



Jenny Watts, M.A.S., has more than eight years of aviation planning, corporate aviation operations, airport administration, and aviation education experience. Ms. Watts has worked at large commercial service and general aviation airports in the Phoenix-Metro area, directly contributing to airside/landside operations, community relations, planning, and business development. Ms. Watts spent two years at Embry-Riddle Aeronautical University Worldwide as an advisor and adjunct faculty member. She obtained a Master of Aeronautical Science degree with emphasis in Aviation Management from Embry-Riddle Aeronautical University Worldwide in 2009, and a Bachelor of Science degree from Arizona State University in Aeronautical Management Technology in 2003. She has been affiliated with the Arizona Airport's Association for over fifteen years. She is also a freelance contributing writer for the *Arizona Aviation Journal*.

FOR MORE INFORMATION, contact Armstrong's Mesa office at 602-803-7079, or e-mail jwatts@armstrongconsultants.com.

Share the Sky – Good Neighbor Tips for Airports Near Dark Sky Communities and Beyond

As aviation professionals, we have a respect for the sky, and all things in it. Aviators are not the only group to have great admiration for all things “up above;” astronomers also play a key role in understanding our sky, atmosphere, and the great void beyond. Aviators and astronomers must cooperate to protect our ability to study this vast expanse.



The Science of the Sky

The southwestern United States is an astronomer's paradise. Largely devoid of people and civilization, this region is home to a massive base of hobbyists and professional astronomers. In fact, Arizona is home to three of our nation's largest telescopes: Lowell Observatory outside of Flagstaff, Kitt Peak National Observatory outside of Tucson, and Mount Graham National Observatory near Safford.

Astronomy is also big business for our state. According to the Arizona Commerce Authority, Arizona's most recent advancements in astronomy, planetary, and space sciences research has generated an estimated \$252 billion and 3,300 jobs for Arizona.

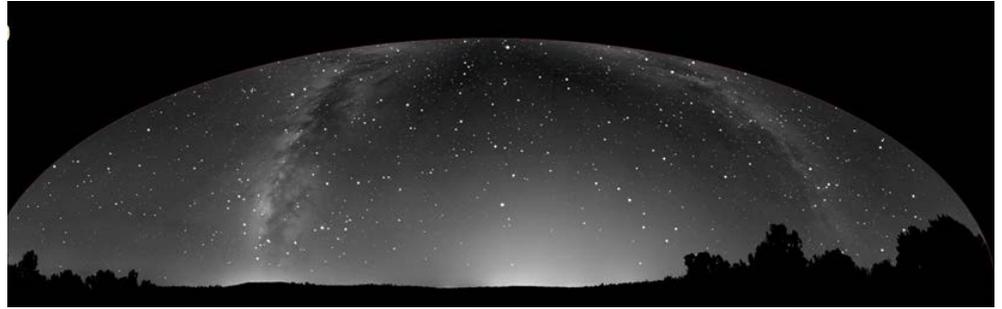
The quest for the perfect night sky is so important to both professional and amateur astronomers alike that several organizations have been created over the last several decades to help advocate for the astronomy community and for the pristine dark sky. Perhaps the best known is the Tucson-based International Dark-Sky Association (IDA). Founded in 1988, the IDA is a non-profit organization that is dedicated to protecting the night skies for present and future generations through advocacy, education, environmental responsibility, and promotion. They are recognized as an authority on light pollution, and are the leading organization combating light pollution worldwide. Some of the most notable outcomes of the organization include its Dark Sky Places program, its collaboration with the Illuminating Engineering Society (IES) to create a joint Model Lighting Ordinance for use by communities, and its establishment of Dark Sky Compliant standards for lighting fixtures.

What is light pollution?

The IDA defines light pollution as: “Any adverse effect of artificial light including sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste.” Simply stated, light pollution is excessive, misdirected, or obtrusive artificial light; it's the pale-yellow foggy quality in our skies that often blocks the views of the stars and other celestial bodies. Light pollution is a negative component of today's modern society for several reasons: It competes with starlight in the night sky for urban residents, interferes with observatories, disrupts ecosystems, and has adverse health effects.

Astronomy is big business in Arizona. Recent advancements have generated 3,300 jobs and an estimated \$252 billion in revenue.

- Arizona Commerce Authority



Sky glow, depicted as a dome of light in this diagram of Flagstaff, Arizona, limits the ability of hobbyists and researchers to visually scan the sky.

