

Prepared for SAB's review of EPA "Report on the Environment (2007)"

Light Pollution

by Stephen Davis – 2/26/08

One thing the EPA has been pushing is its "Green Lights" program. Using energy efficient light bulbs is not good enough:

- a) When too much light is being used,**
- b) When aimed improperly, or**
- c) When nobody is there to use it. [1]**

This is "**Light Pollution!**" And there is way too much of it costing the USA some \$4.5 billion or more annually. This energy and money could be put to far better use. [2,3] Light Pollution and all its ramifications are missing from the EPA "Report on the Environment." [4,5]

The #1 and #2 problems in Congress, needing immediate attention, are the economy and climate change. Both are directly related to energy independence and homeland security. [6]

There is a connection between Light Pollution and what Congress considers as in our best interests. Unfortunately, government hasn't been watching where the money goes and how it is spent. We need accountability [7,8] and awareness [9] at all levels right down to the common man on the street before it's too late and we are all looking for life boats.

What happened to "conservation" – the word that is never to be spoken? [10,] What if the money and other resources aren't there, or could they be put to better use elsewhere? The federal government can lead the way and get others involved through policy, guidance, and monitoring. The Czech Republic, Solvenia, various regions in Italy, 8 states in the USA and 11 other states with pending legislation, and numerous municipalities have enacted light pollution regulations as **best practice**. [11,12,13] With pollution crossing state lines and national boundaries traveling worldwide, the federal government should be proactively involved. [14,15] There have been numerous newspaper and magazine articles all dealing with Light Pollution. [16]

This is something easy to solve. Almost too simple for some to grasp, and you don't have to develop new technology to do it. It does take a change in thinking because of all the myths that have been promoted throughout years past. Now is the time to alter the course!

- Aim the light down to where it is needed,**
- Use only what is necessary, and**
- When done, turn it off.**

It is much better to shield outdoor lights, which is no different than using lamp shades on indoor lights, than using window shades and automobile visors to block easily preventable glare. The person who owns or controls the light is the responsible party.

Below is just a small sampling showing how light pollution relates to the environment and everything in it and what others are doing to help solve the problem. Figure 1 shows the "Growth of Artificial Night Sky Brightness in North America from 1950–2025." Hopefully, this is enough to convince you to take action, because it is sorely needed for our survival and that of future generations.[17,18]

