: Computer lab staff could be trained to shut down computers at closing time.

- Custodial: Custodial staff could be consistently trained to turn off bathroom lights when not in use and building lights after cleaning at the end of the night. Provide custodial staff a shutdown checklist for the end of each day to ensure that building systems are shut down to conserve resources. Turn off lights in unoccupied rooms and ensure that exterior lights are off during the day. Report leaking faucets and running toilets. Train custodial staff members on what materials are recyclable and what are not.

- Kitchen: Kitchen staff can be trained to minimize lighting when cafeterias are not in use, run exhaust fans only when needed, minimize use of tap water for thawing food, turn off kitchen equipment when not in use, apply appropriate temperature set points for refrigerators and freezers, and run dishwashers only with full loads. Teachers and other staff also should receive training on solid waste and recycling practices.

- Teachers and Other Staff: Teachers can be trained to turn off computers at the end of each day, minimize use of personal appliances and non-radiant space heaters, work with task lighting, use blinds to manage heating/cooling of spaces, and turn off lights when leaving. Teachers and other staff should also receive training on solid waste and recycling practices.

- Ensure that existing sustainable practices receive appropriate educational support. Survey staff members to determine their awareness of these efforts and judge if additional support is necessary.
- Provide staff training on environmentally preferable purchasing and materials donation guidelines.
- Provide staff training on recycling best practices (materials that can be recycled, separation guidelines, etc.).
- Develop a District practice that requires contractor hiring criteria to include sustainability skills/experience where relevant (e.g., construction, maintenance, etc.).
- Hold brown bag lunches for staff members to learn about specific practices or products related to sustainability.
- Develop a staff mentoring program between BVSD and Poudre School District to share experience and best practices related to sustainability (energy, computer management, etc.).
- Include presentations on sustainability at District wide events.

- Require that an education plan be submitted in concert with any proposed sustainability initiative.

Partners/Resources

Potential partners and resources to support staff training include the following:

- Eco-cycle (training on waste management, recycling, etc.)
- Peer school districts

Goals and Metrics

Effective staff training will support several of the District's goals related to sustainability, from building operation to material flows and transportation.

Potential metrics, or ways to measure sustainability with respect to staff training, include the following:

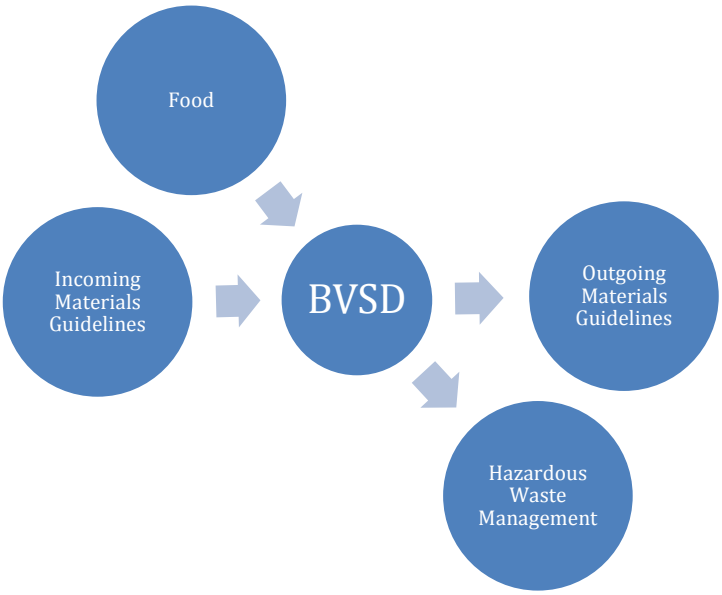
- Staff competency in sustainability
- Percent of District employees trained through new employee orientation
- Reduced energy use and other related metrics

3.4.2.5 Funding for Education Strategies

While developing new programs and initiatives related to curriculum, communications and training will require additional resources, there are also significant opportunities to build on existing partnerships and programs to minimize the need for additional funding. As shown in Appendix E, BVSD already has available several effective partnerships with organizations that can offer assistance with curriculum materials, student programs, and staff training. A portion of cost savings from increasing operational efficiencies in schools (e.g., savings from energy challenges) could also be used to enhance curriculum, communications, and training materials. Finally, a number of grants are available to school districts through the U.S. Department of Education, Colorado Department of Education, corporations, and foundations. A good resource for the range of grants available is www.schoolgrants.org.

3.4.3 Material Flows

By reducing resource consumption, elevating local and selective purchasing, employing purposeful reuse and recycling, building on existing Zero Waste programs, and expanding local and organic food purchases, BVSD can measurably demonstrate continuous improvement in landfill diversion rates, reduced GHG emissions from solid waste, and generally reduced impacts related to the flow of materials.



3.4.3.1 Incoming Material Guidelines

Description

Incoming materials to BVSD include those purchased by the District and donated to the District by groups in the community. The District seeks to make informed purchasing decisions related to products and services by researching the life cycle impacts and attempting to select those products that will deliver acceptable quality at a reasonable cost while maximizing sustainable performance. The District has employed third-party certifications as a means to screen products in the past, including Forest Stewardship Council certified wood and paper products and GREENGUARD for low-emitting interior products and materials. The District also employs a Reference Card to help decision makers screen incoming donations of technology, appliances, carpet, furniture, and chemicals to assure that the donations are of value to the District and not just an additional disposal burden.

Responsible Parties

Responsible parties include procurement and warehouse staff, school principals and directors, and any other decision makers for purchasing or donations.

Implementation Steps

- The District has begun to include sustainability language in Requests for Proposal (RFPs). This practice could be expanded and standardized for all RFPs where appropriate, requiring service or product providers to demonstrate the following:

- Sustainability in services provided
- Performance above industry standards/application of best industry practices
- Willingness to address particular sustainability topics, such as the application of less toxic materials, IAQ, or others that may be applicable to a particular service
- Client references for previous sustainable work

- The District has begun to request from vendors products that have third-party certification where applicable and practicable. This practice could be expanded for purchases in product sectors for which appropriate certifications can be identified. Additional certifications to consider incorporating into purchasing policies include but are not limited to:
  - ENERGY STAR™ for appliances, office equipment, and commercial food service equipment.
  - Electronic Product Environmental Assessment Tool (EPEAT) goes beyond ENERGY STAR™ to rate electronic products on materials used, design for end of life, longevity, energy, corporate performance, and packaging.
  - Green Seal certification for various cleaning products and related materials.
  - Conservatree provides resources for identifying recycled papers that will meet the District's needs and function well in office equipment.
  - GREENGUARD certification for indoor products with acceptable indoor air standards (e.g., building materials, furnishings, finishes, etc.)

- In seeking third-party certifications, the District could identify priority criteria preferred by BVSD. Examples include minimized packaging and manufacturer take-back programs that will support the District's existing efforts in these areas.
- The Environmental Protection Agency has numerous resources for Environmentally Preferable Purchasing (EPP) that could be explored by the District in developing guidelines for other products and sectors.
- The District's Reference Card for General and Technology Donations helps decision makers determine if donated materials are of value to the District. This document was last updated in 2005-2006. For technology in particular, this Reference Card could be

updated to reflect recent advancements that have likely raised the threshold for technology that is of use to the District. The Reference Card could also be expanded to include any other frequently donated items.

- In the interest of reducing the volume of donated materials that are not of use to the District, BVSD could setup a centralized list of "Wanted" items. Any donated materials not specifically on this list, in other words those donations without a specific application, would be declined.

Partners/Resources

Partners and resources for environmentally preferable purchasing including the following:

- ENERGY STAR™ – www.energystar.gov/
- EPEAT – www.epeat.net/
- Conservatree – www.conservatree.com/
- EPA EPP Resources – www.epa.gov/epp/
- U.S. Green Building Council (USGBC) – http://www.usgbc.org/

Goals and Metrics

Goals related to environmentally preferable purchasing include the following:

- RFPs issued will contain sustainability criteria for products and services where applicable.
- Most equipment or materials purchased centrally will achieve a particular level of third-party certification where applicable.
- On a material basis, District will reduce quantity of donated material that goes straight to disposal without use by 20 percent.

Potential metrics, or ways to measure progress, include the following:

- Percent of certified products
- Percent of donated material landfilled without use
- Additional metrics of particular interest to the District, such as the mass or volume of packaging waste generated

3.4.3.2 Outgoing Material Guidelines

Description

Outgoing materials from BVSD can largely be classified as general solid waste, specific materials for surplus or recycling, organic materials suitable for composting, and construction and demolition

wastes. The District, in partnership with Eco-Cycle, addresses the diversion of recyclable materials from the general solid waste stream through the School Recycling and Environmental Education Program. This program provides comprehensive recycling service including paper, cardboard, magazines, newspaper, aluminum, steel, plastic, and glass. The District has implemented take-back and recycling programs for materials including furniture, books and electronic waste. The District's diversion rate – the quantity of material recycled divided by the total quantity of waste and recyclables – was estimated at 17 percent based on the inventory conducted for the SMS. Compostable materials are diverted at Green Star Schools and the expansion of that program is addressed under the next section on Zero Waste Programs.

Responsible Parties

Responsibility falls on all students, teachers, and staff, as well as bond projects; facility design staff; warehouse staff; and custodians.

Implementation Steps

- The District should formalize guidelines for specific materials such as furniture, books, and electronics to maximize reuse opportunities and insure that the product has provided its maximum service before appropriate disposal through surplus or recycling. Options might include a database of lower uses that electronic equipment can fulfill before disposal.

- An estimated 50 to 80 percent of construction and demolition (C&D) waste is potentially reusable or recyclable depending on the project and local markets for recycled materials (Triangle J Council of Governments). Particularly with the Bond Project in progress, BVSD has the opportunity to specifically target a reduction in C&D waste. A number of local recycling service providers could support BVSD in this initiative including Eco-Cycle and Waste-Not Recycling. Some specific areas to address to achieve increased C&D waste diversion include:

  - Construction techniques
  - Reuse of material onsite
  - Require recycling of materials such as concrete, metal, wood, and glass
  - Require diversion strategies in specification language including requirements to track quantity of materials
  - Require waste management plan on each project that estimates volumes, identifies disposal methods and providers, and outlines how subcontractors will be trained to carry out recycling

- Additional C&D diversion strategies are available in WasteSpec.

- The District should baseline C&D diversion rates on some in-progress or recently

completed projects to understand their current performance.

Partners/Resources

Potential partners and resources for the management of outgoing materials include the following:

- Eco-Cycle – www.ecocycle.org/
- Waste-Not Recycling –www.waste-not.com/construct.htm
- WasteSpec -- www.tjcog.dst.nc.us/regplan/wastspec.shtml

Goals and Metrics

Goals related to outgoing materials include the following:

- Increase reuse of equipment by 10 percent.
- Increase specific product and material recycling by 20 percent.
- Increase C&D waste diversion to an average of 50 percent across all projects on a weight basis.

Metrics, or ways to measure progress related to outgoing materials, include:

- Percentage of equipment reused
- Percentage of products and materials recycled
- Percentage of construction and demolition waste diverted from landfill

3.4.3.3 Zero Waste Program

Description

The Green Star Schools Program offered by Eco-Cycle and implemented at 19 BVSD elementary schools forms the foundation of a zero waste program and is already achieving diversion rates over 60 percent at schools where it has been implemented. The program aims to reduce waste, increase recycling, implement the collection of compostables, improve environmental awareness, and lower the trash collection bill through new lunch processes, targeting zero waste in classrooms/halls/washrooms, emphasizing critical thinking about resource use and special waste reduction opportunities. This program has been nationally recognized and is a unique opportunity for BVSD to move toward zero waste.

More generally, the District has also made progress toward zero waste by beginning to identify and implement opportunities to reduce paper use. The District uses direct deposit and electronic paystubs almost exclusively.

Responsible Parties

Responsible parties for the Zero Waste Program include Operational Services and Information Technology.

Implementation Steps

- The District could seek to implement the Green Star Program at additional schools. There are currently 13 schools on the waiting list to join Green Star but the program is limited in its ability to sustain services or add schools by funding. The Green Star program is primarily funded by a number of grants and Eco-Cycle has aggressively pursued ongoing funding from these and other sources. Identifying a stable source of funding to allow the program to continue to provide services and add as many as 6 additional schools per year would allow all BVSD schools to join the program within 5 years. After the initial education phase of 2.5 years that occurs when a school joins Green Star, the steady-state operating cost of the program drops significantly.

- The Education Center could be a pilot site for a full zero waste program. In combination with joining the Green Star Program and the implementation of other Material Flow strategies presented in this SMS, the zero waste threshold of 90 percent diversion would likely be within reach at the Education Center. This site could serve as a test to determine what additional strategies would be needed to achieve zero waste District-wide.

- Departments District wide identified numerous additional opportunities to reduce paper use by moving to paperless electronic applications. The District could facilitate the implementation of these strategies by working across departments to prioritize these strategies and help Information Technology move forward with the opportunities that have the best potential to reduce paper use. Addressing internal opportunities first will allow the District additional time to develop a strategy for addressing equity of access issues with external opportunities. Some high priority opportunities that arose during the SMS process include those below, but the list of paperless opportunities will continue to expand with time.

  - Electronic bid system for purchasing
  - IEP records and protocols
  - On-line student testing (CSAP currently in pilot at three schools)
  - Employment applications
  - Personnel records (electronic) and staff communications (email)
  - Newsletters and other district publications (about 20 percent of schools have converted completely to electronic newsletters)
  - Sustainable communications model including electronic addressing for employees and infrastructure to facilitate community engagement without a

lot of driving around to meetings (e.g., web conferencing over expanding fiber network)

Partners/Resources

Potential partners and resources for the Zero Waste Program include the following:

- Eco-Cycle – www.ecocycle.org/
- Other school districts converting to paperless applications

Goals and Metrics

Goals related to the Zero Waste Program include the following:

- District-wide diversion rate increase to 50 percent
- Education Center as a pilot zero waste site achieving 80 percent diversion

A potential metric for measuring progress toward zero waste goals is as follows:

- District diversion rate

3.4.3.4 Hazardous Materials Management

Description

The District has implemented the Teachers Science Safety Program, a 1-day training that focuses on hazardous waste management practices for science teachers. Topics of the training include minimizing laboratory chemical purchases, safe handling of materials, and methods for micro experimentation. This training is provided annually and has been attended by most science teachers in the District.

The District provides an annual collection for waste laboratory chemicals at the end of the year.

Responsible Parties

Responsible parties for hazardous materials management include Operations and Environmental Services.

Implementation Steps

- Complete planned online safety quiz to help teachers stay current on hazardous waste management skills.
- Expand current collection program to include more hazardous products, including household hazardous waste, cleaning products, visual arts wastes, and pest management products.
- Begin tracking hazardous and high impact material purchases including laboratory chemicals and cleaning products to identify baseline against which reductions can be measured.

Goals and Metrics

Goals related to hazardous waste management include:

- Reduce hazardous or high impact material purchases by 5 percent annually over baseline year

Potential metrics, or ways to measure progress toward hazardous waste goals include:

- Annual volume of hazardous waste disposed

3.4.3.5 Food

Description

The District recently undertook a Nutrition Services Feasibility Study with Lunch Lessons, LLC as part of the School Food Project. This study focused on opportunities for BVSD to bring more "nutritious, closer-to-the-source" meals to District cafeterias. The key findings of this study address areas including wellness policies, food and menu, facilities, management and staffing structure, technology and accounting, procurement and inventory management, and provide recommended strategies to achieve the above goal.

This effort and the recommendations arising from it complement BVSD's partnership with the Growe Foundation's Garden to Table Program that is available in some Green Star schools. This program addresses healthy and sustainable lifestyle choices through organic vegetable gardens on-site, wellness promotion, healthy school foods, and environmental sustainability.

Responsible Parties

Responsible parties for the food program include Nutritional Services.

Implementation Steps

- The Nutrition Services Feasibility Study provides a three-year roadmap to bringing more nutritious and locally sourced foods to BVSD students. Implementing the recommendations in this Roadmap is the foundation of an improved food service program.
- The Garden to Table Program provides a good complement to the recommendations above by bringing organic gardening experience to the students and integrating curriculum around healthy lifestyle choices that will help students to better understand the value of the meals that are provided.
- By breaking the current food services paradigm and developing the infrastructure for scratch cooking with locally sourced foods, BVSD will have developed the forward looking infrastructure to continually phase in additional organic foods with the long term goal of sourcing a majority of foods from local and organic sources.
- Offering an alternative local/organic meal plan to students at a premium is a potential funding source for the added cost of implementing new menus.

Partners/Resources

Potential partners and resources for the food program include:

- BVSD Nutrition Services Feasibility Study from Lunch Lessons LLC
- Growe Foundation – www.growefoundation.org/
- Colorado Harvest of the Month – www.d11.org/fns/harvest.htm

Goals and Metrics

Goals related to the food program include:

- Percentage of foods sourced locally
- Percentage of foods sourced organically

Potential metrics, or ways to measure progress toward food goals include:

- Percent organic food
- Percent locally purchased food

3.4.3.6 Funding for Material Flow Strategies

- The Recycling Resources Economic Opportunity Fund Grants Program from the Colorado Department of Public Health and Environment may be a grant opportunity that could be applied to one or more of the proposed strategies. http://www.cdphe.state.co.us/el/p2_program/rreogrants.html
- Greenopolis offers small grants ($1,000 and less) to promote sustainability education and activities in particular topic areas including Waste Reduction & Elimination and Reuse and Recycling. http://greenopolis.com/egreenu/foundations/grants/guidelines

3.4.4 Transportation

This focus area broadly considers the need for BVSD to reduce fuel consumption, vehicle emissions, and vehicle miles traveled as an institution that provides transportation to its student population. Therefore, BVSD will invest in strategies that will specifically increase fuel efficiency and reduce emissions related to fleet vehicles. In addition, the District understands the need to evaluate and address transportation issues beyond the fleet that are impactful to overall community health and wellbeing. To this end, BVSD will promote strategies that reduce community vehicle miles traveled related to staff and student commuting and encourage alternative transportation.

3.4.4.1 Fleet Strategies

Description

Currently, BVSD maintains the capacity to transport approximately 10,000 eligible students daily for school attendance only. Actual ridership is approximately 8,000 students daily for a total of approximately 16,000 student bus trips per day, not including after school activity transportation. The District offers bus transportation for kindergarten students and considers applications for open enrollment students to catch nearest stop buses if space is available. Currently, routing is managed manually with assistance from computerized routing software by transportation staff members. However, the department is moving to a more integrated computerized route optimization system that will be operable for the 2009-2010 school year. Part of this move has included training staff on the system and improving the routing data uploading.

In terms of equipment, the District operates approximately 193 buses and 44 Suburbans to transport students. Of the 193 buses, 50 have been upgraded with diesel oxygen catalysts for reduced emissions, and 133 have engine pre-heaters to reduce morning warm-up idling. All new buses ordered are equipped with pre-heaters and those ordered in 2010 will have improved engine efficiency for better mileage. In addition, there is a District-wide bus anti-idling policy to reduce emissions and fuel consumption.

All fleet vehicles that run on diesel are fueled with B5 biodiesel with good results. Eight of the 193 buses are fueled exclusively by Compressed Natural Gas (CNG). In addition, the Transportation Department has one dual-fuel compressed natural gas van and considers alternative fuel and hybrid options when purchasing support vehicles.

Responsible Parties

Strategies related to the District's fleet will be implemented by the Director of Transportation and appropriate department staff members. It should be noted that vehicle purchases for departments other than Transportation are the responsibility of each department and are not managed within Transportation.

Implementation Steps

- Increase fuel economy (miles per gallon) by decreasing the average age of buses.

Currently, the average age of BVSD buses is slightly more than 11 years.

- Reduce vehicle miles traveled (VMT) through improved use of the route optimization Edulog software in addition to manual routing to maximize efficiencies.
- Re-evaluate the current Edulog routing system and prepare an RFP to gather information about other routing systems that might serve the District better.
- Consider using a Global Positioning System on buses to optimize routing, locate buses off their routes, and gather data on trip factors, such as speed, traffic, etc. As part of the RFP from the previous strategy, ask vendors to illustrate how their routing systems interact with GPS systems.
- Consider hybrid or alternative fuel vehicles when replacing support vehicles and Suburbans.

Partners/Resources

In the past, BVSD has taken advantage of its membership in the Metropolitan Area Transportation Efficiency Study, or MATES – a group of school districts in the state that collectively work with the Regional Air Quality Council (RAQC) to pursue grants for transportation upgrades. Participating in partnerships like this enables BVSD to learn from other districts and collaborate for greater effect. Specifically, the RAQC has a Diesel Idling and Emissions Reduction Programthat the District may be able to participate in for additional equipment retrofits. For more information, see the following web site: www.cleanairfleets.org/bus_retrofit.html.

Goals and Metrics

Goals relating to the District's fleet include:

- Decrease average age of buses to 7.5 years through a 15-year replacement cycle for overall increased fuel efficiency.
- Reduce fleet VMT by 5 percent by the end of 2010.
- Increase the number of hybrids or alternative fuel vehicles in the support fleet.

