

Best practices worldwide

Question (x14text): "Can you give an example of a lighting application that avoids or reduces light pollution in an ideal way?"

Yes, an ideal example is... (open answers, n=117, all internet links last access April 2018)

1. "I was involved in creating the conceptual design for a new type of efficient, effective luminaire called Lumicana which has been engineered by www.lumican.com. With its unique design, engineered by Lumican, this luminaire places sufficient light ONLY where it is required on streets and sidewalks. This luminaire is also very efficient and is controlled by computer and sensors. It also has 2200 Kelvin LED's which meet the health concerns as expressed by our international group of associates. Lumicana promises to be a real game changer in reducing light waste, trespass and pollution within communities as it supports the Prime Principle of Light-Efficient Communities. [Light only what needs to be lit only when it needs to be lit with the most efficient light source of appropriate intensity and colour without creating direct light trespass on neighbouring properties and the night sky. Keep your light to yourself!] No other lighting manufacturer has approached this concept or created such a luminaire to my knowledge. This is THE luminaire which will address almost all concerns related to community light waste, trespass and pollution for streets and areas which must be lit at night. "
2. "Full Cutoff Luminaires"
3. "Fully shielded, low amounts of light and warm colors. Reduction or switch off at night. Download area of www.sternenpark-rhoen.de"
4. "https://www.chevronaustralia.com/docs/default-source/publications/frontier_spring_2012.pdf?sfvrsn=4 , Page 13 addresses the focus on control of light pollution to protect marine turtles. The fact that this issue was recognized and addressed Front End Engineering Design is unique and probably the first time it has happened in a large industrial development anywhere on earth.. "
5. "Many local to me restricting CCT 3000K and timing"
6. <http://www.lightingjournal.org/index.php/path/article/view/80>
7. "Los realejos, Tenerife. PC Amber + regulation + Ulor 0%"
8. "Three Kings Church in Slovenia:
<http://www.lightingjournal.org/index.php/path/article/view/80>"
9. "Smart streetlights that are timer and sensor based as well as all outdoor lighting being properly recessed in a shield. "
10. "Shielded lighting fixtures that direct light to the ground / area to be lit no blue light below 3000K switch off or reduce at late hours use motion sensors if possible"
11. "Downward pointing covered lighting in red spectrum turned on by motion sensors. For home, commercial building and Highway lighting"
12. "Use of PC amber LED technology. E.g. in the city of Sherbrooke Canada"
13. <https://www.linkedin.com/pulse/solar-luminaire-approaches-2000-cycles-david-seal/>
14. "dynamic lighting full shielding low color temp no light when not needed"
15. "Here is a step in the right direction:
<http://lossofthenight.blogspot.com.au/2017/02/excellent-led-streetlamps.html>. But ideally a streetlamp should produce no glare at all into people's eyes. Either the lamp should be adequately shielded so that glare is experienced only by someone standing virtually directly underneath and looking straight up (an unlikely scenario), or it should be adequately diffused, so that it will not dazzle anyone approaching it. Many new LED streetlamps are fully cut off but NOT shielded and NOT diffused. Just tonight I walked past a few old lamps and a few new lamps

