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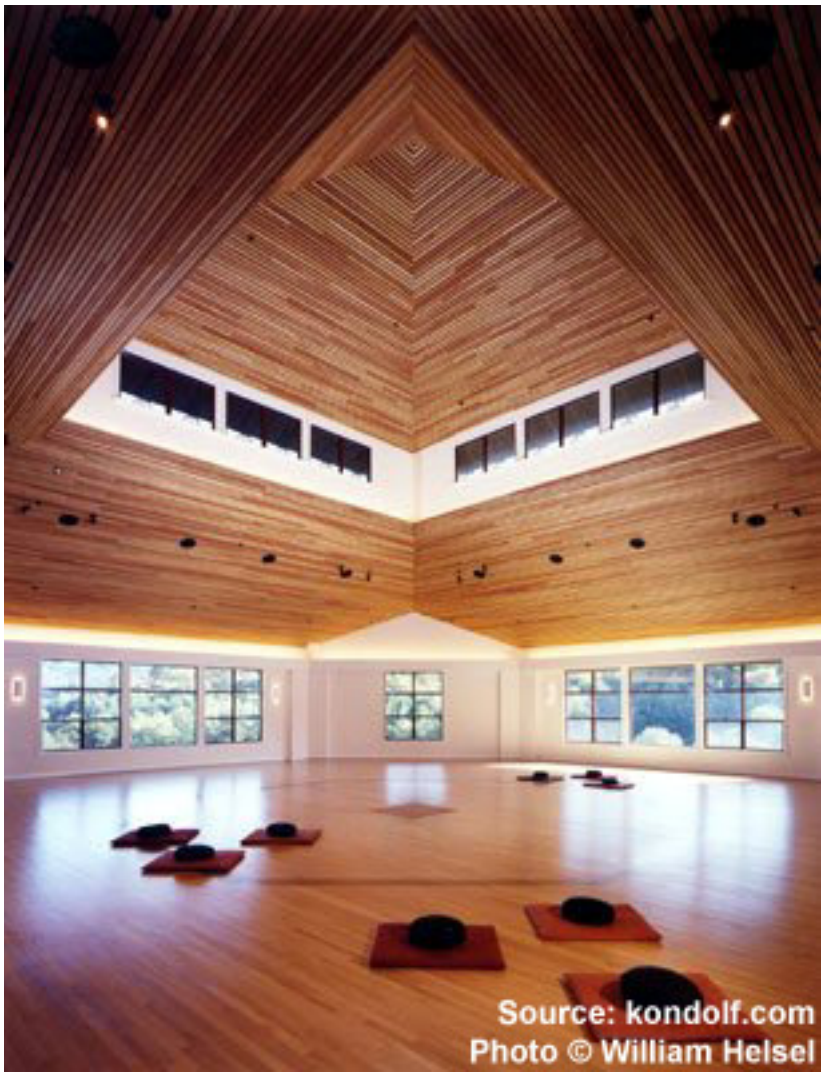
Innovations Come to Light

As Eve Kushner discovers, light can make or break a project. We talk to experts in the field with tips that can help bring building and interior design into the modern age, while making buildings more user-friendly.



Electric light conveys a sense of vitality, safety, financial security and urbanity. Like fire, glowing incandescent bulbs satisfy something deep inside us. According to lighting designer and environmental psychologist Linnaea Tillett, founder of Tillett Lighting Design in New York City, we are a phototropic species, as the whole human body draws toward light and sunshine.

But, she says, our celebration of light has become excessive, particularly in the United States where she works: “We love lights. It’s like the way we eat red meat. We treat it as the main course. It’s not. Incandescent light is a condiment.” Environmentally aware and historically frugal, Europeans have limited their incandescent light usage, she says. But elsewhere, the problems are acute.

BURNING BRIGHT

With increasing concern about climate change and energy shortages, governments and individuals have begun curbing such excesses. The European Union, Canada, Australia and New Zealand will likely phase out incandescent bulbs.
In California, legislators have strictly limited the watts used per square foot. Proposals to ban incandescent bulbs have cropped up in California and at least two other states. Moreover, current federal proposals and regulatory efforts aim to double US lighting efficiency.