Potential metrics for fleet improvements include:

- Total VMT annually
- Average fleet miles per gallon

3.4.4.2 Community Strategies

Description

The District recognizes that attention to fleet operations is only part of the equation when it comes to sustainability in transportation. BVSD can directly control its buses and routes, but it must continue to engage the community, particularly students and parents, in order to achieve meaningful progress

toward reduced emissions and VMT.

Successfully engaging the community will mean more eligible students riding the bus, more staff and students walking or riding their bikes, more staff and students taking advantage of public transit, and more car pooling. In order to get there, however, BVSD must address safety concerns (both real and perceived), increase communication about available options and their impacts, and make desired choices more appealing.

Responsible Parties

Many good programs that encourage alternative modes of transportation are underway at BVSD, and it will be important for the Student Transportation Coordinator to work closely with schools and District administration to expand these programs. It also is paramount that members of the community take responsibility for their own impacts relative to school transportation. Information and education are vital in changing behaviors for greater sustainability.

Implementation Steps

- Reduce VMT by increasingbus ridership for eligible students. Educate students and their parents about the benefits of riding the bus (safe, on time, efficient, good for community, etc.) and dispel negative perceptions.
- Reduce VMT by increasing RTD ridership for those who do not qualify for busing. Develop an eco-campaign that makes riding RTD the right thing to do, the green thing to do, and the cool thing to do. Include incentives and recognition, such as frequent rider prize drawings at each school, Green Team membership, school competitions, etc.
- Expand existing Safe Routes to School programs to all District schools by developing safer walking routes and widening walking boundaries.
- Develop a transportation master plan that takes into account all the functions in BVSD's transportation system (vehicles, infrastructure, operations, etc.).
- Expand crossing guard training to all elementary schools and develop volunteer crossing guard pool so that parents and students feel more secure about walking routes.
- Expand BLAST (bike lesson and safety training) to provide basic bike and safety skills to students so they will be more confident and competent riders.
- Continue and expand programs that recognize active transportation, such as International Walk to School Day (October) and Earth Day/BVSD Bike to School Day (April), and make the connection between a healthy body and a healthy environment.
- Promote Bike to Work Day and inform employees about new tax incentives for biking commuters.

- Reduce emissions by building off the CASEO (Clean Air at Schools: Engines Off) model for a District-wide anti-idling campaign that targets parent vehicles. The CASEO model involves social marketing to students, teachers, and parents about the impact of individual vehicle idling in school areas. Please see http://enginesoff.com/pdfs/CASEO-Background-Report.pdf for more information on the results of the CASEO study completed this spring.
- Mark and enforce more anti-idling zones around the District.
- Encourage school green teams to promote anti-idling.

Partners/Resources

Because the District already is involved with Safe Routes to School, the Colorado Department of Transportation may continue to be a valuable resource, both for information and grant funding. Cities also are eligible for infrastructure funding, and BVSD should coordinate those cities within the District on walking route improvements. In addition, RTD is a valuable partner for developing greater ridership on public transit. And finally, the District should leverage its existing relationship with the Regional Air Quality Council through the CASEO program.

Goals and Metrics

Goals related to community-related transportation include the following:

- Increase District bus ridership by 2 percent for those students who qualify for transportation.
- Increase RTD ridership by 0.5 percent for those students who do not qualify for District transportation.
- Decrease community VMT by 10 percent over 2 years.
- Increase the percentage of students walking and biking to schools.

Potential metrics for tracking community transportation include the following:

- Percentage of students riding District buses
- Percentage of students using RTD
- Community VMT

3.4.4.3 Funding for Transportation Strategies

The District should continue to mine the Regional Air Quality Council for funding related to vehicle equipment upgrades. In addition, the EPA has a Clean School Bus USA program that lists resources available to school districts for funding upgrade efforts. Visit epa.gov/cleanschoolbus/funding.htm for more information about Clean School Bus USA.

In terms of anti-idling, the American Lung Association may be instrumental in rolling out the CASEO program to schools once the study results are complete and BVSD could tap into this organization, along with the Regional Air Quality Council, for support with outreach to students and parents.

As mentioned previously, there also are Federal tax incentives for commuters who bike to work. BVSD could consider leveraging off these available incentives through staff education. The North Front Range Metropolitan Planning Organization has a press release that generally describes these incentives at www.nfrmpo.org/News/NewsDetail/08-10-30/press_release_-_bike_commuters_get_flexible_spending_account.aspx.

3.5 Implementation Platform

In total, the above sections of the SMS reference 18 different high-level strategies, each with its own set of implementation steps, responsible parties, resources/partners, and metrics. As well, each of the four focus areas includes its own description of available funding resources for implementation. For the strategies to work together as a cohesive system, these distributed efforts need to be coordinated and integrated from a centralized level in order to:

- Ensure parts are not working at odds with each other.
- Maximize synergies between related strategies.
- Cross-pollinate lessons learned.
- Measure cumulative impacts relative to stated goals.
- Determine next meaningful paths based on progress and emerging opportunity.

Managing the SMS as a system requires an organizational structure as well as a communications structure. The remainder of this section addresses each of these centralized implementation pieces.

3.5.1 Organizational Pieces

BVSD is fortunate to have a Sustainability Coordinator on staff because this ensures a dedicated person charged with keeping performance to the SMS on track from year to year. This centralized position can be responsible for the yearly measuring of progress to goals and coordination of the integration bullet points above. Ideally, BVSD's Sustainability Task Force Committee convened to support the initial development of this SMS (see Acknowledgements section) would continue to meet to support implementation at the departmental level and to guide the continued evolution of the SMS. As well, among the BVSD staff that participated in the various interviews, there are likely champions for different strategies or even specific action steps based on professional expertise and motivation. Finally, the community is rich with sustainability expertise and resources that should be tapped in implementing the various strategies of this SMS. The Sustainability Task Force Committee, with its District and outside stakeholder membership, could be the forum for involving community resources in a way that supports ongoing development of the implementation platform for the SMS (see Section 3.4.2.3).

3.5.2 Monitoring and Reporting

Monitoring is essential for evaluating the cumulative effect of the SMS, especially as implementation across the 18 different strategies continues to grow and mature in years to come through this continuous improvement approach. With the baseline GHG inventory established in the SMS, a protocol and information management system has been provided to ensure ongoing measurement of BVSD's carbon footprint on an annual basis. The carbon footprint is aggregated from a number of supporting key metrics, such as energy consumption, solid waste generation, recycling rates, and transportation metrics, that support 5-year goals within the different focus areas of the SMS. These measurements can then provide the basis for a quantitative and technically credible annual sustainability report to the community. The report would share quantitative progress toward goals, while sharing success stories and communicating intentions for the upcoming year.

3.5.3 Next Steps

It is recommended that the Sustainability Coordinator be tasked with using this initial SMS document to develop a Year 1 work plan for BVSD. The plan would address the following immediate next steps for putting this SMS into action:

- Select the key metrics, of those listed in Section 3.4 above, that will be tracked and reported under the SMS; confirm, enhance, or develop the necessary tracking methods for the metrics selected.
- Work with the responsible parties identified for each of the 18 strategies to determine which of the documented implementation steps are priority items for Year 1; obtain commitment to implement those action items in Year 1 and determine the necessary resources/support to accomplish these priority steps.
- Develop a calendar for coordination meetings with both the internal department leads and external Community Advisory Board; link the calendar to an end-goal of creating BVSD's first annual sustainability report.
- Create a simple system for BVSD students and staff to share/report unplanned successes – activities not necessarily called out in the SMS, but implemented nonetheless because of growing awareness and attention to sustainability across the district.
- Create a simple system for capturing new ideas/opportunities for addition to this SMS for consideration as Year 2 priorities.

4.0 Concluding Summary

In total, this initial version of the SMS includes 18 different high-level strategies. Like book-ends, these strategies are held together as a system by a unifying vision statement and an implementation platform. The implementation platform coordinates the numerous participants across the District and community that will be enlisted to advance sustainability within BVSD. This initial version of the

SMS provides the current situation and recommends immediate next steps. Most importantly, it establishes the long-term continuous improvement process for BVSD to address sustainability. In so doing, it lays a path for the District to reach significant sustainability goals in the 5-year horizon while setting itself on course for achieving true sustainability stretch goals over the longer term.

Appendix A: SMS Interview Notes

This appendix contains the notes from five interviews conducted early in the SMS process to inform the baseline and strategy development. The interviews were linked to specific BVSD departments and are presented in the following order:

- Bond/Maintenance
- Business Services
- Curriculum, Instruction, Schools
- IT, Communications, Human Resources
- Operations/Maintenance
- Transportation

Interview Summary
Bond/Maintenance
1:30-3:00pm March 5, 2009

Group Members:

- Don Orr (Bond) – Group Leader
- Mike Cuskelly (Maintenance) – Group Leader
- John Bollinger (Bond)
- Lou Novak (Bond)
- Tim Guiterman (GEO)
- Ted Burke (Maintenance)
- Darron King (Maintenance)
- Kerrie Trezise (Maintenance)
- Ghita Carroll (Sustainability)
- Joe Sleeper (Operational Services)
- Jimmy McClements (Community)
- Denise Golden (Parent)

1. **SMS introduction** – Julie Sieving (Brendle Group)

An SMS is a comprehensive and systematic way of approaching sustainability.

2. Clarifying Questions

Why focus on the bond as part of the SMS process? There is a community expectation that the bond do more in terms of sustainability than what the budget allows for or what was done in Phase 1. Therefore, BVSD asked Brendle Group to focus on the bond in response to community concerns.

How do we tie new construction to operational change (ex. great new buildings compromised by personal appliances)? Develop and communicate strategic goals and expectations and provide education and training to achieve these goals.

3. **Brainstorming Results** (items in the Opportunities column are necessarily related to items in the Existing Practices column)

Existing Practices	Opportunities
Construction/Bond	
Participating in Xcel Energy design assistance program where possible	Better branding, education, and awareness about bond – post green features of Phase 1 on web site
Applying for Xcel rebates where possible	Performance goals tied to City Climate Action Plan and integrated into technical specifications (ex. btu/sq. ft., normalized factors, etc.)
Experiencing successes (ex. Casey)	Partnering and access to supplemental funds (ex. City of Boulder EET)
Casey - LEED Gold and possibly Platinum	Clear and well-defined proposals based on SMS for EET funds
Good design practices (not well defined)	Well-defined and emphasized design and construction practices
Oriented technical specifications toward sustainability	Broader scale energy modeling (designers and architects)
Using low VOC materials	Technical specifications that include base level commissioning of equipment
Requiring architects to have LEED AP on staff	System-wide balancing (buildings)
Phase 2 Bond – including CMGC at design phase and throughout construction (consistency of expectations regarding sustainability)	Xcel recommissioning for buildings over 50K sq. ft.
Clear design/construction expectations (not documented)	Documented design/construction expectations regarding sustainability
Using recovered materials and equipment (cabinets, boilers, control units, etc.)	LEED certification on one building with experiences applied across district
Compiling architects' notes on existing practices	Operations budget tied to construction budget, with stated goals
Sustainability Coordinator (Ghita) as resource for Phase 2	Provide more information about effective products and practices - "what is working"
Participating in Xcel Energy design assistance program where possible	
Electrical/HVAC/Energy	
Using daylighting where possible	Metrics and successes on BVSD web site – communicate energy savings
Energy efficient lighting throughout (T8s)	Audits to inform long-term costs and other considerations
Occupancy sensors	School incentives/rewards for reduced consumption and savings (see Poudre School District program)
Andover energy management system for HVAC	Revolving fund fed by energy savings (seed funds needed until energy savings begin to accrue)
High-efficiency equipment where possible (ex. boilers) and at replacement	Cost analyses that include long-term energy and maintenance costs as well as other factors
Recycling working parts for use elsewhere	Policy limiting personal appliances
Demo retro commissioning program at Centaurus	More retro commissioning district wide if pilot is successful
	Water-cooled condenser conversions
	Increased maintenance staff to keep pace with

Existing Practices	Opportunities
	expanding facilities
	Look for opportunities to delamp
Renewables	
Ground source heat pump at Summit and Casey (see ops and maintenance for more examples of existing renewables)	
Water	
Centralized irrigation system using evapotranspiration sensors (one-third complete)	Reclaimed water for irrigation
Low-flow fixtures (for replacements and new construction)	
Synthetic fields	
Recycling/Solid Waste	
Some construction waste recycling and effort to find alternative recycling options	Shared effort to recycle (students, teachers, parents, custodial staff)
	Establish goal for construction waste recycling for remaining bond projects
General	
High-performance requirements for portables	Guidance through technical specifications, policy, benchmarks, and goals
Student training for building audits; basic audit tools in the works	Education/training about existing standards
Installing Smart meters at all Boulder schools to show live electricity use (collaboration with Xcel Energy)	Publicized information about successful efforts - garner community support (ex. showcase Casey ground source heat pump in presentation and on web site)
	Emphasis on improving indoor air quality (maintenance, ops, cleaning, pests, etc.)
	Sustainability linked to curriculum
	Engaged students as eco-investigators (clubs)
	Smart Grid opportunities (leverage and promote) and virtual energy use tools, such as Green Touch
	Five upcoming budget forums – use to communicate intents and opportunities
	Formalized technology and practice reviews (product demos and beta testing)
	In-house training – expand and encourage product suppliers to be resources for training
	Prioritized goals, benchmarks, and accountability shared district- and community-wide

Interview Summary
Business Services
March 19, 2009 12:30-2:30

Participants:

- Sharon Meyer (Purchasing) – Group Leader
- Bill Sutter (Finance) – Group Leader (not at interview)
- Matt Stewart (Warehouse)
- Cyndra Dietz (Eco-Cycle)
- Sherri Gibson (Bond Purchasing)
- Leslie Stafford (CFO and Food Services – not at interview)
- Ghita Carroll (Sustainability)
- Becky Zidan (Purchasing)
- Dave Swanson (Budget)
- Sue Anderson (Nutrition Services)
- Jennifer Shriver (Community Member)
- Denise Golden (Community Member)

1. **SMS introduction** – Julie Sieving (Brendle Group)

An SMS is a comprehensive and systematic way of approaching sustainability.

2. **Clarifying Questions**

None

3. **Brainstorming Results**(items in the Opportunities column are necessarily related to items in the Existing Practices column)

Existing Practices	Opportunities
Food/Nutrition Services	
Harvest bars in cafeterias (fruit and veggies) at all elementary schools but one by end of year	Buy more local organic food – Lunch Lessons district wide
Harvest bar boats – clay linedcompostable boats	Replace disposable foam containers and trays with durable trays and clay-coated food boats
Reused silverware from linen companies	Introduce reusable/washable silverware and cups/bowl and fund replacement costs
Washable trays at secondary level	Provide napkin dispensers in all schools that limit numbers taken
Styrofoam free by end of this school year (47 sites)	Initiate Green Star cafeteria themes district wide
Managers given reusable bags for meetings	Supply only the utensils necessary for each meal; make utensils available for purchased meals only
Bulk foods for managers meetings (rather than packaged, reduced napkins, etc.) for 30-150 people twice a month	Install magnets on trash cans to limit loss of tableware

Existing Practices	Opportunities
Computer ordering to reduce paper	Limit pre-packaged food/snacks offered for sale
Garden to Table – 7 sites	Serve trayless meals (all washables)
Lunch Lessons collaboration looking at local food purchasing	Offer bulk foods (not pre-packaged), including bulk milk dispensed into washable cups
Office staff use washable cups/glasses	Recycle food service gloves
Computer ordering to reduce paper	
Managers given reusable bags for meetings	Consider school and roof-top gardening
	Expand Green Star Schools(composting of all food waste and nonrecyclable paper)
	Composting that will take almost anything
	Participate in local CSA for local produce (Circle a Garden in Montrose as example)
Purchasing	
Recycled paper district wide (30% minimum recycled content)	Standardize bid language to specifically solicit sustainable products
RFPs include language about recycled paper responses and limited responses (recycle all responses)	Include sustainable preferences in RFPs
Furniture/Fixtures/Equipment bids: SES certified/FSC/Green Guard certified	Make Energy Star a policy for purchases
Looking into vendor take backs (some vendors will take used product back and will reuse/recycle)	Use approved requisitions that don't have to be printed
Browse on-line for products rather than look through catalogs	E-bid system
Life-cycle research is general practice in purchasing (training)	Develop and standardize guidelines for environmentally sensible purchasing
Bids go out electronically	Require product recyclability and packaging recyclability and eliminate nonrecyclable paper colors district wide
Some bid language that solicits more sustainable products	Work toward 100% postconsumer paper
Green specifications, product research, and indoor air quality requirements for portable classrooms (leased 40 last year)	Contract globally – program for environmentally preferred purchases
Finance	
Encouraging use of scanners rather than faxed forms, etc.	Go paperless by substituting forms/faxes for electronic versions
Offering flex schedules, such as 4/10 (1 person) and telecommuting 1 day every 2 weeks (4 people) to reduce commuting times	Have budget/allocation information on centralized spreadsheet
Ed Center has 8 weeks of 4-day work week in summer	Train staff on recyclability of papers and products to better use the recycling bins at Ed Center; make Ed Center Green Star next school year
Warehouse	
Collecting furniture and sending it back where it came from (Take Back Program) - Resource taking lots of old furniture	Make Take Back Program more successful
Reusing shrinkwrap, separators to fill orders for schools	
Recycling cardboard	Recycle shrink-wrap with Eco-cycle

Existing Practices	Opportunities
Sending off old pallets for reuse	Warehouse green custodial products that custodians really want and will use
Computer for 5 drivers to check emails so they don't need to be printed	Buy hybrid pickup trucks for deliveries
Work order requests outside of regular routes are aligned geographically with regular routes (savings in time and fuel)	
Reduced routes to 2 people/1 truck	
Recycling electronic waste (computers, TVs, AV) – 2.5 tons per day with EcoCycle, which is more expensive but more sustainable	
Negotiated computer packaging to 8 machines per box (2,500 computers per year) - HP is packing with recyclable packaging	
General	
Eco-Cycle • 5-year non-compete bid with BVSD (stabilized district commitment) • recycling in every school (not policy level) • computers/books to Eco-Cycle	Work toward zero waste
BCSIS • solar tubes in existing classrooms • PV grant – short list • email newsletter (make paper copies available) • directory where parents can indicate they want to receive information via email • Green Star Zero Waste school, zero waste events, composting • working toward school sustainability council	Eliminate food/snacks in classrooms (to improve indoor air quality, reduce pests, lighten load on custodial staff)
Copy machines must take any type of paper (recycled content)	Collect compostables at Ed Center as part of Green Star
Newsletters: • 20% schools converted to email newsletters • 50% half/half newsletters • 25% all paper newsletters	Balance Ed Center building so that no one needs to employ band aid fixes to heating/cooling comfort issues
Lafayette Elem • low-level recycling • hoping to be a Green Star School • just began Garden to Table program	Make Ed Center a showcase for sustainability
	District wide toner recycling program
	Purchase and use non-toxic cleaners district wide
	Provide basic health, safety, and toxicology training to custodians in conjunction with standards for non-toxic cleaning products
	Employ natural pest management
	Offer flex/telecommuting district wide
	Mandate environmental education in all schools
	Sealing for buildings (doors, windows, etc) to

Existing Practices	Opportunities
	reduce energy use

Interview Summary
Curriculum/Instruction/Schools
March 10, 2009 2:30-4:30

Group Members:

- Judy Skupa (Curriculum and Instruction) –Group Leader
- Sam Messier (Science)
- Kurt Levasseur (Career and Technical Education)
- Susan Reiderer (Community Schools)
- Deidre Pilch (School Leadership/Secondary)
- Cyndra Dietz (Eco-Cycle)
- Ghita Carroll (Sustainability)
- David Martin (TEC)
- Doug Johnson (Halcyon)
- Francis Schneeweiss (ELL)
- Martha Gustafson (Manhattan)
- Kristi Dahl (CU/Science Discovery)
- Nancy Doty (parent)
- Karen Daly (Exec Director for Student Success)

1. **SMS introduction** – Julie Sieving (Brendle Group)

An SMS is a comprehensive and systematic way of approaching sustainability.

2. **Clarifying Questions**

How long is the project? The SMS development will go through June with implementation ongoing efforts thereafter.

Will students be included in SMS process? Students will be included with the advisory committee; Ghita is happy to talk to student groups as well.

Where is the funding coming from for the SMS and its implementation? Some money is available through grants, some through performance contracting, and some through capital funding (bond and capital reserve).