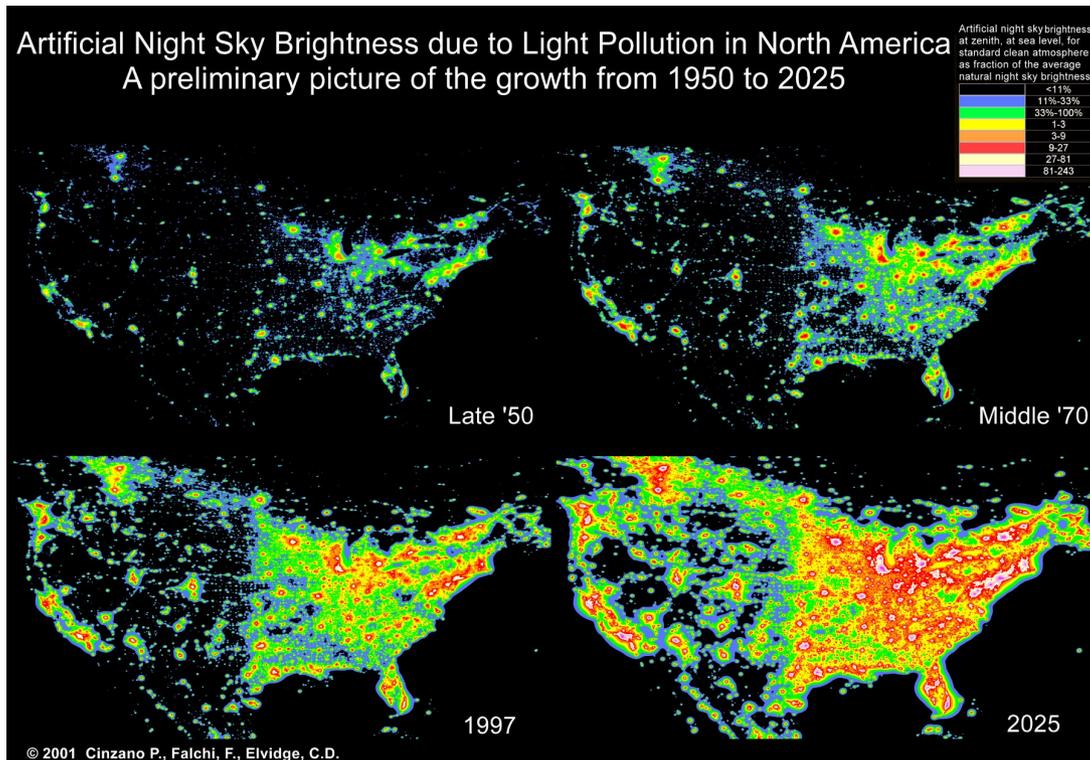


Figure 1. Growth of Artificial Night Sky Brightness in North America.

References:

1. Application – how it is being used.

"[DOE Vows to Turn Up Appliance Efficiency](#)" by H. Josef Hebert, San Francisco Chronicle, Nov. 13, 2006 – appliance efficiency and *not* how it is used.

2. NOVA, "Saved by the Sun," aired 10/23/07 on PBS–TV, WGBH – Boston, \$19.95 plus S&H, 1–800–255–9424

Amory Lovins: (46–53 minutes from the beginning of the video)

"We do have a national energy policy. It is basically to keep wasting lots of energy imported at whatever price and by whatever means as necessary, keep stealing from our kids, and keep screwing up the climate. You may think this is senseless, immoral, and wasteful energy policy, and you would be right."

"It is cheaper to save fuel than to buy fuel. It's profitable. That is why smart companies do it like mad to improve their bottom line."

3. Lovins, Amory, "Soft Energy Paths: Toward a Durable Peace", Ballinger Pub. Co., Cambridge, MA, 1977

One way is by reducing "commercial overlighting," which is often five or more times what is recommend by the Illumination Engineering Society of North American.

"... around three-quarters of the energy used build and run most power stations is lost in producing and distributing the electricity, a loss that is often not recouped by corresponding efficient use of the electricity."

In the case of lighting, of the remaining one-quarter, only 10% is converted into light and the remaining 90% as useless waste heat by the most efficient light bulbs; then much less than half of the 10% that is light falls on the intended target. Darn poor return on investment! It would be better turn the lights off and put the money in the bank. That way the principal would be preserved, and it could earn interest.

4. [Economic Issues in Wasted and Inefficient Outdoor Lighting](#):

"If we had a water sprinkler system that wasted much of its water by scattering water everywhere onto the street, through our neighbor's windows, and upward to encourage evaporation, we'd not tolerate it for long."

1 ton of coal can produce 2100 KWH
1 barrel of crude oil can produce 556 KWH

5. Emissions produced by [Niagara Mohawk Power Company](#) (from [Natural Resources Defense Council](#)) [residential rate: 14.2 cents/KWH]

4.52 lbs/MWH of Nox (Nitrous Oxide),
25.58 lbs/MWH of SO₂ (Sulfur Dioxide), and
2,243 lbs/MWH of CO₂ (Carbon Dioxide),

which are all manmade greenhouse gases and produce acid rain.

Revkin, Andrew C., "[New York City and 8 States Plan to Sue Power Plants](#)," New York Times, July 21, 2004. – "to sue utilities today that they say are the country's biggest emitters of carbon dioxide, the heat-trapping gas that scientists have linked to global warming." The finger points upwind, but what is happening downwind with regards to demand?

