

LEGISLATIVE RESEARCH REPORT

FEBRUARY 2, 2009



REPORT NUMBER 09.091

ENERGY EFFICIENCY IN ALASKA SCHOOL BUILDINGS

PREPARED FOR REPRESENTATIVE LES GARA

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You asked about energy efficiency programs in schools in Alaska. Specifically, you wanted to know which energy efficient projects and programs are currently in place in Alaska schools, which programs and building improvements would be most effective in those schools, and the conclusions of any analyses done regarding the energy efficiency of Alaska school buildings.

CODES AND STATEWIDE MINIMUM STANDARDS

Alaska does not have a statewide energy conservation code for public or commercial buildings or a minimum statewide energy efficiency standard applicable to all school buildings.¹ Sam Kito, facilities technical engineer and architect, Department of Education and Early Development, points out that some energy standards are indirectly written in statute; as provided in AS 14.11.011(b)(4)(A)(ii), schools are eligible to apply for a maintenance or construction grant (also known as a capital improvement plan or CIP funding) from the state only if they meet certain requirements—in particular, schools must have a preventative maintenance plan that allows them to annually collect certain data on utilities used in school buildings owned or operated by the district.² This plan is loosely defined and varies greatly from district to district. Mr. Kito explains that all school districts but one regularly apply for CIP funds and strive to meet this criterion.³

We contacted superintendents from each of the 53 Alaska school districts with a survey of questions regarding the current status and needs of buildings in their districts. We received

¹ Anchorage and the Matanuska-Susitna Borough have chosen to require all new buildings, including schools, to meet national or international "green" building certification standards. Anchorage has adopted the International Energy Conservation Code (2006); in 2007, the Matanuska-Susitna Borough adopted the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) "Silver" standard for all new construction and additions of 10,000 square feet or greater.

² Mr. Kito can be reached at (907) 465-6906. We include AS 14.11.011 as Attachment A.

³ Mr. Kito explains that the Aleutians Region school district does not apply for CIP funds.

responses from 16 of the school districts.⁴ Of these, all reported problems with basic infrastructure, energy efficiency, and rising fuel costs.⁵ All cited financial reasons—not federal or state standards or requirements—for retrofitting or upgrading their school facilities.

ENERGY EFFICIENCY RESOURCES AVAILABLE TO ALASKA SCHOOL DISTRICTS

We were unable to locate any federal or state grant or loan programs specifically targeting energy efficiency gains in schools. The relevant state and federal programs we identified were broad, competitive grant programs under which school districts compete against a wide range of other projects and are often required to provide a significant contribution themselves. Unlike Alaska home owners, schools are not currently eligible for specific weatherization grants or rebates.⁶ We present below the federal and state energy efficiency programs we identified, along with district-wide and individual school projects in Alaska.

FEDERAL AND STATE PROGRAMS

Federally sponsored programs

The Village End Use Efficiency Measures initiative attempts to increase energy efficiency and reduce the amount of diesel brought into rural Alaska communities. Funded by the Denali Commission and implemented by the Alaska Energy Authority and the Alaska Building Science network, the program works to replace energy efficient lighting switchboxes and motion sensors, and to apply weather stripping and low mass boilers in villages that have recently received an upgrade to their local power system.⁷ Though not designed specifically for school buildings, the program directly benefits schools. Between January 2005 and January 2007, the program worked with 17 villages, retrofitting 152 community buildings and 110 teacher units.⁸

⁴ We received responses from Alaska Gateway, Anchorage, Chugach, Cordova City, Delta-Greely, Galena City, Haines Borough, Hydaburg City, Juneau, Kenai, Kuspuk, Lower Kuskokwim, Pelican City, Saint Mary's, Sitka, and Wrangell City school districts. Refer to Table 1 at the end of this report for more information.

⁵ Several superintendents noted that their school buildings were over 30 years old. Six mentioned a need for improved insulation and one noted that doors to school buildings do not currently close.

⁶ The Alaska Housing Finance Corporation has a home energy rebate program in which a homeowner, upon completing specific renovations for energy efficiency, can be eligible for a one-time rebate of up to \$10,000. For more information on this program, refer to http://www.ahfc.state.ak.us/energy/weatherization_rebates.cfm#The_Home_Energy_Rebate_Program.

