REDUCING LIGHT POLLUTION
IN THE NORTH SEA REGION

A GOOD PRACTICE STORY COLLECTION

Interreg North Sea

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North Sea

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CONTENTS

ABOUT THESE STORIES

These good practice stories are part of the Interreg North Sea DARKER SKY Project. Across six regions in the North Sea Region, we work with communities, harbours and cities to reduce light pollution in ways that fit local needs to increase biodiversity and ecological connectivity.

The stories are gathered from our project partners and connected stakeholders. They share experiences from their own regions and from the work they are doing within the project. All stories were collected during the first two years of the project in 2024-2025. **Some describe earlier moments in time, and in many places important steps have already been taken since then.** For the latest developments, we invite you to follow our news and articles on the project website and on LinkedIn.

The aim of this collection is to inspire and to share practical insights. **The stories can be used as examples, conversation starters or reference points for others who are working on lighting, biodiversity protection, planning or community processes.** They show how different places deal with light at night and how solutions can grow step by step.

The settings and approaches vary widely: from small villages and islands to harbours, cities and universities. What connects all stories is a shared way of working: **bringing people together, balancing safety, everyday use and nature, and learning through practice rather than fixed solutions.**

Each story stands on its own. Readers can start wherever it feels most relevant to their own context. Every story begins with a short overview to give orientation, followed by the full text with more detail. Each story reflects the situation at the time of writing. The timeframe of interviews and writing are indicated to help place the stories in context.

Enjoy reading! We hope the stories give you ideas and perspectives you can take with you.

LAUWERSOOG

THE NETHERLANDS

SETTING

- **Timeframe**: as of June 2024
- Seaside harbour village in the Netherlands, located between the Wadden Sea UNESCO World Heritage site and the Lauwersmeer Dark Sky Park
- **Community-led development** of a "Masterplan Darkness" to reduce light pollution while maintaining safety and harbour operations.

MAIN STAKEHOLDERS

- Harbour Coalition, port management, harbour community and local residents
- Local businesses and ship operators
- Environmental and nature protection organisations
- Municipalities and provinces
- Visitors and neighbouring coastal towns/ports
- DARKER SKY Project team

KEY TOPICS

- Light pollution and its ecological and human health impacts
- Harbour safety and economic needs
- **Community engagement and participatory planning**
- Sustainable lighting solutions and infrastructure adaptation

KEY APPROACH

- **Co-creating the "Masterplan Darkness" with community input**
- Replacing outdated lighting with dark-sky-friendly, shielded, warmer-colour fixtures
- Targeted changes in the harbour area first, then the village
- Aim to reduce light emissions by 50% by 2026
- Public engagement encouraging voluntary light reduction and awareness

IMPACT

- **Extension to whole municipality planned**
- Strong positive local reception and early voluntary adoption of lighting changes
- **Strengthened community identity and environmental stewardship**
- Raised regional interest: neighbouring ports are observing and considering similar action
- **Establishing Lauwersoog as a demonstrator and role model for balancing economy, safety and nature protection**

"GIVING DARKNESS, NOT TAKING LIGHT."

Giving Darkness, Not Taking Light: Engaging Everyone for a Darker Sky

© Theo Jurriens

Lauwersoog, a seaside village nestled on the edge of the Wadden Sea, has always been a place where land and water intertwine. But recently, it faced a dilemma: How could it keep its dynamic harbour economy running safely while preserving the tranquillity of the night sky?

In this active harbour community, light is essential. It guides ships safely into the harbour, illuminates neighbourhood streets and ensures the safety of residents, visitors and harbour workers. But there's a catch.
Lauwersoog's lies very close between to the highly protected Wadden Sea UNESCO World Heritage site and the Lauwersmeer Dark Sky Park. That means that every artificial beam of light has consequences. It spills into the natural darkness, disrupting predator-prey dynamics, confusing the navigation of local and migratory species and unsettling their reproductive patterns, ultimately impacting entire ecosystems.

Beyond its toll on wildlife, light pollution also disturbs our circadian rhythms and well-being. This issue takes on added urgency as the Netherlands ranks as Europe's third most light-polluted country.

Despite many other successful initiatives protecting local nature, the challenge of addressing light pollution remained yet unaddressed in Lauwersoog.

Enter the "Masterplan Darkness". It's not a cloak-and-dagger operation or imposed new decree; rather, it's a community-driven strategy to strike a delicate balance. **The motto? "Giving darkness, not taking light." The goal? To protect nature without casting the village into total darkness.**

Inducement stemmed from other successful sustainability initiatives in the region and was motivated by the allure of the Dark Sky Park. As part of the DARKER SKY Project, a dedicated harbour project team was ready to act. A first inventory revealing excessive light pollution in Lauwersoog's harbour initially stunned the community. But it quickly spurred them into action.

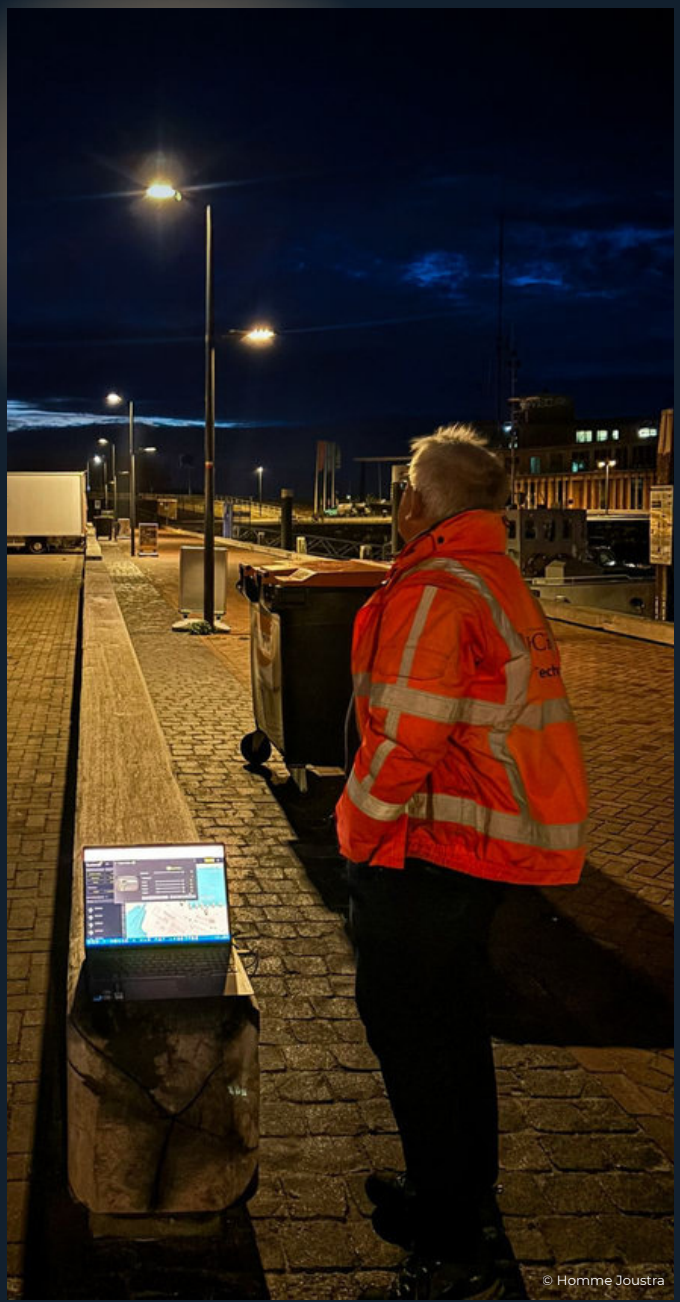
So, the Masterplan didn't emerge from a secret council chamber. Instead, it unfolded amidst the community. Residents, business owners and environ-mentalists came together in meetings, discussing concerns and sharing perspectives to develop a plan for change.