6. US Rep. Kirsten Gillibrand, 20th District, "Congress on Your Corner," Glens Falls, NY, Feb. 6, 2008

7. NYS Governor Eliot Spitzer in his:

(a) [2008 Inaugural Address](#) in which he made references to: find a way to live together, time for change, opportunity, searching for balance between chaos and order, greater good, give government back to the people [leadership and education], future for our children, global revolution, easy vs. responsible, status quo, core values, and reform.

(b) [State of the State Address \(2008\)](#) in which he made references to holding government accountable, special interests and the status quo, where government fulfills its most basic duty – to protect its people, our time has come, give their children a better life than they had, and

(c) [State of Upstate Address \(2008\)](#) in which he departed from his prepared speech to say: "We all know what the mayors think of [being held accountable vs. just give us the money]."

8. Example of government waste: NYSDOT Contract D260128 – includes the replacement of the existing streetlights with historic/decorative lights:

- (a) requiring nearly four times as many lights to do the same job,
- (b) resulting in a seventy times the uplift serving no useful purpose other than illuminating the night sky,
- (c) a six times increase in energy cost,
- (d) nearly four times as much glare for motorists and pedestrians far exceeding the safe limit specified in ANSI/IES RP-8-2000,
- (e) a dramatic increase in light trespass for those living along the highway possibly endangering their health in the long term or their right to the peaceful enjoyment of their own property, and
- (f) at a cost of \$654,000, funded largely by federal and state grants with no oversight, guidelines, or restraints with regards to light pollution control.



The same is happening in many communities across the state and elsewhere in the nation.

9. Ryan, Kathleen, "Outdoor Lighting Manual for Vermont Municipalities," Chittenden County Regional Planning Commission, Essex Junction, VT, 1996 – sponsored by US Department of Energy, Vermont Department of Public Service, and three power companies. [This is excellent; currently out of print – request a reprint or photocopy 1-802-872-1600.]

10. Charlie Rose, PBS-TV, Feb. 2, 2007 – A panel discussion on climate change with Dr. [Michael Oppenheimer](#), of Princeton University, who was a co-author of the just released Fourth Assessment Report of the Intergovernmental Panel on Climate Change sponsored by the U.N.. Oppenheimer talks about the growing scientific consensus that global warming is occurring and that it is largely man-made. He also discusses potential remedies. (video, audio, transcript available)

11. [State and municipal laws](#) that attempt to address light pollution. [The list is not current or complete.]

12. The NYS bill [A7438/S4364](#) makes reference to what a wise and prudent man would do. The NYS bill was retitled the "The Healthy and Safe Outdoor Lighting Act" in recognition of the significant medical and biological research being performed (see additional references below).

13. [Metrolux's findings](#): "We thought [we] did our job – we designed the lighting system like we have always done in the past." –and– "Often the measurements taken indicate that the offending light is at a level that is less than moonlight! We take our findings back, we write our reports, and conclude that the complaint is groundless . . . boy, are we WRONG!" [Web page no longer available.]

14. [Global Warming Pollution Reduction Act of 2007 \(S. 309\)](#). This important science-based climate bill would set real, long-term reductions in global warming pollution.

15. ["UN chief calls for climate change action"](#), Edith Lederer, AP, Feb 11, 2008

16. Newspaper and magazine articles:

(a) Owen, David, "[The Dark Side, Making war on light pollution](#)," The New Yorker, Aug. 20, 2007

(b) Bower, Joe, "[The Dark Side of Light](#)," Audubon, Mar/Apr 2000, pp 92–97. [Truly Outstanding! See actual magazine article for excellent photos]

(c) Guynu, Sharon, "Fighting Light Blight," AMC Outdoors, Jan/Feb 2000, pp 20–21. [Really Excellent!]

(d) Cray, Dan, "[Bag Those Beams](#)," Time, Jan. 31, 2000, pp 56–57.