There are several categories of light pollution, but the most relevant for astronomers is known as **sky glow**. Sky glow refers to the glow effect that can be seen over populated areas. It is the combination of all reflected light escaping into the sky. Sky glow is attributable to poorly directed light that is being scattered by the atmosphere back toward the ground. This phenomenon reduces contrast in the night sky to the extent that it may even become impossible to see any of the brightest stars!

Although most large optical observatories are surrounded by zones of strictly enforced restrictions on light emissions, and some telescopes even have light pollution reduction (LPR) filters, it may still be possible for sky glow to occur in nearby densely populated areas. Light pollution puts research at risk and can undermine the ability to capture visual images. For amateur astronomers, sky glow may make it nearly impossible to observe the night sky from one's own property.

Dark Sky Communities and Dark Sky Compliance

One of the most important programs within the International Dark-Sky Association is known as Dark Sky Places. The program was started in 2001 to encourage communities around the world to preserve and protect dark sites through responsible lighting polices and public education.

The five Dark Sky categories:

- International Dark Sky Communities
- International Dark Sky Parks
- International Dark Sky Reserves
- International Dark Sky Sanctuaries
- Dark Sky Developments of Distinction

Airports should be most interested in the Dark Sky Communities.

An official Dark Sky Community is “a town, city, municipality or other legally organized community that has shown exceptional dedication to the preservation of the night sky through the implementation and enforcement of a quality outdoor lighting ordinance, dark sky education, and citizen support of dark skies. Dark Sky Communities excel in their efforts to promote responsible lighting and dark sky stewardship, and set good examples for surrounding communities.” Arizona is home to three such communities, all located relatively close to one another, which has resulted in the densest grouping of IDA Dark Sky Communities in the world. The communities include Flagstaff, Sedona, and Big Park/Village of Oak Creek.

The City of Flagstaff led one of the world's first coordinated legislative efforts to reduce the adverse effect of light pollution on the environment.



Setting an example: Flagstaff as a model city

Outdoor lighting ordinances have been on the rise in Dark Sky Communities and in numerous cities, towns, and rural areas all across the country. In fact, according to the Flagstaff Dark Skies Coalition, the City of Flagstaff led one of the world's first coordinated legislative efforts to reduce the adverse effect of light pollution on the environment; nearly three decades of ordinance development has taken place that has been fully supported the municipality, local government agencies, local observatories, and community advocates.

The City's lighting ordinance in place today is definitely a local example that other communities seeking such legislation can look to for guidance. With the help of the IDA, communities can not only advocate for the preservation of their night sky, but they can also use the Model Lighting Ordinance to develop their own, and look for and use IDA approved "Dark Sky Compliant" lighting fixtures that have been designed to reduce upward light reflection, glare, trespassing light, inefficient energy uses, and urban glow.

What does Dark Sky have to do with my airport?

So as an aviation or airport professional, one might ask, "How does this pertain to airports?" or "What does Dark Sky compliance have to do with my airport?" To answer that, one must first recognize that airports, regardless of their size, often utilize a lot of lighting. From runway and taxiway lights, to signage, to navigational aids and beacons, to parking structures, buildings, and aircraft hangars, airports are always in some way or form illuminated. As they should be – most lighting on or around airports serves the specific purpose of navigational, directional, and way-finding purposes, all with the safety of users in mind, both in the air and on the ground. In fact, airfield lighting and other safety related lighting, such as obstruction lights found on power lines, cell towers, and tall buildings, just to name a few, are regulated by the FAA. Because of that, airports are most certainly exempt from any type of municipal or county ordinance regarding outdoor lighting, especially airfield lighting used specially for navigation and safety, e.g. runway/taxiway lights, rotating beacons, and visual glide slope indicators, etc.

Dark Sky initiatives can help your airport save money while preserving the environment.

Reconsider your lighting solutions for:

Aircraft hangars
Terminal buildings
Parking lots
Tenant buildings

Overly aggressive, inefficient lighting fixtures are good candidates for reduction, replacement, or retro-fitting.

What about areas of the airport that are not related to the airfield lighting?

Think about your lighting strategies for aircraft hangars, terminal buildings, parking lots, and other tenant buildings. These areas are not in need of aggressive or misdirected lighting. Inefficient lighting is often a problem at those structures. What if, as an airport administrator, you could cut down on the airport's energy consumption, lessening environmental impact and expenditures, and at the same time become a better neighbor to your local community? It's simple: All you have to do is think about reducing, retro-fitting, or replacing lighting in certain areas of your airport.



