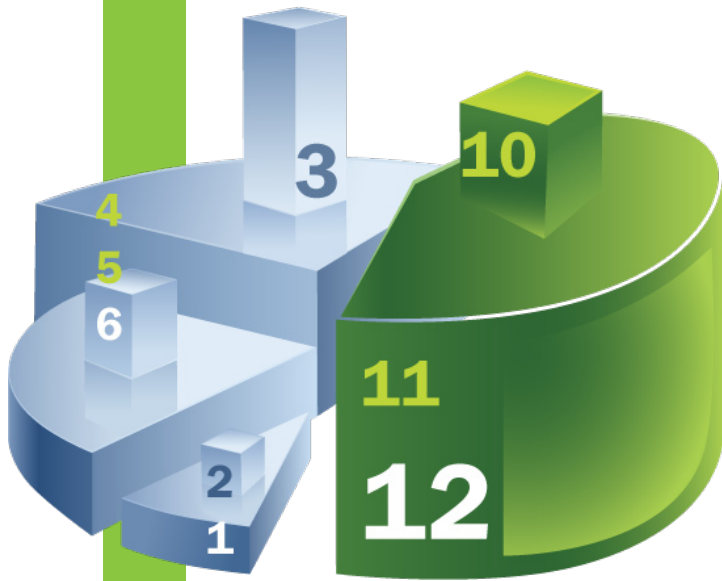
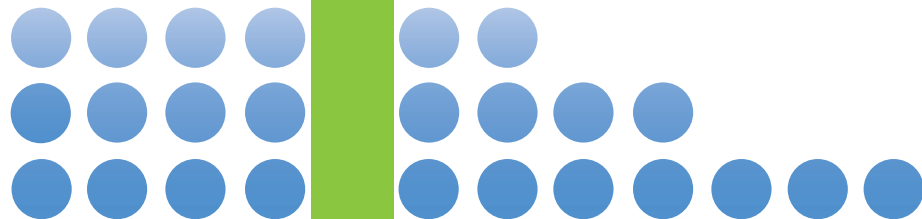


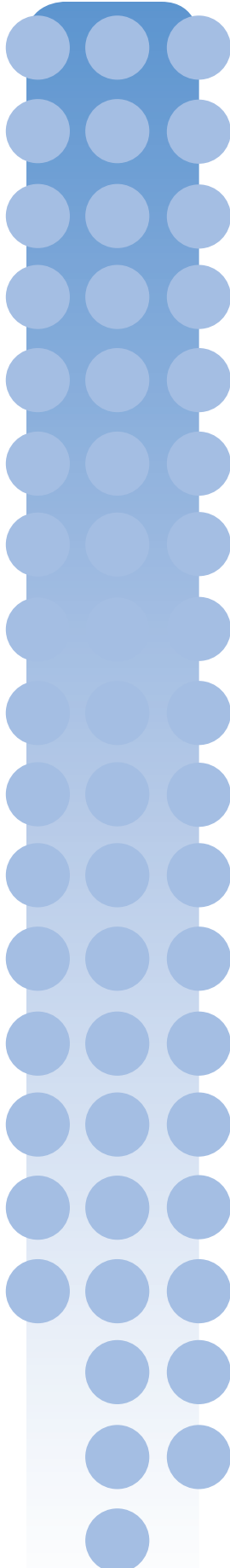
# Smart Thinking: 12 Steps Forward to Reducing Energy Consumption at Colleges and Universities



White Paper – Higher Education Energy Strategy







In a time when the word “energy” brings to mind rising prices or images of a natural treasure filling up with oil from an offshore disaster, there is a place where energy can be perceived with hope: the nation’s colleges and universities.