They discussed light levels, safety concerns and the delicate dance between safety, progress and preservation. **The result? A blueprint masterplan that harmonized human health and safety, economic vitality and environmental stewardship.**

This initial planning focuses on renewing the lighting in Lauwersoog, with the harbour area taking centre stage. Yet, the vision extends beyond the harbour, it includes the village also. Over the next year, dark-sky-friendly lighting will replace outdated fixtures at areas like harbour piers, docks, building exteriors and village streets. Height, colour, shielding and brightness - all carefully considered features - will contribute to this transformative change towards a 50% light emission reduction by 2026.

But the Masterplan Darkness isn't just about wattage, lux and lumens. It is about hearts and minds. The community needed to see darkness as a gift, not a loss. The project team is currently launching educational campaigns, motivating everyone to dim lights of their ships, turn off late-night advertisements or interior lighting and embrace energy-efficient alternatives. By showing the positive outcomes, like better health and biodiversity, the community became more supportive and excited about the plan.

How's the progress so far? The responses have been overwhelmingly positive. **Early adopters - businesses and residents alike - have enthusiastically embraced the change.**
They've shown full commitment by already reducing their light emissions either by changing or switching off their business or private lighting. This initiative has leveraged the community's existing environmental awareness, strengthened bonds and is propelling them toward new sustainable goals.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And neighbouring ports? They perked up, curious about this village that dared to redefine progress and expressed interest in joining dark sky protection efforts.

Lauwersoog dreams big. **As a community driven demonstrator site of the DARKER SKY project, it envisions itself as a model, a place where industry, recreation and nature coexist harmoniously.**

By celebrating darkness, not fearing it and embracing the balance between people, economy and nature, this harbour hopes to inspire others across the whole North Sea region.
Perhaps one day, as towns across the region look up to their own star-filled skies, they found inspiration in Lauwersoog's commitment to giving darkness, not taking light.

ABOUT

Interview took place in **June 2024** with Klaas Laansma (Harbour Coalition Lauwersoog)

Main project partners

- Nynke Visser & Reynier Peletier, University of Groningen
- Piet Zijlstra, PolyCiviel
- Klaas Laansma, Harbour Coalition Lauwersoog

LEARN MORE

about Lauwersoog and current progress

- Introducing Our Pilot Sites: Lauwersoog
- Night of the Nights Event in Lauwersoog 2025
- DARKER SKY News
- DARKER Pilot Site Lauwersoog

MORE GOOD PRACTICE FROM THE LAUWERSOOG AREA
The transformation of lighting at the Lauwersmeer military base


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SPIEKEROOG

GERMANY

SETTING

- **Timeframe**: as of September 2024
- Small car-free island in the Wadden Sea, Lower Saxony, Germany; part of the Lower Saxon Wadden Sea National Park; village with ~800 residents and seasonal tourism.
- Spiekeroog's successful **development and certification as a Dark Sky Community** and the **use of darkness as a tourism and conservation asset.**

MAIN STAKEHOLDERS

- Island municipality and mayor
- Lower Saxon Wadden Sea National Park Authority (NLPVW)
- Astronomer Andreas Hänel
- Island residents and local businesses
- National Park House Wittbülten and trained Dark Sky Guides
- Visitors, tourists, and nature enthusiasts

KEY TOPICS

- Protection of natural darkness and reduction of light pollution
- **Development of an island-wide lighting concept**
- Community involvement and public awareness
- **Dark sky tourism and guided night experiences**
- Ecological preservation and energy efficiency

KEY APPROACH

- **Implementation of IDA-compliant lighting concept (reduced brightness, shielding, warm light tones)**
- Dimming and reprogramming existing lights; replacing fixtures in sensitive areas
- Community outreach and reassurance regarding safety and cost benefits
- Establishment of designated stargazing and educational sites
- **Development of guided dark sky tourism offers and training of specialized guides**

IMPACT

- **Island achieved official Dark Sky certification**
- Energy costs reduced by approx. 70%
- Increased awareness of biodiversity-light pollution links
- Growth in demand for dark sky experiences, especially in off-season
- **Strengthened island identity and reputation as a sustainable tourism model**
- Inspiration for neighboring regions to pursue similar paths

"SPIEKEROOG IS LIGHTING THE WAY FOR THE FUTURE OF DARK SKY TOURISM."

Turning Darkness into a Tourism Asset on Spiekeroog

On the small Wadden Sea island of Spiekeroog, nature is a constant companion. Without cars, with only the sound of waves, winds and bicycles, the island offers an escape to tranquillity and, above all, to the stars. Beneath one of the darkest skies in northern Germany, Spiekeroog is setting an example of what it means to embrace the night.

But this journey towards the active protection of darkness did not happen overnight. It began with repeating questions posed to astronomer Andreas Hänel at the Osnabrück Planetarium: why had the extraordinary starry skies of the East Frisian coast and its islands not yet received the recognition of a Dark Sky certification?
In line with the 2018 Leeuwarden Declaration, which emphasised measures to reduce light pollution, Hänel and the Lower Saxon Wadden Sea National Park Authority (NLPVW) identified Spiekeroog as the ideal candidate for a Dark Sky certification.

The island's unique conditions provided an ideal foundation: the majority of its area is strictly protected as part of the Lower Saxon Wadden Sea National Park, while the inhabited village, home to 800 residents and welcoming 63.000 overnight guests annually, provides a car-free infrastructure**. Initial measurements confirmed the island's exceptional darkness.** In some areas, after public lighting was switched off at 00:30, the sky brightness was lower than Hänel had recorded in hundreds of other locations: 22,1 mag/arcsec2.

Balancing light and darkness in Spiekeroog's lighting concept

Achieving Dark Sky certification required strong collaboration and commitment. Spiekeroog's mayor at the time, Matthias Piszczan, spearheaded the effort, alongside with the island's council, the NLPVW, the island's National Park House Wittbülten and Andreas Hänel. Since most light sources to be regulated were within the village, the application was submitted for the entire island as a Dark Sky Community, supported financially by the EU funded Dutch-German Interreg project "Wadden-Agenda 2.0".

