



Personal Controls for Office Lighting

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The Need for Control - the Economics

- For most office facilities, lighting accounts for over **40%** of the electrical bill
- Potential energy savings involved with lighting control can be above **30%** of the total building energy usage



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Power Smart Workspace System

BC Hydro's Power Smart division realizes 80% energy savings in new offices
- *Electric business March 2003*

Personal Lighting Controls

- personal dimming
- on-board occupancy sensor
- photo control sensor



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The Ideal Automated Lighting System

- supports the task at hand
- accommodates the individual
- integrates lighting controls and natural light
- energy efficient
- environmentally sensitive, maintainable and sustainable,
- well integrated with the architecture
- reinforces an organization's image and culture

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Lighting Design Approaches

Traditional approach:

- lowest cost to achieve basic light level throughout facility
- few lighting control points

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Lighting Design Approaches

Better approach:

- best financial value based on energy savings and productivity benefit
- flexible lighting control

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Maximum Expected Energy Savings

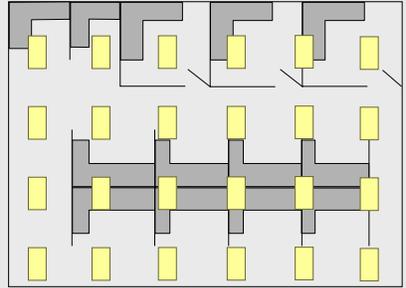
Space Type	Controls Type	Max. Expected ES
Private office	Occ. sensor	45%
	Photo dimming	30%
	Manual dimming/ Multi-level switching	25%
Open office	Photo Dimming	35%
	Occ. sensor	25%

Study by Lighting Research Center at several federal office buildings - 2000

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Standard Troffer Layout

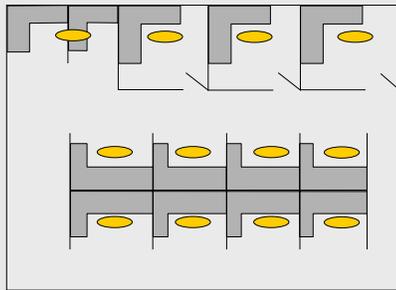
24
2'x4'luminaires
72 lamps



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Workspace Specific Layout

12
Power Smart
luminaires
36 lamps
50% fewer
lamps!



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Power Smart Office System

Data	Base Design	Power Smart
■ Luminaire	2x4-2T8 (59W)	3T8 (95W)
■ Luminaire Q-ty	500	195
■ Ltg. Load Density	1 W/sqft	0.5 W/sqft
■ Energy savings	N/A	80%
■ New Building Payback	N/A	2 yr.
■ Retrofit Payback	N/A	5 yr.

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Ceiling Light Constant in Open Offices

- Full Output



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Ceiling Light Constant in Open Offices

- Daylighting sensing
- Task Dimmed



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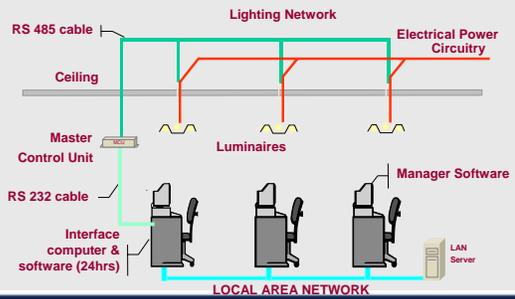
Ceiling Light Constant in Open Offices

- Occupancy sensing
- Task Off - Ambient On



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Network Connected

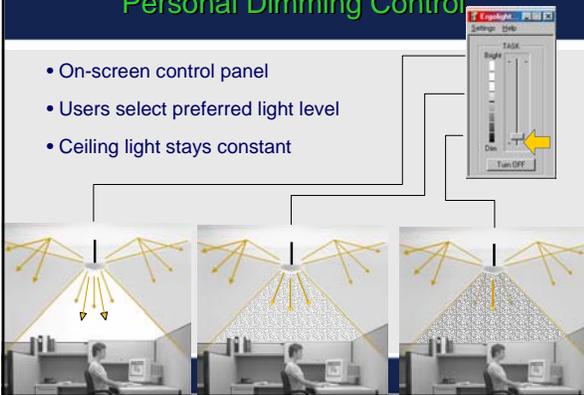


Control software on all computers

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Personal Dimming Control

- On-screen control panel
- Users select preferred light level
- Ceiling light stays constant



