



CO-DESIGN APPROACHES

TO REDUCE LIGHT POLLUTION OF THE DARKER SKY PROJECT

SUMMARY

The Interreg North Sea project DARKER SKY focuses on reducing light pollution and restoring nighttime ecosystems. Across several demonstration areas in the North Sea Region, darker and more biodiversity-friendly lighting solutions were developed through co-design processes. This means that governments, researchers, stakeholders, and citizens **worked together to plan and implement lighting changes**.

Each of the pilot sites **applied a different approach** depending on its local context, governance structure, and community needs.

LOCAL CO-DESIGN APPROACHES PER SITE

Brest, France

Brest has a long history of policy development around environmentally friendly nighttime lighting.

The approach is **mainly top-down**: Brest Métropole developed a strategic lighting framework called the **Nocturnal Ambience Coherence Scheme (NACS)**, focusing on energy efficiency and environmental impact.

For the DARKER SKY demonstrator site, collaboration mainly took place between **metropolitan departments, ecologists, and technical experts**. Citizens were informed through public events and awareness activities, while active participation in the design phase remained limited.

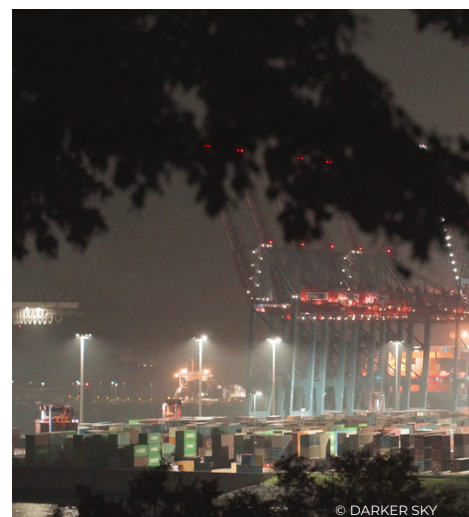
Hamburg, Germany

Hamburg used a **hybrid approach**. The district authority led the formal lighting renewal process, while citizens and stakeholders were actively involved through public Night Walks, workshops, and co-creation sessions with researchers and students.

Together with the University of Applied Science Hamburg (HAW), the project introduced innovative 3D and XR tools that allowed participants to experience different lighting scenarios through VR and interactive visualisation. This **combination of institutional planning and participatory methods** strengthened both political and public support.



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Norddeich, Germany

The Norddeich harbour followed a **mainly top-down** approach. Before DARKER SKY started, Niedersachsen Ports (NPorts) had already planned the transition to LED lighting as part of a broader modernization strategy.

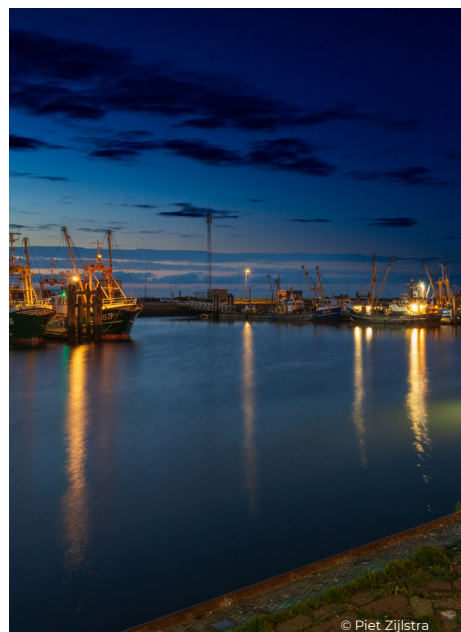
Within the project, ecological expertise from the Wadden Sea National Park Authority and other experts helped **optimize these plans from an environmental perspective**. Participation mainly focused on technical workshops and expert consultation rather than citizen involvement.