- in my suburb. The new lamps were horrible compared to the old ones. A simple diffuser on each would probably fix the problem 99%."
16. <http://knkx.org/post/light-pollution-identified-potential-issue-threatened-puget-sound-chinook-salmon>
 17. "CSbG EcoLight: <http://www.csbg.ca/>. Developed for dark-sky preserves and low light applications - amber LED lighting"
 18. "...generally, the use of full cutoff luminaries with HPS or pc-amber light, with the minimum light flux the possible. "
 19. "well shielded lighting, and low blue"
 20. "At night at an astronomical observatory, astronomers need to see enough so they don't trip on steps. Very low level, fully shielded red lights can provide this lighting without destroying the night sky for research. "
 21. "Every development permit should include a lighting plan that ensures light trespass will not be an issue for neighbors or the sky."
 22. "Avoiding light pollution is IMPOSSIBLE. Reducing light pollution is possible by low lumens and full shieldings and switching off lighting when it is not needed and light only that what is REALLY needed."
 23. "Include lighting control to turn off or reduce the lighting levels when no one is there. <http://www.lighting.philips.com/main/cases/cases/parks-and-plazas/renato-poblete-river-park> Note: the filters are turquoise (510nm) not blue ;)"
 24. "In view of my approach and my negation of the notion of light \"pollution\", I can only give examples of bad and wasteful lighting such as light that isn't directed towards surfaces that need to be seen or choices of lighting distribution that allow for some of the light to be directed elsewhere than to the surface / object that needs to be lit creating wasteful lighting or trespassing light."
 25. "Full cut-off fixtures with low colour temperature with adequate intensity to do the job."
 26. "The best means is dynamic switching of lights such that illumination is only provided when a task is being performed. Motion-sensing switches are best for this, provided that they are properly installed and maintained (i.e., light is switched off promptly after activity ceases, and the motion trigger threshold is set appropriately.)"
 27. "Take a look at Flagstaff's experience. That's all"
 28. "<https://www.hinterlandtimes.com.au/2017/07/07/maleny-perfect-for-astro-tourism/>"
 29. "Dru Point, Margate, Tasmania. Bare minimum output (9w) warm white with high CRI, full cut-off (maximum light angle is 60 degrees) and timer set to turn off after 6 hours of operation: <http://www.illumni.co/kingborough-tasmania-successfully-adopts-solar-powered-lighting-solution/>"
 30. "Twilight"
 31. "- avoid Floor lighting
- shield beams
- lowen intensity
- use low color temperatures
- avoid free radiance lights"
 32. "Correct (more adequate) color light of LEDs"
 33. "Several streets that I've seen where new lighting is much more strongly shielded and dimmed, potentially based on sensors (\"intelligent lighting\")"
 34. "the starpath sensory lighting. The sharing of cultural practices such as the Danish practice of fostering hygge (see the work of Mikkel Bille)"
 35. "Amber LED"
 36. "Color of light, facing down, less intensity, avoid if not totally needed"
 37. "Shielding the lights reduce 40% the attraction of shearwaters: <https://sora.unm.edu/sites/default/files/journals/auk/v102n02/p0377-p0383.pdf>

Metal halide lights are able to ground a higher number of shearwaters than High Pressure Sodium lights:

http://www.ebd.csic.es/Airam/pdf/Rodriguez_et_al_2017_Journal_for_Nature_Conservation.pdf

38. <http://lossofthenight.blogspot.de/2016/05/look-what-happened-when-circle-k.html>

Another example is simply not lighting areas that don't need light, like Berlin's ring autobahn and urban parks."

39. "3000K full cut off leds internal to cities with 50% power reduction at 10pm , 2200K fco leds external cities with permanent adaptive lighting sistem or after 8pm. "
40. "<http://www.hellenot.org/projekte/#c1307> (We will have a new website soon, please contact me if the link is dead.)"
41. "Full cut-off lamps with CCT < 3000K Time-control of lightning"
42. "Ein Projekt von Uwe Knappschneider in Vechta"
43. "Old street lamps with a color temperature of less than 3.000 K. Old Copenhagen street lamps hanging directly above the streets and shining only downwards. Light protection street lamps around the observatory at Hamburg Bergedorf (color temperature less than 2.000 K)"
44. "Begin to reduce the excessive illumination inside of public spaces, because it leads to the people demand more light when they go outside."
45. "it always depends on genius loci"
46. "One of our latest products for I+b 2018 is dark sky friendly and that is a key factor in promoting it. <https://www.selux.com/ger/de/exterior/products/inula>"
47. "replacing old armatures to new ones with full cut off, with led warm light"
48. "Full cut-off luminaires"
49. "use linear optics on a jogging path in a community park and not flood it . i think simple, basic optics along with right CRI index can make a difference "
50. "Security lights that just turn on when someone moves near the house, street lights that dim when there's no traffic, dimmers on residential lighting to produce a more pleasant light experience"
51. "<http://www.luminicaambiental.com/renovacion-del-alumbrado-en-a-veiga-trevinca-starlight/>"
52. "Embedded roadway lighting on roads next to sea turtle beaches. This example and others are in our report: <https://irma.nps.gov/DataStore/Reference/Profile/2243203> "
53. "no luminaires pointing upwards"
54. "There is no specific product but LED street lights which are pointed vertically downwards help to avoid light pollution."
55. "Gas station canopies with recessed lighting."
56. "for private ground: control of light by movement detectors. Reduction of brightness by time bending lighting fixtures downwards. All methods that provides a reduction in an easy clear way."
57. "Philips Soft White SceneSwitch bulbs"
58. "While nothing is ideal, I think that the work we are doing in the Mont-Megantic Dark Sky Reserve really helps to reduces light pollution in many ways :
- Regulations are in place on the territory.
 - Many thousands of fixtures were converted to reduce light pollution 10 years ago and we continue with progressive conversion for the rest (public, residential, commercial, etc.)
 - We worked with light manufacturers to have Low-CCT LED fixtures (pc-amber) available.
 - We educate the park's visitors and give many keynote for different groups and organisations.
 - We provide support for municipalities and individuals. Website: [ricemm.org/en](http://www.darksky.org/idsp/reserves/montmegantic/), annual reports available on : <http://www.darksky.org/idsp/reserves/montmegantic/>"
59. "Have a look at the dark sky park and reservation submissions to the IDA for Kerry Dark Sky Reserve and Mayo Dark Sky Park"