Graphic User Interfaces

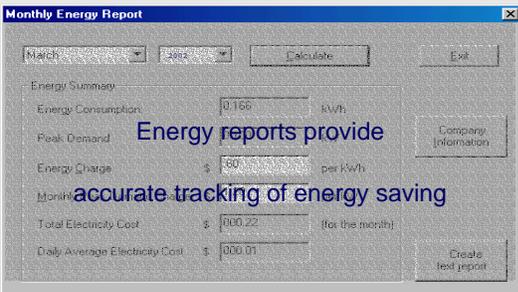


Energy Manager Controls

Individual User Controls

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Energy Management Reports



Energy reports provide accurate tracking of energy saving

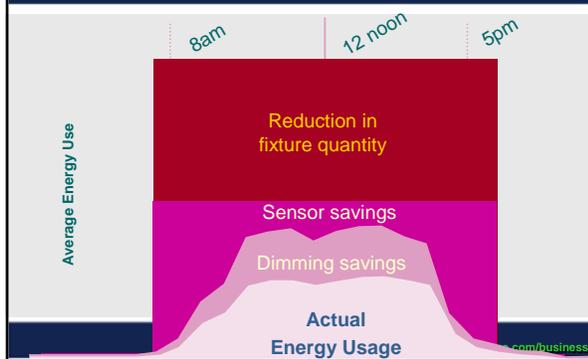
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Maximum Expected Energy Savings

Space Type	Controls Type	Max. Expected Energy Savings
Private areas	Manual dimming /switching	25%
	Photo Dimming	35%
	Occ. sensor	25%
Power Smart Goal		85%

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Synopsis of Daytime Energy Savings



