

# The dark side of light

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Antony Funnell



**IMAGE:** BIG CITIES AROUND THE WORLD GET BRIGHTER AND LIGHTER. BUT NEW FORMS OF LIGHTING TECHNOLOGY PROMISE A MORE SOPHISTICATED AND CONTROLLED APPROACH TO URBAN ILLUMINATION. (STEPHEN AND CLAIRE FARNSWORTH / Flickr CC BY-NC-SA 2.0)

Such is the level of light pollution in our cities and towns that many people in the developed world have never experienced true darkness. It's bad for our health and bad for the environment. Now designers are hoping to use smart technology to turn down the lights. **Antony Funnell** reports.



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Excerpt: The dark side of light

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A small team of staffers from the National Parks Service in the United States have spread out across the country gathering data on what they and others describe as an ‘endangered’ resource.

Their primary interest isn’t wildlife or vegetation, or any of the usual environmental markers one might consider—air purity or water quality, for instance—what they’re looking for is something they know they can’t really see. Something that illumination itself would only ruin.

They’re looking for darkness.

Armed with robotic cameras, members of the Night Sky Team photograph the entire sky at regular intervals, comparing the results over time in order to gauge the ongoing effects of light pollution.

They’re currently taking measurements in more than 30 national parks, even in the remote wilderness regions of southern Utah. It’s estimated that the amount of light

in the night sky globally is increasing by around 6 per cent a year, but that

statistic can be deceptive, according to Paul Bogard from James Madison University.

‘The growth is just slow enough that it’s hard for folks to appreciate from night to night or even from year to year,’ he says.

**I think that as more and more people realise the many costs of light pollution and the value of darkness we’ll begin to see there’s really no reason not to control our use of light at night...’**

**PAUL BOGARD, AUTHOR, *THE END OF NIGHT: SEARCHING FOR NATURAL DARKNESS IN AN AGE OF ARTIFICIAL LIGHT***

‘Our gas stations and parking lots here in the States are lit about 10 times as brightly as they were just 20 years ago, and 20 years is not that long ago, and 10 times as bright is an enormous growth in light.’

Bogard, the author of *The End of Night*, argues that our world is now so well lit that many of us have lost all understanding of ‘true’ darkness.

‘We’ve taken what was once one of the most common human experiences, which is walking out the door and coming face to face with the universe, and we have made that one of the most rare of human experiences simply by overusing and misusing artificial light at night and creating this light pollution.’

‘Being able to see the night sky, having it be dark enough to see a brilliant night sky has inspired science and religion and philosophy. We’ve cut ourselves off from this resource of darkness; this source of inspiration, meditation and reflection.’

The Bortle Dark-Sky Scale is used to measure environmental light and identifies nine levels of darkness and illumination, with level one representing complete natural darkness. Bogard argues that most residents of the western world now live in an environment that rarely, if ever, gets below level five.

‘When you ask somebody, “Does it get dark at night,” they might look at you like, “Of course it gets dark at night!” But it really doesn’t get dark in our cities the way that it used to.’

‘Scientists are finding out that artificial light at night is disrupting our sleep and contributing to sleep disorders, which are tied to every major disease we are dealing with in the western world these days, like diabetes, obesity, cancer, depression. It is confusing our circadian rhythms, those 24-hour rhythms that orchestrate our body cells and that rely on the natural cycles of light and dark.

‘So when you begin to add up the many costs of light pollution, the monetary costs, the waste of energy, the human health cost, the environmental cost—again, we are not the only animals obviously who

have evolved with darkness, so much of the wild world has evolved to depend on darkness. When we flood their world at night with artificial light we essentially destroy their habitat.'

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Sandy Isenstadt, a professor of modern architecture at the University of Delaware, says the history of modern lighting took a decisive turn in the mid-20th century.

Until around the late 1930s, he says, electric lighting was still considered new and, in many ways, novel. People experimented with the new technology in interesting and creative ways. However, that soon gave way to an approach that saw our cities and towns become drenched in light in order to appease motorists and because of the perceived benefits in terms of public safety.

That said, Isenstadt believes recent advances in smart lighting technologies have begun to reverse that trend.

'I think it's a real credit to the lighting design profession that they've been able to innovate so much and present so much in the way of new possibilities,' he says. 'Cities around the world are recognising a great enrichment of urban life through new lighting designs and new lighting practices.'

That enrichment, according to Brisbane lighting designer Jono Perry, includes clever lighting that can help brand a city's identity and distinguish it architecturally.

'Architecture was originally conceived for what it looked like during the day, whereas we can now think about cities and how they look at night,' he says. Cities all over Asia, cities in Europe have done that a lot.'

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Thinking about how to appropriately light a city at night is important, says Perry, because the central business districts of our cities are increasingly places where people live and raise families, not just work

and shop. It's not just advances with Light Emitting Diodes or LEDs that are making the transformation, either. It's the combination of LED technology and smart Wi-Fi connected sensors.

'The ability to have ubiquitous sensors that can be operated remotely means that on the one hand the city itself has greater control over lighting [and] on the other hand it also means it opens up the potential for ordinary citizens to have some control,' says Sandy Isenstadt.

'We used to think that higher and higher levels of lighting were what made people feel safe. In fact, it's a range of more complex factors such as the surrounding brightness, contrast, even colour. Certain light colours can improve facial recognition, and people feel a lot safer if they can make out fine details at a greater distance. It's often these more subtle factors.'



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The Amsterdam-based company Tvilight is one of those firms leading the way in the practical roll-out of smart lighting technology. Tvilight manufactures street-based lighting systems that automatically respond to traffic and pedestrians. The idea is to create urban lighting systems that limit light pollution in suburban areas, with lights dimming or illuminating depending on the level of human and vehicular traffic detected.

The company's CEO, Chintan Shah, says Tvilight holds community consultations whenever they're engaged to install a new sensor grid, because getting people on board is important for the adoption of any new urban technology.

He also says there are clear economic benefits for civic authorities.

‘In the Netherlands we have projects in residential areas, at train stations, at airports, in industrial areas, where we are saving up to 80 per cent energy. So it is quite significant.

‘This is simple to measure. What we do is dim the lights for up to 20 per cent. It's a comfortable level of light. It's like in a restaurant. However, as soon as any person is detected we go up to 80 per cent or 100 per cent of the lamp intensity, meaning full light when people are around. Just by dimming the lights we can achieve significant savings.’

For Paul Bogard, the sophistication of such systems gives cause for optimism: ‘The new technologies by and large are focused downward,’ he says. ‘They shine their light downward where we need it rather than up into the sky where nobody needs it. So that's a good thing.’

‘I think that as more and more people realise the many costs of light pollution and the value of darkness we'll begin to see there's really no reason not to control our use of light at night and to realise how important night and darkness are for the experience of being alive.’

However, he cautions that any change in the nature of our lighting design needs to be met with a corresponding re-examination of our rationale for lighting in the first place.

‘If we simply adopt the new technology but we don't change any of our attitudes about lighting and darkness at night, I know that instead of really realising the energy savings from the efficiency of the new lights we will just light everything more brightly and use up all that efficiency.’

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