3. **Brainstorming Results** (items in the Opportunities column are necessarily related to items in the Existing Practices column)

Existing Practices	Opportunities
Programs/Schools	
CU/Science Discovery • Empowering The Future program • K-12 class programs • Solar-Racers • E-science • Green Power • Professional development/workshops for teachers • GEO grant that puts equipment in teachers' hands (kits)	BVSD/PTOs should emphasize value of courses at CU/Science Discovery Center
District education standards exists and are updated every 7 years by topic • H.S. science standards and materials updated this fall to include concepts of sustainability	Update standards to include concepts of sustainability
Curriculum documents – each content area has set of enduring questions for all levels (how has science & technology impacted life)	Leverage student capacity for enacting change
Connections in curriculum/FOSS kits tied to Garden to Table program	Engage students – ex. a Green Diploma that rewards students for a specific level of effort related to sustainability
18 Green Star schools • Zero waste events • On-site composting • Student involvement • Composting at Green Star facilities • Worm bin training for teachers	Align sustainability practices and curriculum Eco-Cycle exchange – reuse of materials Expand number of green star schools.
Eco-Cycle education: recycling, solid waste, litter prevention, holiday waste reduction, composting, household hazardous waste, forestry, energy conservation, indoor/outdoor air quality	Green Collar Jobs Initiative (wind, PV, water) - greatly expand efforts to provide "green job" training; continue to explore partnerships between Tech Ed, Community Schools, City, Workforce Boulder County, State, Department of Labor
Horizon School • Energy Detectives program for students • Outdoor classroom • Outdoor ed program • Green gym design • Biking to School (Friekker program) • Grant from Whole Foods for Xcel Energy assessment (bring own bag campaign)	Updated transportation education to replace older style auto tech education (fuel cell, hybrid, etc.)
Manhattan MS • No cosmetic improvements - reused cabinetry • Green building concepts • Garden to Table hopeful • Zero waste events • Bike club through science department • Green Star hopeful, including school garden and grant for orchard – 1 tree this year • Parent group helping students learn about waste station • Reduced catalogs (60% reduction)	Take advantage of parent in-kind volunteering (ex. Helping kids with waste station, etc.)

Existing Practices	Opportunities
• Email/paperless communication • Shredded documents used in zoo for animal bedding	
Recycled materials for art activities	More Eco-Cycle training for staff as a package and secondary level programming
Solar grant applications	Support teacher training around sustainability and district efforts
Sombrero Marsh Program – 4th grade environmental field trip (old dump that is now protected wetland, also a wind turbine)	Solicit reusable materials
Tech students training to repair rather than dispose of cars – maintenance, emissions control, and analysis	
Recycling metals for welding practice	
Construction Trades Class – recycled materials; bee hive construction	
Green house program with composting (worms) – Tech ed	
Low volatile chemicals in collision repair shop	
Recycle all solvents in collision repair shop	
Recycle metals in welding training (old cars) and then recycle what is left	
Xeriscape curriculum at Tech Center	
Halcyon School • Reduced margins on documents to save on paper • Recycled paper when possible in graphic print shop • Reprinting on used paper • Art stored on server; only best printed • Reusing equipment • Wish list posted • Using items on hand	
Science safety training for teachers – green chemicals and minimizing chemical waste	
Garden to Table Program in a few schools • Volunteer sustainability coordinator positions within these schools	
Many other environmental organizations offering programming in BVSD schools - Currently creating a summary of all existing programs	
Administration/Operations	
BVSD-parent communication via email entirely	
Community Schools Program using one third less paper (*data is available from Susan Riederer*) – no agendas for meetings; email attendance sheets from K-Care	Expand efforts to formalize/coordinate these opportunities for schools
Food service starting to reflect Garden to Table; “School Food Now;” looking at quality rather than quantity; cooking from scratch; local suppliers	
Email communication (bills, purchasing)	Make Ed Center a Green Star center – adult/staff education showcase
Electronic forms	Centralized cooking, locally grown food

Existing Practices	Opportunities
Spec Ed. IEPs (40 pages paperwork at minimum) – efforts to reduce printing these pages; use electronic presentation instead	Leverage Green Dimes concept district-wide to cut down on catalogs
ESL/ELL shared spreadsheet to reduce/eliminate forms for each student in program	Shared car at Ed Center (maybe electric or alternative fuel) to use to visit schools or on school business
One employee telecommuting (20 hrs/wk) in business office	Address Green Star school demand
Pedometer club to encourage walking – friendly competition	Address shredded paper gap
Green cleaning products	
Carpool errands	
Limiting paper towel	
Recycling computers (Jarrod Polis Foundation)	
On-line assessment	
Storage on CD ROMs rather than paper	
Carpooling and trip changing	
Community Education	
Green Point system from City/County for Life Long Learning – evening classes	Educate organizations that lease/rent school space and encourage green events in school buildings
Life Long Learning • Grants for wind energy and water sciences • Researching on-line learning opportunities	Develop outreach program to influence ELL/ESL families through students
Community classes using district space	Campaign to get people interested in neighborhood schools rather than choice to another school; encourage adults to work in their neighborhood (district employees)
Hands-on high performance architecture – evening classes	Partner with City ambitions (climate targets) to meet climate goals and tie to student learning
DOLA and workforce collaborating to retrain existing workers	
On-line lectures and in-class, hands-on components; if students pass standards, they don't need to attend	

Interview Summary
IT/Communications/Records/HR
March 19, 2009 9:30-11:30

Action Items:

- Ed Center as showcase of what district wants to do

Group Members:

- Briggs Gamblin (Communications) – Group Leader
- Dave Williamson (IT) – Group Leader
- Bob Jamieson (HR) – Group Leader
- Dwight Reifsnyder (IT)
- Kelly Valdez (IT)
- Jonathan Dings (Planning and Assessment)
- Beth Collins (HR)
- Allison Metz (Communications)
- Kim Bane (Student Success/SPED)
- Ghita Carroll (Sustainability)
- Peter Chandler (Community Member)

1. **SMS introduction** – Julie Sieving (Brendle Group)

An SMS is a comprehensive and systematic way of approaching sustainability.

2. **Clarifying Questions**

None

3. **Brainstorming Results**(items in the Opportunities column are necessarily related to items in the Existing Practices column)

Existing Practices	Opportunities
Special Ed	
Special Ed • computerized IEP system serving 2,300 students	Special Ed • reduce duplicate hard copies of IEP documents • address paper protocol for student assessments done each year (45-70 pages) • Move to virtual training for professional development district wide
Print Shop • printing smaller quantities of materials and reprinting if necessary • recycled content paper for print jobs • digital proofs rather than hard copies	Strategy for eliminating paper copies of records (IEPs) electronic storage; extend to testing protocols and other paper copy
On-line CSAP testing in pilot phase at three	Move to on-line testing district wide

Existing Practices	Opportunities
schools	
Using on-line household surveys	Print fewer testing summary results
Records scanned in PDF for storage (currently schools have hard copies – must have visual image that can't be altered)	Move to online version of household survey (address equity issues)
Open enrollment applications moving to on-line (5,000 apps per year)	Video conferencing rather than regular personal visit to each school (review test scores, improvement practices)
Training on DVD (rather than having staff come in)	Address requirement for some employees to have a car at work (visits)
Some employees bike to work	
Human Resources	
Employment applications online (principals can view electronic versions)	Eliminate need to print applications when someone is hired (make electronic)
Personal printers eliminated for networked printers	Reduce paper put in shredder that should be recycled
Microfiche converted to CDs in last 3 years	Implement program to get accurate electronic address information for all employees and use this avenue for all communications, when possible
Address changes made via email	Make all personnel records electronic
Self-service electronic function for making changes to employee files (address, phone, etc.)	Have HR meetings at schools rather than Ed Center to reduce miles traveled
Worker's comp doctor reports coming online (some)	Increase effectiveness, ease of use for online benefit enrollment
Online benefit enrollment (not working very well)	Balance HVAC in building (HR area) for greater comfort control to eliminate use of space heaters (extremely cold in work areas)
Some staff orientation materials available online	Improve employee engagement in their own health (to reduce insurance expenses) by offering showers in bldgs, providing on-site food service at the Ed Center to support food project and income for the project, etc.
Tuition reimbursement email letter and checks are direct deposited	HVAC in HR area – comfort control to eliminate use of space heaters (extremely cold in work areas)
Hiring paperwork sent via email, when possible	Build off "Small steps to better health" tag line and apply to sustainability
Salary letters to teachers send via email	Put on a sustainability fair to educate employees (much like the Health Fair, which helps people look beyond what they do at work)
95% employees using direct deposit with email check stub	Make employee wellness survey results available on the district web site
Not providing water bottles for meetings	Implement program to get accurate electronic address information for all employees and use this avenue for all communications, when possible
Going Green section in employee newsletter every months (small practices with big returns) – spotlights successes in district	Make all personnel records electronic
12 pilot schools experimenting with small $$ for employee wellness (discounts are available on	

Existing Practices	Opportunities
rates but people don't know about them)	
Communications	
Reduced amount and size of publications; don't print as many (ex. Annual report online versions in PDF formats)	Implement an online application that requires review and sign-off of Rights and Responsibilities document (currently print 33,000 copies that go to all households)
Using recycled content paper when possible	Develop a sustainable communications model with community to address policy making (how do we do this without lots of paper and driving around)
Working with digital proofs rather than paper versions	Print fewer materials
Every Thursday – Ed center people out in the schools (community connection)	Collect and communicate information on sustainable types of materials for print shop
New sustainability coordinator position	Ed Center could lead the way with sustainability practices (ex. EC goal to be zero waste?) – use Ed Center as PR opportunity
Work toward SMS	Encourage online newsletters and notices, and provide guidance on how to write good online communication that will help to connect to population that resists (community outreach)
Individual schools leading toward sustainability	Build community connection w/out mass meetings and travel or paper materials
BVSD web site has new green page to inform community and employees about what's going on in the district	Develop a sustainable communications model with community to address policy making (how do we do this without lots of paper and driving around)
IT	
Reducing number of servers opportunistically – server virtualization (backup server that runs at night can also do separate task during the day – varying usage patterns allows one server to do tasks of two) – stacked advantages of fewer servers, less power demand, less cooling required, etc. (40 out of 150 servers have been virtualized)	Get rebate $$ from Xcel for virtual servers
Power Mgmt practice is in place to control about 50% of PCs (sleep mode at night)	Improve power management
Moving toward IT training online as fiber optic lines are installed; video conferencing	Engage in pre-recycling as first step toward recycling to take advantage of still good equipment
Online IT training materials in Knowledge Base (online rather than hard copy)	Push old equipment out into communities for students/families (re-use)
Old computers go to EcoCycle	Expand online training beyond IT topics
Some donations, although large quantities are a challenge	Research opportunities to turn computers completely off at night (push out upgrades when computers are turned on in morning)
Inventory control using batch and model identification	Consider serial number tracking for inventory control
IT Governance Committee beginning in March to address using community resources	Take advantage of community resources for IT tech support for schools
	Address challenges of going paperless and implementing more automation systems (HVAC,

Existing Practices	Opportunities
	irrigation, etc.) and prioritize these applications on the IT fronts. Top Paperless Priorities: - IEPs - School report cards - Open enrollment application (transportation) - Personnel records - Rights and Responsibilities handbook - Employee directory - Employee evaluation (procedure and compliance issues where signatures are required) – just print signature pages and electronically store the rest
	Prioritize and strategically implement recommendations from last year's IT audit
General	
Monarch K-8 student energy audit	Provide white board name plates for meetings
	EliminateStyrofoam service ware for meetings
	Publish and post guidelines about what to use for meetings and what is recyclable
	Give community/staff information on small things they can start doing now that will make a difference
	For annual new teacher training (2 days) and classified employees (every month) – have Ghita as guest speaker to inform new people coming in about district goals and sustainability
	Provide employee training about what is recyclable and tools for being successful
	Roll out awareness campaign relating effects of current activities that show impacts
	Incentivize schools/communities to save energy (encourage action)
	Develop common metrics that would encourage friendly competition among schools for sustainability
	Encourage eco-clubs, staff involvement, school showcases – create a forum for sharing ideas about conservation
	Revisit Eco-pass program district wide and research cost issues
	Gather data on open enrollment and define environmental impact of this practice – create awareness
	Consider addressing open enrollment using electronic lottery with preference given for proximity to school of choice
	Reduce travel via conferencing services (audio bridge); can move to video with fiber installation
	Infuse sustainability into culture so that employees are evaluated based on successes with sustainability

Existing Practices	Opportunities
	Make Ed Center model for what should be achieved in schools – PR benefits for district
	Set auto paper towel dispensers for shortest amount of paper to reduce waste

Interview Summary
Operations/Maintenance
9:00am-11:00am March 5, 2009

Action Items:

- Brendle Group to add subgroup membership to web site
- BVSD to provide Brendle Group with EPA grant writeup for integrated pest management (IPM)

Group Members:

- Steve Hoban (Operations/Environmental Services) – Group Leader
- Mike Cuskelly (Maintenance) – Group Leader
- Tom Noyes (Maintenance)
- Joe Hopman (Maintenance)
- Brian Elster (Maintenance)
- David Jackson (Operations)
- Debbie Sedelmeier (Operations)
- Thomas Graham (Operations)
- Dan Wisotzkey (Operations)
- Ghita Carroll (Sustainability)
- Joe Sleeper (Assistant Superintendent)
- Cyndra Dietz (Eco-Cycle)
- Jonathan Hondorf (Community Member)
- Sharon Tuck (Community Member)

1. **SMS introduction** – Julie Sieving (Brendle Group)

An SMS is a comprehensive and systematic way of approaching sustainability.

2. **Clarifying Questions**

- Is there a plan to get all interview groups together? Group members need to be champions of the process as they go back to their areas. There is a Steering Group that met on February 5 that includes people who have budget control and authority to enact change. There also is a web page on BVSD's web site that will list interview group members, their departments, and will include the results of all the interviews.

- What are the other subgroups? Business Services, Bond/Maintenance, Operations/Maintenance, Transportation, Curriculum/Instruction/Schools, IT/Communications/Records/HR.
- At BVSD, what is the difference between maintenance and operations? Maintenance – Grounds and building infrastructure maintenance
- Operations – Custodial, security, environmental, minor maintenance (stewards of the buildings).

3. **Brainstorming Results** (items in the Opportunities column are necessarily related to items in the Existing Practices column)

Existing Practices	Opportunities
Electrical/HVAC	
Motion sensors in classrooms, corridors, multi-purpose rooms (80%)	Address issues with motion sensors (items hanging from ceiling and influenced by HVAC air movement activate lights at night)
T8 lighting upgrade completed in mid 1990s (100%)	Research information about impacts of daylighting, temperature, etc. on effective learning
Mercury vapor fixtures swapped for metal halide (partial)	Documented maintenance program to maintain equipment efficiency
HVAC maintenance (filters, operational characteristics)	In-house or third party building commissioning/re-commissioning
Replacing refrigerant with environmentally friendly version as opportunity (eliminating HCFCS and R22)	Get more out of current energy management system (ex. motor controls, variable frequency drive applications, pneumatic replacements, etc.)
Energy management district wide (99.9%) – comfortable setpoint, setback at night	Better building performance that will reduce or eliminate use of personal appliances
Weekly/daily custom scheduling for energy management (building by building)	District-wide limits on personal appliances
Boiler improvements	
Booster heaters	
Opening windows for air flow and to keep buildings cooler longer	
Renewables	
Five PV installations	Wider application of solar and wind power (ex. wind turbines to run irrigation pumps)
One ground-source heat pump installation; one on the way	Partner with local businesses for donations (ex. help with synthetic fields)
Daylighting – e.g., solar tubes at Summit and Sundolier™ system at Southern Hills	
Wind generator at Ed Center and Manhattan	
Partnering with a local group (CRC) in a grant program to offer 2 to3 more schools 10 kW solar systems.	
Water	
3-inch mower setting (water conservation)	

Existing Practices	Opportunities
Researching centralized irrigation and controls	Implement centralized irrigation and controls
Six synthetic sports fields	Install additional synthetic fields
Installing flow meters; breaking out domestic and irrigation metering; meter replacements	Install more low-flow plumbing fixtures
Installing low-flow fixtures as old fixtures fail (5-10%)	Greater collaboration between BVSD and community to partner on sustainability (ex. Use of gray water)
Two schools use gray water	
Cleaning	
Using more reusable cleaning products (clothes rags, towels, reusing disposable wet mops)	Guidelines for purchasing and using more efficient cleaning equipment (ex. pressure washers – clean more surface with less water)
Using less water in cleaning	Guidelines for reusable/washable cleaning tools
Using less toxic chemicals in cleaning (ex. graffiti cleaner that is eco-friendly)	Green cleaning supply lists and green cleaning technology guidelines for all schools (including restroom cleaners, floor finishes, floor strippers, and other chemicals)
Identifying best chemicals to use (greenest, most effective, most cost effective) and standardizing chemical use and procedures	Guidelines for effective green products to help avoid green washing
Identifying equipment that meets sustainability goals (ex. low water foaming carpet extractors); pilot schools testing products right now	
Recycling/Solid Waste	
District-wide multi-stream/commingled recycling(paper, cardboard, plastic, aluminum, steel, glass)	Air hand dryers in place of paper towel dispensers
Green Star program in 17schools with 13 more on waiting list • Shifting responsibility to students/staff and away from custodians • Composting cafeteria waste • Moving to washables away from disposables • Encouraging waste free lunches • Supporting zero waste events/school parties	Clarity and purposeful education for administrative staff on what can be recycled and composted
1,000 EcoCycle classroom presentations per year	Washable, recyclable, or compostable food service items
Books sent to warehouse, shared between schools, remaining are sold to booksellers, sent to Eco-Cycle for recycling and donation to charity	Evaluate the possibility of eliminating food and drink in the classroom except for special events
Locally recycling computers/electronics through Eco-Cycle	Use new presentations for students and staff to promote recognition of overall district goals and programs
General	
Purchasing practices that include giving credit for local architects and construction management companies, structured bids for low packaging computers, etc.	Process for evaluating sustainable technologies and practices, including a good feedback loop
Work toward IPM (integrated pest management) best practices (audit of three schools, reports coming)	Implement district-wide IPM

Existing Practices	Opportunities
Learning about flooring, carpet – recycled content, polished concrete (supporting IAQ)	Professional development for decision-makers to enable them to identify real sustainable opportunities (benefits and drawbacks) – decision-making tools related to sustainability that include reliable information
	Staff education/training on topics such as: • Overall awareness • Energy use of personal appliances • Greenwashing • Sustainable technologies and practices
	Internal and external education on energy audits and what they mean
	Evaluate requirement for packaged snacks in schools

3. **Other General Comments**
   - Do more with less.
   - Report what works and doesn't work.
   - Consult directly with trades for feedback on technologies and practices.
   - Spend wisely the first time to avoid additional costs.

Interview Summary
Transportation
March 10, 2009 12:00-2:00pm

Group Members:

- Bob Young (Transportation) – Group Leader
- Landon Hilliard (Transportation) – absent
- Steve Schuster (Transportation)
- Greg Jackson (Transportation)
- Dennis Lewis (Transportation)
- Kirk Knapp (Transportation)
- Ghita Carroll (Sustainability)
- Frank Phillips (Transportation)
- Dena Neuhaus (Transportation)
- Myriah Conroy (Community Member)
- Francoise Poinsatte (Community Member)

1. **SMS introduction** – Julie Sieving (Brendle Group)

An SMS is a comprehensive and systematic way of approaching sustainability.

2. Clarifying Questions

What is the payback and how will this effort affect BVSD. In other words, will it be an 18-month commitment or will it be more long term? The goal is to ensure that these practices are more long term. These interviews serve as an effort to feed the bucket of ideas that will inform overall strategies. The SMS as a tool is for the long term – the product of the next few months is to become a living document for the district.

Are the inventory and solutions a parallel effort? Solutions gathered today are intended to inform the baseline. The Brendle Group is in the process of merging solutions and the inventory.