Power Smart Office System



Power Smart Office System

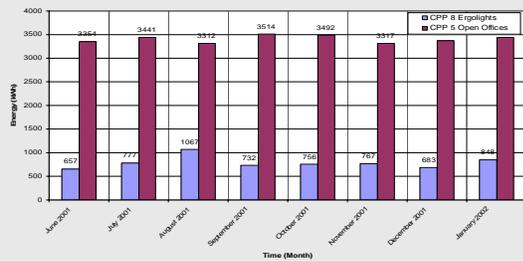


Power Smart Office System



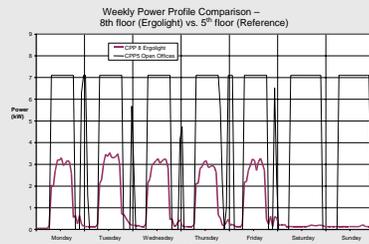
Power Smart Office System

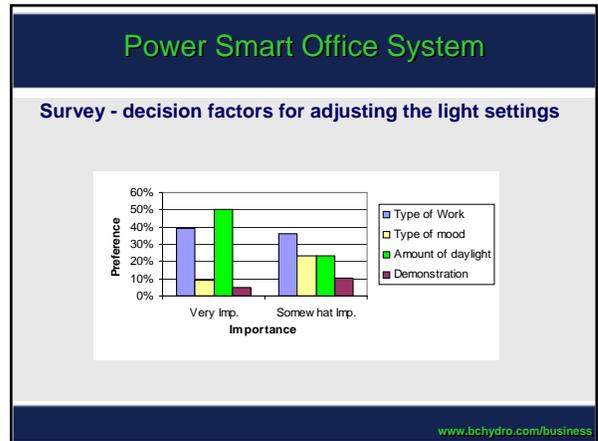
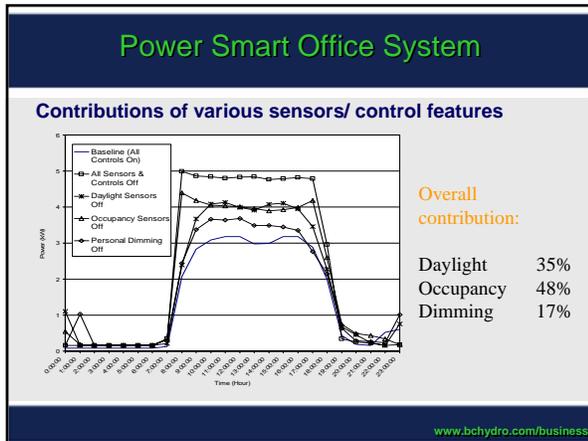
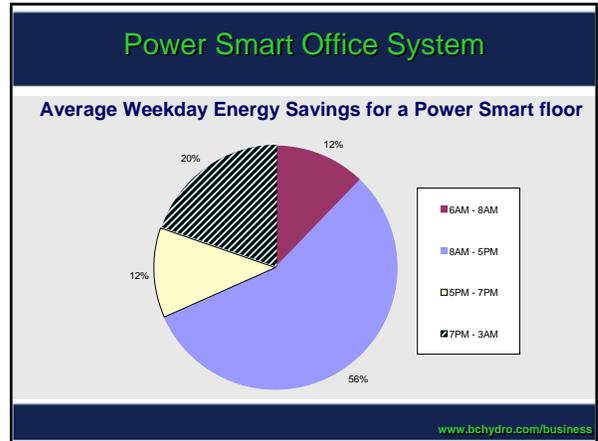
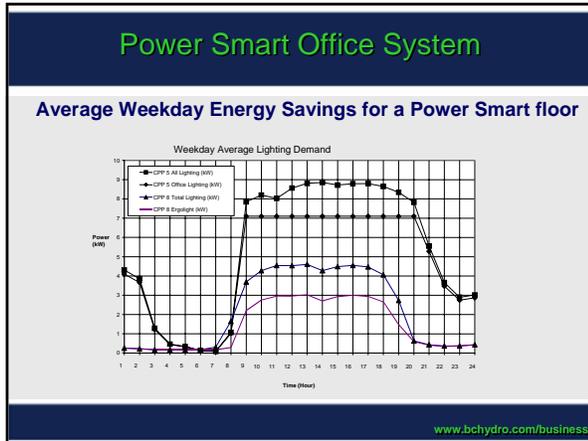
Monthly Energy Consumption for an Power Smart floor



Power Smart Office System

Weekly Profile of Energy Savings for a Power Smart floor



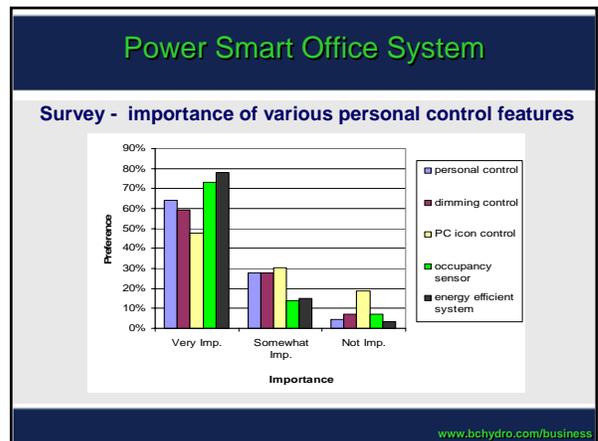


Power Smart Office System

At what brightness, do you usually operate your Personal Lighting Control?

	Total	Window	Interior
At 100%	21%	50%	50%
About 80%	27%	58%	42%
About 50%	29%	65%	35%
Less than 50%	9%	87%	13%
N/A	14%	50%	50%

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Power Smart Office System

Has the Personnel Lighting Control System contributed to your work productivity?

- **Increased productivity** 30%
- **Decreased productivity** 1%
- **No change in productivity** 65%
- **N/A** 4%

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Power Smart Office - Conclusion

- Using a workstation-specific lighting system, significant operational savings result from reducing the quantity of luminaires by 40% to 50% in open office spaces.
- Additional savings of up to 40% can be achieved by adding occupancy sensors, photocell sensors and personal dimming PC controls.
- Potential weekly overall energy savings:
 - ◆ 56% weekday daytime 8AM to 5PM
 - ◆ 44% weekday after-hours 5PM to 8AM
 - ◆ 95% weekends

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Power Smart Office - Conclusion

- While a small number of office occupants still prefer their lights full on, at least half will dim their lights to as low as 50% if provided with a convenient personal control.
- While resulting ergonomic benefits may be difficult to determine accurately, at least 30% of the occupants felt that their productivity has improved as a result of using the personal controls.
- Thank You!

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