According to a new report released by the American College & University Presidents’ Climate Commitment (ACUPCC), participating schools are working to cut more than 33 million metric tons of greenhouse gas emissions per year, and more efficient energy use is at the heart of this effort.<sup>1</sup>

These efforts are also reflected among those colleges and universities participating in the College Sustainability Report Card, the only comparative evaluation of campus and endowment sustainability activities at colleges and universities in the United States and Canada. In contrast to an academic focus on sustainability in research and teaching, the Report Card examines colleges and universities as institutions, through the lens of sustainability. Its 2010 key findings on climate change and energy are telling:

- **Over half of the schools have made a carbon reduction commitment.** Increased attention to climate change is reflected at an impressive 58 percent of the schools through a commitment to carbon reduction. Fifty-two percent of the schools have signed the Presidents’ Climate Commitment, while 23 percent made carbon reduction commitments in addition to, or instead of, the Presidents’ Climate Commitment.
- **More than two-thirds of the schools have conducted a carbon emissions inventory.** A notable 69 percent of the schools have conducted an inventory of their carbon emissions.
- **Two in five schools purchase renewable energy.** Forty percent of the schools either purchase renewable energy directly from their utility providers or buy renewable energy credits equivalent to a percentage of their campus energy use.
- **Nearly half of the schools produce renewable energy on campus.** Facilities for producing solar, wind, bio-, or geothermal energy are in operation at 45 percent of the schools.<sup>2</sup>

The picture that emerges is both hopeful and instructive: hopeful in that our higher educational institutions are taking the lead in driving positive change, as we expect them to; and instructive in that it has become clear that any college or university that values sustainability should consider developing an energy management strategy.

For most organizations, the cost of energy is outpacing all other variable costs. For example, the cost of natural gas increased over 250 percent from 1993 to 2006; the cost of fuels and power increased over 110 percent during the same period; and the bulk of the increase (81%) occurred over the last four years.<sup>3</sup>

Clearly, while the overarching climate concerns are one driver, bottom line costs are another.

The nation’s higher education institutions spend almost \$14 billion annually on energy. The implementation of sound energy management strategies can reduce energy bills by 30 percent or more.<sup>4</sup>

Further, colleges and universities are recognizing that students and employees expect them to be an active part of the global energy sustainability solution. Doing so not only supports the environment and saves money— it attracts the best students and staff.

And yet, despite the compelling reasons to act and clear momentum in the higher education sector, many colleges and universities find that implementing an energy program is a difficult challenge. Why? In many cases, the answer is simply that no one knows where to begin.

## Getting Started

The fact is an organization can begin almost anywhere— such as raising awareness of energy consumption. If your college or university wants to save energy, it's important that the community become aware of the energy consumption that they are responsible for. Simple changes in people's behavior can quickly lead to significant energy savings, but such changes will only happen if people are aware of the energy consumption they have the power to control. Education is key. Governmental and utility-based programs such as EnergyStar®, LEED programs, and numerous Department of Energy initiatives can help greatly in this process.

Steven Hanawalt posits an excellent way to frame the energy improvement opportunity— by asking three simple questions for each energy asset of the organization:

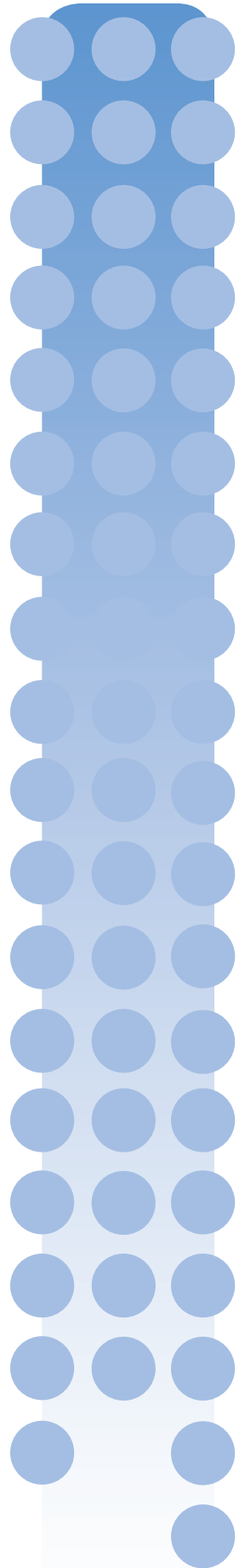
- What Is?
- What Should Be?
- What Could Be?

“What Is” means understanding current energy consumption— establishing a baseline to measure improvement against. “What Should Be” means understanding the design level performance of energy assets on hand. And “What Could Be” defines the optimally run enterprise.<sup>5</sup>

“There are some things that I believe are universal for us all regardless of institution— the first being we live in an environment of increasingly scarce resources,” says Roger Young, principal at Roger Young & Associates, an Andover, MA-based consultant to the education industry. “There isn't a day that goes by when we're not reminded of our financial— our budgetary— resources and how tight they are.”