One way to promote Dark Sky compliance: Reconsider your hangar lighting scheme.

So, why should Dark Sky measures really matter at your airport?

1. Sustainability measures at airports, which include energy consumption and efficiency (and to a lesser extent Dark Sky compliance) have become increasingly more sought-after by local municipalities and the FAA.
2. Increasing the customer service and overall "good neighbor" reputation can improve your standing in the community.

Your airport will become an example of good stewardship towards the environment and to its community. It is a small concept that can reap huge benefits, both tangible and intangible.

Arizona airports leading the way

Two great examples of Arizona airports that are leaders when it comes to Dark Sky compliance: Flagstaff Municipal Airport and Tucson International Airport. Both have committed to the cause fully in an effort to support their local community efforts and Dark Sky advocates.

As previously mentioned, the City of Flagstaff is an IDA International Dark Sky Community; the entire community is very committed to keeping it that way, not only for themselves, but for those who visit the area from all reaches of the globe. Thus, when the Flagstaff Municipal Airport (FLG) began its Airport Sustainability Master Plan in the fall of 2014, it was paramount for airport management to include Dark Sky compliant measures in the plan. In fact, with regards to the Dark Sky measures within the sustainability master plan, one of the goals set by the team working on the project is for FLG to "become the most IDA Dark Sky compliant commercial service airport in the nation." They are well on their way, as the plan outlines areas on the airport where lighting fixtures should be replaced with shielded-fixtures, the conversion of the parking lot lighting to timers and increased shielding, replacing airfield lights

Tucson and Flagstaff continue to set the standard for Dark Sky compliance in the aviation community. In fact, the Tucson Airport Authority was awarded the IDA's prestigious Lighting Design Award in 2015, demonstrating a major commitment to the scientific and astronomy hobbyist communities.



The Tucson Airport Authority, which oversees Tucson International Airport (TIA) was the 2015 recipient of the IDA's Lighting Design Award.

(where applicable) to LED fixtures, and removal of unnecessary lighting outside of the terminal, just as several examples. For FLG, the Dark Sky Community affiliation is really a core element of the community character, and the airport wanted to be a part of that.

Although the City of Tucson is not an official IDA Dark Sky Community, astronomy plays a huge role in the community, and there are many supporters to the IDA's cause. This second example of an airport becoming more neighborly and in touch with its community's desires is found at Tucson International Airport (TIA), run by the Tucson Airport Authority (TAA). In March 2015, the IDA presented the Tucson Airport Authority and its engineering firm with their Lighting Design Award. Criteria for the award includes :

- freedom from glare
- rational lighting levels
- energy efficiency
- good nighttime ambience
- minimal obtrusive light
- minimal contribution to sky glow

The award recognized a project at TIA that involved the replacement of more than 650 lighting fixtures with energy-efficient LED lighting. The project included lighting around the airport terminal, including aircraft parking aprons, roadways, parking lots, and the parking and car rental garages. Many of the previous light fixtures were unshielded, or only partially shielded, but all of the new LED fixtures are fully shielded with no direct light emitted above the horizontal plane. Again, this example illustrates initiative on behalf of TIA and the Authority to increase its sustainability and good neighbor efforts for the general public that holds the preservation of the night sky as a priority.



For more information about using Dark Sky compliance strategies at your own airport, contact our Mesa, Arizona, office at 602-803-7079.

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Dark Sky Tips for Airports

We know you want to be a good neighbor, so here are some tips from the IDA for mitigating light pollution at your airport.

- Always choose full-cutoff fixtures that emit no light above a horizontal plane passing through the light-emitting element of the fixture nearest to the ground,
- Use “warm-white” or filtered LEDs (CCT \leq 3000 K) to minimize blue emission,
- Look for products with adaptive controls like dimmers, timers, and motion sensors,
- Consider dimming or curfew requirements during overnight hours,
- Avoid the temptation to over-light because of the increased efficacy of LEDs,
- Only light the exact space and in the amount required for particular tasks,
- Evaluate existing lighting plans, and re-design some or all of the plans depending on whether the existing light is actually needed.

Whether starting small by simply switching to more energy-efficient light fixtures – or by thinking on a larger scale by incorporating these initiatives into your next airport master plan sustainability master plan, or airfield engineering designs – share the sky with those around you. **The outcome can only be bright – make your airport a shining star within your community.**