Together, a lighting concept was developed according to International Dark-Sky Association (IDA) certification standards which balanced diverse needs: **reducing light pollution while ensuring safety for pedestrians and cyclists, meeting legal and financial constraints and convincing residents and businesses of the benefits.**

According to this thoughtful lighting concept, tailored to pedestrian use, focusing on minimal and directional lighting for orientation, the transformation began. Public lighting was either substituted with new fixtures or adapted to the IDA standards. Previously installed 68 fixtures with modern LED modules and a 3000 Kelvin (K) colour temperature already aligned with IDA guidelines. However, their excessive brightness (40–60 lux) and partial shielding created glare and failed to fully meet expectations.

The solution? A hands-on approach. Mayor Matthias Piszczan personally reprogrammed each of the 68 lights, reducing their luminous flux to 30%. This adjustment not only achieved IDA compliance but also enhanced energy efficiency and extended the LEDs' lifespan. Meanwhile, in the environmentally sensitive areas along the beach promenade and national park access paths, new fully shielded fixtures with a 2200K colour temperature replaced the older lights, safeguarding the island's protected landscapes.

The result? Energy costs were reduced by 70% and the new lighting proved safer, more efficient and far less intrusive. Even the island's harbour, a critical and traditionally bright are, updated its lighting concept. During peak working hours, particularly when ferries arrive and depart, the colour temperature is set to 3000 K, while for the rest of the night, it is dimmed to warmer 1800 K.

Community engagement built on a shared appreciation for nature

For Spiekeroog's success, community engagement was vital. Despite the challenges posed by the pandemic, efforts to inform and involve residents remained. Press coverage played a crucial role, keeping the public updated on progress and highlighting the benefits of the new lighting concept.
Convincing the islanders, however, proved to be less of a hurdle than expected. With a community of residents and visitors who

share a deep appreciation for the island's nature, acceptance came naturally. The mayor, a former police officer, reassured locals about safety concerns, explaining that reduced lighting can still provide a safe environment when lamps are strategically placed to ensure clear visibility along pathways. His message was clear: the changes prioritized safety and protected the island's environment. Cost savings also won over residents. The lighting upgrades reduced energy costs significantly, a tangible benefit that resonated with many practical-minded islanders.

Visitors, many of whom are nature enthusiasts and academics, embraced the changes. For them, the island's protected environment is a major draw and the lighting adjustments further enriched their experience. Repeated visitors even celebrated each newly installed lamp, seeing it as another step toward preserving Spiekeroog's unique charm.

Tourism: embracing the dark sky potential

The island's newfound status as an IDA certified stargazing destination has opened doors for Dark Sky tourism. The NLPVW installed three dedicated observation points on the island in collaboration with the National Park House Wittbülten:

- The "**Light Place**" where the impact of artificial light from the mainland and on the sea is visible.
- The "**Dark Place**" nestled in a dune valley, completely free of artificial light.
- The "**Stargazing Place**" is equipped with reclining benches and railings, perfect for stargazing.

The tourism office and National Park House Wittbülten coordinate and offer the highly demanded guided night walks and educational programmes, all receiving very positive feedback. A main aim of the NLPVW is to strengthen the awareness about the link between biodiversity and dark skies. To ensure well-trained guides for these activities, a dedicated training for Dark Sky Guides was initiated by the NLPVW, provided by "Ländliche Erwachsenenbildung in Niedersachsen e. V. (LEB)". These trained guides now lead tours through the night, spreading awareness and knowledge about the night sky and light pollution.

Though the island has yet to see a significant increase in visitor numbers. What has grown noticeably is the interest in Dark Sky experiences, with an expected shift towards off-season tourism. With the best conditions for stargazing found in the spring, autumn and even winter months, Spiekeroog is adapting its offers to cater to this demand, focusing on the quieter seasons when visibility is at its peak. National press coverage has

boosted awareness and partnerships with the Bochum Observatory have allowed the island to offer specialised astronomy presentations and family-friendly night sky activities.

However, the journey towards developing robust Dark Sky tourism is not without its challenges. For example, managing expectations during cloudy nights requires flexibility, as visitors are still taken on tours and offered alternative narratives, learning about light pollution and the stars they may not see.
Despite these and other obstacles, the island remains committed to enhancing its Dark Sky offerings, with the hope that increased awareness will ultimately highlight Spiekeroog's Dark Sky status as a unique selling point for the region.

Lighting the way for the future of Dark Sky tourism

Achieving Dark Sky certification was a monumental effort that strengthened the island's identity. Strong dedication, commitment and teamwork by everyone involved made it possible. **Spiekeroog's success demonstrates the potential of Dark Sky tourism to bring economic benefits while staying true to ecological preservation.** Despite challenges such as limited resources, staff shortages and unpredictable weather, the island is fulfilling this potential as best as possible, offering unique and inspiring experiences to visitors and thereby creating dark sky ambassadors.

Beyond boosting local tourism, Spiekeroog's Dark Sky initiatives are paving the way for others. By sharing its journey, the island serves as a lighthouse for communities across the North Sea Region, showcasing what's achievable even in remote settings with similar constraints.
Spiekeroog is already inspiring neighbouring islands to embrace Dark Sky tourism. Certified or not, these destinations are adopting stargazing activities, proving that the desire to reconnect with the night sky is universal.

By leading the way, Spiekeroog highlights the transformative power of collaboration and serves as a model for sustainable, nature-focused tourism across the North Sea Region.

ABOUT

Interview took place in **September 2024** with Andreas Hänel (Association of Startgazers) and Katrin Kirfel (NLPVW)

Main stakeholders

- Spiekeroog municipality
- Astronomer Andreas Hänel
- Lower Saxon Wadden Sea National Park Authority (NLPVW)
- National Park House Wittbülten

LEARN MORE

- Dark Sky: Spiekeroog
- Star Island Spiekeroog (German)
- Our Partner Meeting on Spiekeroog
- DARKER SKY News

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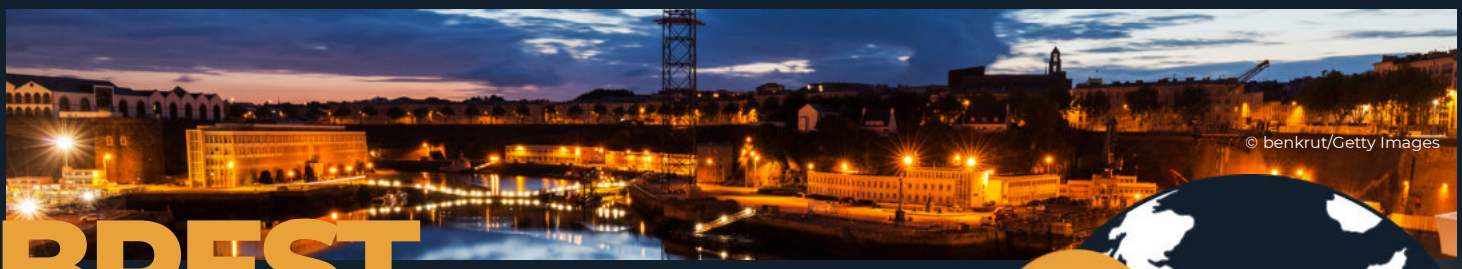

BREST

FRANCE

SETTING

- **Timeframe**: as of December 2024
- Large coastal city (Brest Métropole) in western France with over 200,000 residents.
- Development and implementation of the **Nocturnal Ambience Coherence Scheme (NACS)** to create adaptable, ecologically responsible and citizen-informed public lighting.