4. Brainstorming Results(items in the Opportunities column are necessarily related to items in the Existing Practices column)

Existing Practices	Opportunities
Open Enrollment	
27% greater traffic congestion due to open enrollment (each bus takes 36 cars off road)	Encourage behavior changes through training
Foothills School is a model school for Safe Routes to School Program (infrastructure)	Establish transportation master plan to regulate open enrollment; individuals submit personal transportation plan for open enrollment (see Denver Public Schools for example – elem/MS success)

Existing Practices	Opportunities
BVSD and municipality are working together on Casey MS	Treat county communities as separate but equal – need policies around open enrollment
	Procedure to determine who needs special transportation and criteria for meeting needs efficiently
	Charter schools should coordinate carpool practices with parents
	Website to help coordinate carpooling for OE, charters, meetings, and events
Bus Operations	
Block heaters on timers (2 hours before buses start) 100%; temperature sensitive if it is warm enough	Type-A buses driven by coach/sponsor rather than bus driver (limit need for large buses for small needs)
Buying Type-A multi-function buses to replace suburbans	Limit Pre-trip bus startup while running through checks (don't have the bus running)
Updates on buses – 80% diesel oxygen catalysts with grant money ($200-250K grant money through Regional Air Quality Council RAQC)	Replace old buses; old buses meet EPA standards for when they were made but newer buses have much better emissions – GHG inroads (new buses with 2010 emissions standard – cleaner and more fuel efficient) – average fleet age is11 years
Anti-idling bus strategy	Upgrade bus replacement cycle to 7-year average age of buses as opposed to current 11-year average age (BVSD has one of oldest fleets in Colorado) 237 buses (including 40+ suburbans)
B5 in all diesel vehicles	Bus wash using recycled water and special enzymes – need for regular bus washing but no facility outside of Boulder
Mountain training program – teaches drivers to operate buses safely in mountains (proper operation reduces need for maintenance and replacement)	Good connection from operation to maintenance
Routing Efficiency and Alternative Transportation	
Process of looking at all stops, routes, runs, travel directions to consolidate and make more efficient while maintaining same level of service – less idle time, less overall time (time+load+distance equation) – centralized and localized attention (special needs is centralized); redundancy in checking routing	Develop Safe Routes program more fully
Sharing drop-off and pick-up (trip routing) – many complaints about bus sharing (ex. Sports teams) – *tracking Suzanne Ferguson*	Training and tools to walk the talk (ex. recycling)
CDOT Safe Routes to School Crossing Guard training that provides standardized training for volunteers	Raise level of crossing guard training and expand number of programs
Working with other Colorado districts on updates and current legislation (LEGUP – legislative update)	Adequate paths (sidewalks) or crossovers for kids to get across busy streets; extended sidewalks; other infrastructure upgrades to enable walking without need for buses
Moving toward walking/bike riding for children (bike racks full)	City Council/Transportation Board working directly with BVSD on policy issues for community-wide benefits

Existing Practices	Opportunities
City/BVSD coordination on parking issues/policies – ex. promotion of monthly RTD passes to get to school instead of driving (Boulder HS downtown where parking is limited)	More use of RTD buses and passes
Freikker Program – bike racks	Athletic event carpooling
Bicycle clubs	New bike racks, safe pathway for students (jersey barriers), separate bike traffic from Bear walking and car drop offs (infrastructure)
Some effort to coordinate staff carpooling	Separate buses from drop off areas – more safe areas (infrastructure) ex. Platte MS
	Continued consolidation of student stops
	Implement crossing guard program (collaborate with other community entities) – create more safe walking/biking areas; common drop-off locations (no current legislation, but some is proposed) Safe Routes National Coalition is resource
	Leverage cost effectiveness of crossing guards rather than buses (training opportunity)
	Collaboration with RTD (including drivers riding RTD to Transportation terminals)
	Develop Safe Routes program more fully
Transportation Options	
Safe Routes to School program that encourages K-8 students to bike/walk (32 schools participated)	Continue Safe Routes to School efforts beyond grant cycle
Bear Creek Elem Oberstar Award - no bus services, 69% students walking/biking - Krueger Cup – 70 students have not used auto transport all year	Study trip timing to determine which is faster/better, more fun (walking/biking or riding in a car)
BLAST rolling out this year in 1 to 4 schools – bike lesson and safety training for 5th-6th graders (basic skills in PE classes)	Apply BLAST district wide
Anti-idling policy for district vehicles	Overcome safety concerns and convenience issues
International Walk to School Day in October	
Participation in pilot anti-idling effort with CASEO (cars at schools engines off) - Ryan Elem in Louisville is control school with signs and newsletter	Implement the CASEO model district-wide to reduce parent idling
Earth Day BVSD Bike to School Day in April	Support a district wide eco-pass that can be paid for by employees using pretax dollars (automatically deducted)
RTD Eco-pass (all purpose) for BVSD staff in some locations	Develop a Transportation Master Plan to look at all functions in transportation system (infrastructure/operations), identify hazardous corridors that require bussing, etc.
16 middle schools/high schools have discounted monthly bus passes	
$100,000 grant to study middle schools and determine obstacles to riding RTD (Go by	

Existing Practices	Opportunities
Bus/School Pool program) – to promote bus and carpool transportation	
Training	
In-service training/staff development (lots of required training – compliance)	Strategy to eliminate waste from the process, not just the end product
Shop works with PACE – Boulder County	Traveling training team to work with schools and community organizations on education and enforcement
	Reinstitute training on safe walk zones, etc.
	Education for staff – leaders need to support behavioral change
	Work with community to do PR campaign that includes environmental benefits of riding the bus (good drivers, efficient, safe)
	Cross-train bully-proofing and bus drivers
	Address (2) Charter schools – no buses, only parent transportation
	Reduce parent idling
	Prioritize issues and institute new practices – coordinated emphasis on instilling better behaviors (parents, staff, students)
	Build sustainability into classroom curriculum – transportation issues specifically (in-service training)
General	
Students with special needs program is outstanding	Move special needs programs to other schools – Special Ed Program Placement (reduce long bus rides for students)
Bus barn lights on timers	Implement standard lot maintenance
	Increase building efficiencies
	PV or wind generation at Nederland terminal – a teaching opportunity for mountain schools (lessons in operation and generation)
	Take advantage of partial and matching funding from GEO and DOLA – apply with matching funds
	Prioritize opportunities and include diversity of impacts from transportation in criteria
	Bathrooms (water usage, paper towels – reductions)
	Xcel Smart Grid project – reverse energy flow back to grid (use rooftop area at bus barns to feed system)
	Rechargeable batteries for flashlights used for pre-trip check in the dark (windup flashlights)
	Buildings – heat/cooling balance so that workers aren't compromised (Transportation Bldg – converted car port)
	Buy property next door to have bus wash, better buildings, more centrality
	Process of reverse engineering – create less waste
	Incorporate sustainability/transportation issues into curriculum

Appendix B: Comments Received on Draft SMS

The following comments (included in the order received) were compiled during the draft review process. BVSD appreciates all those that reviewed the SMS and provided feedback.

From: Frank Phillips
Sent: Tuesday, June 16, 2009 10:30 AM
To: Susan Blythe
Subject: First Draft - BVSD SMS

Impressive and ambitious document! I am glad to see you mentioned Performance Contracting as a vehicle for implementing the changes. Speaking as a councilman from the city of Lafayette, we did a $1.2 million contract with a 10 year payback. The project included lighting, Solar water and PV, and even methane reuse at our waste water treatment plan. The size of the district and number of facilities make performance contracting an ideal application. If your company is attending the CML annual conference in Vail this year, I am giving a presentation on it. If not, you can still access the presentation on the CML website (www.cml.org).

Thanks,
Frank Phillips
Transportation

Greening Boulder Schools-
A Task Force of Parents and Community Members
Concerned About Public School Sustainability

Recommendations for Boulder Valley School District's
Sustainability Management System
June 22, 2009

We applaud BVSD for the significant new steps they have taken this past year to promote sustainability- from hiring a sustainability manager to the creation of a sustainability management system (SMS). These efforts will truly enhance all aspects of BVSD's organization and will have far reaching affects in the community at large. We appreciate the opportunity to comment on this initial SMS and respectfully submit our comments below.

General comments

BVSD Sustainability Goals

In general, we find that the level of detail included in the SMS document is insufficient for becoming the guiding, working point of reference. In particular, the information presented in Table 7 (BVSD's SMS Framework), needs to be far more comprehensive. Short Term, or 5 year goals, seem surprisingly modest. It is hard for the reader to imagine how BVSD will successfully reach the stretch or long term goals with such a timid start.

We recommend that intermediate goals (10-, 15-, and 20- year) be established and clearly articulated in Table 7. Intermediate goals will include specific, measurable targets in all focus areas and will provide a clear road map/directive to realistically achieve the District's worthy long term aspirations.

Given the length of the SMS document, a clear and concise summary of BVSD 5, 10, 15, 20 year and stretch goals in Table 7 is essential so that the public may have a quick and easy way to grasp the magnitude of the SMS program.

In Spring of 2009, BVSD signed a MOU with Boulder City and County and the University of Colorado- an indication of the School District's willingness to work with the community at large towards sustainability goals. It makes sense therefore that BVSD in turn embrace goals that reflect City, County, and State guidelines.

For example,

Colorado state government seeks to achieve by June 30, 2012:

- 20% reduction in energy use
- 20% reduction in paper use
- 10% reduction in water consumption
- 25% volumetric reduction in state vehicle petroleum consumption

- The City of Boulder and Boulder County also have specific goals for reduction of greenhouse gas emissions (seven percent below 1990 levels by 2012).

- Boulder County's community goal is 15% reduction in vehicle miles traveled (VMT) with progressive reductions over time.

Finally,

- We recommend that all goals be reviewed to ensure they are SMART goals (Specific, Measurable, Achievable, Realistic, and Time-bound).
- Many Stretch Goals need to be more specific. We recommend that Stretch Goals and Implementation Steps more closely match the goals set by Poudre Valley School District's SMS (http://www.psdschools.org/documentlibrary/downloads/Operations/SMS_4-20-07.pdf), California's High Performance Schools, and the recent Colorado Collaborative for High Performance Schools (CO-CHPS).
- All the Brendle Implementation Steps should be incorporated in the goals listed in Table 7 and their successful implementation should be required (*shall* or *must* rather than *could*).
- Goals for reduced energy consumption and energy conservation should use per-capita indicators.

Current Bond Work

We request that BVSD incorporate the above sustainability goals into all bond work being planned for the future, and to Phase 2 and 3 Bond Construction work currently being implemented (specifically including Phases 2A and 2B).

Public process

We believe the following should be **required**:

- Annual report to school board, including a specific review of all goals and a description of progress towards those goals. Provide many opportunities for public review and commentary.
- Post information on each school's website and on the district's website, annually, with information about specific goals and progress toward those goals.
- Establish Community Advisory Board to include input from parents and community, giving BVSD the benefit of outside expertise. This board would include district representatives as well.

Institutionalize sustainability goals

It is unclear to us which parties will be responsible for achieving the goals outlined in Table 7. Without assignment of specific accountability, we believe that BVSD will not successfully reach its short or long term goals. Clearly, the Sustainability Coordinator can only do so much- principals, operations and maintenance staff, teachers, students and support staff must all do their part. Responsible parties must be clearly specified in the SMS.

We recommend that:

- BVSD provide for District-wide, department, building, and individual accountability to ensure specified goals are met. Individuals, departments, principals will be responsible for specific progress by specific dates, with consequences if results are not achieved.

BVSD's SMS should be tied to staff development, performance reviews, and hiring criteria.

- BVSD should educate its staff and students, so they understand that resource conservation and efficiency efforts pay for themselves and can potentially provide more funding for core educational uses.
- BVSD recognizes its responsibility to ensure a secure energy and resource future for the institution of BVSD, its staff and students. BVSD has a responsibility to the community to address the financial exposure and risk of not dramatically decreasing the District's energy consumption. BVSD culture should incorporate appreciation for the District's efforts to reduce future energy and budget costs, and its responsiveness to the issue of increasing energy costs in the future.
- All BVSD departments, buildings, and individuals should recognize and incorporate into their policy and practices the benefits of green school goals (e.g., student/staff comfort, productivity gains).
- BVSD should expand the scope of the SMS effort for all BVSD goals and efforts, ala High Performance Schools.

Comments on Specific Focus Areas

Buildings

We recommend that BVSD implement all the building related assessment themes recommended by Brendle Engineering Table 6, pg. 10 and incorporate these into their goals in Table 7.

We recommend BVSD adopt the following **Stretch Goals**:

- Net-zero energy use in all new construction by 2020, in alignment with California's goals.
- No potable water used for irrigation: establish a metric and set an intermediary goal. Specifically apply this goal to new construction.
- 50-95% reduction in water consumption.
- All schools participate in Green Star School Program.

We recommend BVSD strengthen the 5-Year Goals as follows:

- Change goal for current bond projects from 10% to 30% better than IECC Energy Code (2006) -please note: we believe this is a typo in Table 7. The public sector should strive to set an example by going above and beyond private sector requirements.
- Change goal of 5% improvement in operating efficiency of existing buildings to a goal of 10% reduction in energy consumption BTUs (or other comparable metric), per capita and per sq. ft.
- New construction AND renovation projects meet CO-CHPS standards.
- Non-toxic and biodegradable products are used for weed and pest management for all buildings/grounds.
- Create district-wide water conservation plan with a goal of a 10% reduction in water consumption at each building, with specific goals for reduction in both indoor and outdoor use.

- Include existing buildings in energy reduction goals.
- Require that life-cycle analysis be performed when considering the demolition of a school building.
- All future bonds will comply with School LEED and CO-CHPS standards for new construction.

Finally, we recommend BVSD adopt the following new 5-Year Goals:

- Perform energy audits at all existing schools with a focus on both operational/structural improvements and the efficiency of the building structure and envelope. Establish a baseline per-capita intensity of use for each occupied building.
- Consider District-wide performance contracting options (research the models from the Governor's Office and the City of Boulder).
- Establish a revolving fund to finance energy conservation and energy efficiency projects.
- Provide energy consumption data for each school. Make historical data (per sq. ft. per student) readily available to the school community so that schools can readily monitor and strive to reduce their energy consumption. Work with utility providers to provide each building with information about their energy and water use (currently these data are not easily available).
- Provide school Principals and maintenance and operations staff with sufficient training and jurisdiction to manage their own HVAC, water, and energy systems.
- Provide incentives for schools to meet their goals. Require Principals to develop a School Sustainability Plan with the school's Green Team. Offer financial incentives to schools that reduce energy and water expenses by 10%. With BVSD energy costs over $2.5 million/year, offering incentives to schools that strive to reduce these costs is one significant path to reducing costs. We recommend incentives include availability of monies saved by reducing energy consumption for additional energy conservation and efficiency projects.
- Monitoring and reporting: set a 2-year goal for working with utility providers to develop methods for efficiently and routinely gathering and distributing building-specific data.
- Provide and display real-time energy data in ways that are accessible to staff and students.
- Establish protocol at all BVSD schools for the creation of xeric landscaping and athletic fields, with a stretch goal of 95% reduction in water consumption.
- Lighting- virtually all BVSD schools are out of compliance with Boulder's illumination ordinance (http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=2607&Itemid=4). This is especially true of unshielded, high wattage outdoor lighting. At least, new buildings and remodels should comply within 5 years. Studies have shown that bright lighting does not make buildings safer.
- Institute a proactive preventative maintenance plan.

2. Materials

- "hazardous end products safely managed" should be an immediate, not stretch, goal.
- RFPs provide for environmentally sound procurements with a percentage range to allow for the slightly higher cost of such products and services (for example, if a more sustainable product costs 10% more than an environmentally unsound one, that product can still be purchased since the 10% additional cost is within the additional cost range deemed acceptable by the District).
- Provide training for employees on material and operations efficiency, such as most efficient copying options, paperless communication systems, paperless educational methods, etc.
- Ensure average diversion rate of 70% for Construction and Demolition work is 70% by volume and 70% by weight. Provide measureable proof that best practices in recycling and reuse of construction waste are indeed occurring.
- In order to reach stretch goal of zero waste, mandate **now** that all buildings use the 3 bin system (waste, compostables and recyclables). Compostables should be removed from trash and recycled separately.
- Reduce 50% of paper based documents distributed by curriculum and instruction in 5 years.
- Review EPA Environmentally Preferable Purchasing (EPP) guidelines and use the Responsible Purchasing Network (responsiblepurchasing.org).

3. Education

- Describe methods to provide sufficient staff training to ensure goals are met.
- Include assessment of sustainability literacy in staff performance reviews.
- Integrate real-life applications of school- and individual-based resource and energy use.
- Set and achieve specific goals for energy literacy for BVSD students and staff.
- Building energy and water use data is presented clearly at each school and tied to curriculum (reading, writing, science, math).
- Ensure all BVSD students and staff have a basic understanding of the environmental impact of their personal energy/materials use both at home and at school. Examine individual, home and school building carbon footprints.
- Ensure all BVSD students and staff have an understanding of energy and resource scarcity, and the impact of their personal choices on these areas.

4. Transportation

- BVSD partners with Boulder City and County to advance mutual goals concerning transportation demand management.
- BVSD will establish baseline data for all aspects of transportation so progress in the future can be monitored.
- A 5% reduction 5 year goal in VMT is not very ambitious- make goal in alignment with Boulder County goal of 15% VMT reduction.
- Within 5 years, BVSD will provide Eco-passes to all full time employees as part of its employee benefit package.

- BVSD will increase staff and student bus ridership by at least 10% within 5 years (The stated 5 year goal of a 2% increase in bus ridership seems remarkably unambitious).
- BVSD will work with RTD to provide Eco-passes to all middle- and high-school students.
- BVSD will provide "Safe Routes to School" information at each school and fully staff the Safe Routes to School program to increase walking and biking by 10% within 5 years.
- BVSD will require all schools to develop a policy to encourage and promote carpooling.
- Set 5-Year Goal of reducing GHG emissions from Transportation by 10% by reducing fuel consumption and increasing fuel efficiency, among other conserving activities. Eliminate goal of reducing fleet age- instead, use efficiency and conservation metrics to measure progress.
- Establish/promote anti-idling policy at all schools.
- BVSD will hold Principals accountable for transportation goals at each school.
- Establish a specific % 5 year goal for increasing bike and walk mode share and define the metric for how this will be measured over time.
- Include staff/student parking management and parking cash-out as a 5 year goal. Both of these have been demonstrated to be key strategies to reduce single occupancy vehicle use.
- Institute more efficient bus routes with the 5 year goal of reducing total number of bus/transport routes. Use the GPS/AVL system to evaluate bus routes and times. Evaluate the data gathered to see where route adjustments can be made to increase efficiency and effective use of vehicles.
- Implement/promote anti-idling policy at each school.

5. Climate

- Require building energy conservation and energy reduction plans to first assess energy efficiency and conservation efforts, the proven easiest method to create cost-effective results.
- Verify that the 5-Year Goals in all Focus Areas will permit BVSD to achieve the 5-Year Goals for the Cross-Cutting Climate Theme.
- Set 5-Year Goal for a 1000 kW increase in renewable energy production.
- BVSD will explore 3rd party financing options to expand renewable energy production.
- BVSD will explore benefits of performance contracting on a district-wide level.
- Ensure BVSD Implementation Steps for Climate Area focus on Scope 1 and 2 activities. Include Scope 3 activities as Stretch Goals.
- We propose an additional 5-year climate goal: 20% reduction in intensity of energy use.
- BVSD should prepare for climate change. Any change in land-use in the District (closing a school, rebuilding a school, building a new school) should comply with overall City and County planning goals and should demonstrate a net reduction in GHGs (green house gases).

- Reduce the utility (energy and water) portion of the GHG percentage by 1.5% per year until the year 2016 for a total reduction of 15 percent in 10 years. Measure this by GHG tons per square foot.
- Design standby computer function to limit hours of operation using integrated management software.

Task Force Members:

Julie Herman	Will Toor
Kevin Afllerbaugh	Ron Flax
Tom Volckhausen	Jennifer Shriver
Nancy Doty	Brad Queen
Peter Chandler	Bay Roberts
Pat Shanks	Sam Nishek

Boulder County

From: Livingston, Ann
Sent: Tuesday, June 30, 2009 11:00 AM
To: Joe Sleeper
Subject: RE: BVSD SMS 6-1 Draft for Committee Review

Joe:

The County supports the BVSD efforts on the SMS; we are appreciative of the opportunity to offer further input on the current draft. While we feel that the general direction of the plan is on track and there are a number of tried and true as well as innovative ideas in the plan, we are concerned about some of the goals and metrics in the current draft.

The goal for the bond projects of 10% better than IECC is of concern. The the broad stakeholder process countywide on commercial building codes developed a consensus that our base codes should require 30% better than IECC 2006 ; and the City of boulder already requires 30% better than IECC 2006– so 10% better is less than what any private sector builder would be required to do. The public sector should be setting an example by going beyond the private sector requirements. Boulder county does this – for example, we built the Addiction Recovery Center at about 40% better than code and then supplemented the efficiency efforts with a 3rd party financed 40kw solar system on the roof, we are building new affordable housing close to net zero, and are designing our new road maintenance facility to be near net zero. We believe that 10% better than code is not a sufficient target. Since BVSD will be paying energy bills on these buildings for many years to come the county believes that investments in efficiency (at 30% or greater as compared to current code) make good financial sense over a long term time horizon.

The short-term goal of 5% increase in existing building efficiency seems is unclear – is it a 5% reduction in building energy use per year, over five years, etc.? If it is intended as a 5% total reduction then it seems like a modest goal, particularly when compared to the Governor's goals for state buildings.

In addition to decreasing the average age of the fleet the county encourages BVSD to also set a target directly tied to an increase in average fleet fuel efficiency.

We would like to see quantified goals for increasing bike/walk modeshare and an increase in the 2% goal for increasing the bus modeshare.

While there is a focus on student transportation, there is less focus on employee transportation. BVSD is a very large employer and there are many proven tools for affecting employee transportation choice. To our knowledge BVSD is the only major public institution in Boulder County that does not provide Ecopasses to all fulltime employees as part of the employee benefit package. People with Ecopasses are 9 times more likely to use transit. BVSD may also wish to consider parking management or parking cashout – key strategies to reduce SOV use.

