

**From:** [Dirk Dunning](#)  
**To:** [SENR Exhibits](#)  
**Subject:** Re: SB 1530  
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I am writing to comment on and make recommendations about SB 1530.

I strongly support SB 1530 and immediate actions to dramatically reduce fossil fuel emissions to fight climate change.

As we do that we must as the bill proposes work to protect all Oregonians. There is one aspect of protecting Oregonians that has been completely missed though.

The Bill requires greater energy efficiency in lighting as regards fluorescent lighting. And though that seems an easy thing and a laudable action, it has serious problems that need additional action including changes in the language in the bill.

LED lighting is overwhelmingly based on light emitting diodes that emit an intense blue light at about 452 nanometers wavelength. Much of this light is converted to orange light by being absorbed and re-emitted as orange light by phosphors. The human eye and brain interpret this blue-orange light as being sort of white. No other animal or plant sees light the way we do. And that creates enormous problems for many plants and insects.

More importantly, the intense blue light does two very terrible things. The first and most important is that it bleaches the retina. Most people can tolerate about three hours of exposure to LED light in a day before the bleaching overwhelms the bodies ability to repair the damage. The lights are designed with a safety basis of exposure of 10,000 seconds (2 hours and 47 minutes) per day. This does not count the added blue light exposure and injury from electronic devices.

Almost no one (myself being one exception) limits themselves to less than 3 hours exposure a day. As a consequence, very nearly everyone is being injured by exposure to the lights. Infants, children, people with certain eye diseases or immune disorders, and anyone over 55 years of age are at greatly increased risk. Many of these should NEVER be exposed to LED lights at all.

You likely already know this yourselves by how much you and we all have come to hate the new car headlights. They hurt! They hurt for precisely this same reason. They are damaging our eyes. At night and in the dark, the bright glare of the lights makes the effect even stronger and worse.

Additionally, and independently from the retinal injury the lights are causing, the lights also trigger a portion of the eye dedicated to determining whether it is daylight or night into telling the brain to not produce the sleep hormone melatonin. This causes enormous negative impacts on sleep, immune function and healing.

A study in Barcelona Spain in 2018 demonstrated that following introduction of LED street lights in Spain that they saw an actual medical impact on the population. For those exposed to LED streetlights, they saw a 47% rise in the rate of breast cancers, and a 105% rise (a more than doubling) of the rate of prostate cancers. Though LED blue light does not directly cause cancer, it does lead to a dramatic rise in the rates of breast, prostate and other hormone sensitive cancers by the disruption of the nightly sleep and healing cycle. We also know from a recent study by Oregon State University that skin exposure to the blue light from LEDs leads to a 15% reduction in life expectancy and to brain damage.

This same sleep disruption has been known from half a century of studies on night shift workers to also cause large increases in cardiovascular disease, type II diabetes, obesity, stroke, depression and suicide, as well as many other diseases and general declines in health and productivity.

It appears likely now that the conversion to fluorescent lights (which also emit a fair amount of blue light) beginning in the 1970s may be a large contributor to the rise in breast and prostate cancers from the 1970s to now.

The LED lights are designed to be extremely energy efficient. In doing so they are allowed to strongly flicker at 120 times per second. This “non visible flicker” is almost entirely disregarded by the Federal safety standards for the lights and by industry. It is now known that non visible flicker at rates up to 5,000 times per second causes headaches. For many people (myself included), the 120 times per second flicker of the lights is devastating. It directly leads to intense tinnitus which sounds like very loud ringing in the ears that persists for hours or days after being exposed to the lights for as little as 10 seconds. Imagine someone blaring their car horn right beside you constantly for days. Now put one of those on each side of you and change the tone up to the top end of hearing at 8,000 hertz. That is what the light induced tinnitus sounds like. The 120 time per second flicker also leads to intense migraine headaches, optical migraines and other maladies.

In addition, as the blue LED flickers on and off and the orange phosphors brighten and dim, the lights shift from strongly blue to strongly orange and back 120 times per second. The human eye cannot perfectly focus in two colors. As a result, the eye tries to shift back and forth between these. It fails. The result is both eye strain, pain and headaches, and everything always being blurry. This cannot be avoided with light of this type.

All of this is avoidable.

Recently, SORAA Corporation from Europe introduced their Be Healthy line of lights. It emits no blue light and instead uses violet LEDs to operate. They also eliminated the non-visible flicker. (<https://www.soraa.com/soraahome/healthy>) Cree Corporation has dramatically reduced the blue light emission in their lights too in response to some of these concerns, though they have not eliminated the flicker. These prove that the needed changes can be made and be made simply.

However, this does not resolve the problem with existing lights.

For those of us impacted most severely by the current lights, our lives have become extremely limited. My life in particular is hugely impacted. To protect my own health I had to retire from 24 years and 11 months service with the Oregon Department of Energy. We moved into the 550 building which is entirely lit by LED lights. After one half days exposure, the lights triggered my immune system to attack my eyes resulting in anterior uveitis that required six weeks of cortisone to treat. That was followed by a second bout of iritis requiring another six weeks of cortisone. At that point my physicians ordered me to be removed from all areas lit by LED, fluorescent or bright lights. That turned out not to be enough.

My job duties required frequent travel including driving at night and meeting in conference rooms lit by LED lights in other facilities. Simply entering and leaving the 550 building required excessive exposure to LED lighting. The Department was entirely unsympathetic and unhelpful in aiding me in dealing with these hazards. Management failed to protect me, and so lost my services. As a direct result I retired one month shy of 25 years service. I simply could not even make it that one added month to reach 25 years service.

Today, I cannot safely enter most stores, shops, businesses or even my doctors offices without being injured. I have to wear a blindfold just to see my physicians. My civil rights have been curtailed. And no one in State government seems to care at all. I have been discarded.

Many other Oregonians are as impacted by these lights as am I. Their civil rights are also curtailed and their health is destroyed as well. I have the technical background and knowledge to understand precisely how and why I was and am being injured, and what actions to take to protect myself. The vast majority of people have no idea. Doctors are entirely uninformed about these hazards as well, so they cannot help their own patients. And because of the energy efficiency requirements (both the Federal ones and the one in this bill), there are very few options for safe lighting. And none of those are required in markets, shops or other gathering places.

What is needed ultimately is legislation in Oregon (ideally - in this bill) mandating that all LED lighting be converted to blue light free -and- flicker free types. Oregon should become a world leader in protecting our citizens from this enormous and as yet unrecognized hazard.

My recommendation to you is to add provisions into the bill that either:

1) directly require the phase out and replacement of all existing LED lighting in the State to non-blue light emitting and non flickering types (specifically limiting flicker at any frequency under 5,000 hertz), or

2) providing authority to the Oregon Department of Energy and directing the Department to work with the Health officials and investigators in the State to determine the severity of risk to health that LED lights pose and to propose standards to the legislature to ensure the protection of vision and health of ALL Oregonians, including the rapid phase out and replacement of non-compliant lighting. This direction must require that the Department seek input on all aspects of hazards that lighting may pose, not limited to just the blue light and flicker hazards.

Thank you for your consideration. I would be happy to meet with anyone interested in the science behind these hazards - though only in locations entirely free of LED lighting.

Sincerely,  
Dirk Dunning  
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