MAIN STAKEHOLDERS

- Brest Métropole municipal administration and elected officials
- Urban planners, engineers, ecologists and researchers
- Residents and local communities
- Université de Bretagne Occidentale
- Specialists involved in public lighting and biodiversity management

KEY TOPICS

- Light sobriety and sustainable public lighting
- **Balancing safety, energy use, and ecological protection**
- Participatory and interdisciplinary planning
- Understanding nighttime rhythms of people and wildlife
- **Integration of environmental frameworks (black frame, blue/green frames)**

KEY APPROACH

- Establishment of the Nocturnal Ambience Coherence Scheme (NACS)
- **Three-phase process: diagnosing the lighting system, territorializing issues, strategic planning and experimentation**
- Collaborative workshops and interdisciplinary coordination
- Citizen input via questionnaires, night walks, online platforms, public events
- **Integration of the "black frame" to protect biodiversity from artificial light**
- Use of digital mapping and simulation tools to guide decisions

IMPACT

- **Transition from static, energy-focused lighting policies to adaptive, needs-based lighting**
- Stronger alignment between lighting practices, ecological considerations and social use of nighttime spaces
- Improved coordination across municipal departments
- Growing citizen awareness, though engagement still remains a challenge
- **NACS serves as a scalable model for other cities seeking sustainable lighting strategies**

"THE FUTURE OF PUBLIC LIGHTING IN BREST ISN'T ABOUT ELIMINATING LIGHT, BUT USING IT WISELY — IN RHYTHM WITH BOTH PEOPLE AND NATURE."

Meeting Nighttime Needs with Brest's Dynamic NACS Approach

In Brest, a new way of thinking about public lighting is taking shape. A new decision-making process for public lighting aims to create a nighttime atmosphere that balances safety, usability and environmental responsibility. The **Nocturnal Ambience Coherence Scheme (NACS)** was developed for integrating expert knowledge, citizen participation and flexible decision-making to adapt lighting to the city's evolving needs.

A Call for Light Sobriety

Until the 1990s, the primary goal was to illuminate motorized traffic lanes, often with high brightness levels. Concerns about reducing energy consumption began to emerge in the 2000s, followed by growing awareness of biodiversity issues in the early 2010s. Later, sociological considerations regarding the use of nighttime spaces and their evolution throughout the night came into focus.

In France, the need to rethink public lighting became unavoidable in 2018 when new national regulations set new standards for more sustainable lighting practices.

The push for "light sobriety" aims to reduce energy use, limit light pollution and protect the night environment. Brest Métropole has long prioritized a measured approach to street lighting management rooted in sobriety. However, decisions regarding lighting adjustments were historically made on a case-by-case basis at the local level.

Over time, the original purpose of lighting - to support nighttime activity in line with people's needs - was often overlooked. With over 36.000 light points serving more than 208,500 residents, Brest recognized the need for a comprehensive lighting strategy. City officials understood that this required more than technical fixes. **It meant studying how people use public spaces at night, how artificial light affects different species and how urban life is changing.**
Understanding the rhythms of the night, Brest Métropole had already taken steps by dimming and switching off lights at certain hours, initially based on empirical knowledge. However, nighttime activities are evolving, shaped by a variety of factors. The city at

night consists of different rhythms: the activities of people, the habits of wildlife and the changing needs of urban life. Traditional lighting plans were static, leaving little room for flexibility and a long-term vision.

Brest wanted a smarter approach, one that used real-time observations and citizen feedback to adapt lighting to actual use. In 2021, that vision led to the creation of the NACS, a strategy designed to make public lighting more sustainable and responsive.

The Nocturnal Ambience Coherence Scheme

Brest Métropole developed the Nocturnal Ambience Coherence Scheme (NACS) to go beyond standard energy-saving measures. This strategy integrates environmental protection with sociological and participatory research, evolving from top-down lighting policies to a more collaborative model.

The NACS follows three key phases:

1. **Diagnosing the lighting system** – Evaluating the existing lighting network, including political, technical and social factors. This involves collaborative workshops bringing together officials, planners and engineers to align political and technical decisions with nighttime needs.
2. **Territorialization of lighting issues** – Engaging experts and residents through workshops to understand lighting's impact on daily life and to identify nocturnal activities. This process adapts lighting to local habits, creating a more tailored strategy.
3. **Strategic planning and experimentation** – Using digital mapping and simulations to test future lighting scenarios, ensuring they meet both human and environmental needs. The coordination committee of elected officials oversees this process, evaluating the effects of policies on lighting and prioritizing adjustments.

A Collaborative Approach

Traditionally, public lighting has been managed in separate administrations, with little interdisciplinary coordination. **The NACS seeks to change that by promoting collaboration across departments. By bringing together urban planners, ecologists, policymakers and residents through collaborative workshops**, Brest Métropole ensures that decisions are based not just on technical expertise but also on the real experiences of those who navigate the city at night.

A coordination committee of elected officials, representing areas like urban tranquility, active mobility and citizen participation, oversees the NACS. Using a digital mapping tool, they evaluate how policies affect lighting and prioritize adjustments. Each lighting project follows the NACS guidelines, considering factors like brightness levels, colour temperature and night-time dimming.

To gather citizen input, Brest employs various methods, though engaging the public remains a challenge. Questionnaires are conducted both online and on the streets. The Université de Bretagne Occidentale also contributes by conducting surveys. Additionally, Brest offers a dedicated online tool for citizens to provide feedback, express opinions and report issues related to public spaces. Public night walks, organized by invitation, provide another opportunity for direct engagement. To ensure the public stays informed about new lighting initiatives, Brest Métropole distributes information through district representatives, press conferences, local media and integrates lighting discussions into existing local fairs and conferences.

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Integrating the Black Frame

One of the most innovative aspects of NACS is its connection to wider environmental frameworks. **Brest is incorporating the "black frame" - a regulation designed to protect biodiversity from artificial light - into its urban planning. This builds on the existing "blue and green frames", which focus on water and vegetation networks. Together, these approaches create a more holistic urban strategy that considers both human and ecological needs.**

Implementing black frames requires understanding nighttime rhythms, from the routines of night workers and leisure seekers to the natural cycles of plants and animals. By considering these factors, Brest aims to create a dynamic lighting strategy that adapts to seasonal and daily changes.