60. "Full cut off luminaries, with automatic dimming after certain hour. Turning off electronic billboards after certain hours."
61. "1 - The Lighting Master Plan and the Dark infrastructure for the City of Rennes (2012), France. 2 - The Garonne River nightscape in Toulouse (2005), France. 3 - The Rhonelle Park lighting in Valenciennes (2011), France. See for information our website: <http://www.concepto.fr/eng/> and all articles about these projects in our website and in Lighting Magazines."
62. "Cardiff LED roll out has tried to minimise negative impacts"
63. "This guidance from Torfaen council sounds promising, but how many people are aware of the effects of light pollution? <https://www.torfaen.gov.uk/en/Related-Documents/Pollution-Control/PollutionControl-LightPollution/Light-Pollution-Booklet.pdf>"
64. "Any project which complies to LEED's light pollution reduction credit."
65. "Simple PIR switch that means light is not used when it is not needed."
66. "Fully shielded lighting"
67. "Outdoor environments that raise or lower lights depending on the amount of activity. "
68. "The change of street lighting from HPS SOX/SON to LED. The optical efficiency was such that we recorded an increase in sky quality from changing one type to the next. The LED's are dimmable so local authorities have been able to further reduce lighting at core hours."
69. "we developed a prototype of light, that ...
 - a/ only illuminates to the lower half-space
 - b/ provides sufficient quantity + quality lighting for the early evening hours (winter time) ...
 - c/ reduces performance during the low traffic time in the late night
 - b/ has no blue light during the low traffic time in the late night<https://www.facebook.com/hynek.medricky.3/videos/1674543442611932/?t=0>
70. "As far as I know the lighting design program from the manufacturer Carandini (Catalunya, Spain) has the possibility of calculating the upper hemisphere emission of a project. Web page: www.carandini.com"
71. "Cover it"
72. "smart lighting: only providing light when and where needed."
73. "Scott Monument Edinburgh: <https://ksld.com/projects/2017/scott-monument>. Lighting is directed to surfaces of the building not the sky"
74. "The Cree RSW luminaire: <http://www.cree.com/news-media/news/article/next-generation-of-groundbreaking-rsw-led-street-light-portfolio>, A radically different design of LED luminaire utilising wave guides rather than an exposed array of directly visible LED chips. Also available in lower CCTs eg. 2700K"
75. "Opticalight, an interesting projection method for facade lighting: http://opticalight.ch/wordpress/en/category/projectors_new"
76. <https://intiled.ru/>, here we used special optics 10x100 degrees to avoid the light pollution
77. "The closest to ideal are lighting design solutions with low luminance levels, rational use of energy, good visibility conditions and meaningful idea. http://www.concepto.fr/portfolio_page/parc-du-quartier-de-la-caserne-de-bonne-grenoble-france-2/, <http://www.speirsandmajor.com/work/architecture/queen-elizabeth-ii-olympic-park/>, <http://www.speirsandmajor.com/work/architecture/shakespeares-new-place/>"
78. "The new smart street lighting is used to dim these lights to 60% from 11.30 pm to 6 am. The times and percentages can be changed for each light or group of lights. This enables the lights to be available when required but not otherwise. "
79. "The towns and villages of the IDSR du Pic du Midi. Les villes et vilages étoilés (The Stared Towns and villages) of 'ANPCEN in France"
80. "Recently we cooperated with a small municipality of Bezverov located in Manetin Dark Sky Area. They reconstructed their public lighting along the main road. Based on our recommendations, they replaced old, dirty and inefficient fixtures with high quality, full cut-off