You may be interested to note that a rebate program exists in statute for schools that reduce the amount of waste used. Under AS 46.11.070, schools that significantly reduce the amount of waste used by students and staff and improve recycling efforts may—subject to available funding—be eligible for awards of up to \$2,000. Sandra Woods, environmental specialist II, Solid Waste Program, Division of Environmental Health, Department of Environmental Conservation, notes that no such program is currently active due to lack of funding. Ms. Woods can be reached at (907) 465-5318.

⁷ The Denali Commission provides rural power system upgrades to meet basic standards for safety, reliability, and environmental protection in power plant and distribution systems of select Alaska villages. Upgrades are distributed to those communities with the highest need. For more information on the Denali Commission, refer to www.denali.gov/

⁸ Communities that have participated in Phase I of the Village End Use Efficiency Measures initiative include Buckland, Elim, Gambell, Golovin, Koyuk, Old Harbor, Port Heiden, Savoonga, Selawik, Chefornak, Chevak, Kasigluk, Kongiganak, Kwigilingkok, Mekoryuk, Nunapitchuk, and Quinhagak. Phase II includes 14 villages; Phase III, 20 villages. All projects are projected to be complete by 2010. For more information on the program, please refer to <http://www.akenergyauthority.org/programs/alternativeVEUM.html>. We include the final report on Phase I of this program as Attachment B.

The EnergySmart School program (U.S. Department of Energy) is another federal program specifically designed to help school districts become more energy efficient. Though the program cannot provide grants or loans for school projects, it provides other resources, such as publications, suggested energy standards, recommendations and design manuals for construction of new buildings or retrofiting, and training sessions for administrators and teachers.⁹ It is unclear how many schools in the state currently use this resource.

State programs that schools can use for energy efficiency

As mentioned earlier, schools that meet the preventative maintenance requirements described in AS 14.11.011(b)(4)(A)(ii) are eligible to apply for capital improvement (CIP) funds through the Department of Education and Early Development for construction or major maintenance projects. Under this program, schools with a specific project in mind can either apply for a grant or for debt reimbursement. Don Hiley, facilities program manager at Southeast Regional Resource Center, explains that although CIP funds are not specifically for energy efficiency projects, schools can rarely get funding directly for energy efficient upgrades and as such, try to become more energy efficient when completing a construction project or retrofit that applies under these grants.¹⁰ Sam Kito, Department of Education and Early Development, notes that this past year, 38 school districts applied for CIP funding.¹¹

Schools can also receive funding for energy efficiency projects from the Alaska Energy Authority's energy cost reduction program. This program provides grant and loan financing for project proposals that reduce the cost of power and heat in Alaska communities. According to Rebecca Garrett, program manager for the Alternative Energy and Energy Efficiency Program, at least two school districts—Anchorage and the Aleutian East Borough—have received funding through this program for lighting retrofits in school buildings this past year.¹²

According to Joel St. Aubin, chief of statewide public facilities, Alaska Department of Transportation and Public Facilities, performance contracting is currently available to school districts.¹³ Performance contracting—a program in which a contractor audits a building and provides recommendations for upgrades with the guarantee that the resulting energy and operating savings will be sufficient to fund the project—has not been used by any school district to date.

State programs for renewable energy

School districts are eligible to apply for funding from the Alaska Energy Authority for projects that produce renewable energy for school buildings. Through HB 152 (Ch 31 SLA 08), the legislature established the Renewable Energy Grant fund and awarded AEA \$50 million annually for the next

⁹ For more information on the EnergySmart school program, refer to <http://www1.eere.energy.gov/buildings/energysmartschools/>.

¹⁰ Mr. Hiley can be reached at (907) 586-6806. Southeast Regional Resource Center is a non-profit organization that has helped many schools through the process of applying for these grants.

¹¹ Mr. Kito projects that out of approximately 200 applications, roughly 32 are for school construction projects and approximately 138 are for major maintenance projects. Of these, he estimates that 25 will receive CIP funding.

¹² Ms. Garrett can be reached at (907)-771-3042. The Alternative Energy and Energy Efficiency Program is program managed and funded largely by the Alaska Energy Authority. We include the "Alternative Energy and Energy Efficiency Program Assistance Plan," which details current projects run by the Alaska Energy Authority, as Attachment C. The energy cost reduction program is not specific to schools.