Boulder County has over 720kw of solar capacity and is actively pursuing further expansion. While the 100kw target reflects a desire to increase the renewable energy assets of the district, BVSD could pursue larger scale renewable projects based on 3rd party financing as the county did. We were able to install most of our solar systems with little to no upfront costs and anticipate significant savings on a per kwh basis moving forward.

Thank you for the opportunity to provide additional comments. The county lauds BVSD's progress on the SMS and the district's broader efforts in the area of sustainability. However, we do encourage the district to consider more aggressive goals and metrics in the areas mentioned above.

Please let us know if you have questions or would like to discuss further. The county is happy to support the district in any way we are able.

Sincerely,

Ann

Ann Livingston
Sustainability Coordinator
Boulder County Commissioners' Office

Appendix C: Boulder Valley School District Bond Program Phase I Sustainability Report

Sustainability Report

Phase 1

June 2009

Boulder Valley School District
BOND PROGRAM
It's all about the kids!

greenBVSD

Executive Summary

BVSD believes in green building and the benefits of integrating sustainability concepts into our daily operations. It is good for our kids, the environment and the bottom line. The Bond Program has provided us with a great opportunity to expand our current practices and employ new and innovative strategies.

In the 2006 bond issue ballot language the district committed to implementing cost-effective, environmentally-friendly and energy efficient design and construction strategies. The following measures represent some of the steps the school district took toward building sustainability in the phase 1 projects of the bond:

- We updated BVSD's technical specifications to include more sustainable elements. The revised technical specifications call for the use of materials such as low VOC emitting paints and carpets and high efficiency heating and cooling systems. In addition, our technical specifications encourage all design consultants to utilize the Sustainable Design Resource Guide which is compiled and released by the Colorado American Institute of Architects. This guide provides information on some of the green products available, and how to implement them into design, as well as contact information for local representatives and manufacturers.
- We chose many of our architects because they had at least one Leadership in Energy and Environmental Design (LEED) Accredited Professional on their staff, and/or had designed a LEED Registered or LEED Certified Project as a company. We relied on the expertise of these professionals to incorporate sustainable design into the projects to the extent possible.
- Our bond buyer is responsible for obtaining quotes on furniture, fixtures and equipment (FFE) for new spaces and prioritizes 'green' products. The District purchases third party indoor air quality certified and in other ways environmentally friendly products where budget and availability allow. Our buyer asks potential vendors about their sustainability practices and we are looking into the possibility of establishing 'take back' programs with vendors. In these programs, vendors take back products at the end of their life cycles to recycle.
- Where possible we are re-using products and fixtures in remodels. We also are working with local company Resource to divert waste from landfills by salvaging furniture, fixtures and other materials that can be reused.
- We encouraged all design teams to incorporate daylighting into the projects—increasing the amount of natural light entering a building which reduces lighting and heating needs.
- We established environmental standards for portable classrooms used in the bond program.
- The District continues to implement energy- and resource-wise strategies implemented in previous bonds, such as low-maintenance landscaping, efficient irrigation systems, low-flow water devices, Energy Star appliances and recycled content materials.

Many additional green design elements were included in phase 1 projects and are highlighted in this report. Of particular note is Casey Middle School, which, thanks to a partnership with the City of Boulder, will be BVSD's first LEED certified building and is on track to receive LEED gold.

Sustainable Features in Phase 1 of the Bond Program

Our experience from phase 1 of the bond program will help us define what is possible and evaluate our goals around what we would like to achieve in terms of building sustainability. We are creating guiding principles to direct the remaining projects in phases 2 and 3 of the bond. In conjunction with the guiding principles, BVSD is creating a district-wide Sustainability Management System (SMS). The SMS is a comprehensive approach for defining goals, visions and strategies around integrating sustainability into our operations and curriculum. The guiding principles and the SMS will be complete by June 2009.

The intent of this document is to highlight some of the sustainable design elements included in the projects completed or underway as part of Phase I of the bond. We asked architects to provide a summary of each project identifying sustainable features of the design, the results of which are included in this report.

For more information about BVSD's Bond Program, go to:
http://bvsd.org/bondproject/Pages/default.aspx.

For more information about BVSD's Sustainability Programs and the Sustainability Management System, go to: http://bvsd.org/green/Pages/default.aspx.

Again, we appreciate your interest and encourage any comments and suggestions.

Sincerely,
The BVSD Bond Team

Boulder Valley School District
BOND PROGRAM
It's all about the kids!

greenBVSD

Boulder High School

Project Architect: Klipp Architects
General Contractor: Pinkard Construction
Project Manager: Dave Jorschumb
Budget: $11,812,819
Projected Completion: Summer 2009

The Boulder High School project included the construction of a new 20,000 square foot (sf) main gym, a 2,700 sf office addition and a 2,000 sf stagecraft area, as well as extensive remodeling of classrooms and offices. The project design team included LEED accredited professionals. The new construction meets BVSD's technical specifications which were revised at the onset of the Bond Program to encourage a higher level of sustainability.

Sandstone used for the veneer was recycled from the existing building

Sustainable Features

Sustainable Sites

- Updated and provided additional bike racks
- Reduced onsite parking by 27 spaces

Water Efficiency

- All new fixtures installed are low flow

Materials and Resources

- Reused 65 percent of the stone removed during demolition; the remainder of the stone needed for the exterior veneer was acquired from a local source.
- Recycled 50 percent of onsite construction waste
- Used carpet with recycled content

Energy and Atmosphere

- Installed high efficiency motors in HVAC systems
- Installed energy efficient lighting throughout and highly efficient T-5 lighting in the gym
- Installed motion sensors for lighting
- Used high performance glazing on windows which reduces glare and heat gain

Indoor Environmental Quality

- Used low-emitting paints and adhesives
- Installed thermostats that allow users thermal control within a set range

Broomfield High School

Project Architect: Anderson Mason Dale Architects
General Contractor: Haselden Construction
Project Manager: Steve Schumacher
Budget: $21,242,210
Projected Completion: Summer 2009

The building design maximizes daylighting.

The Broomfield High School Bond project will provide the school with a new 53,000 sf classroom addition, classroom renovations, new administrative and counseling offices and new special education classrooms and teacher work space. The project also included upgrades to building systems and athletic facilities improvements.

Early in the design phase, the design advisory team held a sustainability workshop and identified as priorities very good daylighting and a courtyard with an outdoor learning component. Weidt Group performed an energy analysis to guide decisions related to choosing more efficient systems and products. In considering the energy efficiency of the building, the design team was guided by the idea that it is worthwhile to spend a little more on more efficient systems and equipment with shorter payback periods.

The project design team included LEED accredited professionals. The new construction meets BVSD's technical specifications which were revised at the onset of the Bond Program to encourage a higher level of sustainability.

Sustainable Features

Sustainable Sites

- Maximized open space by designing a two-story building with a courtyard

Water Efficiency

- Installed low flow urinals and toilets
- Used water efficient landscaping

Materials and Resources

- Asphalt from the demolished parking lot was reused around portables
- Construction waste from the demolition was separated and recycled
- Used carpet and ceiling tile with recycled content
- Used regional building materials

Energy and Atmosphere

- Installed more efficient mechanical systems
- Installed 81 percent efficient boilers which will payback in 4 years
- Installed Variable Frequency Drives (VFDs) on supply/return air fans and heating pump which adjust according to need

Broomfield High School

Sustainable Features (continued)

- Installed energy efficient cooling systems
- Utilized sun shades to reduce heat in the classroom
- Used dimming ballasts, which change the lighting based on the amount of sunlight in the room
- Used R-16 wall insulation and R-30 roof insulation (both above code) in the envelope design
- Used window glazing strategies for heat and glare reduction

Indoor Environmental Quality

- Installed operable windows to allow for natural ventilation instead of mechanical
- Used low-emitting paints and carpet
- Installed lighting systems that allow for a high level of user control
- Design maximizes daylighting—virtually every occupied space has daylighting and views
- The design employs a south-facing roof to increase daylighting and make rooms warmer in the winter months.
- Increased lighting in the core of the building through directed daylighting features
- Installed thermostats that allow users thermal control within a set range

Casey Middle School

Project Architect: RB+B
General Contractor: Saunders Construction
Project Manager: Lou Novak
Budget: $32,922,650
Projected Completion: Summer 2010

The Casey Middle School project will provide a new 110,000 square-foot, Leadership in Energy and Environmental Design (LEED) certified building. The new building will be anchored on the site by the south and west walls of the original structure. The decision to retain these walls was the result of a community-based process that involved school community members in the design process. The pursuit of LEED certification was made possible through collaboration with the City of Boulder and use of the City's Educational Excise Tax funds.

The new building is targeted to receive a LEED Gold certification

Sustainable Features

Sustainable Sites

- Implemented an Erosion and Sediment Control plan
- Phase I Environmental Site Assessment (ASTM E1527-05) was conducted; Contamination possible so Phase II assessment conducted as well; If the site is contaminated, it must be remediated to meet local, state, or federal EPA region residential standards
- BVSD and the design team made the decision to keep a middle school in central Boulder; The location is easily accessed by public transportation and within walking and biking distance to residential housing
- Bike racks and showers will be provided onsite; Site is accessed by bike lanes
- Designated parking will be provided for alternative fuel vehicles and car pools; A reduced number of parking spaces will be provided
- The design team worked to reduce the overall development footprint
- Implemented a storm water management plan
- Fifty percent of parking spaces will be underground/covered
- Installing highly reflective roof
- Using light pollution reduction strategies for interior and exterior lighting

Water Efficiency

- Project will reduce potable water consumption for irrigation by 50% over the local baseline
- Project will reduce water use by 40% compared to EPAct 1992

Casey Middle School

Sustainable Features (continued)

Materials and Resources

- Collection and storage areas will be placed around the building for convenient occupant recycling and composting
- Project is recycling/diverting demo and construction waste through on-site separation, com-mingling program, and partnership with Resource. (53% diversion rate after demolition)
- Specifying products with high recycled content such as steel, concrete, gypsum, partitions, tile, etc.
- Specifying products harvested and manufactured within 500 miles of the site
- 50% of all permanently installed wood based products will be FSC certified

Energy and Atmosphere

- Building design will optimize energy performance by 42%
- Project will include an on-site solar system (20kW)
- Commissioning agent will perform enhanced commissioning and post-construction measurement and verification
- School district is considering buying two years of green power to offset 35% of the electricity use

Indoor Environmental Quality

- Designing classrooms and learning spaces to meet the listed Sound Transmission Class (STC) requirements, excepting windows, and to achieve minimal background noise level in classrooms of 45 dBA
- Developing and implementing an Indoor Air Quality (IAQ) management plan that promotes good housekeeping practices, protects absorptive construction materials, and incorporates air filters during construction and prior to occupancy; Will prohibit smoking within 25 feet of the building entrances once building is closed
- Upon completion, will flush out the building with a designated volume of air to remove toxins prior to occupancy
- All adhesives and sealants within weather barrier shall meet the testing and product requirements for low-emissions
- All paints and coatings within weather barrier shall meet the testing and product requirements for low-emissions
- All flooring systems within weather barrier shall meet the testing and product requirements for low-emissions
- All composite wood and agrifiber products (including plywood, particleboard, MDF, etc.) within the weather barrier to contain no urea-formaldehyde
- Providing individual lighting controls for 90% (minimum) of administrative offices and regularly occupied spaces to enable adjustments to suit individual task needs and preferences. For classrooms and core learning spaces provide systems that operate in two modes: general/high(35 - 50 fc at desk level) and AV/low (10-20 fc)

Casey Middle School

Sustainable Features (continued)

- Providing thermal comfort controls or operable windows for 50% of occupants and for shared multi-occupant spaces
- Will implement thermal comfort survey of occupants 6-18 months after occupancy. Plan should be developed for all adults and students grade 6 and above
- Project will achieve a prescribed daylight level in 75 - 90% of all classrooms and core learning space; 75% of all other regularly occupied spaces
- Incorporating views to exterior for 90% of occupants
- Project will meet Impact Insulation Class and achieve a maximum unoccupied background noise level in classrooms of 35 dBA

Innovation and Design

- Using low impact cleaning and maintenance equipment
- Doubling the open space - 50%, currently at 131%
- Zero Waste - Cafeteria using food pulper and fully compostable items for food service
- Will design curriculum based on the high performance features of the building, and commit to implementing the curriculum within 10 months of LEED certification

Centaurus High School

Project Architect: CSNA Architects
General Contractor: Brown Schrephferman
Project Manager: Tom Blahak
Budget: $5,948,991
Completed: Winter 2009

The existing corridor was maintained between the old and the new building

The Centaurus project includes construction of a 5,400 sf, two-story classroom addition and renovation of administration, counseling and special education classrooms and teachers offices. The project also included upgrades to building systems such as HVAC, fire alarms and intercoms, interior signage and exterior site work as well as athletic facilities improvements.

The project design team included LEED accredited professionals. The new construction meets BVSD's technical specifications which were revised at the onset of the Bond Program to encourage a higher level of sustainability.

Sustainable Features

Materials and Resources

- Reused existing casework
- Maintained existing corridor between the old and new areas of the building, maintained existing walls
- Used local concrete and brick
- Reused 100% of existing exterior walls, floor, and roof and 50% of interior non-structural elements

Energy and Atmosphere

- Replaced two primary boilers with high efficiency models
- Installed motion sensors for lighting in classrooms and offices
- Installed high efficiency lighting in new areas

Indoor Environmental Quality

- Used low-emitting carpets
- Installed thermostats that allow users thermal control within a set range
- New spaces have large windows to increase daylighting and views

Crest View Elementary

Project Architect: Eidos Architects
General Contractor: Tower One Construction
Project Manager: Dave Jorschumb
Budget: $5,892,213
Completed: Fall 2008

A reflective roof was used on all new additions to reduce heat gain in the building.

The Crest View Elementary Bond project provided the school with a new 4-classroom addition, new cafeteria and kitchen, new Kindergarten classrooms, remodeled administrative offices and a performance platform in the gym. The project also included building repairs and systems upgrades.

The project design team included LEED accredited professionals. The new construction meets BVSD's technical specifications which were revised at the onset of the Bond Program to encourage a higher level of sustainability.

Sustainable Features

Sustainable Sites

- Installed additional bike racks
- Used aluminum metallic reflective roof on all of the new roof addition to reduce heat gain; In addition, the product does not emit strong odors when installed as built up roofs do

Materials and Resources

- Maintained the floors, walls and roof in remodeled areas
- Some kitchen equipment was reused
- Recycled demolished concrete
- Design specified materials with recycled content where possible
- Used regional materials including masonry block and brick
- Used linoleum (vs. vinyl composition tile) which is a rapidly renewable material in the new hallways and cafeteria

Energy and Atmosphere

- Equipment meets extra standard for refrigerant management, beyond code
- Installed all new windows throughout; windows are one-inch insulated with low-e glass and integral blinds
- Installed motion sensors for lighting

Indoor Environmental Quality

- Installed individual controls for lighting
- Installed and updated thermostats to allow users thermal control within a range
- All new rooms have exterior walls to take advantage of daylighting and views
- Enhanced acoustical performance with a structural system with internal acoustical properties to eliminate the ceiling, additional acoustics in the cafeteria and concrete block walls to cut sound

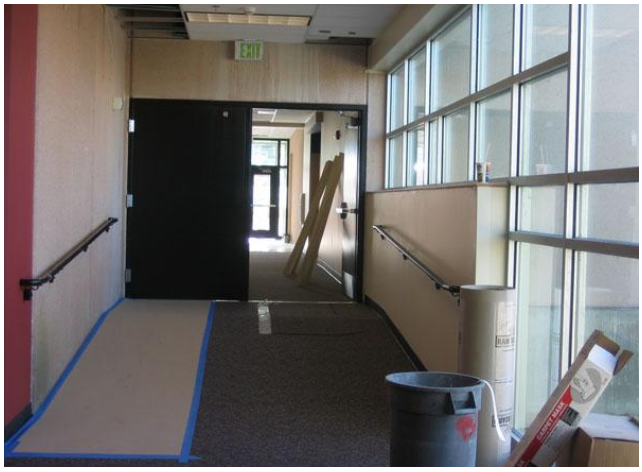
Innovation and Design Process

- Created infrastructure to be solar ready

Fairview High School

Project Architect: RTA, Inc.
General Contractor: Golden Triangle
Project Manager: Steve Schumacher
Budget: $10,910,579
Projected Completion: Summer 2010

The Fairview High School project includes classroom renovations, remodeling of the senior balcony and counseling offices, locker replacement and construction of a new two-story classroom addition. Also included in the project are upgrades to boilers, the HVAC system, the communication system and interior signage.



Eco-friendly materials were used, including carpet and ceiling tiles with recycled content and low-emitting paints.

The project design team included LEED accredited professionals. The new construction meets BVSD's technical specifications which were revised at the onset of the Bond Program to encourage a higher level of sustainability.

Sustainable Features

Water Efficiency

- Remodeled some bathrooms, and replaced all fixtures with low flow toilets and urinals
- Design uses native grasses instead of sod on 1/5 of the original turf grass

Materials and Resources

- Existing structure was reused where possible in the renovation to reduce demolition waste.
- Reused lockers
- Used carpet and ceiling tiles with recycled content
- Used some regional materials

Energy and Atmosphere

- Replaced existing boilers with high efficiency condensing boilers
- Installed economizers on the new rooftop units to provide cooling from outside air
- Used motion sensors for lighting
- Used dimming ballasts, which change the lighting based on the amount of sunlight in the room

Indoor Environmental Quality

- Used low-emitting paint
- Installed operable windows
- Installed Solatubes in the addition
- Used sloped ceilings in the classrooms to bounce light deeper into the room
- Used light shelves to bring light inside

Foothill Elementary School

Project Architect: Larson Incitti
General Contractor: Haselden Construction
Project Manager: Dave Jorschumb
Budget: $9,051,405
Projected Completion: Summer 2009

The Foothill Elementary project includes the construction of a new wing that houses classrooms, the IMC and work rooms. Classroom renovations, building systems upgrades and renovation and expansion of the administrative offices also are part of the project. The project design team included LEED accredited professionals. The new construction meets BVSD's technical specifications which were revised at the onset of the Bond Program to encourage a higher level of sustainability.

The new library features high efficiency lighting and green seal certified carpet

Sustainable Features

Water Efficiency

- All new fixtures installed are low flow

Materials and Resources

- Trees removed from the site went to neighbor for firewood
- Used materials with recycled content such as masonry, roof and building insulation, concrete, tile, gypsum, carpet, metal toilet partitions and steel parts and pieces
- Used regional building materials such as brick, fly ash for concrete, mortar, cement, sand and steel joists

Energy and Atmosphere

- Installed high efficiency boilers
- Installed energy efficient lighting
- Installed motion sensors for lighting
- Surpassed State envelope requirements by 33% using high efficiency roof and wall insulation
- High efficiency glazing on windows

Indoor Environmental Quality

- Increased ventilation by upgrading and installing additional unit ventilators
- Used low-emitting sealants and paints
- Used green seal certified carpet
- Installed formaldehyde free case work
- Installed thermostats that allow users thermal control within a set range
- All new classrooms have daylighting and views

Innovation and Design Process

- Created infrastructure for school to be solar ready

High Peaks/Boulder Community School of Integrated Studies

Project Architect: Lanz-Boggio
General Contractor: W. O. Danielson
Project Manager: John Bollinger
Budget: $7,042,039
Projected Completion: Summer 2009

The High Peaks/BCSIS project includes extensive remodeling as well as new construction. Through the project, the school will receive a new main gym, new art and music classrooms, new fifth grade classrooms and extensive renovations. The project also includes upgrades to building systems such as HVAC.

Building additions take advantage of opportunities to maximize daylighting

The project design team included LEED accredited professionals. The new construction meets BVSD's technical specifications which were revised at the onset of the Bond Program to encourage a higher level of sustainability.

Sustainable Features

Sustainable Sites

- Used a light colored membrane roof to reduce heat gain; in addition the product does not emit strong odors when installed as built-up roofs do

Water Efficiency

- All new toilets installed are low flow
- Used water efficient landscaping

Materials and Resources

- Recycled onsite construction waste
- Used carpet with 10% recycled content
- Used vinyl composition tile and roofing product with recycled content

Energy and Atmosphere

- Met the minimum energy performance needed for LEED credit
- Used high efficiency mechanical equipment
- Installed energy efficient lighting
- Installed motion sensors for lighting
- Specified glass insulation with high R values

Indoor Environmental Quality

- Used low-emitting adhesives, sealants, paints and carpets
- Gym included translucent glazing panel around the upper portions to reduce or eliminate the need for lighting
- All new and renovated spaces have views and increased daylight
- Used Solatubes in each remodeled classroom
- Tried to meet enhanced acoustical performance LEED standard for the gym
- Sunshades reduce glare

Innovation and Design

- Created infrastructure for school to be solar ready

Lafayette Elementary

Project Architect: Barker Rinker Seacat
General Contractor: Mark Young Construction
Project Manager: Tom Blahak
Budget: $3,009,587
Completed: Fall 2008

The Lafayette Elementary Bond project included construction of a 4,800 sf classroom addition, a 1,767 sf multipurpose room and the expansion and remodeling of the administration suite. In addition, upgrades were made to building systems such as HVAC and intercom. The project design team included LEED accredited professionals. The new construction meets BVSD's technical specifications which were revised at the onset of the Bond Program to encourage a higher level of sustainability.