Young points out that energy impacts the university community because it “adds no value to the educational process.” Every dollar spent on energy impacts teaching and learning because it takes economic vitality away from that core mission.

This should also be a motivating factor in getting started.





## Twelve Steps Forward

While each higher educational institution is unique, and subject to governmental regulations and policies for energy usage and standards that may differ, the following actions are compiled from best practices for developing and implementing an effective energy conservation program in any educational organization.

### 1. Appoint an Energy Manager

Energy programs need a strong and official advocate. This person should have a global understanding of the institution, especially the maintenance and operations areas, including ASHRAE standards, air quality standards, etc.

It is the Energy Manager's task to gather, compile, develop, and ultimately "own" accountability for the energy plan. He or she sets goals, tracks progress, and promotes the energy management program.

This is not to say that a special staff position needs to be created for the role—many smaller institutions will look to existing staff as possible Energy Managers—but the fact is that the profile of this role is clearly rising.

Tom Raftery, lead analyst of GreenMonk, the energy and sustainability practice of Seattle, WA-based industry analyst corporation RedMonk, says that the Energy Manager represents an increasingly prominent role in most organizations.

"I foresee the rise of the Energy Manager," he says. "With the increasing regulatory landscape around carbon emissions, carbon management and reporting will become mandatory for most organizations. In that environment, having someone specialized in energy management will start to seem like a very good idea."<sup>6</sup>

### 2. Establish Benchmarks

To know "What Is", a baseline is needed—before anything else. When considering your energy data bear three things in mind:

**a) Accuracy is critical.** Make certain that all utility bills (i.e., electric, water, gas, propane, etc.) are compiled and input accurately.

**b) Timeliness is important.** Data should be collected at monthly intervals, allowing reports to be pulled on a granular basis for better visibility and understanding of trends.

**c) Metrics must be comparable.** Think about the metrics you will employ, and be consistent in implementation. Don't compare energy per square foot in one instance and energy per student in another.

With quality benchmark data, colleges and universities can draw better conclusions about the paths to take to efficient energy management.

### 3. Develop the Plan— Establish an Energy Policy

With the establishment of accurate benchmark metrics, energy policies can be developed and conservation plans put into place. New policies may include things like favoring communal cooking areas for faculty and students over the practice of individual refrigerators in offices or dorm rooms. Critical here is establishing awareness among users regarding what these assets cost in terms of dollars. Give individuals the knowledge to drive change, and empower them to make choices. Perhaps they have the option to pay for an item themselves, or to choose between assets. The goal here is to build possible savings into the plan, then “sell” the merits of the plan over time. An energy policy will also include elements like:

- Staging guidelines
- Appliance and vending machine regulations
- Equipment operating procedures
- Facility maintenance, upgrade, and renewal recommendations
- Utility peak load, usage, and conservation guidelines

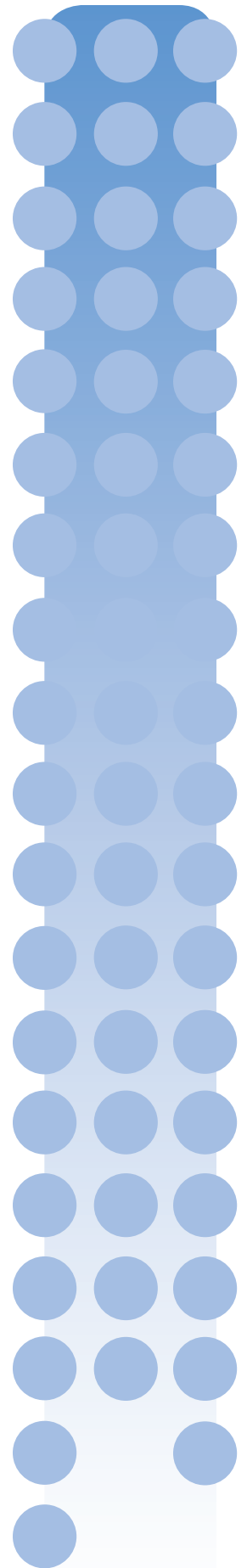
### 4. Determine measurable goals

The goals of an energy plan will depend entirely upon the institution. Successful plans are often implemented in phases, with reasonable goals set for each phase. Keep immediate goals modest: early success will help create and sustain momentum. Be certain that goals are based on measurable metrics— choose a percentage reduction in a simple electrical metric based off current energy bills, or choose a metric that is a direct result of a change in staging policy.