¹³ Mr. St. Aubin can be reached at (907) 269-0823.

five years to fund renewable energy projects.¹⁴ The money can be used for feasibility studies and energy resource monitoring. Butch White, grants administrator for the renewable energy grant program, explains that though the program is not specific for school districts, both Copper River and Delta-Greely schools have already applied and received this award mid-January of this year.¹⁵

SCHOOL DISTRICT-WIDE ENERGY PROGRAMS

Of the 16 school districts that responded to our survey, two mentioned district-wide programs to encourage energy efficiency in all school buildings under their jurisdiction. The most aggressive of these, Anchorage, established a year-long energy conservation pilot program from January 1, 2006, through January 1, 2007, with the goal of reducing energy use by 10% through an initial energy audit and increased awareness of energy conservation through teacher and staff training. Nine schools actively participated in the program, reducing electricity use by 11.2% and natural gas use by 6.5%, for a total of \$114,361 in savings to the district.¹⁶

Kenai has a district-wide program that allows for individual schools to make money by conserving energy. Individual schools that save the district money in fuel costs receive those savings directly and can use the funds as needed for supplies or improvements for their school buildings. Paul Brenner, energy conservation manager for the school district, notes that the program is effective because schools see direct financial results.¹⁷ He also explains that the school district recently purchased the use of an online program that allows him to track energy usage in all school buildings in the district. With this program, schools can compare energy usage and compete to reduce the total amount of energy used in individual schools.

ENERGY PROJECTS AT INDIVIDUAL SCHOOLS

Several superintendents expressed an interest in alternative fuel projects, especially in rural areas with high fuel costs. As mentioned above, Delta-Greely and Alaska Gateway school districts have both applied for grants for woodchip boilers for their schools. Similarly, Cordova City and Galena City schools are currently using waste oil boilers to provide some heat for certain school buildings. Finally, Jim Nygaard, superintendent of the Cordova City school district, explained that students had installed a wind generator for a science project, allowing the science classroom to produce its own power.¹⁸ A few schools had done cost analyses on the feasibility of these projects; in a study of the woodchip boiler project, the Alaska Gateway school district found that the district would save approximately \$125,000 annually for a single school. Further, the Galena City district reported savings of approximately \$300,000 a year in heating fuel since the establishment of a waste oil boiler in one building.

¹⁴For more information on the Renewable Energy Grant fund, refer to http://www.akenergyauthority.org/RE_Fund.html.

¹⁵ Mr. White can be reached at (907) 771-3048. The Copper River and Delta-Greely school districts were announced as recipients of funds through this program on January 14, 2009. For more information on the renewable energy fund project grants, refer to http://www.aidea.org/AEA/RE_Fund.html.

¹⁶ For more information on the program, refer to "Energy Conservation Pilot Program, Final Report (January 2007)" in Attachment D.

¹⁷ Mr. Brenner can be reached at (907) 714-8825. He notes that in the past year, for example, he distributed approximately \$2,000 to a K-2 elementary school and \$4,100 to a high school in Homer.

¹⁸ Mr. Nygaard can be reached at (907) 424-3265.

Other energy efficiency efforts in the 16 school districts that responded include switching to more energy efficient lights in buildings, providing additional insulation, using fewer lights and less heat when buildings are not in use, and promoting energy conservation education. A few schools recently installed digital controls in buildings, allowing facilities management to monitor lights and heat off site. Jim Smith, superintendent of the Galena City school district, mentions his district's hosting of a statewide rural energy conference geared to promote education on energy efficiency.¹⁹ Mr. Nygaard of the Cordova City school district describes a few unique energy efficiency measures that students at his schools have taken, including removal of lights from vending machines and removal of door stops from all exterior doors.

