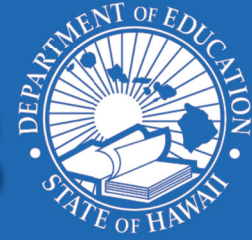


Cooling schools

August 2015



The challenge

Hawaii's cooling tradewinds are faltering, ocean temperatures are rising. As climate change makes the Islands hotter, focus once again turns to installing air conditioning in classrooms. HIDOE is not against installing AC — in fact, there are 17 AC-related projects on Oahu alone finished or under way in 2015, from a new school (Hookele Elementary) to a new classroom building at Ewa Elementary to a series of building retrofits. As funding is released by the state, we will continue to whittle away our lengthy project list. However, **our goal is to make all classrooms comfortable, sustainably,** using fact-based, data-driven methodologies that lead to effective long-term solutions. We will continue to work with the Legislature and community on this pressing issue.

WHY DOES IT COST SO MUCH?

New schools are built to modern standards, with technologies that ensure energy efficiency and stability. For the majority of our schools, however, the following are realities to keep in mind about adding AC.

OLD BUILDINGS, INFRASTRUCTURE

The majority of HIDOE schools are on average **more than 50 years old**. Their electrical systems reflect a bygone era. They weren't designed to support today's high level of energy demand — for computers and broadband networks, let alone AC. Many older classrooms have only four electrical outlets, for example. Schools that installed AC units without the proper electrical support have blown circuits to classrooms, even building wings. Also, most of our buildings are not designed to be air-tight. For an AC system to cool a room, the building envelope needs to be sealed, requiring replacement of windows and doors, among other things.

BUDGET BREAKDOWN

To install AC at all schools, we need **\$1.695 billion**:

• 153 elementary schools X \$5 million	\$765 million
• 33 middle schools X \$10 million	\$330 million
• 40 high schools X \$15 million	\$600 million

How this was calculated: The cost of AC and related infrastructure upgrades at Pohakea Elementary in 2010 was \$4.3 million — about \$110,000/classroom. Pohakea is a smaller elementary school (573 students in 2014). By comparison, August Ahrens is one of our largest (over 1,400 students). Adjusting for various school sizes and inflation since 2010, the estimated cost to AC the average elementary school is \$5 million, the average middle school \$10 million, the average high school \$15 million. This bears out: A 2010 Campbell High cost estimate came in at over \$13 million.

Running AC: HIDOE spends about \$48 million annually on electricity. That will rise as more AC is installed. After Pohakea's AC went live, **its power bill doubled**. There are also ongoing maintenance costs with these systems.



PV/AC, Waianae High School

WHAT ARE WE DOING ABOUT IT?

Technologies offer solutions where the need is greatest and the right structural conditions are present, including:

- Solar-powered ventilators
- Photovoltaic AC (PVAC)
- Solar lighting
- Increased insulation
- Reflective roof coating

We're also:

- Piloting "energy positive" portable building designs.
- Deploying solutions from our 2015 Heat Abatement Study.

Details are on the back page.

CAN I DONATE AC?

Yes, if it meets health & safety requirements, and the school's system can handle it. See back page.

AC PRIORITY LIST

1. Ewa Beach Elementary
2. Ilima Intermediate*
3. Campbell High*
4. Aikahi Elementary
5. Kaimiloa Elementary*
6. Nimitz Elementary
7. Mokulele Elementary
8. Pearl Harbor-Kai Elementary

* part of heat abatement study

FORMERLY ON PRIORITY LIST (year removed)

- Maili Elementary (2002)
- Kihei Elementary (2007)
- Kamehameha III Elementary (2010)
- Lokelani Intermediate (2015)
- Pohakea Elementary (2012)
- Hickam Elementary (2014)

