PROPOSAL FOR ENERGY CONSERVATION
AT PUTNAM HEIGHTS GRADE SCHOOL
EAU CLAIRE, WISCONSIN

Undertaken by: The Sixth Grade Class

Putnam Heights School

Teacher: Brian J. McGee

Principal: Bruce Bylander

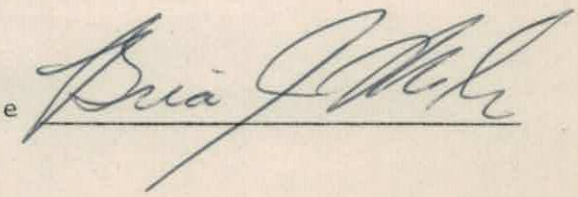
June 5, 1978

INTRODUCTION

As one of our goals at Putnam Heights School for the 1977-1978 school year, the sixth grade class undertook a study of the energy efficiency of our building. The purpose was to see if there were any practical ways to save both energy and money for our school. It was discovered that some of our ideas for saving energy were impractical since the school was already achieving a fairly high level of efficiency. In other areas, we found that substantial improvements could be made. Furthermore, it was found that a substantial amount of money and energy could be saved in these areas in a relatively brief period of time.

The research for these reports was done primarily by the students of the sixth grade class. Working in groups, the students studied the various energy use areas reported on in this summary. They have signed their names to the areas for which they were responsible. Where necessary, I have edited their work to enhance and clarify their findings.

Finally, we would like to extend credit to many people who helped with this project: Bruce Byland, principal; Olaf Saheim, building custodian; Jim Wilson, Northern States Power, the architects at Larson, Hestekin, Smith, and Ayres, Ltd.; and the people at Wiersgalla Plumbing, Menards, and other building firms.

Brian J. McGee 

BATHROOM SINKS

Present Situation: We have been checking our bathrooms and have found that many students do not turn off completely the water faucets after they use the sinks. By monitoring the sinks for about a week, we discovered that about 30 gallons of water per day is lost due to leaking faucets. This amounts to 5,400 gallons of wated water per year. Though minimal, this wastage adds about $2.00 to the water bill per year.

Proposed Changes: We checked the cost of buying automatic shut-off valves for the sinks. These range in price from a low of $16.00 to $60.00; however, no style could be located to fit our sinks. Because of the cost factor in buying shut-off valves, we suggest that a program of educating the students be undertaken to explain how their failure to shut off faucets affects their environment. It is also proposed that new construction should specify sinks with shut-off valves. Depending upon the cost of the shut-off valve, the valves might pay for themselves as they would save about $.40 per year. Also, though figures are not included, the shut-off valves would also save in the heating of hot water.

Julie Barneson — Julie L. Barneson

Amy Isaacson — Amy Isaacson

Laura Brown — Laura Brown

TOILETS

Present Situation: We have about 160 students. Assuming that each student used the toilet about once every other day (which may be a low estimate) at the rate of 4.25 gallons per flush, the toilets require about 340 gallons of water each day or 61,200 gallons per year. Present water rates are $.0028 per cubic foot or $.00037 per gallon.

Proposed Change: We have tried putting one gallon jugs of water in the water holding tanks to cut the amount of water used per flush by one gallon. This idea did not work very well because it did not leave enough room in the tank for the float to operate freely. There is enough room to add a brick into each toilet; however, there is probably an even easier way to adjust the water level. The method involves bending the float level down in the back of the water tank. Using this technique, the custodian could adjust the water level to maximize savings of water while ensuring sufficient water to provide a good flush. A savings of even one quart of water per flush would mean a yearly savings of 3600 gallons of water per year in the Putnam Heights school alone. If this technique were instituted at all schools in the system (again assuming a flush per student every other day), the savings would be approximately $88.95 per year. While this

savings would not significantly affect the water bill, it would save our environment 240,413 gallons of clean water per year. In addition to the saving of clean water, the sewage system would also benefit since less water would have to be processed.

Karla Krumenauer Karla Krumenauer

Lee Lyke Lee Lyke

WATER HEATER

Present Situation: We are presently heating 100 gallons of water from 45° to 140°. Our custodian turns on the hot water at 7:05 a.m. and turns it off at 2:30 p.m. The cook feels that it is necessary that the hot water be set at 140°.

Proposed Changes: Because of the requirements of the cook for a hot water setting at 140° and the present good conservation practices of the custodian who turns the heater on in the morning and off soon after the dishes are finished, there are no proposed changes in this area.