(e) Ivins, Molly, "[Stupefying Stance on Global Warming](#)," Baltimore Sun, June 6, 2002

(f) McKibben, Bill, "[U.S. Is Icing Our Warming Report](#)," Newsday, June 6, 2002

(g) Bill McKibben addressed the Ceres Conference in Boston on April 25–26, 2007. (47 min. [on-line video](#)) His Keynote speech is incredibly relevant on CO2 global warming and the need to act within a very short time if our grandchildren and their children are to be able to sustain themselves. His speech is of enormous importance on what global warming will do to the earth and our ability to inhabit it.

(h) [14th North American Interdisciplinary Conference on Environment and Community](#), Saratoga Springs, NY, Feb. 2004 – where Mike Hansen presented a light pollution paper.

(i) "[Our Energy Challenges in a New Era of Science](#)" – opens with maps showing light pollution in the World and the USA.

17. Thomas Paine: "These are the times that try men's souls"

18. Franklin D. Roosevelt: "If it fails, admit it frankly and try another. But above all, try something."

Additional References:

Wildlife:

[Fatal Light Awareness Program](#) (FLAP) – raises awareness about excessive lighting which disorients birds resulting in thousands of deaths – especially during spring and fall migration.

"[Ecological Consequences of Artificial Night Lighting](#)" Conference at UCLA, February 23–24, 2002, sponsored by The Urban Wildlands Group and the UCLA Institute of the Environment and summarized in "[Deprived of Darkness](#)" by Ben Harder, Science News, April 20, 2002, Vol. 161, No. 16, p. 248

"[Ecology of the Night](#)" Conference, Ontario, CA, 2003

National Park Service:

[Natural Lightscapes](#) – the diurnal cycle of light and dark is natural and important for survival of many species and for our own cultural benefit. "[Did You Know](#)" we are losing it! It has been measured, and predictions have been made. See also "[Preserving endangered night skies](#)" by Dan Duriscoe and Chadwick A. Moore.

Harder, Ben, "[Light All Night](#)," Science News, Mar. 18, 2006, Vol. 169, No. 11, p. 170 – links artificial light to changes in animal behavior and survival. The measurement of light pollution, coming mostly from distant cities, and sky quality is part of a comprehensive effort by the NPS to inventory park resources in order to track park health and provide quality experiences for visitors.

"[Big Bend After Dark](#)" – plan your visit to see life after dark.

Ritter, John, "[Flagstaff still proud keeper of dark skies](#)," USA Today, Nov. 2, 2007 – "the park service now considers protecting dark skies part of its mission." If only our leaders thought like this.

Newton B. Drury, Director NPS 1940–1951

"There are certain values in our landscape that ought to be sustained against destruction or impairment, though their worth cannot be expressed in money terms. They are essential to our life, liberty, and pursuit of happiness, this Nation of ours is not so rich it can afford to lose them, it is still rich enough to afford to preserve them."

Human Health:

Pauley, Stephen M., MD, "[Lighting for the human circadian clock: recent research indicates that lighting has become a public health issue](#)," Medical Hypothesis, (2004) Vol. 63, No. 4, pp 588–596 [a comprehensive review of the medical research]

"the suppression of melatonin (MLT) by exposure to light at night (LAN) may be one reason for the higher rates of breast and colorectal cancers in the developed world ... mounting evidence suggests precautions should now be taken with the design and application of both indoor and outdoor lighting."

Stevens, Richard G., "[Artificial Lighting in the Industrialized World: Circadian Disruption and Breast Cancer](#)", Cancer Causes and Control. 17: 501–507. 2006.

Rynor, Becky, "[Researcher studies link between light at night, breast cancer](#)," The Ottawa Citizen, Sept. 7, 2006 – international conference co-hosted by the National Research Council.

"The evidence proves a very big argument that artificial light at night is a new risk factor for breast cancer," says Dr. Blask of the Bassett Research Institute in Cooperstown, NY. "He expects to find links between light at night and other types of cancer."