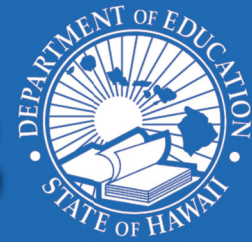
SCHOOLS WITH CENTRAL AC

- Ewa Makai Middle*
- Hookele Elementary*
- Kamehameha III Elementary
- Kapolei Elementary
- Kapolei Middle
- Kapolei High
- Keoneula Elementary
- Kihei Elementary
- Iroquois Point Elementary
- Lokelani Intermediate
- Maili Elementary*
- Mililani Ike Elementary
- Mililani Middle
- Mililani Mauka Elementary
- Pohakea Elementary
- Hickam Elementary

* including cafeteria

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Solutions

Finding solutions to these challenges isn't moving at the pace we'd all like. However, flexible technologies are offering some relief from rising temperatures. We have a trove of data from these systems that we're mapping back to our schools to find the right fits within our Capital Improvement Projects budget. HIDOE makes annual budgetary asks to cover these needed projects.

PROJECTS

Solar-Powered Ventilators: These vents push hot air out of classrooms allowing cooler air to come in, and don't require electricity. Timing this ventilation at night — known as nightly thermal flushing — can reduce daytime temps by 4 to 6 degrees. *Installed at a dozen HIDOE campuses.*

PVAC: HIDOE piloted a photovoltaic air conditioning project to cool a portable at Waianae High. Two more will be installed on portables at Campbell High School through a crowd-funded program led by high school students.

Solar Light: High efficiency skylights that allow light into the classrooms without the heat generated by electric lights. *Installed in three HIDOE schools.*

Increased Insulation: Since 2005, HIDOE has improved roofs and walls to reduce the amount of heat gain, in conjunction with scheduled repairs such as reroofing. *Installed across dozens of schools with recent building upgrades.*

Roof Coating: By covering roofs with a reflective fluid coating system instead of standard black or gray materials, a drop of up to 5 degrees is possible by reducing heat transfer into the classroom.

Innovations in Building Design: "Energy positive" portables like the one below at Ewa Elementary can make it possible to bring AC online while reducing power use overall. Learn more: bit.ly/EwaEIPort



HOW CAN I DONATE AN AIR CONDITIONER?

Anyone can donate AC units or funding to schools or to the system. We need to compile the following information to ensure a donated unit will work.

Health and safety: There are several requirements, but the most important is indoor air quality. Most residential-size window units do not have fresh-air intake capabilities — at home, you may have a few people in a closed room at a time; in a classroom setting, however, with as many as 30 people in the room, fresh-air intake is necessary to regulate carbon dioxide levels. Otherwise the air could be hazardous.

Electrical systems: There have been cases where AC units were installed at schools without the proper capacity; circuits were blown for some classrooms and even whole building wings. In addition to the damage, there's a potential fire hazard. There are 35 active projects to upgrade campus electrical systems across the Islands now.

What's acceptable? Any new unit can work as long as a fresh-air vent is also installed:

- Window units that have enough thermal output (BTUs) for the room size
- Split AC units
- Photovoltaic AC units

What would not work would be portable AC units or used systems.

What are the steps to make a donation? If you are making a donation to a school, please contact the principal. If you want to make a donation that does not go to a specific campus, please contact the Auxiliary Services Branch at 808-586-3452. If you make a donation to a school directly, please ask for:

- **Form 1:** Informs the Office of School Facilities and Support Services (OSFSS) of the incoming unit, gives it the opportunity to ensure proper electrical capacity at the school, that it will be properly installed, and a sign off indicating agreement that the project will include fresh-air input.
- **Form 6700:** Looks at the specifications of the unit being installed against the proper requirements. The Facilities Maintenance Branch in OSFSS then reviews the proposed donation.

HEAT STUDY

The goal: A 76-degree set point in all classrooms via accumulated improvements such as those listed at left. For classrooms where these efforts don't bring down the temperature sufficiently, AC and supplemental cooling is planned. Read: bit.ly/HeatStudy

CALENDAR

Starting the school year later is an option, one that involves many stakeholders.

By law (Act 167), the school year must include 180 student instructional days.

Under contract with unions:

- Half of instructional days completed before winter break
- School ends before June 11

The calendar is discussed annually at a fall Board of Education meeting. Agendas: www.hawaiiboe.net/Meetings/Notices