



ARIZONA STATE UNIVERSITY

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Dear Mr. Jensen:

Arizona State University's innovative Campus Metabolism™ project, <http://cm.asu.edu>, launched May 2008, is an interactive and educational website displaying real-time energy consumption data for multiple campus buildings. It was created to highlight the often overlooked and hidden connection between the actions in our daily lives, resource use and the resulting environmental consequences. The system was developed and implemented through a collaborative effort between many parts of the university community. The website is currently tracking "Energy" which includes Chilled Water (used for cooling), Electricity, and Hot Water/Steam (used for heating and hot water). The website goes further and also tracks the renewable energy production of the 21 different photovoltaic systems located on the Tempe campus. In the near future Campus Metabolism™ plans to display Transportation figures as well as Recyclable and Non-Recyclable Waste values.

Project Results:

- Users can visualize real-time energy consumption of multiple campus buildings.
- Users can compare the energy use of buildings against one another or against historical data – last week, last month, or last year, as well as download data for offline use.
- Enables teaching and learning about resource consumption as it relates to the built environment and occupant behavior.
- Abnormally high energy use patterns have been identified with this tool leading building managers to correct problems that may have otherwise gone unnoticed.
- Student lead intra-campus energy conservation competitions have lead to increased sustainability awareness and a quantifiable decrease in energy use per student in the participating buildings.

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Students and faculty are now using this tool in many class projects. Historical data can be downloaded as Microsoft Excel files for every building being tracked on the site. Students from a variety of disciplines use this system to quantitatively correlate building energy use to human behavior, building design, local climate and a wide range of other parameters. Accessing information is quick and simple enabling teaching through inquiry based learning for students outside of the traditional technical disciplines.

Users are encouraged to send feedback emails directly from the site. In some instances users find unusual or abnormal energy use patterns and point this out to facilities management. This direct communication allows the ASU community to take a participatory role in improving the way buildings are operated. The tool can also be used to examine the benefits of building improvements measures, especially those related to energy conservation and efficiency. Historical and future data can be used to quantify the change in energy use performance due to capital improvement projects. Providing real, quantifiable data greatly improves the accuracy of return on investment (ROI) analysis which proves very useful when making decisions on future campus improvement projects.

The Campus Metabolism project has been given full support by university leaders within the office of the president, the office of the campus architect, capital programs management, research and economic affairs, and residential life. Roll-out to all buildings on all four campuses is in the planning phase.

While many institutions have out-sourced the development of their building dashboard type programs, an expensive option that creates a rigid design, we built this in house through a cross-departmental collaboration and in partnership with our energy services company. This is the largest system of its kind in the country. While other universities have implemented other resource monitoring systems tracking only one form of energy, ASU's system provides several data points per building including heating, cooling, and electricity. The system currently displays data from 20 buildings with an additional 70 buildings to be added in the near future. This is the only data visualization tool to draw on the metaphor portraying a university campus as a system with its own metabolism.

Sincerely,



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