Though districts had completed energy audits for a few individual buildings, few districts had completed an energy audit of all school buildings. Of the 16 schools contacted, only the Galena City School District reported completing energy audits at all schools in the district.²⁰

Recommendations made by the Alaska Energy Authority

Given the current ad hoc and unorganized energy efficiency efforts described in this report, it is not surprising that the Alaska Energy Authority released a set of recommendations in 2008 that encourage state involvement in school energy efficiency efforts. The Alaska Energy Authority recommendations to the legislature include the following: to provide funding for conducting an energy audit for every school in the state; to provide funding for institutional conservation grants for schools, educate teachers and staff about energy conservation; and to provide funding for the Alaska Energy Authority to establish a low interest loan program for energy improvements in public facilities.²¹ The Alaska Energy Authority estimates that energy audits and user education could reduce energy usage by approximately 10% in one year, saving schools across Alaska approximately \$2 million.²²

Finally, in a 2004 study of energy programs in rural Alaska, the Alaska Energy Authority explains that basic steps taken for energy efficiency—such using high-efficiency lighting or replacing electric water heaters—would significantly reduce the costs of electricity and heating fuel in villages. Based on an assessment of current use of energy in Canadian schools in the Yukon Territories, there could be reduced use of fuel and electricity of up to 50% in rural Alaska school facilities with potential cost savings of several thousand dollars.²³

I hope you find this information to be useful. Please do not hesitate to contact us if you have questions or need additional information.

¹⁹ Mr. Smith can be reached at (907) 656-1883, extension 107.

²⁰ Mr. Smith explains that energy audits have been done for all 17 sites in the district.

²¹ For more information on the recommendations of the Alaska Energy Authority, refer to pages 42-44 in "Alaska Energy Efficiency Program and Policy Recommendations" (Attachment E).

²² Information is provided in page 42 of "Alaska Energy Efficiency Program and Policy Recommendations."

²³ Refer to pages ES-10 and ES-11 of "Alaska Rural Energy Plan: Initiatives for Improving Energy Efficiency and Reliability – Volume I: Executive Summary" (Attachment F).

Table 1: Energy Efficiency Projects in Alaska School Districts

| District Name | Current Projects for Energy Efficiency | Potential Projects Needed | Special Regional Considerations | Results of Cost Benefit Analyses |
|------------------------|--|--|---|--|
| Alaska Gateway Schools | looking into alternative energy grant | looking for alternative energy grant to reduce hazardous fuels in Tok area; interest in converting from oil furnace to woodchip boiler | no data available | oil to woodchip boiling system would save \$125,000 annually at Tok School (reduction of 65,000 gallons of fuel used prev. yr) |
| Anchorage Schools | Energy Conservation pilot program - awareness of energy conservation, 10% goal for energy savings; operational audits, periodic meetings (more information provided in Attachment D) | want to expand project | no data available | Energy Conservation pilot program saved 11.2% electricity and 6.5% natural gas; cost savings to district of \$114,361, projected savings of \$1,500,000 annually if all schools involved |
| Chugach Schools | (awaiting funding for cost benefit analyses for school district; no information currently available) | | | |
| Cordova City Schools | students conducting "energy audit" of school; use of timers, motion sensors; removal of lights from vending machines; taking unused water heaters off-line, "powering down" electronics; removal of all door stops; installation of wind generator and battery bank (science classroom now generates own power); waste oil boiler attached to heating system; additional insulation; better siding | need for electronic controls for heating system (buildings heated when not in use); more effort towards motion sensors/timers for lights | high price for fuel | no data available |
| Delta-Greely Schools | recently approved for Alaska Energy Authority renewable energy grant to put wood chip boiler in a school | most buildings over 50 years old; have no boilers, no glycol, windows are single paned; need for added insulation, new windows, better doors (doors don't close currently) | subarctic climate; recent winter temperatures have ranged from -42 to -65; 100mph winds | no data available |

Table 1: Energy Efficiency Projects in Alaska Public School Districts, cont.