Greg Brown Greg Brown

Jim Rubenzer _____

WATER FOUNTAIN

Present Situation: In the past we have allowed our water fountains to run during the hot days. This practice uses 2.73 gallons per minute which comes to 1064.7 gallons of water per day. Figuring about 45 hot days during the school year, this would mean that 479,115 gallons of water is wasted at each of the school's three water fountains yielding a total waste of 1,437,345 gallons if all three are running. Although water rates decrease as consumption increases, it costs about $.0028 per cubic foot or $.00037 per gallon. Using the gallons wasted given above, the yearly cost of this waste per fountain is $177.27 or $531.81 for all three.

Proposed Changes: We propose leaving the water fountains off during hot days. This will not save the school a great amount of money, but such a practice would save a lot of clean water. If all schools in the Eau Claire system followed this practice (assuming about 50 water fountains in the system), we could save our environment 23,955,750 gallons of clean water per year plus alleviate the strain on our sewage disposal facilities since less water would have to be processed.

Betsy Boden Betsy Boden
Maureen Corrigan Maureen Corrigan

OUTSIDE WALL

Present Situation: Each classroom has an outside wall which is composed of 3/8 inch hardboard and single-pane glass. The area of the hardboard is approximately 111.3 square feet. The hardboard has an insulative value of 1.7R. The daily heat loss in this wall is 1,415,736 BTU (a day). This means a loss of 1.36 gallons of #2 fuel oil per year per square foot or a loss of 141.368 gallons of #2 fuel oil for this classroom alone in the school year.

Possible Alternatives: We propose putting in two inches of styrofoam insulation with an R value of 10 behind the present 3/8 inch. This insulation would be covered with 1/2 inch of insulation board, with an R factor of 2, brining the total R value of the wall up to 13.7. The cost of putting in this insulation would be $.26 per square foot or $27.30 per room.

This would not include the cost of labor, but, because the project is not a very difficult one (consisting primarily of gluing, screwing, and drilling), there might be a possibility of the students doing it. Also, it might be a good community action project with students and parents working together. This type of project would not only save the school money for installation costs; it would also instill a strong feeling of school pride in the students and the parents in the community. The school would be part "theirs" in a fashion not felt through taxation.

If this plan were followed, it would pay for itself in one year. In a ten-year period, it would save $4.62 per square foot or $514.21 per classroom. This savings represents a 1,878% return on the initial investment, omitting consideration of the costs of inflation.

If, on the other hand, the parents and students cannot be allowed to do the work, installation charges will increase the costs two to three times. Nonetheless, payback should occur after two years. The rate of return on the investment after a ten-year period would be 500% (again fuel increases due to inflation are not considered).

Holli Ridge Holli Ridge

Amy Sandborg Amy Sandborg

Holly Akervik Holly Akervik

CLASSROOM LIGHTING

Present Situation:

Each classroom presently has 36 fluorescent lights using 40 watts of electricity each per hour. The cost of electricity was figured on an 8.5 hour day, 180 days per year, at the rate of $.03 per kilowatt hour. Using these figures, it costs $66.09 per classroom per year, a total of $462.63 per year for six classrooms.

In the bathrooms we have 24 lights using 40 watts of electricity. Figuring a 7.5 hour day, and 180 days per year, the total cost is $38.88.

In the gym there are 12 lights using 500 watts of light. The cost of this electricity, figuring on a 7 hour day, 180 days a year, is $226.80.

Suggestions:

In the classrooms we have a total of 1,440 watts per classroom. After calling NSP, we discovered that because of foot candle requirements, we would not be able to reduce our light loads in the rooms except on the row closest to the window. On a cloudy day every other light could be turned off, while on sunny days the whole row of lights closest to the windows could be eliminated. This would be a savings of approximately 14.28 kw per day in our school and an annual savings of 2570.4 kw. In cash this can be translated to $77.11

per year with no expenditures of additional money for construction. Implementation of the suggestion merely requires that the custodian remove the fluorescent tubes from every other light fixture.

In the bathrooms there is a total of 960 watts. We suggest that removing the fluorescent tubes from the middle row of lights would save 2.4 kw per day and 432 kw per year. This results in a cash savings of $12.96.

Because of the foot candle requirements in the gym, there are no cutbacks which are feasible.