The classroom addition at Lafayette Elementary features ample

Sustainable Features

Water Efficiency

- All new toilets installed are low flow

Materials and Resources

- Used local brick for veneer

Energy and Atmosphere

- Installed energy efficient lighting
- Installed motion sensors for lighting
- New windows have high efficiency low E glass

Indoor Environmental Quality

- Increased ventilation and thermal control with operable windows in all new spaces
- Used low-emitting paints
- Utilized southern orientation to incorporate daylighting

Louisville Middle School

Project Architect: SLATERPAULL Architects
General Contractor: Adolfson & Peterson Construction
Project Manager: Dave Compton
Budget: $16,632,864
Projected Completion: Summer 2009

The Louisville Middle School project will provide the school with a new two-story addition to house the auditorium, music, art, applied technology and IMC. The addition also will feature a new student commons area. Also included in the project are classroom renovations, new signage, IT improvements and a new intercom system.

The project design team included LEED accredited professionals. The new construction meets BVSD's technical specifications which were revised at the onset of the Bond Program to encourage a higher level of sustainability.

Brick was salvaged from the old building and reused in the new construction

Sustainable Features

Sustainable Sites

- New construction did not increase light pollution
- Auditorium may be used jointly by the community

Water Efficiency

- New fixtures Installed were low flow

Materials and Resources

- Used stained concrete to finish the floors instead of floor covering
- Used brick salvaged from the demolished building in the new addition
- Diverted construction waste materials from landfills
- Used interior finish materials with high recycled content such as carpet, ceiling tiles and acoustic tiles
- Used regional brick

Energy and Atmosphere

- Installed high efficiency boilers
- Installed efficient fans and pumps
- Installed 85 percent efficient domestic hot water heaters
- Installed motion sensors in all new rooms to control lighting
- Used efficient wall insulation (R-15) and roof insulation (R-38)
- Used glazing strategies to reduce glare and heat gain

Indoor Environmental Quality

- Used low-emitting paints and sealants
- Classrooms have dimmable lights

Louisville Middle School

Sustainable Features (continued)

- Installed thermostats to allow users control of temperature within a set range
- Maximized daylighting with interior light shelves that bounce light into the classroom and exterior sun shade devices to reduce glare and heat gain
- Installed Solatubes in halls and classrooms
- Maximized views in the new spaces
- Used acoustic insulation in classroom walls to create quieter teaching space
- Used acoustic panels in the auditorium, music rooms and common area

Innovation and Design Process

- School/construction project is being used as a teaching tool
    - Taking old boiler covers and using them for display
    - Construction club is ongoing, contractor is participating.
    - Creating a display in library of start to finish

Manhattan Middle School

Project Architect: OZ Architecture
General Contractor: Adolfson & Peterson Construction
Project Manager: Tom Blahak
Budget: $11,061,508
Completed: Winter 2009

A 9.8 kilowatt photovoltaic system was installed on the roof of the new wing

The Manhattan Middle School project will provide the school with a new six-room science wing, a new 2,286 sf band room and extensive remodeling to classrooms, offices and other spaces. The project also includes extensive upgrades to the building systems such as HVAC and electrical.

The project design team included LEED accredited professionals. Incorporating sustainable features into the design was a high priority for the design professionals and the design advisory team. The new construction meets BVSD's technical specifications which were revised at the onset of the Bond Program to encourage a higher level of sustainability.

Sustainable Features

Sustainable Sites

- Reduced light pollution by capturing light in the building and aiming exterior flood lights down

Water Efficiency

- Water efficient landscaping was achieved through the use of ditch water
- Updated irrigation lines and used the existing the cistern and ditch
- Installed master irrigation controller with weather station to monitor water requirements

Materials and Resources

- Reused as much as possible including doors, frames, cabinets, ceiling tiles, lockers and 30 percent of casework.
- Recycled steel and other metal
- Used materials with recycled content

Energy and Atmosphere

- Installed onsite renewable solar to provide power to select systems in the new Science wing. When demand is low electricity is fed back into the grid.
- Installed two solar and wind powered light poles onsite
- Installed motion sensors for lighting in all new spaces

Indoor Environmental Quality

- Used low-emitting paints, door stain and concrete floor finishes
- Installed thermostats to allow users control of temperature within a set range
- Designed for daylighting and views in 75 percent of new classrooms

Manhattan Middle School

Sustainable Features (continued)

- Polished concrete floors utilized a certified green system with no off gassing and sustainable maintenance which does not need chemical stripping

Innovation and Design Process

- Corridor ceilings are exposed so students can see building systems making the building a learning tool
- Teachers plan to integrate the renewable systems into the curriculum.

Southern Hills Middle School

Project Architect: MOA Architects
General Contractor: Golden Triangle Construction
Project Manager: Lou Novak
Budget: $10,169,858
Projected Completion: Summer 2009

The new additions were designed with attention to daylighting and views.

The Southern Hills Middle School project includes extensive remodeling as well as new construction. Through the project, the school will receive a new main gym, new band and orchestra classrooms, new science and special education classrooms, a larger IMC and larger, remodeled administrative and counseling offices and remodeled classrooms. The project also includes upgrades to building systems such as HVAC, irrigation and fire sprinklers. These systems upgrades should result in greater energy efficiency.

The project design team included LEED accredited professionals. The new construction meets BVSD's technical specifications which were revised at the onset of the Bond Program to encourage a higher level of sustainability. In addition to specifying products that were eco-friendly, the design team also was conscious of not specifying any products where possible. For example, floors in the new and remodeled areas of the school are 'finished' as stained concrete rather than using a floor covering product such as tile.

Sustainable Features

Sustainable Sites

- Added new bike racks and relocated them
- Used built-up roofs, with a light colored aggregate to reduce heat gain

Water Efficiency

- Installed low flow fixtures

Materials and Resources

- Salvaged many of the large boulders and bricks for reuse onsite
- Recycled all materials possible; had sorting bins for recycling and reuse

Energy and Atmosphere

- Upgraded the mechanical and electrical systems
- Limited air conditioning in the building
- Installed energy efficient lighting
- Installed motion sensors for lighting

Indoor Environmental Quality

- Replaced existing ventilation systems
- Installed thermostats that allow users thermal control within a set range
- The new additions were designed with attention to daylighting and views.

Summit Middle School

Project Architect: Hutton Architecture Studio
General Contractor: Golden Triangle Construction
Project Manager: Dave Compton
Budget: $5,200,000
Completed: Fall 2008

Large windows in the new library provide ample daylighting

The Summit Middle School project will provide the school with a new IMC and support spaces, new science labs and art studio space, expanded and remodeled health clinic and faculty areas and new carpet and floor finishes throughout the building. The project also includes extensive upgrades to the building's systems including mechanical and electrical systems, a new fire sprinkler system, irrigation and communications.

The project design team included LEED accredited professionals. Incorporating sustainable features into the design was a high priority for the design professionals and the design advisory team. The new construction meets BVSD's technical specifications which were revised at the onset of the Bond Program to encourage a higher level of sustainability.

Sustainable Features

Water Efficiency

- Installed low flow fixtures

Materials and Resources

- Reused existing light fixtures and duct work to the extent possible
- Recycled existing asphalt where possible
- Recycled existing pea gravel through a contractor negotiated exchange of old gravel from the site for clean
- Used carpet with an overall post consumer recycled content of 30% or more
- Used bio-based tile made from corn or similar natural material; this product includes 10% pre-consumer recycled content, affords low VOC emissions, and offers enhanced performance over traditional vinyl composite tile
- Used linoleum tile flooring which has natural content
- Used local brick as primary exterior finish material

Energy and Atmosphere

- Installed geothermal heating and cooling for the new addition
- Installed high performance (8' diameter) ceiling fans to de-stratify IMC volume while also reducing both cooling and heating needs
- Installed high efficiency electric lighting

Sustainable Features (continued)

- Installed dual switched (50%/100%) motion sensors for lighting
- Used glazed triple pane windows which
- significantly increase efficiency
- Included a continuous layer of rigid insulation in wall assembly (R6 per inch thickness)
- Upgraded to higher efficiency 100% cotton fiber insulation (recycled blue jeans)
- IMC form and roof design has been articulated to provide solar protection for east, west, and southern exposure
- Utilized sunshades on windows with east and west exposure to reduce heat in the classrooms
- Performance tuned window glazing in classrooms to each specific exposure
- Window glazing in the IMC maximizes natural light while providing glare control through diffusion and specific levels of transmittance

Indoor Environmental Quality

- Installed operable windows to allow natural ventilation in lieu of mechanical system
- Used low-emitting paints
- Casework was manufactured using low-emitting formaldehyde wood products
- Solid core wood doors were manufactured using low-emitting adhesives and sealants and no added urea-formaldehyde
- Installed Solatubes (w/ dimming capability) in each classroom

Appendix D: School Sustainability Toolkit

Boulder Valley School District

School Sustainability Checklist

The following is a quick checklist adapted from the Washington Green Schools Program (www.wagreenschools.org) to help your school's Green Team develop sustainability practices in four areas: energy, solid waste, water, and transportation. You can use this checklist to help track your school's progress as you take certain actions and accomplish milestones.

Energy

- ☐ Establish or improve school-wide strategies for turning off all lights when adequate sunlight is available or when rooms are not in use.
- ☐ Establish or improve school-wide strategies to turn off (or put to sleep) all computer monitors, peripherals (printers, scanners, etc.) and other electronic equipment (copiers, typewriters, etc.) when not in use.
- ☐ Establish or improve school-wide strategies to make sure space around vents on walls and window sills is kept free of obstruction.
- ☐ Establish or improve school-wide strategies to make sure windows, blinds, and curtains are closed at theend of the school day to keep heat in, and open during the day to let daylight in and reduce heating need.
- ☐ Establish or improve school-wide strategies to make sure doors to the outside of the building are not leftopen longer than necessary when heating and cooling. Classrooms should also keep windows and doorsclosed when heating and cooling.
- ☐ Establish or improve school-wide strategies for turning off all outside lights during daylight hours. Consider turning them off at night after caretakers leave the school (dark campus w/motion sensor lights).
- ☐ Set standard heating and cooling points for thermostats to 68°F - 70°F during the winter or heating season and to 75°F or higher during the summer or cooling season. Include a plan to encourage students and staff to dress appropriately for the season so that they will be comfortable with the new energy conserving thermostat settings.
- ☐ Implement weekend and vacation shut-down procedures for heating/cooling and lights/equipment to maximize energy efficiency.
- ☐ Coordinate after-school and weekend activities for efficient use of heating and lighting systems.

- ☐ Have appropriate school/district staff regularly check mechanical equipment and perform proper cleaning and preventative maintenance (heating coils are vacuumed, filters are changed as scheduled, etc.).

- ☐ Implement an equipment consolidation program to ensure that energy is not wasted by using more equipment than necessary (e.g., unplugging and/or removing unnecessary refrigerators and reducing the number of computer printers through networking).

- ☐ Post conservation reminder stickers and posters around the school (turn off the lights, turn off this computer/monitor, thermostat settings, keep door closed, etc.)

- ☐ Include a "conservation minute" or "factoid" each day or week. Post this information, make it a trivia game, a morning announcement, staff meeting announcement, etc.

- ☐ Contact your local utilities or agencies to schedule speakers on energy conservation or to order classroom resources related to energy conservation.

- ☐ Have students calculate their personal "ecological footprint" using one of the many online calculators and have them write, draw, or present about simple things they can do to reduce their footprint.

- ☐ Have students calculate their personal "carbon footprint" using one of the many online calculators and have them write, draw or present about simple things they can do to reduce their footprint.

- ☐ Research three local or international schools to learn what they are doing to conserve energy, and how they measure and evaluate their results.

- ☐ Establish a relationship with a sister school internationally with similar academic/environmental goals so students can be engaged with the global community. Share information with whole school community.

- ☐ Have older students teach younger students activities or lessons relating to energy, conservation, etc.

- ☐ Start a student "Conservation Patrol" or "Classroom Energy Monitor" program, or rotate studentresponsibility to perform classroom and school walk-throughs to monitor conservation actions (turn off lights, monitors, etc.).

- ☐ Perform a skit, puppet show, or other type of entertainment related to energy use and conservation to the school, community members, or another school.

- ☐ Design an advertising campaign including displays for the foyer, commons, cafeteria or other space to educate students and staff about school energy conservation actions that they can take at school and at home.

- ☐ Each classroom signs an energy conservation pledge for their classrooms and/or students could take an energy conservation pledge home for their family to sign and post on their refrigerator.

- ☐ Establish an Environmental Club, Energy Club, or Conservation Club, that focuses on environmental issues and projects in your school and community.

- ☐ Research and identify barriers to making any additional improvements in energy conservation at your school, and propose solutions to the school/district/school board, or other appropriate audience.

- ☐ Learn about solar energy to heat water. Determine if solar-heated water would be appropriate at your school and present your findings and ideas to your administration or other appropriate audience.

- ☐ Research potential energy and financial savings if portable electric heaters, small classroom refrigerators or other appliances were not allowed. As part of your research, find if other schools, districts or agencies have banned their use as part of their energy conservation policy.

- ☐ Create a school wide recognition program for students who participate in conservation activities outside of the classroom and/or have students partner with community groups, non-profits, or businesses on conservation related projects.

- ☐ Mentor another school in your district or county to help improve its energy conservation practices.

- ☐ Students calculate the schools "ecological or global footprint" using an online calculators, and present information, findings and recommendations to school community or other appropriate audience.

- ☐ Students calculate the school's carbon footprint and present information, findings and recommendations to school community or other appropriate audience.

Solid Waste

- ☐ Set up a recycling program where your school is recycling at least two material types (i.e. paper and plastic containers, or paper and cardboard). Be sure to provide recycling containers and clear signs for a successful program.

- ☐ Use one-sided prints for scratch pads/drafts. Place labeled trays for reuse paper in each classroom and office. Encourage paper reuse.

- ☐ Create a policy of double-sided photocopying and printing, and provide instructions to photocopier users. Encourage double-sided copying and printing.

- ☐ Use email instead of paper copies for one or more regularly issued newsletters, bulletins or memos. (Be aware of audiences that might not have computer access.)

- ☐ Reduce print runs based on number of leftover copies, or "right size" the paper used (i.e. use half sheets), or encourage the double checking of formatting documents so that one or two lines do not carry over to the final page. Think of and document other methods.

- ☐ Promote "paper free" days at least twice during the school year.

- ☐ Start a bag reuse campaign for lunch sacs.
- ☐ Establish, promote and monitor a reuse station for supplies such as file folders and envelopes. Appoint one staff member to oversee this reuse system.
- ☐ Purchase office paper and paper products that contain at least 30% recycled content.
- ☐ Promote "waste free lunches." Promotional messages may include: "Take or bring only what you will eat" and "Bring reusable containers and lunch sacks for your home lunches." Measure the effects of your efforts throughout the year.
- ☐ Develop a program to decrease the *uneaten* and *unopened food* in the garbage.
- ☐ Research milk carton recycling in your area. If recycling is not an option, research other packaging options (including plastic pouches).
- ☐ Replace disposable plates, glasses and cups with durable products in the staff break room.
- ☐ Hold an end of year locker cleanout school supply reuse (*Great Locker Cleanout*).
- ☐ Hold a student-run reuse exchange event/fair/garage sale.
- ☐ Purchase and reuse durable, reusable party/holiday decorations.
- ☐ Research three local or international schools to find out what they are doing with food waste and look for opportunities available in your area to begin a composting program.
- ☐ Implement composting of food waste either on-site (via a minimum of two classroom worm bins or school-wide on-site composting using a BioStack or Earth Tub) or off-site (via a hauler collection program that transports food waste to a composting facility).
- ☐ Set up a program to compost yard debris from school grounds either on-site or offsite.
- ☐ Research three local or international schools to find out what they are doing to recycle and reduce waste, and how they are measuring and evaluating their results.
- ☐ Establish an Environmental Club, Recycling Club, or other club that focuses on environmental issues in your school and community
- ☐ Measure your school's carbon footprint reduction or the energy saved resulting from waste reduction, recycling and/or composting effort, using one of the online carbon calculator tools.
- ☐ Have older students teach younger students about recycling, waste reduction, composting, etc.

- Students create and perform a skit, puppet show, or other type of entertainment aboutrecycling, waste reduction or composting in your school to the school, community, or another school.
- Design a print advertising campaign to educate other students at your school about the recycling, waste reduction or composting actions at your school.
- Design a display for the foyer, commons, cafeteria or other public space to educate students and staff about your school's recycling, waste reduction or composting actions.
- Make a public service announcement film or radio ad about recycling, waste reduction or composting in your school and involve your local media.
- Create a school wide recognition program for students who participate in recycling/waste reduction activities outside of school and/or have students partner with a community groups, non-profits, businesses, etc. on a recycling/waste reduction related projects.
- Mentor another school in your school district or county to improve its recycling, waste reduction or composting practices.
- Identify barriers to making additional improvements in recycling, waste reduction or composting based on your Recycling & Waste Reduction Assessment, and propose solutions to the school or school district.
- Create a book recycling program for your old library books or textbooks and send them to war-torn countries or other countries in need.

Water

- Post permanent notices in all bathrooms about bathroom water conservation practices.
- Run a campaign to have students and staff sign pledges on water conservation and water protection as a call to personal action (home and school) (e.g. shorter showers).
- Learn about the water conservation benefits of using native plants for landscaping and present your findings and potential for native plants at your school to your administration or other appropriate audience.
- If your school uses pressure washing or hoses to clean sidewalks and other concrete, measure/estimate how much water is used per year on this activity. Provide alternatives to using water for these activities. Present your findings and recommendations to your administration or other appropriate audience.
- Have a monthly "Leak Patrol" check for water leaks and report them to maintenance staff for repair.
- Implement (design, build, and maintain) a rain garden – use as a model for your neighborhood

- ☐ Implement native plant landscaping, an organic garden, or other type of demonstration area, including informational signs on the environmental benefits.
- ☐ Install and monitor precipitation gauge or weather station. Alter the schools irrigation schedule based on level of rainfall.
- ☐ Create a certified schoolyard habitat (National Wildlife Federation).
- ☐ Design a display for the foyer, commons, cafeteria or other public space to educate students and staff about your school's water quality or conservation actions.
- ☐ Contact local agencies to find out what resources, programs and technical assistance in water protection or conservation is available for your school (speakers, classroom resources, technical assistance, grant programs, special projects, etc.). Schedule a speaker, program or technical assistance for your school.
- ☐ Introduce students to careers in water protection and conservation. Have a career day and schedule several speakers from your area that work on water protection and conservation issues.
- ☐ Learn about the water conserving benefits of compost and/or mulch, and propose the use of it at your school to your administration.
- ☐ Present an in-service training related to water quality and conservation to teachers, school staff, or PTA.
- ☐ Develop a water quality protection policy regarding charity carwashes and alternatives (coupons, carwash kits, education about where and how.) Contact a water resources person.
- ☐ Develop a policy at your school to protect your local watershed by choosing actions that conserve and protect water sources.
- ☐ Determine water savings (in volume and $) for one year for one of the following: faucet fixtures (aerators and motion sensor), low-flow toilets and waterless urinals, low-flow shower heads, or irrigation systems. Present your findings to the administration.
- ☐ Research three local or international schools to learn what they are doing to conserve water, and how they are measuring and evaluating their results. Present your findings to the school community or other appropriate audience.
- ☐ Have older students teach younger students activities or lessons relating to water quality and conservation.
- ☐ Identify barriers to making additional improvements in water quality or conservation in your school.
- ☐ Design a print advertising campaign to educate other students about the water conservation actions at your school.

- ☐ Perform a skit, puppet show, or other type of entertainment about water quality or conservation in your school to the school, community, or another school.
- ☐ Make a public service announcement film or radio ad about water quality or conservation in your school and involve your local media.
- ☐ Design a campaign to run a "green" car wash using car wash kits.
- ☐ Create a school wide recognition program for students who participate in water conservation activities outside of the classroom and/or have students partner with a community groups, non-profits, businesses, etc. on a water conservation related projects.
- ☐ Mentor another school in your school district or county to improve its water conservation practices.