Though the black frame regulations are still in development, Brest Métropole is already aligning new lighting projects with future environmental standards. The city is working closely with ecologists, urban planners and technical experts to gather data and refine its approach. Data is central to the NACS, including information on lighting infrastructure, roads, historic monuments, natural areas and schools. This data comes from Brest's internal systems and public platforms, ensuring that lighting strategies are synchronized with environmental, social and economic needs.

Future of Public Lighting in Brest

The NACS is an evolving strategy that emphasizes participation through regular reviews, district consultations and citizen input. Activities like night walks and professional surveys help integrate local needs into lighting policies.

The future of public lighting in Brest isn't about eliminating artificial light but using it wisely, ensuring it serves residents while respecting nature's rhythms. By involving experts, administrators and citizens in decision-making, Brest is setting an example for municipalities looking to create more sustainable and responsive lighting strategies.

ABOUT

Interview took place in **December 2024** with Saïg Potard (Brest Métropol)

Main project partners

- Brest Métropol municipality, Saïg Potard
- Université de Bretagne Occidentale, i.a. Sébastien Gallet, Enora Morin

LEARN MORE

about Brest and current progress

- Introducing our Pilot Sites: Brest
- DARKER SKY Pilot Sites in Brest
- DARKER SKY News
- Chaire universitaire Noz-Breizh

HOLWERD

THE NETHERLANDS

SETTING

- **Timeframe**: as of April 2025
- Small rural village near the Wadden Sea coast in the northern Netherlands.
- **Community-driven efforts** to reduce light pollution in Holwerd as part of the DARKER SKY project, despite funding delays.

MAIN STAKEHOLDERS

- Local residents
- Local entrepreneurs and business owners (especially industrial area)
- Landmakers Cooperation (project initiators)
- Municipality of Noardeast-Fryslân
- DARKER SKY project partners (e.g., Hamburg University of Applied Sciences)

KEY TOPICS

- Light pollution and its impact on health, nature and energy use
- **Community engagement and bottom-up participation**
- Smart and sustainable lighting solutions (dimming, motion sensors)
- **Youth involvement and long-term village identity**
- Setbacks due to paused funding and ongoing advocacy

KEY APPROACH

- **Community meetings, street walks, demonstrations using VR and lighting simulations**
- Survey to assess perceptions and awareness of light pollution
- **Plans to dim or switch off lighting in selected streets and adopt motion sensors in industrial areas**
- Awareness-building through school visits, public events and peer-to-peer engagement
- Supporting DIY changes among residents and businesses while awaiting funding

IMPACT

- Increased awareness and understanding of light pollution across all generations
- **Strengthened community bonds and shared sense of responsibility**
- Residents and entrepreneurs already adopting voluntary lighting adjustments
- Project was temporarily paused due to funding issues, but momentum and support remain strong
- Inspiration spreading to neighbouring communities (e.g., Nijlân initiative)

*"THIS WASN'T A TOP-DOWN PLAN;
IT WAS NEIGHBOURS TALKING TO NEIGHBOURS."*

Holwerd Reaches for the Stars Despite Setbacks

In the small northern village of Holwerd, near the Wadden Sea coast, people are used to thinking big. Though less than 2.000 residents strong, the village once set out to break open its sea dike and bring the tide back in - a bold plan called Holwerd aan Zee ("Holwerd at Sea"), aiming to reconnect land and sea and bringing new life into the region. While that dream is temporarily on hold, it shows just how much courage and vision this small community holds.

So, when Holwerd became one of nine pilot sites in the international Interreg North Sea DARKER SKY project, aiming to reduce light pollution, it felt like a natural step. And for the local initiators - Landmakers Cooperation, who had also collaborated in the Holwerd aan Zee initiative - the path forward was clear: **this has to be a project done with the people, not just for them. To Landmakers, lighting isn't just a matter of infrastruc-ture, but is strongly connected to health, nature, safety, tourism and energy savings, but above all, it concerns everyone in the village.**

A bottom-up beginning

Reducing light pollution can be simple but powerful by introducing smarter, more sustainable solutions. That means dimming or turning off lights in four streets in the village centre and exploring smart lighting options, like motion sensors, in the local industrial area called Lands Welvaren. But first, they had to talk to the people.

Landmakers invited residents to evening meetings, walked the streets with them at night, and even brought in virtual reality glasses to show how different lighting setups would look and feel. They organized a big event during the national "Night of the Nights" initiative with stargazing, an astronomy talk and the 3D lighting demo, established by the DARKER SKY project partners from the Hamburg University of Applied Sciences in Germany.

They listened to business owners who were concerned about safety and insurance, to older residents unfamiliar with the idea of

light pollution and “dark sky,” and to the youth, who often already knew about the issue of about light pollution and climate topics. Young people, in particular, quickly understood the benefits of reducing light pollution. Many of them plan to stay in Holwerd and therefore care very much about the village’s future.

A youth sounding board, set up originally for Holwerd aan Zee, became part of the lighting conversations. In a visit to a local school, children learned about light pollution and its effects on the environment. Everyone in the village got a chance to learn about light pollution and the lighting modification plans and to give their input.

Strong ties, new insights

At first, many in Holwerd thought it was already dark enough. During the initial meetings with residents, a survey was conducted to better understand how people perceived light pollution, what their lighting needs were, and how they felt about the current situation. The responses confirmed that many believed the village was sufficiently dark, until they were shown photos comparing true natural darkness with the village’s existing light levels. These visuals helped people begin to grasp the wider impact on health, energy use and nature. The survey also served as a baseline to track how opinions and experiences might evolve as the project progresses and changes to lighting will be made.

Crucially, Holwerd has a strong sense of community to build on: people were closely connected to one another, to the area, and to the landscape that surrounds them. Trust was already in place thanks to earlier village-wide initiatives.

The Land-makers team has lived and worked among them before. This wasn’t a top-down plan; it was neighbours talking to neighbours.

Even in the industrial area where safety is a key concern, especially with reports of past burglaries and valuable goods stored on-site, local entrepreneurs showed genuine interest in reducing light pollution. While some worried about insurance requirements that might mandate certain lighting levels, they were still open to explore alternatives. The idea isn’t to simply turn lights off, but to implement smarter solutions: dimming lights at night, using motion sensors, and switching to more nature-friendly technology. The approach aims to improve both safety, energy costs and sustainability, showing that better lighting doesn’t have to mean more lighting.

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A pause, not an end

Things were going well. The village was engaged, motivated and ready. But then, a challenge: funding that had been promised was suddenly paused. No money meant no way to move forward as planned with installing new lights or continuing community workshops for now.

It was frustrating. But Holwerd is used to setbacks - and to dreaming big despite them. While the progress is on hold on the forefront, behind the scenes Landmakers is doing everything they can to get the financing back on track, including legal steps if needed.

The Municipality of Noardeast-Fryslân, Holwerd's local authority, has expressed clear support for the DARKER SKY project, especially for its focus on community engagement and ecological awareness. A new officer responsible for public lighting has just taken up his role. He already confirmed that lighting will be adapted at a site on the edge of Holwerd where biodiversity has been measured and discussions are ongoing about a second potential site within the village.