Pekkanen, John, "Health: [Your Inner Clock](#)," Washingtonian, Jan. 2007, pp 131–134 – traces the history of the research from a streetlight beaming into the bedroom window of Dr. Richard Stevens through the work by Dr. Howard Blask and others.

Weiss, Rick, "[Lights at Night Are Linked to Breast Cancer](#)," Washington Post, Feb. 20, 2008

Major Cities:

[C40 Large City Climate Summit](#), New York City, May 14–17, 2007 – [Lighting](#) is listed as one of six major areas with case studies. While not in the top 40 based on size, [Calgary](#), Canada, a major city having achieved significant improvements in outdoor lighting with financial savings, should have been included and placed at the top of the list. Cities can be good neighbors without creating excessive glare, light trespass, and sky glow. Unfortunately, streetlighting was not on NYC Mayor Bloomberg's list of [127 initiatives](#).

"[San Diego Street Light Conversion](#)", IDA Info Sheet #13 [not currently on the web]

"[Quality Street Lighting](#)", IDA Info Sheet #61

"[Looking to the Stars](#)" – A video about light pollution produced by the City of Los Angeles Public Works Department and Bureau of Street Lighting (24 min.), \$25

Low angle atmospheric scatter:

Holland, J., "[Why the sky over your town and even far from it glows so much?](#)", Masaryk University, Brno, Czech Republic – Direct uplight near the horizontal plane, emitted by an outdoor lighting fixture, produces more sky glow than direct uplight traveling more vertically through lesser air mass.

DSMP satellite images:

[The World](#) and [North America](#)

Artificial Night Sky Brightness:

[The World](#) and [North America](#) and [North America from 1950–2025](#) from "The World Atlas of Artificial Night Sky Brightness," by P. Cinzano, F. Falchi, and C.D. Elvidge, ISTIL, Thiene, Italy

Judy Rocchio, Tamara Williams, Dan Duriscoe, "[Starry, Starry Night, A Thing of the Past](#)," Sierra Nature Notes, Vol 3, Dec. 2003

United States Class 1 Federal Areas – [1997 Light Pollution Study](#) – Lower 48 States

Government:

Revkin, Andrew C., "[Government Outlines Plan For Research On Warming](#)," New York Times, Nov. 13, 2002

Ignoring the overwhelming consensus among scientists worldwide, the Bush administration this week unveiled a proposal that would have the U.S. embark on another years-long study to assess whether humans are causing the globe to warm. Industry officials and other climate skeptics lauded the research plan. But many climate scientists said it would simply reopen issues that most experts consider resolved. Others said more research would be helpful, but not at the expense of delaying action to address climate change. Michael Oppenheimer of Princeton University said, "If you strip away the rhetoric, there's a valuable agenda of research here to pursue. The danger is that while they're continuing to do the research, the window of opportunity to avoid dangerous global warming is closing."

CBS Evening News, May 29, 2001

CA energy crisis: Gov. Davis is hopping mad with Bush for not putting a cap on prices. A mother of 4 children says, "The children are getting real good at turning the lights out."

Big Bend National Park: Park ranger says visibility reduced from over 200 miles down to 9 miles on a bad day due to smog from dirty power plants. Somewhere else in TX with a view of belching, dirty power plants: Christine Whitman defends Bush by saying America had no previous energy plan. A comment is made about "paralysis by analysis." A large banner is displayed from the top of a water tower denouncing the former governor for doing nothing on his watch.

Former Gov. Bush's voluntary emission reduction plan is compared "to asking a bunch of pigs to take a bath. There is a lot of squealing and only 4% comply – the ones that could without much expense."

Royal Commission on Environmental Pollution's [invitation](#) to submit information for its next study, "Artificial Light in the Environment." and a [reply](#) by Martin Morgan-Taylor, Campaign for Dark Skies, UK.