The University of Cincinnati reduced its greenhouse gas emissions to 10 percent below 2004 levels in 2008, and is on track to achieve a goal of at least 20 percent by 2012 with such projects as utility system upgrades, changing temperature set points, insulating steam valves, and replacing light fixtures. An example of phased planning with reasonable goals, these and other projects have saved the university over \$10 million.

### 5. Seek a Line Item in the Budget

Best practice recommendations state that an energy plan must include a budget element.<sup>7</sup> Sometimes it costs money to save money, as in the case of upgrades or replacement equipment that will reduce consumption. An energy plan without this component will be unable to effect any real change. Making the energy plan a line item in the budget will also raise its profile with the administration. An energy manager must embrace this fact— and be prepared to report on plan progress on a regular basis.





## 6. Get Buy-In from the Administration and the Institution at Large

Any successful initiative needs buy-in from above and below. The path to buy-in from executive leadership is by reporting directly to the top and building the plan from the top down.

But the institution must implement the plan from the bottom up.

Those individuals on campus who must change their behavior need to be educated about the real stakes involved: the environment, money, the quality of education and campus life. By providing choices and the opportunity to get involved, you get everyone to take ownership of the plan.

## 7. Make the Plan Relevant— and Transparent

What does 10% savings in energy consumption mean to you? Without context— without relevancy— probably not much. But if that 10% is translated into an additional professor in the History department or new research internships or expanded security staff, that 10% is made real. The institution can better rally around these less abstract elements.

If the institution is involved in the plan, they want to know how it is working; so the plan should be transparent. Transparency means everyone has access to the metrics being measured to better understand the progress being made toward energy goals. The institution should publish its benchmarks and progress on a regular basis— such transparency helps achieve the goal of universal involvement across the community.

## 8. Involve Everyone

If students believe in the cause, students will get involved. So will teaching staff and other faculty members. More people can be drawn into the energy management program through active training and education. Involving everyone affiliated with the college or university will translate to greater achievements.

The College Sustainability Report Card notes how student involvement is being encouraged by colleges and universities:

- **More than two in three schools have introduced sustainability into student orientation.** A sustainability awareness/educational component has been integrated into an impressive 69 percent of new-student orientation programs for incoming students.
- **Nearly two in five schools have student representation on their board of trustees.** Capitalizing on this communication opportunity can increase student awareness and involvement in energy initiatives.
- **Two-thirds of the schools offer paid sustainability opportunities for students.** Sixty-eight percent of the schools offer paid positions to students for work on sustainability activities within the facilities department, sustainability office, or other relevant campus office.
- **More than two in five schools have a green residence.** A green dorm that features green building best practices and/or a dedicated green residence for eco-minded students is offered by 42 percent of the schools.

- **Almost three-quarters of the schools host a sustainability competition on campus.** Seventy percent of the schools have sustainability competitions on at least an annual basis to promote one or more of the following: increased recycling, waste reduction, and energy or water conservation.

