CLEER

Clean Energy Economy for the Region

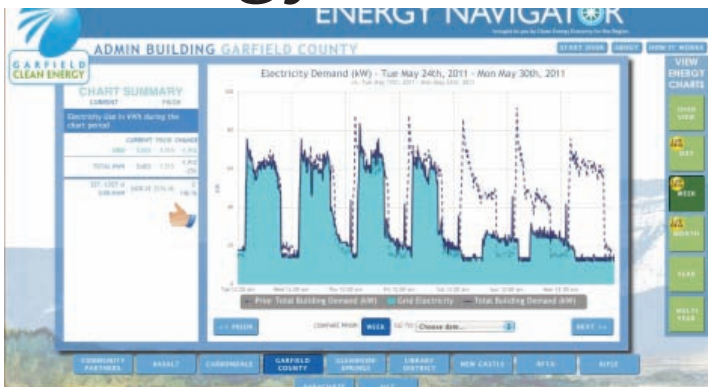
The Energy Navigator: Helping Buildings Cut Energy Use

What is it?

The Energy Navigator (garfieldenergynavigator.org) is a web-based tool that provides data on energy use in any building it's connected to. It tracks energy use, then displays the used energy in a simple-to-understand format on any computer. While energy efficiency upgrades—things like air-sealing and better insulation—are great tools for cutting energy use, the Navigator does something more important—it changes how people operate buildings.

Nearly all buildings are operated without regard to the energy they use. Lights, heating and cooling equipment, and other systems are generally operated with timers or building-computers that simply turn equipment on or off according to a setting made by a facility manager. Sometimes the settings don't match when people are actually using the building.

We've all seen empty buildings lit up and/or heated at night, when no one's in them. Unfortunately, about the only interaction building managers have with the energy their facilities use comes in the form of a bill, which is passed along to an accounting department—so no one really questions how the building uses energy or notices if usage goes up or down.



This image shows one week of electricity use, reported every 15 minutes, at the Garfield County Administration Building. The dotted line in the background is the prior week. What you see is the first weekend of energy savings, including Memorial Day 2011 (on the right) compared to the prior week. Software changes saved 25 percent of electricity use!

Last year, CLEER, a Carbondale-based non-profit that does clean energy work, developed the Navigator to address energy use in buildings.

How does it work?

The Navigator uses energy data from buildings' utility bills which get uploaded into "Utility Manager," a type of energy accounting software. The data then gets put in the Navigator where it becomes accessible to anyone with an internet connection. The easy-to-use display shows monthly energy use and cost in dollars as well as the carbon emissions associated with that electricity use. Then, those in charge of running the buildings can adjust how they're heated, cooled, ventilated, and lit.

"We can make lots of energy with solar panels and other devices, but if were making all that energy and then using it wastefully, there's not much point," said Mike Ogburn, an energy engineer with CLEER, Clean Energy Economy for the Region. "The Navigator is a unique energy solution because it gives us the detailed information about energy use so we can use it more efficiently."

As of early August the Navigator was in use in more than 80 buildings across Garfield County, including li-

braries, town halls, recreation centers, and wastewater treatment plants.

For 39 specially selected buildings the Navigator can be used to view 15-minute "live" electricity use by day, week, and month. Thirteen of the 39 buildings include live solar tracking. The information is displayed on a screen according to physical location (e.g., Rifle, Parachute, Glenwood Springs, etc.) and building type (town hall, recreation center, etc.). When energy use information is then used with "Active Energy Management"— CLEER's term for actively managing how a building is operated—the drop in energy use can be dramatic.

Active Energy Management (AEM)

The Navigator allows the public and building managers to see when energy is being used. By having that information available, building managers can detect when systems could be shut down without compromising comfort, health, and safety of a building's human occupants.

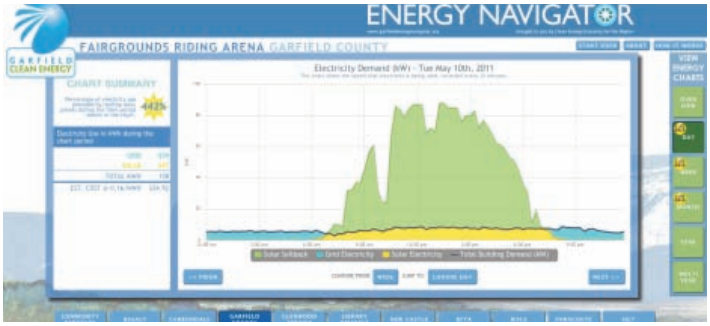
Many building managers have found heating and cooling systems, lights, computers, and other building components staying on when they're often not needed (like nights and weekends) or turning on automatically because they're connected to timers or other devices—some even when the facility is empty. Building managers have started saving tens of thousands of dollars annually across Garfield County by using the Navigator *with* Active Energy management.

The Garfield County riding arena is a great example. The simple combination of information (from the Navigator), AEM, and energy efficient fixtures allowed the staff to cut electricity use by 80 percent on days when the facility was not in use. As a result, the electricity for the facility was 100 percent solar powered most months in the summer of 2011.

Efficiency, Energy Management, and On-site Solar Turn Garfield County Building into Net Electricity Producer

In spring 2011, Garfield Clean Energy, CLEER, and SōL Energy, worked with Garfield County staff for the installation of a 440-panel roof-top solar-electric system, financed through a power purchase agreement. The solar was predicted to generate 57 percent of the electricity the building uses.

The building was also connected to the Energy Navigator. The Navigator showed riding arena staff that the building was using a great deal of energy at night and on the weekends. Staffers started shutting down the building during those times, and quickly saw the results. Even when they thought everything was shut down, the Navigator would show unexpected energy use, and staffers would look for additional ways to trim building energy use.



RIDING ARENA ACTIVE ENERGY MANAGEMENT: This chart shows 1 day of electricity use. The dark blue line shows facility energy usage. Yellow indicates solar energy powering the building. The green section is excess solar sold back to the grid. Facility managers achieved energy savings of 40–70% by ensuring equipment is off when the facility is not in use by scheduled events. On this day the building stayed off and solar energy was 442% of facility needs, with the excess energy sold back to the grid and credited to the building's "solar bank" on its utility bill.

Last November, CLEER worked with Garfield County staff to replace the riding arena lights with more efficient technology, cutting the arena's typical December usage from 22,000 kilowatt-hours to 6,000 kilowatt-hours (a typical U.S. home uses about 1,000 kilowatt-hours a month).

These combined efforts—smart actions on the part of building managers through quick access to data, more efficient technology, and a power purchase agreement-financed solar system—mean that the building is now a mini power station, putting electricity back into the grid and saving County dollars in the process.

Recent utility bills show that in December 2011, the arena saw a roughly 72 percent reduction in electricity consumption over December 2008, December 2009, and December 2010. According to utility data, cost savings in December 2011 were $778 (or 54 percent less than prior years) thanks to both the energy efficient lighting and lower-cost electricity, a result of a power purchase agreement.

In November 2011, the solar panels covered 106 percent of the building's electricity needs, 117 percent in December 2011, and 108 percent in January 2012, with the excess put back onto the grid and credited to Garfield County's electricity bills. In monetary terms, the combination of a lighting retrofit and the solar power purchase agreement brought the electricity bills down to approximately $700 per month during winter 2011–2012 compared to approximately $1,400 per month in prior winters, making it one of the first "net zero electricity" riding arenas.