Clearly, the environmental crisis is beginning to make inroads into the showy complacency of the dot-com era, when many people celebrated newfound wealth through dramatic designs. With new worries about sustainability, design values have shifted.

San Francisco Bay Area lighting designer Anna Kondolf says that just as form follows function, ‘energy concerns dictate a look’. Referring to energy-ef
think they’re going to affect the styles of lighting and architecture in positive ways.”

BEST PRACTICES

Two energy-efficient technologies – light-emitting diodes (LEDs) and compact fluorescent lights (CFLs) –have moved to the forefront of lighting design. Some experts gripe that industry discussions about lighting efficiency miss the point by narrowing to a focus on technology.

“To a great extent, the people who produce the light bulbs have been determining the conversation,” says Tillett. “They’ve said, ‘You need to buy LEDs and compact fluorescents, and that’s going to be our world contribution to the energy crisis in terms of lighting’.”

Many people would rather buy a new product than contemplate behavioural change, she notes. Tillett and her colleagues feel that before rushing into this consumption mode, we should rethink fundamental parameters of energy efficiency and good lighting systems. Design experts believe the following practices are sensible guidelines.

MAXIMISE NATURAL LIGHT

Kondolf, who primarily does residential lighting, entreats architects to orient houses well, taking advantage of natural light and avoiding excessive heat gain.

San Francisco Bay Area architect Dave Deppen couldn’t agree more. From the ‘absolute beginning’ of projects, he considers ways to supply each room with natural light throughout the day. He observes that architects are only now tapping into old wisdom about designing in concert with sunshine. “We’re uncovering old rules again,” he says, citing a ‘double incentive’ for this: quality of life and energy savings.

Naturally lit rooms require few or no lights during the day, thus saving electrical energy. Because incandescent and fluorescent bulbs produce heat, they prompt greater use of air conditioning. When people light rooms with bulbs, they therefore pay for that energy twice.

Large windows with the right orientation provide excellent daylighting, believes architect Brad Gunkel of the Berkeley co-housing architectural firm McCamant & Durrett.

Furthermore, interior transoms (for example over bathroom doors) allow natural light to spread from room to room without a loss of privacy. And sun tubes (lined with reflective material) can run through attics or wall chases, funnelling sunlight into ground-floor rooms in multi-storey buildings.

MINIMISE ELECTRIC LIGHTING USAGE

To get more mileage out of both natural and electrical light, savvy designers fill rooms with light-coloured walls, ceilings, floors and even furnishings. This costs nothing extra. Dark colours absorb considerable amounts of light. By contrast, light-coloured materials bounce light onto other surfaces, creating more luminous rooms.

Whatever the materials and colours in rooms, the following devices can reduce electrical lighting usage:

- Occupancy sensors, which turn out lights in empty rooms and closets
- Dimmer switches, which reduce brightness
- Computerised controls, with which you can turn off all lights from a central location
- Multiple switches in a room, which enable you to use only the lights you need
- Exterior motion sensors, which activate outside lights for night-time visitors – with this device, lights won't need to burn all night (unfortunately, raccoons could easily trip the sensors)
- Exterior photocells, which activate outside lighting when it's sufficiently dark – these devices replace timers, which require adjustment throughout the year

Whatever the device, design experts agree that lighting levels in common outdoor spaces currently constitute light pollution. Choosing light fixtures that focus down, rather than up, can cut some of the brightness. Although people equate brightness with safety, “You don’t have to shine klieg lights on the streets,” says Tillett, whose doctoral dissertation examined perceptions of safety as correlated with lighting.

DESIGN LIGHTING FOR THE SENSES AND NEEDS, NOT FOR EFFECT

Perceptions of light and colour change with age, so a child, her middle-aged father and her elderly grandmother all experience illuminated spaces differently, says Tillett. Bright light can temporarily blind older people, because they’ve lost contrast sensitivity and have rigid eye muscles that can’t adapt quickly. On the other hand, the elderly require two to three times as much light to see. Tillett designs with all ages in mind.