## 9. Focus on Behavioral Changes

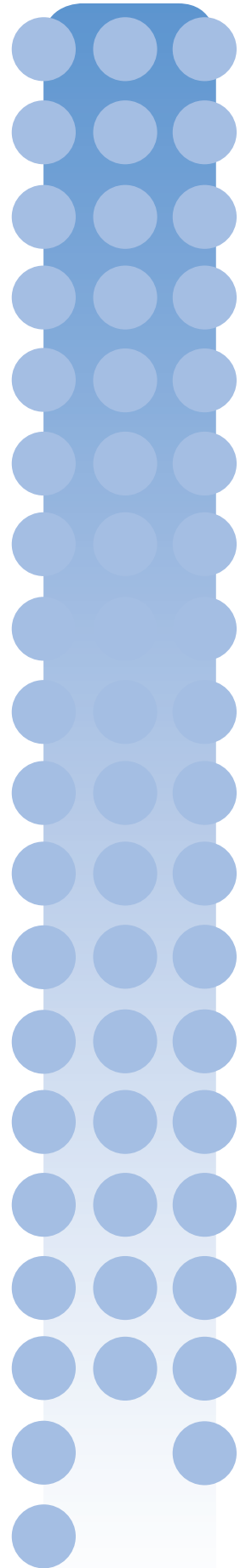
Don't underestimate the power of a simple behavioral audit. Until wasteful behaviors are identified, they can't be changed. Institutions might consider online utilities where students can see energy consumption of one classroom or school of learning or one dorm versus another in real time. Fostering competition and making responsible consumption fun are two keys to changing behavior.

## 10. Pick the Low Hanging Fruit

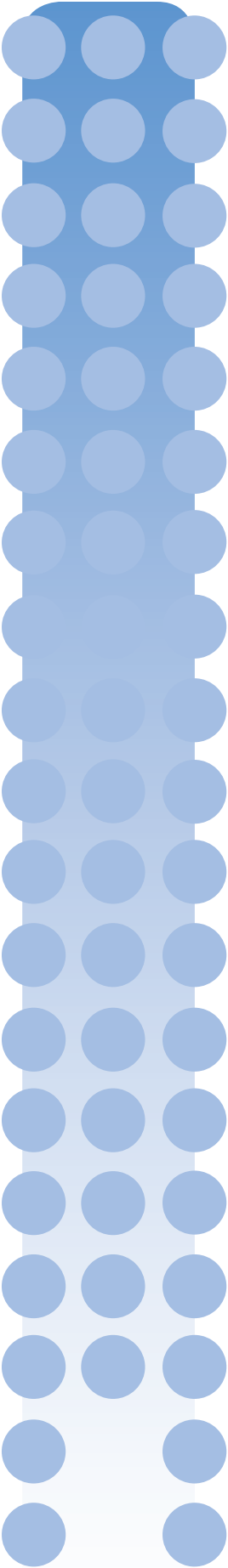
There are many actions that can be taken to yield nearly immediate returns for the plan. These include:

- Energy policy measures like removing refrigerators from offices and individual dorms.
- Installation of energy management tools for computers and appliances
- Eliminating phantom loads and removing unused meters.
- Replacing lighting with more energy-efficient bulbs— lighting is 30 percent of a university's energy budget.<sup>8</sup> Eliminate the number of bulbs lit as well as the wattage of each bulb. Test actual lumens in the classrooms before lighting.
- In humid climates, consolidate mold-sensitive equipment in one area or wing and control the climate in this area discretely.
- Regulate temperatures without risk of human tampering (e.g., install thermostats in the ceiling).
- Keep doors and windows closed; install sensors.
- Review maintenance procedures and make efficiency part of maintenance policy.
- Remove interior lights on vending machines; schedule power on/power off cycles.
- Install outdoor lighting sensors.
- Replace exit signs with LEDs.

The University of Illinois at Urbana-Champaign not only met its goal of reducing energy consumption by 10% by picking the low hanging fruit, but also saved \$5 million as a result. This goal, scheduled to be met in a year, was achieved in ten months.







The reduction in energy use was achieved by updating old lighting fixtures and ballasts in the buildings that used the most electricity. The school identified 44 buildings to update and made the changes in 24 of them during the first phase of the project.

Another major factor in the energy savings was the installation of programmable controls and occupancy sensors in several buildings. The controls have not only led to a 27% energy savings in each building where they were installed, but the Facilities and Services Department has reported fewer complaints involving the heating, cooling and lighting systems.

The project was funded mainly by grants and rebates and cost about \$5 million so far, so the updates have given the school an almost immediate return on investment. The school estimates that the upgrades will amount to energy bill savings of \$1 million a year and as they continue to increase energy efficiency in more buildings, they expect to see that number rise.<sup>9</sup>

### 11. Plan for the Long Term

Institutions should consider performance contracts and design/builds after they have addressed what can be done in-house. Building a comprehensive maintenance program into the plan can save thousands of dollars that otherwise might go to outside contractors. Effective energy plans will include ongoing preventive maintenance and long-range capital planning.