| District Name | Current Projects for Energy Efficiency | Potential Projects Needed | Special Regional Considerations | Results of Cost Benefit Analyses |
|------------------------|---|---|--|---|
| Galena City Schools | building heated from waste heat provided by City of Galena Diesel Power Plants; school district holding a state-wide rural energy conference for greater awareness of efficient energy consumption; use of Preventative Maintenance program to track energy use in all buildings | need for more efficient lighting, heat system up-grades, meter installations in Air Base Buildings; need for new energy efficient equipment in food services sites; window replacements | no data available | building audits done at all 17 sites; heating from waste heat of Galena Diesel Power Plants saving approximately \$300,000/year in heating fuel |
| Haines Borough Schools | new school has heating system "talk back" feature that allows monitoring of system via computer; can control heating plant and automatically set heating levels for different dates and times of day; system and oil fired boilers chosen for energy efficiency; reduced number of lights on after hours, have photovoltaic automatic switches that turn off lights if there is no activity | no data available | no data available | currently conducting energy audit of public buildings |
| Hydaburg City Schools | school recently relamped with energy efficient lamps | need to replace windows and exterior doors with more energy-efficient ones | area heavily timbered, mill 30 miles away produces wood chips; looking into wood-fired boiler system | no data available |
| Juneau Borough Schools | currently in second year of an energy program that addresses plant/physical equipment and people aspect of reducing and/or conserving energy | money for retrofits (specifically for lights, windows, window shades, furnaces); working to have schools certified as Energy Star schools | no data available | during first year of energy program, reduced energy usage by 1 million kWh |

Energy Efficiency Projects in Alaska Public School Districts, cont.

| District Name | Current Projects for Energy Efficiency | Potential Projects Needed | Special Regional Considerations | Results of Cost Benefit Analyses |
|---------------------------------|--|---|---|--|
| Kenai Peninsula Borough Schools | energy conservation award program; replacing windows | most schools 40-50 years old; need retrofits; need new windows, heating systems, improved thermostat systems | high increases of fuel prices (within FY 2008, electricity increased by 18%, natural gas 10-12%, fuel oil by 37%, and propane by 40%) | purchased Schooldude.com (compares energy usage of all schools in district) |
| Kuspuk Schools | efforts to conserve energy by turning off lights, isolating areas of buildings not used as frequently; weather stippings and adding insulation | buildings at least 30 years old; need access to products at a reduced cost and more readily available in remote location (such as insulation, building supplies, storm windows) | severe winter conditions; remote location | no data available |
| Lower Kuskokwim Schools | 2000-01 replaced classroom lighting and 7 gymnasiums to T5 lights with electronic ballasts; currently replacing doors and windows, increasing insulation on new projects; upgrades to heating systems incorporate temperature setback options at times building not in use | continuing upgrades to heating systems (upgrading generators and incorporating heat recovery in existing school generators) | no data available | cost benefit analysis part of design process for new projects; has been done for Chefornak, Kipnuk, Kwig Reno projects |
| Pelican City Schools | turn heat down or off when building not in use | have submitted CIP application | currently water and septic system frozen in high school | no data available |
| Saint Mary's Schools | turn off lights, set temperature accordingly | need upgrades on insulation, windows, lights | no data available | did cost benefit analysis for installing new lights; determined lights would pay for themselves in 1 1/2 years |

Table 1: Energy Efficiency Projects in Alaska Public School Districts, cont.

| District Name | Current Projects for Energy Efficiency | Potential Projects Needed | Special Regional Considerations | Results of Cost Benefit Analyses |
|-----------------------|---|---|--|--|
| Sitka Borough Schools | replaced roofs; added insulation; converted fuel boilers to electricity because fo low electrical rates | have board member working on plan to establish energy efficiency plan similar to Juneau Schools | no data available | no data available |
| Wrangell City Schools | have installed digital controls in buildings; thermopane windows | need money to convert boilers to electricity | hydropower available (need money to convert) | study on savings from gas/oil to electricity and hydropower; could save several thousand dollars on heating fuel |

NOTES: Information provided by superintendents and energy managers of 16 school districts that responded to email survey.
 (1) We include "Anchorage School District 2007 Energy Conservation Pilot Program: Final Report" (May 12, 2008) as Attachment D.

SOURCES: Todd Poage, superintendent, Alaska Gateway Schools; Robin Siegfried, executive assistant to superintendent, Anchorage Schools ; Bob Crumley, superintendent, Chugach schools; Jim Nygaard, superintendent, Cordova City schools; PJ Ford Slack, superintendent, Delta-Greely Schools ; Jim Smith, superintendent, Galena City Schools; Michael Byer, superintendent, Haines Borough Schools; Al Weinberg, superintendent, Hydaburg City Schools ; Joyce Kitka, energy manager, Juneau Borough Schools ; Paul Brenner, energy conservation manager, Kenai Peninsula Borough Schools; Brad Allen, superintendent, Pelican City Schools ; David Herbert, superintendent, Saint Mary's Schools; Steve Bradshaw, superintendent, Sitka Borough Schools; Woody Wilson, superintendent, Wrangell City Schools.

