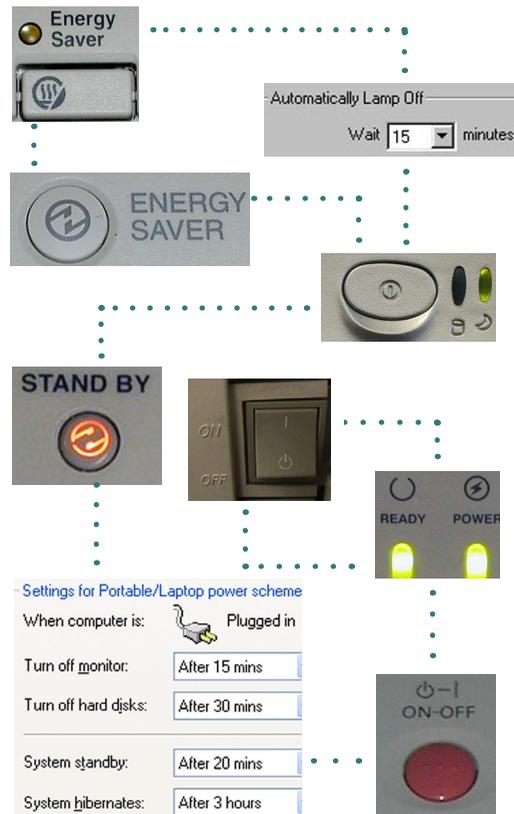


Why worry about Controls?

Office equipment and consumer electronics increasingly use power management to save billions of dollars worth of electricity each year. However, too many of these devices have the power management disabled — often because the user controls are inconsistent and confusing.

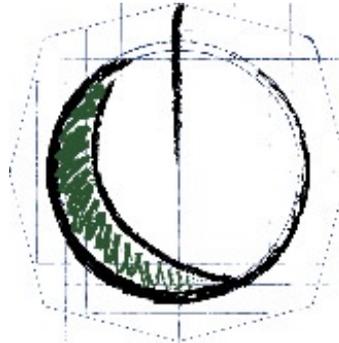
An improved user interface can save electricity without costing more to manufacture. IEEE is bringing together industry leading companies to create voluntary user interface standards to accomplish this.

The images below show the range of inconsistent and confusing symbols and commands users face when trying to use or activate power management controls.



Interested?

Join the **IEEE 1621 Working Group**.



Further details can be found at:
<http://eetd.LBL.gov/Controls>

or contact Bruce Nordman at:
BNordman@LBL.gov 510-486-7089

Also, ask to be put on our email list for occasional project updates.

Funding

This project is made possible by funding from the California Energy Commission's Public Interest Energy Research Program.



ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY

Power Management Controls



The Goal

To save energy, by increasing enabling rates of existing power management capability in office equipment.

The Solution

Make power management more consistent and intuitive to users across all office equipment (via a voluntary standard).

The Standard

The six principles outlined here will save energy and improve the user experience.



<http://eetd.LBL.gov/Controls/>

... Words, symbols, switches, buttons, and indicators - on the outside of devices, in manuals, or on displays ...

Three power states: On, Off, and Sleep

Many devices only have two or three power states, but some — most computers — have many. Whenever possible the user should only have to see or know about three basic states.

Within each state, the device will appear consistent (displays and indicator lights), and behave consistently (what wakes it up or turns it on).



Use “Power”

Use the word “Power”. This covers the power **button** or **switch**, the power **indicator**, control panels, etc.



Use “green / amber / off”

For power indicators use **Green** for **on**, **Amber** for **sleep**, and show no color when the device is off. **Red** should be reserved for warnings, alarms, or errors. Use flashing only for transitions or non-power meanings.



Use ⏻ for “Power”; avoid ⏻

Currently, ⏻ is for an on/off-button, and ⏻ means “Standby”. In future ⏻ should mean “Power”.

The ISO/IEC standards for symbols on equipment need to be changed. ⏻ meaning “Power” is most consistent with actual usage on current products.

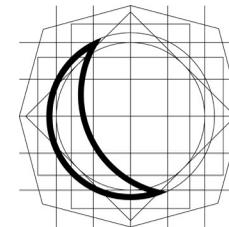


Use the “sleep” metaphor and moon symbol



The device is “in sleep” or “asleep”; it “goes to sleep” and “wakes up”.

Use the moon symbol for sleep, such as on a sleep button, displays, control panels, and the rare separate sleep indicator.



Hibernate is Off

Ensure that users understand that hibernate is a form of **off**, not a type of sleep or fourth power state. Indicators and behavior will be consistent with off-by-shutdown.

“Hibernate” suggests sleep, and other terms used are too techie (e.g. “non-volatile sleep”). We need a new term for hibernate — “off”.

<http://eetd.LBL.gov/Controls/>

Dynamic behavior

The dynamic aspects of how devices behave includes what causes power state transitions — what contexts and events cause what new power states — and what happens during transitions — what the user can see and hear.

Not all devices will behave the same, but we can reduce the diversity and make the behavior more consistent and intuitive. The most important parts of this are:

- Use “power up” to mean turn on or wake up, and “power down” for turn off or go to sleep.
- Use flashing green on the power indicator for powering up and flashing amber for powering down.
- Provide optional audio indications for transitions.
- Alternating green/amber can be used to mean error if red is not available.
- Power buttons should toggle between two most common power states.
- When a device is *asleep*, pressing the power button will (usually) wake it up.
- Holding down a power button for an extended time will trigger an emergency action.

Below is a sample PC state diagram showing possible ways to initiate each type of transition. “Auto” is an automatic action by the PC; the rest are user-initiated actions.