Secondary phases of the energy plan may incorporate long-term investment in new systems or transitional measures for mechanical upgrades or new builds. Be certain to include these planned purchases in capital budget projections, as well as the ongoing maintenance costs of existing and new equipment.

### 12. Celebrate Your Success, Then Reevaluate Everything

When a college or university successfully achieves energy goals, it must look for ways to celebrate the success: broadcast the results proudly.

Then take the time to evaluate what has been done. What worked? What didn't work? At this point, the institution should reassess energy metrics, phases, and future goals. The successful process never ends, but is continuous.

## Data, Ditto: How to Get it Done

Throughout the energy management process, one thing should become increasingly clear: the importance of data integrity. Without the establishment of an accurate baseline, and the ongoing precise tracking of metrics, any energy plan is doomed to make assumptions that will limit its potential.

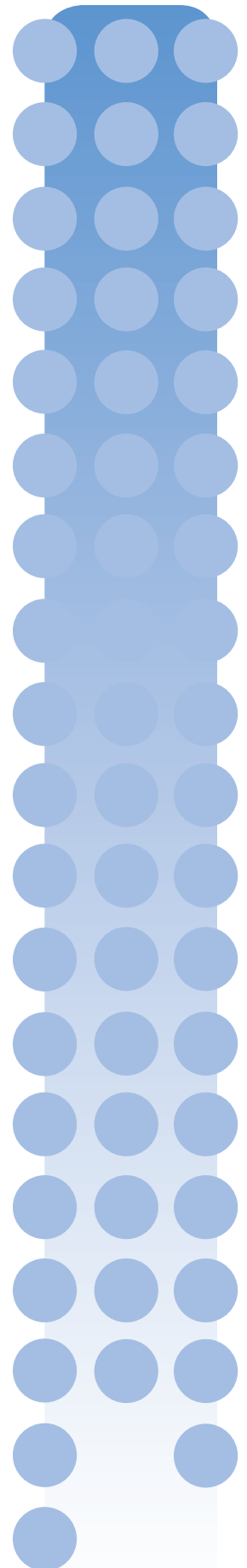
SchoolDude's UtilityDirect is a powerful, online utility tracking, management, analysis and reporting tool that audits, tracks and analyzes utility consumption and costs to identify utility savings opportunities.

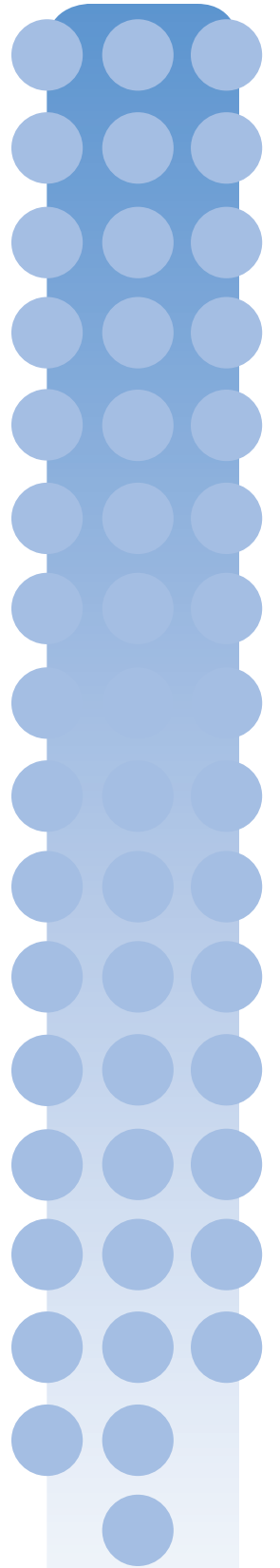
UtilityDirect helps reduce utility bills by identifying utility waste, cost and meter problems, billing errors and savings opportunities, which can save at least 5% of the annual utility budget, an average of \$10 per student annually.

For more information on SchoolDude.com's UtilityDirect, or for more information on how to begin implementation of an energy management system at your college or university, contact [salesrequest@schooldude.com](mailto:salesrequest@schooldude.com).

## NOTES

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