Beyond official steps, several residents and entrepreneurs have already started adjusting their own exterior lighting by installing timers, motion sensors or simply turning off unnecessary lights. These small-scale changes are visible in the village and already help normalise the idea of light-conscious living.

The knowledge is there. The connections are strong. And the people of Holwerd now have an understanding and an opinion. They've learned about the topic. They've talked about it with their neighbours. They understand the possibilities and have taken first steps themselves.

For the team, this growing awareness is seen as an investment in the community's future —because when the government asks and the village stays silent, nothing changes, but when people speak up with knowledge and motivation, it can truly make a difference.

The awareness-raising is also spilling over to other places. After attending the “Dark Affairs – The Importance of Dark Nights” event in Leeuwarden in October, two residents launched their own citizen-led initiative against light pollution in their neighbourhood of Nijlân (Leeuwarden). The Landmakers team is supporting them with funding applications and programme development, while DARKER SKY experts Piet Zijlstra (lighting) and Arjen Strijkstra (biodiversity) are advising them.

What comes next?

If the funding returns, the team plans to bring in the 3D planning tool that can help people further visualize lighting changes in their own streets and yards. Not just telling them what might change but showing them and giving them a say.
Small changes, like dimming a few glaring lamps or adding motion sensors, could have a big impact. And Holwerd’s example might guide even more villages across the North Sea region.

For now, the stars above Holwerd still shine perhaps a little too dim behind the lights. But the people below are watching more closely than before. And when the time comes, they’ll be ready to make their village a place where darkness, safety and nature are integrated in their community.

ABOUT

Interview took place in **April 2025** with Jan Zijlstra (Landmakers Cooperatie U.A.)

Main project partners

- Landmakers Cooperatie U.A., Jan-Willem van Kruyssen & Jan-Zijlstra
- Van Hall Larenstein University of Applied Science, Arjen Strijkstra & Ate Boerema

LEARN MORE

about Holwerd and current progress

- First Smart Streetlight Shines in Holwerd!
- DARKER SKY Pilot Sites in Holwerd
- DARKER SKY News
- Holwerd aan Zee (Dutch)

HAMBURG
GERMANY

SETTING

- **Timeframe**: as of February 2025
- Urban public spaces (e.g., neighborhoods, streets, parks) in the city of Hamburg
- Developing a **participatory, immersive tool** (PARTICLE) to support collaborative urban lighting planning and reduce light pollution.

MAIN STAKEHOLDERS

- Lighting planners and municipal authorities
- Local residents and community groups
- Environmental and ecological experts
- Traffic and infrastructure departments
- Children, people with disabilities, visually impaired individuals
- Non-human species affected by artificial light (e.g., birds, insects)

KEY TOPICS

- Light as a social, ecological and spatial experience
- Lack of public participation in lighting planning
- XR/VR-based co-design and visualisation
- Interdisciplinary and inclusive planning
- Impact of lighting on humans and non-human species
- **Potential for democratization of planning processes**

KEY APPROACH

- Use of XR/VR-based PARTICLE tool to visualise space and lighting effects
- **Creating shared visual and experiential understanding among stakeholders**
- Encouraging cooperation across disciplines and municipal departments
- Opening the planning process to the public for feedback and engagement
- Integrating ecological perspectives and potentially species-specific visualizations

IMPACT

- Collaborative workshops show improved communication and decision-making
- Reduces barriers between experts and non-experts
- Helps reveal compromises and trade-offs in lighting choices
- **Supports more environmentally sensitive and socially responsive lighting solutions**
- Shows potential for democratizing urban planning and reducing light pollution

*"LIGHT IS A PUBLIC MATTER.
KNOWLEDGE AND DECISIONS ABOUT IT SHOULD BE TRANSPARENT, INCLUSIVE AND PARTICIPATORY."*

Opening Up Lighting Planning: A Tool for Co-Designing Urban Light

The way we light our cities affects us all. Yet decisions about lighting are often made far from the streets they're meant to illuminate, guided mainly by minimum lighting norms, maintenance needs and cost-efficiency. **But light is more than a technical figure. It shapes how people and nature experience public spaces and habitats.**

If we want better lighting and reduce light pollution, we need to rethink how we plan it from the very beginning. That means involving not just lighting experts in the process, but also those who experience the light in everyday life and relevant voices from all areas: district authorities, environmental or traffic municipal institutions, ecologists and citizens - and perspectives often overlooked in planning, like children, people with disabilities and the natural world.

Despite great interest of many actors, collaborative lighting planning still remains an exception. **While participatory approaches are more common in other areas of urban development, lighting is often treated as a purely technical matter and as a field fo experts. This can lead to isolated decisions and missed opportunities.**

There is a lack of awareness about light pollution and its effects, which makes it harder to create demand for better solutions. What's missing are platforms and opportunities for exchange, cooperation and, building a shared under-standing of the outdoor environment during the night.

Bringing all different perspectives to the table and creating a common basis for collaborative and participatory lighting planning: this is the vision behind the XR (Extended Reality) planning tool developed by the HAW Hamburg University of Applied Sciences as part of the DARKER SKY project. This new tool is called **PARTICLE** – which stands for Participation, AR, Reality, Transparency, Interaction, Co-Design, Lighting Design, Enlightenment.

A new way to talk about light

The PARTICLE tool doesn't replace specialised planning software, it aims to fill a different gap: creating a shared visual and spatial starting point that allows very different people to talk to each other. Lighting planners, traffic engineers, environmental authorities and building departments all have their own priorities, needs and constraints. Often, these don't align easily.
However, the tool aims to help bridging these gaps. It allows everyone to sit at the same table, literally and figuratively, and start from a common visual understanding.

In this case, PARTICLE combines real-world data of public spaces with digital 3D visualisation to create an immersive experience. The tool aims to make lighting plans and their effects visible and tangible, thereby allowing people to simulate and interact with lighting situations in a realistic virtual environment.

Using VR (Virtual Reality) headsets, touch tables or tablets, stakeholders can explore digital streetscapes and test lighting options by adjusting placement, height, brightness, colour, shielding and more. The simulation includes animated pedestrians and cyclists, making it easier to judge visibility, safety and atmosphere under different conditions. At the touch table, participants collaborate around a 3D model of the site, with their changes displayed on a large screen for group discussion.

Meanwhile, others can experience the same scenarios immersively through VR headsets, with the effects also visible to observers via a separate screen. Both tools allow for intuitive, direct comparisons between existing and improved lighting strategies in a shared visual space.

This changes the tone of the conversation. The tool brings a sense of play into the process: putting on a headset and walking through a familiar space in a new way is engaging, even fun. But this playfulness is not superficial. It helps to lower thresholds and barriers, between disciplines, between professionals and the public and encourages more open dialogue about what good lighting could be.