She also notes that our senses are interconnected. That is, some people need to see whatever they’re hearing, whereas others close their eyes to hear with full attention. Lowering or raising lights affects people’s senses of taste and smell.

According to Tillett, the role of lighting is not to adorn or enhance architecture but rather to make a more liveable space, meet human needs and touch people’s unconscious minds. ‘Go for the amygdala. Go for the emotion’, she urges graduate students in the lighting design programme at Parsons The New School for Design. According to Tillett, lighting design too often appeals to the conscious mind, disregarding the ‘subtle and persuasive power’ and ‘almost mythic qualities’ of light.

THE BETTER BULB

To produce a desired effect and perhaps to satisfy codes, designers must choose the right type of bulb. With steady advances in the capabilities of LEDs and CFLs, the choices keep changing.

LEDS

Low-wattage, long-lasting LEDs are the closest thing to an everlasting light. They consume less energy than
fluorescents. Lacking integral ballasts, LEDs are the smallest bulbs. Producing terrific amounts of light while using very little power, these portable light sources also hold significant promise for countries lacking the infrastructure for electricity. Tillett, who is creating an all-LED space in China, says the Chinese are taking this technology and running with it.

But LEDs can't yet stand up to all the hype. Currently, they aren't bright enough for many purposes. Kondolf comments, "We're trying to use them earlier than they're fully ready for us, so there's some frustration. But I am optimistic about the technology getting there."

The colour of white LEDs isn't great, she says, but this aspect is constantly improving. Lighting designers skirt the problems by using, say, blue LEDs in acceptable places (e.g. as night lights in bathrooms or as uplighting for columns in restaurants). Designers also colour-correct LED light by bouncing it off other materials.

Lacking laments, neither LEDs nor CFLs provide focused beams. Compared with incandescents, they supply atter, more diffused light that works well for ambient lighting. Flat panels illuminated by coloured LEDs can look slick and modern in kitchens.

However, diffused light has major drawbacks. Evenly lit space can look dull. For both drama and functionality, lighting designers rely heavily on shadows. The contrast of light and shadow also orients people, subtly indicating where they should go.

Kondolf and Tillett therefore use LEDs and CFLs in combination with point sources. Incandescent accent lighting goes in choice spots, and ambient light goes elsewhere. That way, Kondolf says, “There isn’t any loss of quality at all.”

CFLS

A relatively recent innovation in fluorescent lighting, CFLs are usually twisted configurations that occupy roughly the same space as incandescent bulbs. To emit light, fluorescent bulbs need a certain amount of surface area. Twisting provides that while making bulbs more compact. Many CFLs can now fit in the same light fixtures as incandescent bulbs.

Required by many governments and adored by environmentalists, CFLs are now widespread. In the past, the ickering of uorescent tubes affected people’s brains adversely, causing agitation. But CFL ballasts are now electronic, not magnetic, says Lawrence Grown, founder of Metro Lighting in Berkeley, California. The much faster frequency produces no detectable flicker. Unfortunately, he says, the technology for dimming CFLs isn’t yet up to snuff: “The ones we’ve tested have flickered when you dim them.”

INCANDESCENTS

Many designers feel that a ban on incandescents would be a huge loss, because certain situations demand them. Only incandescents can throw light down from soaring kitchen ceilings with the desired punch, says Kondolf.

She finds MR16s particularly indispensable. These halogen lights provide just the right accent lighting, sending the eye to a pool of light on a painting, for instance. “As lighting designers, we would really be at a loss without the MR16,” says Kondolf. “It revolutionised the field, because it brought this very powerful source in a tiny form that’s energy-efficient.” She argues that conventional

techniques of evenly lighting a space use more energy than, say, shining low-wattage halogens only on displayed pieces in a museum and, just as important, keeping surrounding areas darker to make this lighting more effective.

Similarly, while restaurants can generally remain dim, halogen lights focused on tables can make dishes look more delectable. Grown notes, “Fluorescent light will never be that, because it just isn’t focusable in that same way. LED lighting does have that capability, so that’s probably where LEDs are going to do well on the market.”

Although an outright ban may not be on the cards, we are likely to see restrictions on the use of incandescent lighting in the future.