International Codes-Adoption by State

| State | 2006 Edition | 2004 Edition | 2003 Edition | 2000 Edition | Notes |
|-------|--------------|--------------|--------------|--------------|---|
| AL | X06 | L | X06 | L | |
| AK | X03 | L06 | X03 | X06 L | |
| AZ | X06 | L | X03 | X03 | IBC, IFC, IMC, IPC, IFGC - AL Building Commission; state owned, schools, hotels, movie theaters |
| AR | X06 | X06 | X06 | X00 | AZ Dept of Health Services; health care institutions |
| CA | X06 | | X06 | X03 | CA currently adopts the 2006 IBC & IFC as the base model codes for the CA 2007 Building Standards Code. CA also adopts a portion of the IEBC, Apx A, Chapter 1 which is published in Volume II of the 2007 CA Building Code. All State Buildings & Facilities IBC, IMC, IPC, IFGC, IECC. All Public Schools & Junior Colleges IBC, IFC, IMC, IPC, IFGC. |
| CO | X06 | L | X06 | X06 | |
| CT | X03 | X03 | X03 | X03 | |
| DE | L | L | L | L | |
| DC | X03 | X03 | X03 | X03 | |
| FL | X03 | X03 | X03 | X00 | |
| GA | X06 | X06 | X06 | X06 | |
| HI | X06 | X03 | X06 | L03 | |
| ID | X03 | X06 | X03 | X06 | 2006 codes scheduled to go into effect 3/1/2009 |
| IL | X06 | L | X06 | X03 | |
| IN | X06 | X03 | X06 | X06 | 2009 IECC, modified by the 2001 Supplement for commercial structures statewide. IBC, IFC, IMC, IFGC, IPMC, IECC, IEBC for IL Board of Edu Facilities (other than vehicular); but do not apply to Chicago. IBC adopted by Dept of Health for hospitals where local codes do not apply. |
| IA | X06 | X06 | X06 | X06 | |
| KS | X03 | X03 | X03 | X06 | |
| KY | X06 | X06 | L03 | X06 | |
| LA | X06 | X06 | X06 | X06 | IBC, IRC, IMC, IEBC, IECC. State owned and rented structures |
| ME | X03 L | X03 | L | X03 | IECC: Bldgs other than 1&2 family regulated by the KRC. The IECC is adopted by the State Fire Marshal's Office for low-rise residential buildings. It is also applicable on a local level. |
| MD | X06 | X06 | L | X06 | IPC. Industrialized housing. Other codes - edition shown may not be in use locally, check with local jurisdiction. |
| MA | A03 | X03 | X06 | X06 | |
| MI | X03 | X03 | L | X03 | |
| MN | X06 | X06 | X00 | X03 | |
| MS | X03 | X03 | L | L | The MSBCC adopted the 2003 IBC & IRC in 2006. Legislation was passed in 2007 stating that jurisdictions adopting new codes must adopt the codes of the MSBCC and that jurisdictions already enforcing other codes must adopt the State Office Space - 03 IPC, Modular Construction - 00 IBC, IRC, IMC, IPC, IFGC. |
| MO | X00 | X00 | L | L | |
| MT | X06 | X06 | X00 | X00 | |
| NE | X00 | X00 | L | X06 | |
| NV | X06 | X06 | X03 | L | IBC, IFC, SFM, schools, health care, state bldgs, commercial bldgs for counties over 100k. IBC, IRC, IFC, IECC, IEBC. NV Public Works Board, state buildings. |
| NH | X06 | X06 | L | X06 | |
| NJ | X06 | X06 | X06 | X06 | |
| NM | X06 | X06 | X03 | X06 | The IFC will go into effect 02/01/2009. |
| NY | X03 | X03 | X03 | X03 | 06 IBC, IRC, IECC & IEBC adopted statewide by NM Const Ind Div. 03 IFC adopted statewide by the State Fire Marshal's Office. |