Transportation

- ☐ Create and send a transportation options survey home with students and display results (complete a web search for resources and examples).
- ☐ Research options in your area for ride matching, carpooling, public transit and/or provide commuter ridematching services and display your results in the school.
- ☐ Have students research what "Safe Routes to School" projects other schools have gotten grant funding for, and come up with a potential project for your school.
- ☐ Ask your local transportation providers (bus, light rail) how to get additional services to your school.
- ☐ Award preferential parking for carpooling vehicles or provide incentives for not driving in the first place.
- ☐ Encourage carpooling and other alternatives to single-occupant vehicle transport for open-enrollment students.
- ☐ Offer a bicycle safety workshop such as a "Bicycle Rodeo", helmet fitting, or other biking safety event. Research if this is already being offered by an agency in your area, who could come, and do this at your school free of charge.
- ☐ Celebrate International Walk to School Month in October by having an activity or event.
- ☐ Celebrate Bicycle Month in May by having bicycle to school activities. May is also Clean Air and Asthma Awareness month.
- ☐ Make covered bicycle parking facilities and other accommodations to promote bicycling to school. You could also cover an existing bicycle parking facility.
- ☐ Create a school-wide recognition program for students who participate in alternative transportation activities and/or have students partner with a community groups, non-profits, businesses, etc. on alternative transportation related projects.

- Measure idling behavior at school (average number of cars/buses idling, use stop watches to time idling and find the average idling time for cars and buses, etc.) Present your findings to the school community.
- Implement a no-idling policy for buses and cars at pick-up and drop-off times and request that delivery vehicles shut off their engines while unloading.
- Design a display for the foyer, commons, cafeteria or other public space to educate students and staff about your school's transportation alternatives or outdoor air quality actions.
- Give a presentation to school board, PTA, or other appropriate group, proposing a new district policy or procedures that would address transportation options/air quality issues.
- Research three local or international schools to learn what they are doing on transportation alternatives and improving outdoor air quality, and how they are measuring and evaluating their results. Present your findings to the school community or other appropriate audience.
- Have older students teach younger students activities or lessons relating to alternative transportation and outdoor air quality
- Identify barriers to making additional improvements in transportation alternatives or outdoor air quality and propose solutions to the school.
- Design a print advertising campaign to educate students at your school about transportation alternatives or outdoor air quality actions at your school.
- Perform a skit, puppet show, or other type of entertainment about transportation alternatives or outdoor air quality to the school community, or another school.
- Make a public service announcement film or radio ad about transportation alternatives or outdoor air quality in your school, and involve your local media.
- Mentor another school in the district in transportation alternatives or outdoor air quality to improve its practices.

2009 Sustainability Dashboard

(School Name)

Site Description

Address **Facility Type** **Occupancy Number**

Summary of Progress, 2008

Brief summary text here of quantified and non-quantified accomplishments.

Project-Based Quantified Results, 2008

Project	Electricity Use	Electricity Cost	Natural Gas Use	Natural Gas Cost	Water Use	Water Cost	Solid Waste Diversion Rate

Utility Bill-Based Quantified Results

Energy

Year	Electricity Use	Electricity Cost	Natural Gas Use	Natural Gas Cost	Total Energy Use (kBtu/sf)
2008					
2007					

Water

Year	Indoor Water Use	Indoor Water Cost	Outdoor Water Use	Outdoor Water Cost
2008				
2007				

Solid Waste

Year	Cubic Yards Waste Generated	Cubic Yards Recycled	Cubic Yards Composted	Diversion Rate
2008				
2007				

Greenhouse Gas Emissions

xxxx tons, 2008

Greenhouse gas emissions can be calculated by each school using the Clean Air-Cool Planet calculator developed for educational institutions: www.cleanair-coolplanet.org

(Insert greenhouse gas pie chart for your school here.)

Sample Site Sheet for Inventorying School End-Use Fixtures

1. Below is a sample of what a filled out form looks like

Building Name	*School Name*
Assessment date(s)	*March 5-15*
Assessment completed by	*Katy*
Supervisor's name	*Mrs. Smith*

Code Key

f- faucet, **t** - toilet,**tt -** tank toilet, **u** - urinal, **s** - showerhead.

Room #	Room Description (if Other, please describe in Notes)	Existing Fixture Type	Existing # of Fixtures	Rated flow (gpm/gpf, if available)	Measured flow (gpm)	Low Flow? (Y/N)	Notes
1	*Bathroom*	*f*	*5*	*2.2*	*3*		*Missing screen*
1	*Bathroom*	*t*	*4*			*N*	
1	*Bathroom*	*u*	*2*			*N*	
2	*Bathroom*	*t*	*4*			*Y*	

Building Name					Code Key		
Assessment date(s)					**f** - faucet, **t** - toilet, **tt -** tank toilet, **u** - urinal, **s** - showerhead.		
Assessment completed by							
Supervisor's name							
	Current Usage	Proposed Usage	Water Savings				
	0.00 kgal	0.00 kgal	**0.00 kgal**				
Room #	Room Description (if Other, please describe in Notes)	Existing Fixture Type	Existing # of Fixtures	Rated flow (gpm/gpf, if available)	Measured flow (gpm)	Low Flow? (y/n)	Notes

Appendix E: Current BVSD Environmental Education Programs

Program Name: **Boulder County Parks and Open Space Cultural and Natural History programs**

Program Contact:
Tiffany Fourment

Program Website:
http://www.bouldercounty.org/openspace/

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
1) We offer a range of topics for both classroom-based and field trips. Some of the more popular topics we teach are food chains/food webs; life zones of Boulder County; local animal ecology (adaptations, life cycles, etc.) wetlands exploration; pioneer life but we tailor our programs to what teachers are looking for. We also have curriculum trunks to be checked out for a week or two at a time. 2) We offer volunteer work/service learning projects on Open Space land.

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
We offer programs for pre-K through high school. Usually our programs are one-time visits.

How do you advertise your program?:
Flier mailings to teachers/schools; presentations for staff meetings

Is your program available upon request?:
Yes

How do schools express interest? Who should they contact? (name, phone, email):
Tiffany Fourment; tfourment@bouldercounty.org; 303-678-6215

How much does your program cost schools? How is your program funded?:
All of our programs are free - taxpayer dollars!

Standards met by your program?:
Many standards for science, social studies and geography

Program Name: Cal-Wood's School Program

Program Contact(s):
Myles Maland, Program Director

Program Website:
www.calwood.org

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
Cal-Wood hosts residential environmental education programs for students of all ages. All programs feature an inquiry-based, experiential approach to subjects that are selected by the head teacher(s). We promote true interdisciplinary learning, weaving together science, mathematics, language arts, visual arts, geography, history, and physical education.

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
Cal-Wood programs are available to all BVSD students; however, we primarily work with elementary and middle school students. Each year approximately 70 schools with over 3,500 students visit Cal-Wood.

History (how long has your program operated in BVSD schools):
Cal-Wood has worked with BVSD schools for over 27 years.

How do you advertise your program?:
Cal-Wood relies heavily on word-of-mouth advertising; however, we also do direct mailings once per year.

Is your program available upon request?:
Cal-Wood's School Programs are available upon request.

How do schools express interest? Who should they contact? (name, phone, email):
Myles Maland, Program Director at myles@calwood.org or (303) 449-0603.

How much does your program cost schools? How is your program funded?:
1-day program: $20 per student; adults attend for free
2-day/1-night program: $73 per student; $36.50 per adult
3-day/2-night program: $125 per student; $62.50 per adult
4-day/3-night program: $183 per student; $91.50 per adult
5-day/4-night program: $235 per student; $117.50 per adult
Cal-Wood also provides assistance to schools with over 50% of the student body qualifying for the Free and Reduced Lunch Program

Standards met by your program?:
CMCS Science 1.0, 2.1, 2.3, 3.1, 3.2, 3.3, 3.4, 4.1, 4.2, 4.3, 4.4, 5.0, 5.1, 6.0
Geography 1.1, 1.2, 2.1, 3.1, 3.2, 4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 6.1
Mathematics 1.0, 2.0, 3.0, 4.0, 5.0, 6.0
History 1.1, 1.2, 2.1, 2.3, 3.1, 3.2, 4.1, 4.2
Reading and Writing 2.0, 4.0

Visual Art 1.0, 2.0, 3.0, 4.0, 5.0

Program Name: Colorado Alliance for Environmental Education

Program Contact(s):
Katie Navin, Program Coordinator, 303-273-9527, info@caee.org

Program Website:
www.caee.org

Program Overview(topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
CAEE is a non-profit organization dedicated to serving the expanding needs of the environmental education community and striving to advance environmental education. As a strong professional association, CAEE provides leadership, promotes professionalism and quality, facilitates good communications and coordination, and establishes a forum for sharing innovations and best practices. It is a neutral and objective source of information related to environmental education in Colorado, and a voice for EE's important role in the balance between societal needs and environmental quality.

CAEE key programs include: professional development through regional networks across the state, virtual networks and discussion forums, awards and recognition program, advocacy for environmental education, annual conference, certification of environmental educators, and the Colorado Environmental Film Festival.

In addition, The Teacher Liaison Network is a network of individuals (preferably one from each school) who are dedicated to environmental education and are willing to share resources with their colleagues. Teacher Liaisons receive free membership to CAEE for helping to distribute resources and information forwarded by CAEE. CAEE also hosts an online Directory of many of the organizations providing environmental education in Colorado, where you can find field trip locations, contact information, and resources to help you in your classroom.

CAEE is also actively involved in promoting environmental education in formal classrooms through their involvement with state educational standards revision and the development of legislation that will support environmental education.

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
Our members include teachers, students, informal educators, public agency employees, businesses, retirees, and many more from all over the state that are implementing or are interested in environmental education.

History (how long has your program operated in BVSD schools):
CAEE was incorporated as a 501(c)(3) non-profit in 1989 to serve the shared interests of public agencies, businesses, teachers, community organizations and individuals distributing and using environmental education materials and programs. It has grown to include over 700 members, 150 active volunteers, 4 staff, and 25 recognized programs.

How do you advertise your program?:
CAEE participates in several conferences and tabling events throughout the year to reach new potential members and markets programs to a growing database of members, volunteers, and contacts. Email announcements are sent to a variety of list serves and online communities. Press releases are sent to a variety of media contacts for several of the larger programs and events.

Is your program available upon request?:
Many of CAEE's trainings and professional development opportunities can be brought to a school or group of educators, like Resource Review Trainings.

How do schools express interest? Who should they contact? (name, phone, email):info@caee.org, 303-273-9527

How much does your program cost schools? How is your program funded?:
Many CAEE programs are free or discounted for members. Costs vary. Programs are funded through grants, sponsorships, program fees, membership fees, and individual donations.

Program Name:City of Boulder Keep It Clean Partnership

Program Contact(s):
Curry Rosato, Steve Noud, and JennelleFreeston

Program Website:
www.KeepitCleanPartnership.org

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
Various water related and non-point source pollution prevention classroom and field programs. See our website for details.

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
All K - 12 BVSD schools. We can do one program per class per year.

History (how long has your program operated in BVSD schools):
16 years

How do you advertise your program?:
Website, newspaper and magazine ads, stickers, magnets, direct postcard mailings, BVSD email, outreach booths, and word of mouth.

Is your program available upon request?:
Yes, through our website.

How do schools express interest? Who should they contact? (name, phone, email):
Register on-line through our website. If teachers have questions, they may contact Steve Noud at nouds@bouldercolorado.gov or call 303-413-7365.

How much does your program cost schools? How is your program funded?:
Programs are FREE. We are funded by water utilities payments.

Standards met by your program?:
Math Standard #3 Science Standard #4.3 among others.

Program Name:City of Boulder Open Space and Mountain Parks Department

Program Contact(s):
Debbie Matlock

Program Website:
www.bouldercolorado.gov/requestahike

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
field trips, almost any topic - created based on needs of group (topic page available at above mentioned website)

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
This is a requested hike program. Teachers may request up to 2 programs a year. We work with the whole community, not just BVSD

History (how long has your program operated in BVSD schools):
Decades

How do you advertise your program?:
We do not advertise…we fill our program by word of mouth.

Is your program available upon request?:
Our availability depends on date, time and availability naturalists. We need a BARE minimum of 4 weeks notice…some teachers give us several months notice and this is great.

How do schools express interest? Who should they contact? (name, phone, email):
www.bouldercolorado.gov/requestahike is where they should go first. The required online request form is available at that link. Questions after that go to Debbie Matlock, matlockd@bouldercolorado.gov, 303-413-7657

How much does your program cost schools? How is your program funded?:
We offer no charge environmental education programs based on naturalist availability. Teachers should visit www.bouldercolorado.gov/requestahike Programs are free - funded by sales tax in the City of Boulder. Transportation is not included.

Standards met by your program?:
Our programs meet science standards…and since they are created for each group, we can work with teachers on this. We can also work with teachers to create standards correlated programs in other disciplines.

Program Name:
City of Boulder Water Conservation

Program Contact(s):
Steve Noud

Program Website:
www.bouldersaveswater.net

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
Residential and commercial water conservation information

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
4th and 5 grade classes in the city limits of Boulder, once per year.

History (how long has your program operated in BVSD schools):
2 years

How do you advertise your program?:
Website, direct mailings, and BVSD email.

Is your program available upon request?:
Yes.

How do schools express interest? Who should they contact? (name, phone, email):
Register through Steve Noud at nouds@bouldercolorado.gov or call 303-413-7386.

How much does your program cost schools? How is your program funded?:
Programs are FREE. We are funded by water utilities payments.

Standards met by your program?:
Math Standard #3 Science Standard #4.3.

Program Name: Water Rangers (Provided by the City of Boulder)

Program Contact(s):
Curry Rosato at 303-413-7365 or via e-mail at rosatoc@bouldercolorado.gov

Program Website:
http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=5606&Itemid=3604

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
Where does our water come from and how much do we use? Over the course of two engaging classroom sessions and a take-home activity, students investigate the world's water supply, learn

where their water comes from, discover how much water they use at home each day and identify ways to conserve water in their everyday lives. Using observation, data collection, recording and calculation skills, students participate in a home water audit that helps them estimate their personal daily water use. Together with their families, students identify ways they can conserve water around their house. This FREE classroom program is facilitated by city of Boulder Watershed Outreach Program staff and includes student data recording sheets and conservation packets with a shower timer, flow gauge and toilet leak tabs.

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
Grades 4-5

How do schools express interest? Who should they contact? (name, phone, email):
Curry Rosato at 303-413-7365 or via e-mail at rosatoc@bouldercolorado.gov

How much does your program cost schools? How is your program funded?:
FREE

Standards met by your program?:
This program supports the Boulder Valley School District Content Standards for math #3 and science #4.3.

Program Name: Climate Literacy (CIRES Outreach)

Program Contact(s):
Mark McCaffrey- 303.735.3155 mark.mccaffrey@colorado.edu

Program Website:
http://cires.colorado.edu/education/k12/people/mccaffrey/
andhttp://climateliteracynow.org

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
In addition to materials, training and presentations related to Climate Literacy, we have developed a number of workshops on communicating climate change as well as other professional development programs for teachers and scientists, including pedagogical and communications skills based on research and experience.

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
Science, math, geography and other interested teachers and middle-high school students.

History (how long has your program operated in BVSD schools):
Over a decade

How do you advertise your program?:
ad hoc

Is your program available upon request?:

yes, but with limits; it would be preferred to develop a contract or long term relationship with funding since we can only do so much on a volunteer basis.

How do schools express interest? Who should they contact? (name, phone, email):
Mark McCaffrey- 303.735.3155 mark.mccaffrey@colorado.edu

How much does your program cost schools? How is your program funded?:
We have limited funding from the University and some grants from federal agencies. But to do more, we will need to find additional funding.

Standards met by your program?:
Numerous both in content and professional quality areas.

Program Name: Cottonwood Institute

Program Contact(s):
Ford Church, Founder and Executive Director, 303.447.1076, ford@cottonwoodinstitute.org

Program Website:
www.CottonwoodInstitute.org

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
The Cottonwood Institute offers two core educational programs that integrate outdoor education, environmental education, and environmental service-learning:

1. Community Adventure Program Overview : The Community Adventure Program (CAP) is a unique academic experience offered to active, socially conscience, environmentally aware high school students and is available for high school and college credit. CAP is a coed, quarter-long program designed for adventurous students who want to practice outdoor skills, discuss and debate local outdoor and environmental issues, develop deeper friendships with their classmates, and who want to make a positive impact in their communities. The Community Adventure Program teaches students essential camping and wilderness survival skills necessary to comfortably and competently explore the outdoors, while providing them with the tools and resources to tackle important environmental issues affecting their communities in order to help change the world. Using the community as their textbook, CAP students spend their time reading primary source documents, taking field trips, participating in overnight camping experiences, listening to guest speakers, watching informative films, discussing challenging environmental issues, and finally designing and implementing a student directed environmental service-learning project to tackle a local environmental issue. For more information, go to: http://www.cottonwoodinstitute.org/courses/community-adventure-program/

2. Programs for Schools and Community Organizations: We have designed a series of 1-day field trips for schools and community organizations that do not have the time or ability to incorporate a longer quarter/semester-long program into their existing curriculum or schedule. These 1-day programs are perfect for busy teachers that are looking to add value to their classroom curriculum and help provide real world context to textbook concepts. 2009 programs include: Winter Survival Skills, Avalanche Science, Physiology of Survival, and

Physics of Fire. We can also customize any of our longer 5-7 day courses for groups, including our Endangered Wolves and Animal Tracking Project, Stone Age Survival Project, Wildland Firefighter Project, Horse Caretaker Project, and our Mountain Biking Survival Project. These courses are great for fall break, spring break, or May-term school trips. For more information, go to: http://www.cottonwoodinstitute.org/courses/schools-community-organizations/

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):

Community Adventure Program: We currently offer CAP at New Vista High School, but we are open to expanding to other schools that are open to collaborating with us. CAP is appropriate for 9 - 12 grade students and our ideal class size is 12 - 15 students. We currently offer CAP in a quarter and semester-long format and classes typically meet for 1.5 - 2 hours a day for 4 days a week. The Cottonwood Institute works with individual schools to hire the right person and will train them to implement our curriculum and will provide professional management and risk management oversight for facilitating and implementing our weekend overnight camping trips. The Cottonwood Institute offers this program year-round.

Programs for Schools & Community Organizations: We currently offer 1 – 7-day field trips and courses for schools and Community Organizations. These programs are appropriate for 9 - 12 grade students and our ideal class size is 12 - 15 students. The Cottonwood Institute provides professional instructors to facilitate these programs and will work with schools and teachers to integrate it into their existing class and align with state standards if requested. The Cottonwood Institute offers these programs year-round.

Through our programs, the Cottonwood Institute has advanced environmental education and environmental service-learning in BVSD schools. Since 2003, the Community Adventure Program was one of the first environmental education program offered in the Boulder Valley School District for academic credit. Our programs have two distinct, but intertwining phases:

1. Wilderness Skill Development: Students spend approximately half of their time learning essential outdoor skills to acquire the basics necessary to comfortably and competently explore the outdoors. The Colorado community is full of world-class outdoors enthusiasts and educators. The CAP provides students with an opportunity to tap into this rich educational resource and to meet new people who have an amazing amount of knowledge, talent, and experience. Below is a sample of some of the summer and winter skills that students become competent in through their participation with the CAP:

- Nature awareness, including: Wide angle vision, animal stalking techniques, nature sketching, journaling, camouflage techniques, nature awareness activities, local cultural history, local natural history, plant identification, edible and medicinal plants, etc.
- Essential camping skills, including: Minimum impact camping, campsite location, modern tents, food and ration planning, outdoor cooking, food hanging, ecologically responsible fires, map, compass, route selection, and back country navigation, etc.
- Essential 3-season wilderness survival skills, including: Survival scenarios, survival priorities, survival kits, natural shelters, 1-match fires, petroleum cotton ball fires, friction fires, natural cordage, traps and snares.

- Winter camping skills, including: Thermodynamics and heat loss, winter gear and equipment, snowshoeing, emergency snow shelters, avalanche awareness, basic mountaineering and snow travel techniques, etc.
- Outdoor leadership and team building skills
- Eco-literacy

2. Environmental Service-Learning: While students are developing and practicing outdoor skills, they become intimately involved with their community by researching local outdoor and environmental issues that directly relate to the skills they are learning. Students participate in Socratic Seminars to discuss these issues, conduct research and contact community experts, and then work together as a class to address the problems they have identified. They then complete an Action Project to help make a positive impact in their community by implementing the following 10-step process:

- Step 1: Explore the community
- Step 2: Identify the issues
- Step 3: Select an issue
- Step 4: Understand issue
- Step 5: Collaborate with the community
- Step 6: Create a sustainable solution
- Step 7: Plan the Action Project
- Step 8: Implement the plan
- Step 9: Complete post Action Project logistics
- Step 10: Evaluate, reflect, and share the experience

History (how long has your program operated in BVSD schools):
5 years

How do you advertise your program?:
Directly to schools and teachers, participate in community events, offer free clinics at REI, website, distribute flyers, email campaigns, direct mail campaigns, phone calls, etc.

Is your program available upon request?:
Yes!

How do schools express interest? Who should they contact? (name, phone, email):
You may contact us by phone or email. Ford Church, 303.447.1076,ford@cottonwoodinstitute.org. Check out our website as well at: http://www.cottonwoodinstitute.org

How much does your program cost schools? How is your program funded?:
Cottonwood Institute costs vary. In some cases, grants fully underwrite the programs. In other cases, schools, students, and Cottonwood Institute fundraising efforts underwrite the programs. Please call the Cottonwood Institute for a custom proposal.