Conclusion: By turning off only the middle row of lights in the bathroom and every other light in the row of lights closest to the window in the classrooms, $90.07 per year would be saved. If each teacher would turn off window row lights on sunny days, it would save the school $.12 per day per classroom. At Putnam Heights, this would save $58.80 per year in seven classrooms. This may not seem like much, but if 300 teachers did this 70 days out of 180 days in the school year, a savings of $2,570.00 could be realized. Over a long term, this would be a substantial savings.

Jeff Johnson Jeff Johnson

David Kincaid David Kincaid

Don Raconelli Don Raconelli

WINDOWS

Present Situation: We have single-pane windows which cover about 56.53 square feet in each of our seven classrooms. The R value of this type of window is 1; this means we have a heat loss of 122,104.8 B.T.U. per room per day. (The rooms are heated to 70° during the day and 68° at night.) This is a total loss of .61 gallons of #2 fuel oil per day per room. With the cost of oil at about $.41 per gallon, this amounts to a loss of $.25 per day. If you figure on a heating year from November to April, the loss through the windows is about $45.00.

The following proposals are made for alleviating this problem. Costs given refer to the choice of only one of the three plans; however, it is possible that some combination of plans could occur.

Proposed Plan #1: We would like to propose putting thermal-pane glass in when replacing broken panes. In this fashion, glass could be changed over slowly.

Proposed Plan #2: We propose that a sheet of glass be added to the four fixed windows in our room as there is already a recessed area for easy mounting of the additional pane.

Proposed Plan #3: Another way to save money would be the construction of insulating shutters. They could take the place of our present shades and would very effectively seal out the cold during the night. They could slide down into place at

night, and, during the day, they could be used as a bulletin board.

Conclusion: (Proposed Plan #1)

The adding of thermal panes to replace any broken windows would cost about $20.00 more than regular single pane glass, but, since the R value for 1/4 inch of air space is 1.7 and only 1 for single pan glass, we would have a 41% reduction in heat loss. This would save $18.53 per room. There would be an eight-year payback period. Savings would be $18.53 per year thereafter.

Conclusion: (Proposed Plan #2)

The adding of a single pane of glass to the fixed windows would cost about $29.20 for the four additional pieces of glass. This would increase the R value from 1 to 1.8. We would have a 45% reduction in heat loss which would give a payback period of only two years with a savings of $14.40 per year thereafter.

Conclusion: (Proposed Plan #3)

The insulating shutters would greatly decrease the rooms' heat loss during the night and increase the total fuel savings. If it were made out of something similar to one inch of styrofoam, which has an R value of 5.5, the total R value of the window and insulation would be 6.5. This would mean a savings of 85% in fuel that would otherwise be

wasted through the windows. Since they would only be used at night (about 16 hours), the savings would be about $25.38 per year per room. The cost of such a shutter is an unknown factor since we cannot find anyone who is making them, but, if the high school industrial arts class wanted to take on the project as an experiment, an exact cost could be pretty quickly determined. Shutters of this type should not be discounted as they would save about $126.90 in a five-year period. In a school the size of Putnam Heights, this would be a savings of about $228.42 per year if done to all windows or $1142.10 over a five-year period. As was previously mentioned, the shutters would make it unnecessary to purchase shades for the classrooms.

Additional Recommendations:

It was discovered that in some windows, but, especially in those around the outside doors, that there were excessive air leaks. At times, the gaps in doors would also be excessive--as much as 1/4 inch. The heat loss on these leaks is unnecessary; payback for repairing them would be almost immediate.

It was also considered that a limited reduction in classroom venting could be effected through the use of green plants. These plants would not only add beauty and oxygen to the room, but they would also help shield the classroom from the hot rays of the sun on bright days.

REDUCTION OF THERMOSTAT AT NIGHT

Present Situation: In our school we are presently heating the building to 68°-70° all day and night. The blowers are shut off at night brining about a great savings, but the temperature is not really lowered.

Proposed Change: Reducing the night time temperature could result in substantial savings. Considering no other changes besides turning down the heat at 3:30 p.m. and increasing it at 7:00 a.m., the following savings could be realized as a deduction from the yearly fuel bill:

Thermostat Decrease	Fuel Cost Savings
5%	3.6%
10%	7.2%
15%	10.8%
20%	14.4%

The savings would be quite high at Putnam Heights, and thermostat timing mechanisms are not very costly. Though the fuel use practices may vary from school to school in the system, projecting upon savings possible at Putnam Heights, it would appear that a major fuel cost reduction is possible for the entire system.