Lauwersoog, the Netherlands

The pilot site in Lauwersoog Harbour is an example of a **strongly bottom-up** co-design process. The University of Groningen coordinated the process together with the Harbour Coalition, which includes port authorities, entrepreneurs, fishermen, municipalities, NGOs, and residents.

Lighting plans were developed through workshops, village meetings, and night walks where participants discussed safety, ecology, and harbour operations together. Scientific monitoring and local knowledge were combined to develop solutions that **balanced biodiversity protection with practical harbour needs**.



Holwerd, the Netherlands

Holwerd applied a strongly **community-driven bottom-up** approach coordinated by Landmakers Coöperatie U.A.. Residents, entrepreneurs, young people, and local authorities co-created lighting solutions together.

The project placed strong emphasis on awareness and learning through VR and AR experiences, workshops, and public discussions. Rather than focusing only on technical changes, the process aimed to increase local ownership and stimulate reflection on the **relationship between darkness, safety, and biodiversity**.



COMMON THEMES ACROSS THE SITES

Several common themes emerged across all demonstrator sites:

- **Focus on biodiversity and sustainability:** All sites aimed to reduce light pollution while **balancing** safety, functionality, and ecological protection.
- **Collaboration between multiple actors:** Every pilot site involved **cooperation** between governments, researchers, technical experts, and local stakeholders.
- **Use of monitoring and evidence:** Ecological measurements, light monitoring, and sociological research played an important role in **evaluating** impacts and guiding future adjustments.
- **Awareness raising and education:** Public events, workshops, night walks, and visual tools helped make light pollution **understandable** and tangible for citizens and decision-makers.
- **Adaptive learning processes:** In all locations, lighting systems and approaches remained flexible and open to future **improvements** based on feedback and monitoring results.



KEY DIFFERENCES BETWEEN SITES

ASPECT	BREST	HAMBURG	LAUWERSOOG	NORDDEICH	HOLWERD
APPROACH	Mainly top-down	Hybrid	Bottom-up	Top-down	Strongly bottom-up
MAIN ACTORS	Metropolitan government	District + stakeholders	Harbour Coalition	Port authority	Citizens & local organisations
CITIZEN INVOLVEMENT	Limited	Moderate-high	High	Limited	Very high
MAIN FOCUS	Strategic lighting governance	Participation & experimentation	Local ownership	Technical optimisation	Awareness & co-creation
USE OF XR/VR	Limited	Extensive	Limited	None	Extensive

THE VALUE OF TRANSNATIONAL EXCHANGE

One of the strongest outcomes of DARKER SKY was the value of transnational **collaboration between pilot sites**. Because the sites differed so much, partners were exposed to a wide range of governance structures, participation methods, and technical solutions. This helped partners reflect critically on their own approaches.

- Holwerd and Hamburg's use of XR and VR tools demonstrated **new ways of involving** citizens and policymakers.
- Brest shared its experience with **long-term strategic** lighting frameworks.
- Lauwersoog showed how small communities can successfully organize **bottom-up** harbour governance.

RECOMMENDATIONS FOR FUTURE PROJECTS

Based on the experiences across the demonstrator sites, several recommendations can be made:

Match the approach to the local context

- There is **no single ideal co-design** model. Approaches should reflect local governance structures, stakeholder networks, and community culture.

Combine science with participation

- On the timescale of such a project, **scientific monitoring** becomes much more meaningful when combined with **local knowledge and public engagement**.

Make lighting visible and experiential

- Night walks, VR tools, demonstrations, and visualisations help translate abstract discussions about light pollution into **lived experiences**.

Ensure long-term governance and maintenance

- Successful lighting transitions require **long-term** organisational capacity, technical expertise, and maintenance planning.

Continue transnational learning

- **International exchange** creates inspiration, strengthens confidence, and speeds up innovation. Sharing both successes and failures is essential for **transferability across regions**.



Interreg
North Sea



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DARKER SKY RESOURCES:

www.interregnorthsea.eu/darker-sky/library

Find more information about the different Co-design approaches on our website

