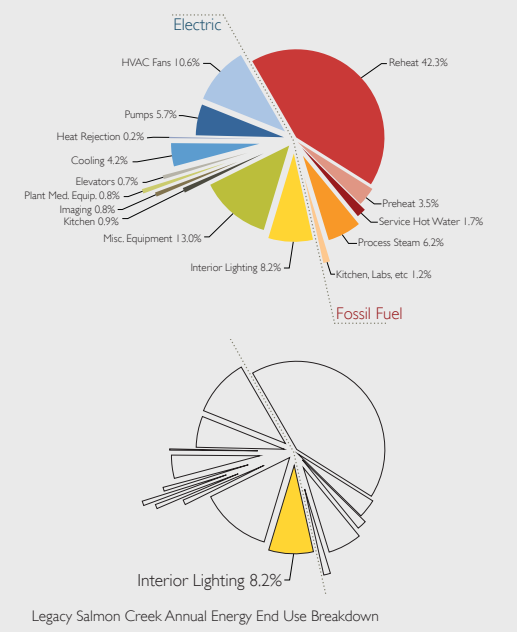


# Patient Room Lighting Study: Legacy Salmon Creek Medical Center



**Context**  
High quality lighting design in hospitals is vital for creating both functional and comfortable spaces for staff and patients. Hospitals use a disproportionate amount of energy, and lighting is one of the end-uses that can be targeted to help reduce the overall energy footprint of healthcare facilities. Little is known, however, about how electric lighting is actually used in hospitals; when are lights on/off, how does that relate with occupancy, how does daylight availability affect the use of electric lights?

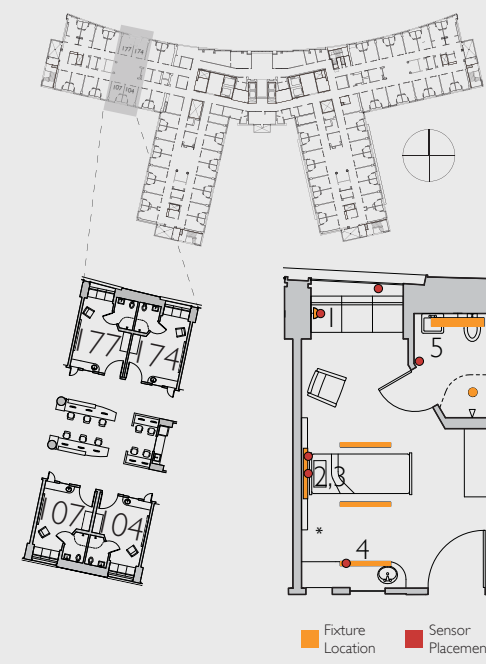
The goal of this pilot project is to develop methods to measure lighting use patterns in hospital patient rooms to help create a clearer understanding of the relationships between lighting use, common lighting design practice and lighting standards. With this information, the team hopes to provide data that will generate discussion related to practical energy reducing measures for lighting.

Legacy Salmon Creek Medical Center (LSCMC) collaborated with the University of Washington's Integrated Design Lab and SOLARC A+E for this in-depth investigation of patient room lighting, which is part of a larger study to measure energy use of the whole hospital.

**Methods & Analysis**  
This study involved measuring occupancy, daylight intensity, and electric light use during a one month period (from January 7th to February 3rd, 2011) in four general medical/surgical hospital patient rooms. Miniature data loggers placed in individual light fixtures recorded light levels of six discrete light sources in each of the four patient rooms. One pair of rooms had north facing windows, the other faced south. Hospital staff recorded occupancy for these four rooms over the study period based on patient admission and discharge. Using the lighting and occupancy data collected, the following calculations were made and are presented graphically below with totals for each room highlighted in grey:

- Circuited Watts/Wattage of each fixture in patient room.
- Utilized Hours: Total hours of all "ON" events logged for each fixture.
- Diversity: A percentage of time that each fixture was "ON" compared to the total time monitored.
- Utilized Watts/SF: Lighting power density of each fixture. Calculated by multiplying circuited watts and diversity, then dividing by square footage of the room.

**Next Steps**  
As a pilot project, this study provided the opportunity to develop a methodology for testing actual use patterns of hospital electric lighting. In this study, some data loggers unintentionally monitored for a shortened period of time or did not monitor at all; these are represented by the greyed out portions of graphs below. Further expansion of the research will be needed to generate more specific conclusions about how electric lighting is used in relationship to occupancy and daylight.



Fixture	Description	Watts
1	Wall Sconce providing up and diffused illumination. Uses two compact fluorescent lamps.	26
2	Uplight component of integrated headwall fixture. Uses one T8 linear fluorescent lamp.	32
3	Downlight component of integrated headwall fixture. Uses one T8 linear fluorescent lamp.	32
4	Series of three recessed, direct linear fixtures with a diffuse lens. Each fixture uses two T8 linear fluorescent lamps.	186
5	Diffuse domed fixture with two compact fluorescent lamps and a diffuse linear fixture with one compact fluorescent lamp.	84
6	Daylight through perimeter vertical glazing.	0

Room SF = 285    Total Watts = 360  
Circuited Watts/SF = 1.3

\* Total Watts and Circuited Watts/SF does not include an unmeasured 26 Watt fixture resulting in 386 total Watts.

### Room 177

Occupancy: [Bar chart showing occupancy over 4 weeks]

Fixture	Circuited Watts	Utilized Hours	Diversity %	Utilized Watts/SF
Total Use Watts	360	529	16	.34
Wall Sconce (1)	26	167	25	.02
Uplight (2)	32	88	13	.01
Downlight (3)	32	2	0	.00
Recessed Linear (4)	186	100	15	.10
Domed (5)	84	172	71	.21
Daylight Footcandles (6)	00	000	0	.00

### Room 174

Occupancy: [Bar chart showing occupancy over 4 weeks]

Fixture	Circuited Watts	Utilized Hours	Diversity %	Utilized Watts/SF
Total Use Watts	360	335	25	.17
Wall Sconce (1)	26	413	60	.06
Uplight (2)	32	204	30	.03
Downlight (3)	32	58.5	9	.01
Recessed Linear (4)	186	72	11	.07
Domed (5)	84	0	0	.00
Daylight Footcandles (6)	00	000	0	.00

### Room 107

Occupancy: [Bar chart showing occupancy over 4 weeks]

Fixture	Circuited Watts	Utilized Hours	Diversity %	Utilized Watts/SF
Total Use Watts	360	611	24	.38
Wall Sconce (1)	26	169	25	.02
Uplight (2)	32	35	15	.02
Downlight (3)	32	69	10	.01
Recessed Linear (4)	186	97	14	.09
Domed (5)	84	241	80	.24
Daylight Footcandles (6)	00	000	0	.00

### Room 104

Occupancy: [Bar chart showing occupancy over 4 weeks]

Fixture	Circuited Watts	Utilized Hours	Diversity %	Utilized Watts/SF
Total Use Watts	360	645	25	.29
Wall Sconce (1)	26	171	25	.02
Uplight (2)	32	285	42	.05
Downlight (3)	32	0	0	.00
Recessed Linear (4)	186	45	7	.04
Domed (5)	84	144	60	.18
Daylight Footcandles (6)	00	000	0	.00