Standards met by your program?:
Cottonwood Institute programs are interdisciplinary in nature and addresses Colorado State Standards in Civics, Reading and Writing, Physical Education, Geography, and Science.

Program Name: CU Science Discovery

Program Contact(s):
Kristi Dahl: Director

Program Website:
http://www.colorado.edu/ScienceDiscovery/

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
Science Explorers is a professional development program for 5-8th grade teachers and their students. The science topics vary within physical science, earth science and biological sciences. The teachers attend a full day hands-on workshop with 5 students and take away a teacher kit and curriculum to complete the workshop back in their classroom with the help of the students who attended.

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
We have approximately 61 teachers and 315 students from BVSD each year. This year we had 80 teachers and 420 students from BVSD

History (how long has your program operated in BVSD schools):
The program has operated in BVSD for 23 years

How do you advertise your program?:
The Science Explorers program is advertised on the web and through Science Discovery Materials. MESA of Colorado and PACE also promote the professional development that Science Explorers provides

Is your program available upon request?:
The program is available upon request

How do schools express interest? Who should they contact? (name, phone, email):
CU Science Discovery has many classes and seminars that provide professional development for teachers and science enrichment for students

How much does your program cost schools? How is your program funded?:
The Science Explorers program costs 425 dollars a team and the program charges 200 dollars a team

Program Name: CU Science Discovery, Outdoor Explorers

Program Contact(s):
Deb Kulcsar

Program Website:
http://www.colorado.edu/ScienceDiscovery/

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):

Outdoor Classroom Project

Through hands-on field experiences that meet Colorado Model Content Science Standards, students will explore, discover and enjoy the natural places of Colorado and learn to steward their natural environment.

Leadership Development – Full Day

Leadership Development introduces the Outdoor Classroom through interactive discussions, group challenges and goal setting. The activities for this session are focused on the concept of community as it applies to the classroom and to the natural world. This theme of community participation will be woven throughout the school-year long program.

Stream and Pond Exploration – Bluff Lake, location depends upon school

Local creek or pond near school
Introduction to ecosystems; riparian habitat, watershed, abiotic/biotic components
Determining health of the water by collecting and identifying aquatic insects,
testing for dissolved oxygen, ph, water temperature, and stream velocity

Mountain Exploration – Mt. Falcon, location depends upon school

Montane Forest Ecology - A look at grasslands, alpine and in-between
Fire ecology, adaptation, bird specimens, history as it pertains to Denver

The day begins with exploration of the forest through a Douglas-fir/Ponderosa pine ecosystem. Animal adaptations are discussed as we hunt for "Buford" a stuffed brown rabbit. The class will come upon a burned area, serving as a dynamic lesson on fire ecology and plant adaptations. After an eerie hike through the ghost forest and a discussion on how the fire started, students reflect in their journals.

Snow Wonder-Full Day at Echo Lake near Mt. Evans

Echo Lake near Mt. Evans, Denver Mountain Parks
Winter ecology on snowshoes, safety skills
Sub-alpine ecosystem, animal tracking and adaptation

The excitement and trepidation of trying something new, snow shoeing, fills the air as we arrive at Echo Lake, a 10,400'elevation mountain park. Once we've acclimated to the "tennis rackets" on our feet, off we hike into the sub-alpine trail around the lake, stopping to identify animal tracks. There's much to see and learn at this elevation, and students are taken by the solitude of the white blanket on the ground, the still and very tall forest and the sun streaming through the pine branches covered with crystals. Winter ecology and safety are the topics for the day.

Environmental Education Field Experience-Two Day/One Overnight at Highlands Camp. CU Mountain Research can also be utilized.

CU Mountain Research Station OR Highlands Camp in Allenspark
Comparison study of ecosystems, water ecology in mountain stream

Plant and insect adaptation activities, night hike, astronomy, campfire

After settling in and participating in a recycling discussion, we're off to the "Hidden Room" for a challenge hike. This discovery hike offers all kinds of natural wonders, including an unusual bog in the middle of a mountain meadow. After a snack, we discuss what "challenge" means to the students and identify types of challenges faced in school. We plan how to maneuver together through the rock crevice to the "Hidden Room". Throughout the two-day experience, students participate in environmental awareness activities, comparing water quality of the mountain stream and the grassland wetlands, a night hike, star observation, a campfire and a host of community building activities. The trip ends with a sharing of camp highlights and ways students will incorporate environmental stewardship into daily activities.

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
The Outdoor Classroom is a partnership between Science Discovery, a program of the School of Education at CU Boulder, and area schools. Last year, as part of this partnership, 80 Denver Public School students had their first ever overnight in the mountains of Colorado. The Outdoor Classroom has the potential for wide application and can serve as a model for use in other locations with a similar audience.

This project began in 1997 and was initiated in response to the need to provide science and environmental education for economically challenged and minority students in an ongoing way as part of the regular school experience. Educating culturally diverse audiences about environmental issues advances environmental justice, the fair treatment of people of all races, cultures and income with respect to the development, implementation and enforcement of environmental laws, regulations and policies.

History (how long has your program operated in BVSD schools):
This project began in 1997 and was initiated in response to the need to provide science and environmental education for economically challenged and minority students in an ongoing way as part of the regular school experience.

Program Name: Earth Education, CU Environmental Center

Program Contact(s):
Earthed@colorado.edu

Program Website:
http://ecenter.colorado.edu/earth_ed/index.html

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
Earth Education is a volunteer and intern program founded and coordinated by the University of Colorado's Environmental Center. We provide free environmental education programs to local public and private schools in the greater Boulder community.
Each semester we have a group of motivated CU undergraduate interns and volunteers who want to build a relationship with a local classroom by teaching environmental education to schools in the greater Boulder area.

Our programs are not only free, but they are organized, innovative, active and follow state standards. We believe that building a child's personal connection to the natural world will help us work toward building a community with a greater environmental awareness and literacy. Earth Education is over 15 years old and has successfully matched undergraduate volunteers with local teachers who are interested in implementing environmental and natural science education into their classroom. We have been working with over 20 schools in the Boulder area and have extended our programs to after school "eco-clubs" that focus on sustainability activities for youth.

The focus of each class varies with the teacher's current curriculum and special requests. Two or more Earth Education volunteers facilitate a 45-120 minute session pertaining to a wide variety of subjects including science, reading and writing, math, social studies, and art. Units of exploration may include **endangered species, letter-writing, deforestation, trash-art, pollution, earth day, water, ecosystems, population growth, eco-literature, organic farming, composting and recycling, cultural variance in resource use, papermaking, nature walks and many other opportunities.**

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
We offer sustainability and environmental education classes to **all** grades, although we do not have a thorough high school program. Most of our programs are offered to 1st-6th graders. We can offer 1 time programs, or a program for 10-weeks with 1 hour each week depending on what specific teachers would like.

History (how long has your program operated in BVSD schools):
Earth Education started in the mid-70s and has been a successful arm of CU' Environmental Center.

How do you advertise your program?:
We send letters, flyers, and emails to BVSD schools. Our program has also spread through word of mouth over the years.

Is your program available upon request?:
Yes, our program starts with each new semester, but teachers can request the program anytime.

How do schools express interest? Who should they contact? (name, phone, email):
They usually email us with interest inquiries at earthed@colorado.edu

How much does your program cost schools? How is your program funded?:
Our program is free to all and any interested schools. It is funded through CU's Environmental Center/

Standards met by your program?:
We follow state standards with our lesson plans, and work closely with teachers to assure that our lessons compliment their needs in various subjects.

Program Name: Eco-Cycle, Boulder/Broomfield County School Recycling and Environmental Education Program

Program Contact(s):

Cyndra Dietz

Program Website:
www.ecocycle.org

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
Our program offers educational presentations and field trips on numerous environmental topics, including Zero Waste, the process of recycling, lunchtime and holiday waste reduction, litter prevention, composting, household hazardous waste, energy conservation, air quality, indoor air quality, rainforest issues and forestry. We give presentations to over 38,000 students (K-12) in Boulder and Broomfield Counties. The program also provides for the collection of recyclables in Boulder Valley and St. Vrain Valley School Districts. Finally, more schools each year are becoming part of our Green Star Schools program, which implements composting and other waste reduction activities to move the school toward Zero Waste.

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
We service all 28,000 students, all schools and all grade levels in BVSD. On any given day, we may be visiting up to 5 different classes (based on having five educators on staff).

History (how long has your program operated in BVSD schools):
Our program has operated in BVSD since 1987.

How do you advertise your program?:
We primarily advertise and communicate via our teacher contact network. One teacher per school is the official "Recycling Contact".

Is your program available upon request?:
Yes, any teacher in BVSD may call us to schedule a presentation at no cost to the school.

How do schools express interest? Who should they contact? (name, phone, email):
Schools may call Cyndra Dietz, Program Coordinator, at 303-444-6634, ext. 122

How much does your program cost schools? How is your program funded?
There is no cost to individual schools. The program is currently funded by Boulder County, Boulder Valley School District, Broomfield County, the City of Boulder, the Town of Superior, Eco-Cycle and various grant sources.

Standards met by your program?
We insure that every program we offer meets Colorado's state standards and local school districts' standards. I won't list them here because we cover such a number of topics that there are many standards met.

Program Name: Garden To Table

Program Contact(s):
Bryce Brown

Program Website:
www.growefoundation.org

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
The Garden to Table is an elementary school program that uses food to illustrate the interconnectedness between humans and nature, and how healthy and sustainable lifestyle choices can impact personal and planetary well-being. The Garden to Table program is aimed at enriching education and inspiring students to adopt healthy and sustainable lifestyles. The theme based program allows teachers to integrate lessons with core curriculum and provide students with hands on learning opportunities to connect to the food they put in their bodies and the environment that supports its growth.

Weaves four components into the school curriculum- (1) organic gardens (2) wellness promotion, (III) healthy food (IV) environmental sustainability.

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
Elementary School- All Grades

History (how long has your program operated in BVSD schools):
4 years

How do you advertise your program?:
Word of mouth

Is your program available upon request?:
Yes

How do schools express interest? Who should they contact? (name, phone, email):
Bryce, Bryce@growefoundation.org

How much does your program cost schools? How is your program funded?:
Free to schools. Grants and fundraising.

Standards met by your program?:
Work with teacher lesson plans.

Program Name: Thorne Ecological Institute: Project BEAR (Building Environmental Awareness and Respect)

Program Contact(s):
Erin O'Neill, Education Director, erin@thorne-eco.org, (303) 499-3647

Program Website:
www.thorne-eco.org

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):

Program: Each of our programs is 3 visits to a classroom, the first two are content presentations and the 3rd is a writing project where students create an "ebook" about what they have learned. Each student takes a book home. We also have options for fieldtrips, assemblies, and Earth Day events.
Topics:

Kinder: Birds
1st-3rd: Bats, Worms (Decomposers), Insects, Plants
4th-6th: Colorado Ecology, Wetland Ecology, Prairie Dogs, Food Chains, Solar Energy, Wind Energy, Climate Change

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
In BVSD we work with Uni-Hill (1st and 2nd grades), Whittier (1st and 2nd grades), and Foothills (whole school). We work with many other students in other counties with Project BEAR and would love to expand into new schools in Boulder, especially with fee-based programs.
In BVSD we teach about 1500 students, but our program reaches over 10,000 in all counties per year.
We visit a classroom 3 times with each program.

History (how long has your program operated in BVSD schools):
11 years

How do you advertise your program?:
On our website, at events, brochures to schools. We could use help with this, especially getting into schools in Boulder.

Is your program available upon request?:
Yes

How do schools express interest? Who should they contact? (name, phone, email):
Schools usually write us or call program contacts (see above)

How much does your program cost schools? How is your program funded?:
The total cost for a 3 visit program is $500, but we have a sliding scale based on the % of free and reduced lunch (no schools pay this full rate, but grants do) This program is mostly funded by grants with some program fees.

Standards met by your program?:
Colorado Science Standards 1.1, 1.2, 1.3, 1.4, 2.8, 3.1, 3.4, 3.5, 3.8, 3.10, 3.11, 4.1, 4.2, 4.3, 4.7, 5.2, and 5.5 (all over our various programs)

Program Name: Sombrero Marsh Program, Thorne Ecological Institute

Program Contact(s):
Christina Allen, Sombrero Marsh Director

Program Website:
www.thorne-eco.org

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):
Full day field trip with 4 stations: 1. "wetland walk" (outside) focusing on the importance of wetlands, the variety of plant, animal, and aquatic life at a wetland, the restoration of Sombrero Marsh from a dump to a beautiful natural area, and garbage reduction and resource conservation in general 2. "bird watching" (outside) focusing on migratory birds' dependence on wetlands, bird identification, habitats, weather, and bird adaptations, especially bird beaks that are adapted for specific types of food as part of "niche separation" 3. "plants and seed dispersal" (inside) focusing on the form and function of plant parts, the reason for seeds to get away from their parent plant, and the methods of seed dispersal, including adaptations seeds have to enhance their dispersal 4. "water pollution" (inside) focusing on all the different types of "non point-source pollution" and how to prevent them, with the main lessons being that all of us are responsible for NPS pollution, that all pollution eventually goes to the creek, and that pollution is nearly impossible to clean up after the fact, so our best chance of keeping our environment clean is to prevent pollution from our daily lives.

Thorne staff teach the two outdoor stations and BVSD classroom teachers teach the two indoor stations (unless they only have 1 class and teacher, in which case Thorne staff teaches 3 stations and the classroom teacher just 1 station. The field trip is also connected to a kit from the FOSS center entitled "Sombrero Marsh Kit" which teachers can use before or after their Marsh Program. Teachers also receive pre and post activities from Project WILD via email before their program.

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
4th grade classrooms, total of about 1500 students per year

History (how long has your program operated in BVSD schools):
8-9 years

How do you advertise your program?:
via email directly to 4th grade teachers

Is your program available upon request?:
yes, but only for BVSD 4th grade classes, or if a particular school's 4th grade doesn't come, their 5th grade is welcome to come

How do schools express interest? Who should they contact? (name, phone, email):
Christina Allen 303 499-3647, christina@thorne-eco.org

How much does your program cost schools? How is your program funded?:
BVSD provides the bussing and the building, OSMP provides the open space property, and Thorne provides the teachers. BVSD and Thorne collaborate on the curriculum

Standards met by your program?:
Plants station Standard 4.1.1 c, d, e, Water Pollution station Standard 4.1.3 b and 4.5.2 a, b, c, Wetland Walk and Bird Watching stations Standard 4.3.1 and 4.3.2

Program Name: UCAR Office of Education and Outreach (various programs and web site resources on weather and climate education)

Program Contact(s):
Susan Foster, deputy director, UCAR Office of Education and Outreach – susanf@ucar.edu, 303 497-2595

Program Website:
See below

Program Overview (topics covered, type of program (e.g. presentation, fieldtrip, materials kit):

1. Windows to the Universe - http://www.windows.ucar.edu – This is an extensive web site visited by over 20 million students and teachers each year. The content spans the Earth and space sciences with constantly updated information about space weather, Earth's weather, clouds, climate, global change, and modeling. Content is written at beginner, intermediate, and advanced levels and translated into Spanish. Many standards-aligned classroom activities and other teacher resources may be accessed on the site. Staff at UCAR EO provides teacher professional development workshops on climate and global change at NSTA conferences and many other venues.
2. KidsCrossing – http://www.eo.ucar.edu/kids - a web site written for elementary to lower middle school grades with information about the water cycle, greenhouse effect, clouds and other things in the sky, and dangerous weather.
3. KidsCrossing in the Classroom – http://www.eo.ucar.edu/educators/KC_guide_intro.html - a collection of standards-aligned classroom activities to accompany the web site.
4. NCAR Mesa Lab Visitor Center Climate Discovery Exhibit Teachers Guide - http://www.eo.ucar.edu/educators/ClimateDiscovery/ - a downloadable .pdf activity guide for middle and lower high school grades which can be used as pre-and post field trip activities or independent of the exhibit. The activities are groups under three topic areas
    1. The Sun-Earth Connection http://www.eo.ucar.edu/educators/ClimateDiscovery/SEC.htm
    2. The Little Ice Age Case Study http://www.eo.ucar.edu/educators/ClimateDiscovery/LIA.htm
    3. Investigating Climate Present – Cycles of the Earth System http://www.eo.ucar.edu/educators/ClimateDiscovery/ESS.htm
5. Planning a field trip to the NCAR Mesa Lab - http://eo.ucar.edu/visit/ - The Office of Education and Outreach hosts over 15,000 visitors a year on scheduled tours of the Mesa Lab exhibits. School groups may choose themes and classroom modules to accompany their tour.

BVSD audience (which schools, grade, how many classes or students per year, how often do you visit a specific class):
Thousands of BVSD students visit the Mesa Lab each year. We collaborate with Fiske and Science Discovery and Colorado MESA in the Science is Everywhere program which works

with specific schools. For more information about this, contact Teri Eastburn (eastburn@ucar.edu) who coordinates the Public Visitor Program at the NCAR Mesa Lab.

History (how long has your program operated in BVSD schools):
We partner with the BVSD rather than operate within the schools.

How do you advertise your program?:
We have a teacher e-newsletter. Word of mouth and tradition in this community play a large role in our contacts with teachers and parents. Super Science Saturday has a huge draw of many thousands of families with young children.

Is your program available upon request?:
All web based information is available at no cost online. Teacher Professional Development workshops on climate change would need to be arranged and costs of the program covered by the school

How do schools express interest? Who should they contact? (name, phone, email):
All web based information is available at no cost online. Teacher Professional Development workshops on climate change would need to be arranged and costs of the program covered by the school

How much does your program cost schools? How is your program funded?:
All web based information is available at no cost online. Teacher Professional Development workshops on climate change would need to be arranged and costs of the program covered by the school

Standards met by your program?:
We align our classroom activities to national science content standards, since we are a national research lab.

BVSD Environmental Education Matrix

Organizations Offering Environmental Education Programs ($ = a cost for the program)									
	Eco-Cycle	*Thorne ($)*	Thorne Sombrero Marsh	Earth Education	Garden to Table	Boulder Keep it Clean	Boulder Water Conserva-tion	Boulder Water Rangers	OSMP
Recycling	elem-high			elem-mid					
Zero Waste	high								
Renewable Energy	elem.	elem-mid							
Water Conservation/Pollution			elem (4-5)	elem-mid		elem-high	elem (4-5)	elem (4-5)	elem-high
Weather									elem-high
Household Toxins	elem-high								
Pollution				elem-mid		elem-high	elem (4-5)	elem (4-5)	
Rainforests	elem-high								
Forest Protection	elem-mid	elem-mid		elem-mid					elem-high
Composting	elem-mid			elem-mid	elem				
Resource Conservation	elem-high			elem-mid		elem-high	elem (4-5)	elem (4-5)	elem-high
Litter	elem								
Ecosystems/Ecology	elem	elem-mid	elem (4-5)	elem-mid					elem-high
Population Growth				elem-mid					
Organic Farming/Gardening	elem			elem-mid	elem				
Colorado Ecology(plants/animals)	elem	elem-mid	elem (4-5)	elem-mid					elem-high
Climate Change		elem-mid							
Wetland Ecology		elem-mid	elem (4-5)						elem-high
Natural History		elem-mid	elem (4-5)	elem-mid					elem-high
Geology									elem-high
Sustainability	mid-high				elem				
Astronomy									
Winter Ecology									elem-high
Outdoor Education		elem-mid	elem (4-5)						elem-high
Support Resources Available									

Organizations Offering Environmental Education Programs ($ = a cost for the program)								
	CAEE ($ sometimes)	Climate Literacy (CU) ($ sometimes)	BC Parks and Open Space	Calwood ($)	UCAR	CU Science Discovery ($)	NWF	Cottonwood Institute ($)
Recycling								high
Zero Waste								high
Renewable Energy								high
Water Conservation/Pollution			elem-high					high
Weather			elem-high		elem-high			
Household Toxins								
Pollution								high
Rainforests								
Forest Protection			elem-high	elem-mid		elem-high		high
Composting								high
Resource Conservation			elem-high	elem-mid		elem-high		high
Litter								high
Ecosystems/Ecology			elem-high	elem-mid		elem-high		high
Population Growth								
Organic Farming/Gardening								high
Colorado Ecology(plants/animals)			elem-high	elem-mid		elem-high		high
Climate Change		mid-high			elem-high			high
Wetland Ecology			elem-high	elem-mid		elem-high		
Natural History			elem-high	elem-mid		elem-high		high
Geology			elem-high	elem-mid		elem-high		
Sustainability								high
Astronomy					elem-high			high
Winter Ecology			elem-high	elem-mid				high
Outdoor Education			elem-high	elem-mid		elem-high		high
Support Resources Available	elem-high and teachers						elem-high and teachers	