Democratising lighting planning

To date, the PARTICLE tool is still being developed and has mostly been tested in workshops with professional stakeholders in Hamburg. These workshops have already shown what's possible: authorities and environmental departments - who often don't work in collaboration - could test and improve ideas together, instead of working separately. However, the potential goes far beyond professional planners.

What if local residents could use the tool to explore different lighting scenarios before decisions are made? What if children could walk through their route to school and share their feedback? What if people with visual impairments could show how flickering LEDs affect their experience of space?

This is about democratising lighting planning - making it open and accessible to everyone affected by it. Light is a public matter. Knowledge and decisions about it should be transparent, inclusive and participatory. The tool could help people not only understand what lighting does, but also what it means to them, others and nature. It allows for shared insight into the compromises involved in planning decisions.

This also raises the question of how to include a seat for nature at the table. Many species rely on darkness and are disrupted by artificial light. In the future, the PARTICLE tool could include species-specific data to simulate how different creatures experience light. Imagine seeing through the eyes of a migrating bird or a nocturnal insect. Every organism has its own wavelength sensitivities, which differ greatly from human vision.

For example, humans are most sensitive to green light and can't see ultraviolet light at all, whereas many insects are highly sensitive in the UV range. If we had this kind of data, we could integrate it into the tool and visualise the lighting impact through the "eyes" of different species.

That would open up entirely new possibilities. It might reveal, for instance, that dimming a light doesn't actually reduce the impact on a particular species, because that species is most sensitive in a spectral range that we haven't touched. Being able to switch the scene and ask, "What does this look like for a migratory bird?" or "Is this still glaring for a bat?" would be a powerful step. But we are only at the beginning.

Giving nature a seat at the planning table could mean building their needs directly into the scenario. This could take many forms: maybe an avatar that represents non-human perspectives or built-in prompts that remind users to consider ecological impacts. How exactly this can be done is still open, but this is the direction for further development of the tool.


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A tool in progress

The PARTICLE tool is still in development and is not yet mobile or ready for use in public spaces. But even now, it shows great promise as a more inclusive and forward-thinking approach to lighting planning: one that can help reduce light pollution and bring in voices that are often left out.
In the future, it could be made available in public libraries, co-working spaces or community centres, allowing decision-makers and lighting planners to come together and citizens to explore local planning projects and give feedback.

In Hamburg, interested municipalities, planners and other stakeholders are already invited to use the tool at the FTZ Digital Reality centre from the HAW Hamburg. Even where the tool itself is not available, the principles behind it can already inspire new ways of planning: bringing different departments and disciplines together early, using visual and interactive materials to support dialogue, and involving local communities and nature, including groups that are usually underrepresented.

Much like in other areas of urban planning, lighting strategies can also benefit from co-creation, transparency and empathy. Good practices might include setting up exchange platforms, cross-departmental working groups, involving ecologists in lighting decisions, or inviting citizens to walk-throughs or night-time site visits.
In the long run, the PARTICLE tool points to a broader shift in lighting planning: **away from expert-only planning and towards planning that is collaborative, interdisciplinary and sensitive to both people and nature.**
This tool offers a glimpse into a more democratic and responsive way of shaping public environments.


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ABOUT

Interview took place in **February 2025** with Carolin Liedtke (Hamburg University of Applied Science)

Main project partners

- Hamburg University of Applied Science, Carolin Liedtke, i.a. Roland Greule & Anna-Carena Mosler
- District Authority of Hamburg-Altona, Phoebe Schütz & Heike Bunte

LEARN MORE

about Hamburg and current progress

- Introducing Our Pilot Sites: Hamburg
- DARKER SKY News
- DARKER Pilot Sites Hamburg
- FTZ Digital Reality (German)

AARHUS
DENMARK

SETTING

- **Timeframe**: as of June 2025
- Nationwide collaboration across Denmark; rural and coastal communities, local observatories, and municipal settings.
- How Aarhus University **supports local dark sky groups** in protecting natural darkness and raising awareness about light pollution.

MAIN STAKEHOLDERS

- Local dark sky volunteer groups
- Aarhus University researchers and educators
- Municipal authorities and decision-makers
- Schools, young people and local residents
- Tourists and regional tourism initiatives
- Nature and wildlife affected by artificial light

KEY TOPICS

- Community-led dark sky initiatives
- Training local dark sky guides
- Scientific support and outreach
- Measuring and communicating light pollution
- Ecological and health impacts of artificial light
- **Strengthening networks and long-term engagement**
- Example case: **Dark Sky Park Bulbjerg**

KEY APPROACH

- Providing training, knowledge exchange and guidance through the university
- **Developing networks and ongoing support to sustain local initiatives**
- Conducting simple night sky observations and making darkness “tangible”
- Integrating ecological and health effects into outreach and education
- Supporting dark sky designations and community-led tourism activities

IMPACT

- Local groups gain confidence, continuity and visibility
- Awareness of light pollution increases among citizens and decision-makers
- Municipal authorities begin shifting from technical to experiential understanding
- **Dark Sky Park Bulbjerg becomes a model for others, strengthening national efforts**
- Tourism and community identity benefit from preserving natural darkness

“IT IS ABOUT BUILDING A NETWORK OF PEOPLE WHO CARE.”

When Local Passion Meets Academic Support

In Denmark, protecting the night sky is a scientific mission as well as a growing community-driven initiative. Across the country, small local groups are preserving natural darkness and raising awareness about light pollution. Supporting and connecting many of these efforts is Aarhus University, which plays a unique role as both scientific advisor and communication hub. Through training, exchange and a strong belief in collaboration, the university helps turn local passion into long-term impact.

Supporting passion with expertise

Across Denmark, numerous local dark sky groups take action to protect the night. **These are not large organisations with formal strategies, but volunteers, neighbours and friends sharing a passion for the night sky. Aarhus University serves as a communication node, offering guidance, exchange networks and expert connections.** When a group pursues DarkSky International designation, the university advises on standards and paperwork. Just as importantly, it emphasises that community events and dark sky activities can matter as much as certification.

One of the most effective ways the Aarhus university supports local action is by training dark sky guides. These courses teach locals basic astronomy, helping them highlight features in the night sky and inspire wonder in their guests. The guides then lead dark sky events and tours in their regions, passing on what they've learned to visitors, students and fellow enthusiasts. In many communities, these tours become small attractions, drawing new visitors and raising awareness. Sustaining these efforts can be challenging.

Many initiatives begin with enthusiasm but can lose momentum without support. That's why the university facilitates connections between groups through regular exchanges and provides information and training to keep efforts going. This ongoing support helps initiatives evolve and remain active.

