

Local Projects

Students can weigh the impact of outdoor lighting decisions on their own community. Here are some local project ideas.

Let There Be Night is a community-wide [science experiment](#) in northern Indiana to measure how much of the night sky is already lost. It's also an opportunity for students to do activities, such as academic fair projects or current events reports, that are meaningful and valuable for their immediate neighborhood. Below are several points to get you thinking. It would be the job of the citizen-scientist to overlook any bias in the list below and to present a balanced report based on evidence.

Getting Started: See www.nightwise.org/ideas.htm for some general ideas.

1. As part of its goals and objectives review in 2006, the City of Mishawaka prepared 50 or so topic sheets and sent them to people representing a cross section of the community. Topic sheets are the forms used to gauge the level of interest in specific objectives. Of the 50 objectives, two sheets were prepared on lighting, with a background paragraph on outdoor lighting issues followed by a question. The first sheet asked people to prioritize whether **"the City should broaden our standards on commercial lighting to afford more protection to adjacent residential uses."** The second asked people to prioritize whether **"the City should broaden our standards on site lighting to provide a more holistic approach to lighting standards by working to become more dark sky friendly."**
2. The community of Edwardsburg, Michigan, is building a new sports complex with lighted baseball, football, and soccer fields. One popular lighting manufacturer has a track record of writing Little Leagues' lighting code, which often exceeds recommend IESNA class IV standards. IESNA states class IV standards are "more than adequate for players needs," but that class IV lighting has "no provision for spectators". It has been suggested that for the benefit of the people watching a game, Little League risk management and the lighting manufacturer require 30% more illumination "for the spectators needs." So, what are the intentions of the Edwardsburg Sports Complex, and are they going to install shielding to minimize light pollution?
3. A homeowner's association wants to alter the outdoor lighting at its entrances. The priority is to make their entrances readily identifiable to drivers who are looking for directions. The association is proposing to eliminate all upward pointing floodlights that illuminate stone walls with the subdivision name on them. The streetlight at entry islands would remain in place. For identity, on the post of the streetlight would be new street name signs that are illuminated from within with LED lights. What are the upsides and downsides of such changes? By how much would they lower their carbon footprint? Assess the acceptance of such a scheme by the homeowners themselves. Propose alternatives or other actions.
4. A homeowner's association with existing streetlights, pedestrian-level lights, light posts in front of every home, and entrance lighting is considering increasing its outdoor light fixtures. Investigate the upsides and downsides of such a move. Assess the homeowner sentiment, both before and after informing them of the potential impact of their decision.
5. A bright municipal streetlight may consume 250 watts of electricity. It has been suggested that each 250 watt light requires 40 mature trees to offset its carbon footprint. In your neighborhood, how

- many lights remain on at night, what is their combined estimated wattage, and what would it take to offset them?
6. Many lamp post lights have multiple small light bulbs within the fixture. One could unscrew superfluous bulbs and still have sufficient lighting. Conduct an experiment to assess what level of brightness people tolerate. For example, do they find two out of three bulbs sufficient lighting? Estimate the savings from the combined lessening of light output.
 7. The St. Joseph County Council (land use planning) is studying illuminated billboards through this winter and wants to be ready to act on regulation proposals in spring 2009, per November 19 article in the South Bend Tribune ("Billboard, windmills occupy council's time")
 8. Mishawaka illuminates new bridge, giving city "a chance to show off another element (of the bridge)," says the city planner, per November 20 article in the South Bend Tribune ("New pedestrian bridge to open Tuesday evening")
 9. By how much is the natural sky brighter because of snow covering the ground? How is the sky glow different when the ground is white? Consider using SQM with snow on ground and without.
 10. Are there enough mature trees in your neighborhood to offset the carbon footprint of the outdoor lights? Consider analogy of 40 mature trees and 250 W on the video "Dark Matters," from the [Let There Be Night DVD](#).
 11. See if people's attitude change about outdoor lighting as a result of education or dark sky advocacy. For example, compare results of same writing prompt before sample population is informed with a writing prompt result after sample population is informed. Similarly, compare results of Mishawaka topic sheets (see Question 1, above) from before and after.
 12. Measure sky glow before, during, and after astronomical twilight to confirm when sunlight no longer contributes light to the SQM readings.
 13. A few recent developments in St. Joseph County were constructed after the design firm was approached by a dark sky advocate seeking a "night friendly" design. Follow up on the developments and their respective adherence to dark sky practices. Examples include Heritage Square, Toscana Park, St. Pius X Catholic Church, and St. Joseph Regional Medical Center.
 14. A few current developments, such as Eddy Street Commons are underway after their developers met with dark sky advocates. Before the projects move far along, take some SQM readings before so you can compare with after. (A similar project was done for [Sorry Starry Night](#).)
 15. Make observations or take SQM readings that build on the following past student projects:
 1. [Sorry Starry Night](#) compares sky glow before and after retail development
 2. [Students investigate lighting issues](#) and share findings with classmates
 3. Dark Sky Team compares nightly SQM values at astronomical twilight (coming soon)
 16. Consider some previously listed [Ideas for student-directed projects](#) (from *Night Vision*)
 17. Okay, so it has nothing to do with light pollution, but some teachers brought it up. It's the end of a particularly hectic day, when someone suggests the student body restlessness is "because it's a full moon." Another suggests it's the first snow fall, which was both sudden and significant, that's causing the wholesale behavior. So, is there a correlation between full moons and student behavior? I proposed that at the end of each day they ranked that day on a scale of, say, 1 to 10. Only after they had consistently rated each day for an extended time--start on the first day of school in the future--could you compare their daily experience with a calendar of the moon. Overlay a plot of the teacher's ranking with a calendar of moon phases.
 18. The South Bend Public Transportation Corporation (TRANSPO) writes it "is building a new 160,000 square foot [bus operations and maintenance facility](#) to serve growing public transit needs in the region. Design for the new facility will incorporate sustainable design and construction strategies...to meet the silver level of certification as designated by the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) program." Report on what it takes for an entity like TRANSPO to make the proposed level of commitment to night friendly design.
 19. Conduct a lighting inventory on your school grounds. What lights are necessary, and what could be

