

Implementing the recommendations

La Palma, Canary Islands, Spain

3 - 7, October, 2021

Framework for Technical Guidance

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Goal and Framework

- Given the urgency of the issue, the goal is to reduce, stop and reverse the growth of ALAN on a one-decade timescale.
 - This goal goes against the two trends of population and economic growth, both of which tend to produce more ALAN if lighting is not thoughtfully managed.
- The framework proposed for endorsement has recommended approaches to achieving the goal.
- Protection of observatory sites, dark sky places and bio-environment and human health is enabled in all three cases from adoption of the technical recommendations.



Implementing the recommendations

La Palma, Canary Islands, Spain

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1. Unified recommendations





Implementing the recommendations

La Palma, Canary Islands, Spain 3 - 7, October, 2021

1. Lighting Masterplan and Efficient Design

- Requirements include measuring ALAN contribution to sky glow, with sufficient angular resolution to note changes in individual major sources.
- Temporal measurements are also required to establish the current baseline and subsequent changes.
- Based on that information and predictive modeling, stakeholders set targets.
- Lumens caps and limits on development are essentially implied.



Source: Costis Bouroussis



La Palma, Canary Islands, Spain

3 - 7, October, 2021

2. Adaptive Control

- Dynamic control of lighting systems, e.g., for roadways, work or pedestrian areas enables dynamic usage zoning.
- Set to minimum level of illumination consistent with safety based on usage, either instantaneous or pre-set periods relative to sunset and usage patterns.





Source: Costis Bouroussis



Implementing the recommendations

La Palma, Canary Islands, Spain 3 - 7, October, 2021

3. Spectral Tuning

- At minimum, sharply limit blue light content for protection of natural areas, health;
- Wherever possible, employ near-monochromatic for protection of near zones of observatories and critical dark areas.
- For near zones of protection, start from the assumption that no color rendition is required, allowing exceptions for strongly made cases for safety.







4. Nominal and adaptive lighting classes for outdoor areas

- Don't exceed 20% of design illumination based on lighting class of zone.
- Use adaptive control and dynamic zoning.
- CIE research-based recommendations for all safetyrelated levels, noting the pressure on their evolution to lower levels.
- More stringent guidelines can/should be adopted for decorative illumination and advertising, such as IES/IDA.
- Critical near zones start from the assumption that no lighting is permitted, then considering safety-based exceptions.







La Palma, Canary Islands, Spain 3 - 7, Octob<u>er, 2021</u>

5. CIE zoning system with associated limits

- Defining the geographic locations of the appropriate lighting zone class is critical for adequate protection.
- In Zones E0 and E1, the approach is to require operators/developers to prove that they need any illumination and that they need any color rendition if so.
- In the context of a regional lighting plan, some areas may not be allowed to reach the limits allowed in a lighting zone overlay, in order to stay within the regional totals.









Source: Costis Bouroussis



6. Skyglow limits for protected areas

- Sky luminance levels should be kept below certain levels which start from <260 µcd/m² for Optical Observatories, DSAG class 1 areas, and up to 750 µcd/m² for Dark Sky Community, rural, DSAG class 6b.
- For optical observatories and critical Dark Sky places, these upper limits may be much brighter than current levels. Protection must be based on current measured site quality and the locally agreed maximum ALAN contribution to additional sky brightness.



Source: Costis Bouroussis



7. Façade lighting and colorful illumination

- The initial assumption is that all outdoor lighting be fully shielded.
- No façade or lighted advertising in Zones E0 and E1.
- Directionality is a key element to control of sky glow - highly controlled/shaped beams if ever above horizontal.



Source: Costis Bouroussis

La Palma, Canary Islands, Spain



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8. Lighting measurements and monitoring

- The appropriate instrumentation and methods should be used for the measurement, assessment and monitoring of the sky-glow and the sources of obtrusive light.
- A standardized metrology system for light pollution based on traceable instruments should be developed and used by the different disciplines.
- Measurements should be readily available through national and international reference databases for key sites.





Source: Costis Bouroussis



Implementing the recommendations

La Palma, Canary Islands, Spain 3 - 7, October, 2021

9. Commercial and military flights planning

Civilian regulators and military flight planners should exclude the observatory near zones from approved flight paths and keep those paths as far from observatories as practicable.



Source: Pete Mauney



Implementing the recommendations

La Palma, Canary Islands, Spain 3 - 7, October, 2021

10. Need for research

- Interdisciplinary research among lighting, medical, and environmental research communities on the effects of artificial light at night on human health, on flora and fauna, on visibility levels and public safety, on thresholds for impacts on humans and natural species and other should be strongly encouraged and supported by national funding agencies.
- The research must use correct metrics and lighting research methods to ensure the results can be communicated between disciplines and implemented





La Palma, Canary Islands, Spain 3 - 7, October, 2021

11. Long-term targets

 A long-term strategy should be developed in terms of international, national or regional regulations, to ensure mitigation of unwanted effects of light pollution, to establish standardized measurement systems, for revision of relevant lighting standards and for the promotion of lighting education.



• Evolution from the experience of the regions that are early adopters of the master plan approach for wider application.



Thank you for your attention!