Understanding darkness through observation

Alongside training and community building, Aarhus University also brings science into the picture. It collaborates with dark sky groups across the country to carry out simple night sky observations.
Measuring darkness often involves unfamiliar units, numbers that mean little to non-scientists. Yet understanding and comparing levels of light pollution is key to protecting the night sky. That's why the university focuses on making differences in darkness tangible and helping people experience them firsthand. Using easy-to-handle telescopes and comparing what can be seen from various places, the university brings technical concepts down to eye level. It turns data into a shared experience: how bright are the stars here? How clear is the Milky Way there? **Linking measurements with real observations helps people understand what darkness means and why it's worth protecting.**

In the town hall of Aarhus, city authorities are already actively working to reduce light pollution - taking measurements, developing lighting plans and installing new fixtures. So far, their engagement has mostly focused on the technical side. But a recent visit to the local observatory may have sparked a deeper shift in mindset. For many of these officials, it was the first time looking through a telescope and truly seeing the moon and stars up close. They were amazed by the experience and the beauty of the night sky. That experience helped them to better understand the meaning of their work and they could feel why it matters to protect the night. And sometimes, that kind of experience is all it takes to change a perspective and spark inspiration.

Aarhus University hopes to build on this momentum and continues reaching out to decision-makers. A first workshop with city staff has already taken place.

The need for scientific support to fight light pollution
Understanding the meaning of natural darkness goes beyond measurements and stargazing. Artificial light at night affects birds' migration patterns, confuses nocturnal animals, disrupts the growth cycles of plants and can even interfere with our own circadian rhythms. By making these ecological and health-related effects part of their outreach, Aarhus University helps people connect the dots between light pollution and its impact on wildlife and humans and why dark sky protection is needed.


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This holistic perspective also plays a key role in the university's educational mission. By showing how light pollution impacts both ecosystems and human well-being, alongside all other dark sky activities, the university creates powerful entry points for engaging young people. Many of its outreach activities are aimed at raising awareness among the next generation to spark interest in protecting natural darkness and studying the night sky. In doing so, Aarhus University not only supports the development of its own scientific community but also strengthens the work of local dark sky groups: a growing network of experts contributes valuable knowledge and momentum to the broader fight against light pollution.

From local passion to national inspiration: Dark Sky Park Bulbjerg

The Dark Sky Park Bulbjerg is one example of how local initiatives can thrive even further with the support of training and networks. Two dedicated individuals – both volunteers – initiated the effort for dark sky protection on their own. They drew on personal knowledge, community ties and successful fundraising to increase dark sky protection activities and to submit the application for Dark Sky Park designation through DarkSky International.

The group had already submitted the application, built awareness and a foundation for activities before reaching out to the university. When they shared their plans for designation, Aarhus University offered to train the now expanded voluntary group of 12 persons, as dark sky guides.

Through lectures and individual sessions, the volunteers learned to share the wonders of astronomy and lead night experiences for different audiences – from families and tourists to astronomy enthusiasts.

Today, the group's activities range from stargazing and ecology-themed walks to lectures on light pollution or astronomy, often supported by the university. They are also organising historical lighting reenactment events in the dunes and along the shore, showing how local people formerly kept a lookout for ships in distress to save any castaways. These events benefit the region's tourism, especially in the off-season, attracting visitors with calm, darkness and star-filled skies. Some have even moved to the area for that very reason.

The group continues to keep the park active and protected: organizing events, securing funding, reporting to DarkSky International and cooperating with the Danish Nature Agency. Regular exchanges with other Danish dark sky groups, facilitated by Aarhus University, further support their work.

Through these exchanges the local groups from across Denmark share their knowledge, inspire new initiatives and help those groups who aim for DarkSky designation. **Dark Sky Park Bulbjerg's application now serves as inspiration for others and new joint projects are already in preparation, including the upcoming telescope-based darkness measurements in collaboration with the Aarhus University.**

Building a support network to protect the night

In this way, Aarhus University's work is not just about astronomy or even just about light pollution. It is about building a network of people who care. Scientists, amateur astronomers, citizens, guides, schools, local councils – each of them has a role to play. And the university sees itself as a place where these threads can be pulled together, a kind of communication node for all those trying to protect the night providing knowledge, advisory support and connections.

Collaboration and mutual support amplify the efforts of every individual, making them more impactful than they would be alone. By fostering these connections, Aarhus University plays a vital role in uniting passionate advocates and local communities, turning local initiatives into collective efforts for preserving the night sky. Through communication, education and shared experiences, these combined efforts have the power to raise awareness and create lasting change.


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ABOUT

Interviews took place in **June 2025** with Hans Kjeldsen and Ole Knudsen (Aarhus University) and Anne-Mette Kristensen and Bjarne Sørensen (Dark Sky Park Bulbjerg)

Main project partners

- Aarhus University, Hans Kjeldsen and Ole Knudsen

LEARN MORE

- Dark Sky Park Bulbjerg
- Hawboernes Forening brochure: Dark Sky Park Bulbjgerg
- SpaCe – Aarhus Space Centre (Aarhus University)
- DARKER SKY News

ABOUT

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LEARN MORE ABOUT DARKER SKY

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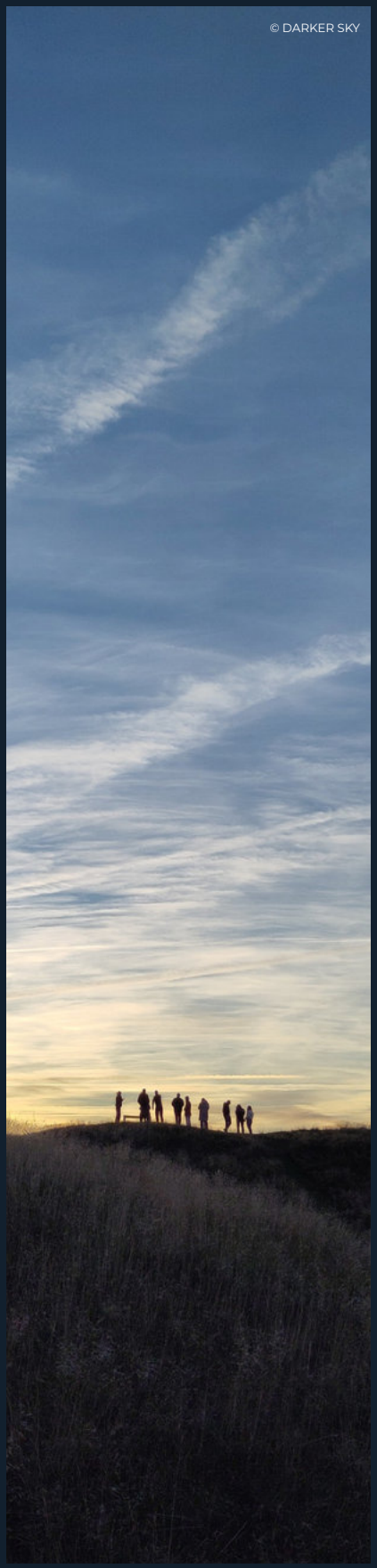
- linkedin.com/company/darkersky-ns
- youtube.com/@darkersky-interregnorthsea
- Light Pollution Knowledege Hub

***Use of AI**:*
ChatGPT and Hemingway were used to improve the writing



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