- altered? Justify your recommendations. What would be your proposed savings to the school district?
20. Astronomer Ferdinando Patat of the European Southern Observatory suggests using the SQM to parallel what professional astronomers are doing. "Record the brightness values as the sun goes down, taking note of the time each measurement is done. Keep doing this into the astronomical twilight. Then, you will be able to produce plots like ours and you will be in the condition of judging when the sun contribution becomes negligible." See www.nightwise.org/twilight.htm for details.
 21. Fabio Falchi writes, "One of the most discussed issue in light pollution is the direct vs. indirect light in producing sky glow. In order to understand better this, I need a number of measures taken with and without snow coverage in the 100 km surrounding the site. Sites far from sources will be affected less by the indirect light while sites near cities or inside cities will be more affected by the indirect. With the SQM reading I'll need also:
 - the transparency of the night (at least in a qualitative way: extremely clear, very clear);
 - the snow coverage at the moment of the measure: for example, main streets (10% of total) clean but sidewalks and surrounding covered, secondary streets half covered, countryside and roofs covered. All in a radius of 80 km. Other example: all streets clean, sidewalks still half covered, surrounding in the country covered. Probably some of you already have several measures taken in the same site with and without snow. Who would help me in this field can contact me directly or in this list."
 22. Build twilight "Light Sensors" to study the effects of light pollution on fireflies. See The American Biology Teacher, Online Publication, February 2008, at www.nabt.org/sites/S1/File/pdf/070-02-0006.pdf.
 23. Create a podcast related to dark skies issues for [365 Days of Astronomy](#).
 24. Build a model of good and bad light fixtures with a light meter to suggest the value of each fixture.
 25. Lead your community in participating in [Earth Hour](#). Conveniently, Earth Hour 2009 was the closing weekend of the 2009 Globe at Night star count.
 26. Ask local gallery or site to host [From Earth to the Universe](#).
 27. Contribute a drawing that features the night sky to "Sketch the Sky" in the South Bend Tribune, hosted by News22 Meteorologist [Cari Peugeot](#).
 28. Name the next Mars Rover in a NASA contest at <http://marsrovername.jpl.nasa.gov/>.
 29. Enter the [Astronomy Music Video Contest](#) by synchronizing your images to the lyrics of "Shoulders of Giants"; sponsored by the Johannes Kepler Project.
 30. Build your own pop bottle magnetometer and participate in [Aurora Watch](#).
 31. Observe and record color, pattern, and location during a [Firefly Watch](#). What's up with fireflies?
 32. Do pupil dilation experiments to demonstrate the effects of light pollution. Adapt from [CfDS experiments](#) at <http://www.britastro.org/dark-skies/education.html?20>.
 33. See <http://www.nightwise.org/projects.htm> for other existing projects you can join.
 34. YOUR GREAT IDEA HERE!

You can contact Chuck Bueter at imagine@lettherebenight.com to follow up on any of these points.

Be an Agent of Change: [Siemens We Can Change the World Challenge](#) offers opportunity for small student teams.



Scientific Method

Galileo launched the scientific method. We will try to continue those ideals with our [application of the scientific method](#) in *Let There Be Night*.

1. Define the question/problem.

By how much have we degraded the night sky from its natural state? How can PHM and the

community lessen its impact on the night?

2. **Gather information (observe) and resources.**

Planetarium visit; www.LetThereBeNight.com; Let There Be Night DVD; recommended books; Orion star charts; Sky Quality Meters.

3. **Form hypothesis.**

Local outdoor lights have quantifiably brightened the sky throughout the boundaries of PHM. PHM and the community can take several identifiable steps to improve its outdoor lighting.

4. **Perform experiment and collect data.**

All students observe Orion and contribute their data to the 2009 Globe at Night star count while small teams quantify sky glow from each PHM school with hand-held meters.

5. **Analyze data.**

During the last two weeks of March 2009, students will share their findings in class and on a school boundaries map. Online or other digital resources will map the district-wide results, which will be shared and compared with the global community.

6. **Interpret data and draw conclusions.**

Teachers will guide discussions about the experience; about emerging trends from the data; and about how we prioritize the tradeoffs of outdoor lighting technology. The combined school teams will meet to make recommendations on how PHM can save money and energy while lessening its footprint on the night sky.

7. **Publish results.**

May 11th PHM School Board meeting; national publications; websites.

Contact Us at imagine@LetThereBeNight.com

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