- fixtures with high pressure sodium lamps, improving the illumination on the road while reducing the light trespass, uplight and glare."
81. "Use temporarily of nocturnal life to adapt the need of light "
 82. "there are everywhere sollutions for reduce the so called light pollution, but i think it would be much inportant, to reduce our values in our standards, and don't let the lobby fabricate the standards in own interest. "
 83. "Smart lighting controls"
 84. "Rest areas in West Virginia along I-64 had some great full cutoff lights. Also Clarksville, TN is installing some. I will eventually have images. Tuscon, AZ has decorative lights in the downtown area that are hard to tell are even on until you are right up under the light. The ground is well illuminated. Pickett State park replaced \"jelly jar\" lights on the cabins with decorative lighting that points down. The before and after images show how much better the porches were illuminated than before! "
 85. "road lantern for low level mounting"
 86. "The use of smart lighting ecosystems, to use light only when it's needed. <https://www.lacroix-sogexi.com/en/site/our-solutions/sensing-solutions/>, <https://www.lacroix-sogexi.com/en/site/our-solutions/our-management-solutions/>"
 87. "With LED-Elements you have the light on the streets and not behind - for exampel HQL-Elements"
 88. "Switching/dimming outdoor lights to very low levels when there is nobody at a site to use the lighting in the first place."
 89. "Some cities in France turning the lights completely off at night (1-6 am), <http://www.bordeaux7.com/bordeaux-actualites/2017/09/25/villes-de-metropole-bordelaise-eteignent-leurs-lumieres-nuit/>"
 90. "In Norway, a long portion of a country road was recently fitted with sensors that automatically increase the luminous flux emitted by the street luminaires from 20 to 100% whenever a car is spotted passing by."
 91. "dimming light and automatic turning off lights when there no people"
 92. "dimming, on-demand, smart technology, fluorescent dyes on ground to mark a path"
 93. "Obviously certified dark sky places. Locally we have some small housing developments using 3000k CCT and some small achievements with water treatment plants using warm white shielded lighting instead of unshielded"
 94. "Better armatures / shielding of light; reduction of blue light in the spectrum"
 95. "Dimming the power of lamps after the rush hours in most of the cities and villages to 10% of their maximun power will be enough to have the streets lightened and control power consumption and light pollution."
 96. "IKEA now is selling LED ambar lights very cheap and good quality. If we propote LED ambar inseide houses maybe is more easy that to implement them also in the streets because people nowadays don't know much about their existence..."
 97. https://issuu.com/mondiale/docs/arc_102/154
 98. "Starpark Hohe Rhön, https://www.sternenpark-rhoen.de/m_37080"
 99. "Street lamps that shine on the ground and not to the sky"
 100. "Full cutt off lighting with little short wave component which is only on when people need to see."
 101. "Golden Jubilee Bridges, London,"
 102. "Sheilded, flat glass LED lights"
 103. "Well designed, shielded light of yellow-orange color of the level needed for it's purpose and not more, equipped with a timer or a motion sensor when appropriate"
 104. "Motion operated street lighting for use in suburban and residential areas. The implementation of compulsory 1p.m. till dawn curfews on street lighting in these areas. Forty-five degree full cut-off lanterns that do not become visible until one is almost under the fixture. Low colour

- temperature LED lighting that does not exceed 2200K (and preferably less). An outright ban on street lighting in rural areas and small rural communities. "
105. "Please see our website"
 106. "Malvern Hills Dark skies study 2012, "
 107. "In,I believe it is, Flagstaff,USA, they have warm (amber) lighting which is soft for humans and wildlife as well as the night sky. A prime example!"
 108. "Well shielded asymmetric exterior light. Discussions on www.britastro.org/dark-skies, <http://www.need-less.org.uk/> "
 109. "turn the lights off"
 110. "REDUCE CCT OF STREET LIGHTING AND USE REMOTE CONTROL TO REDUCE LEVELS WHEN NOT REQUIRED"
 111. "LED's no higher than 2200K and with a yellow/orange hue. Fully shielding streetlights that can and will be dimmed by consensus. Headlights that are yellow not blinding white and that are forced to be properly angled. No after market headlights that break every rule."
 112. "The incoming artificial light at night law on the Island of Saint Helena."
 113. "Presence detection"
 114. "Properly pointed light fixtures. Eileen "
 115. "Municipal \"dark sky ordinances\" are becoming more commonplace in the USA: <https://www.1stoplighting.com/content/FAQdarkskies/info.aspx>, Another great example, mentioned in the same link, is that \"Lighting retailers have an icon, on the left, that designates certain items as Dark Sky compliant\" - a simple badge/icon which informs consumers that light pollution matters enough for businesses to flag it on their products, while at the same time steering consumers towards buying appropriate lighting fixtures. "
 116. "advertising signs and hoardings must have luminaries located at the top and aiming down. up-lighting to building facades to have a very narrow beam (in the vertical) so as to be aimed just below the top of the facade "
 117. "light directly on the surface to be illuminated (street, place...)"