Green Inland Ports

Good Practices

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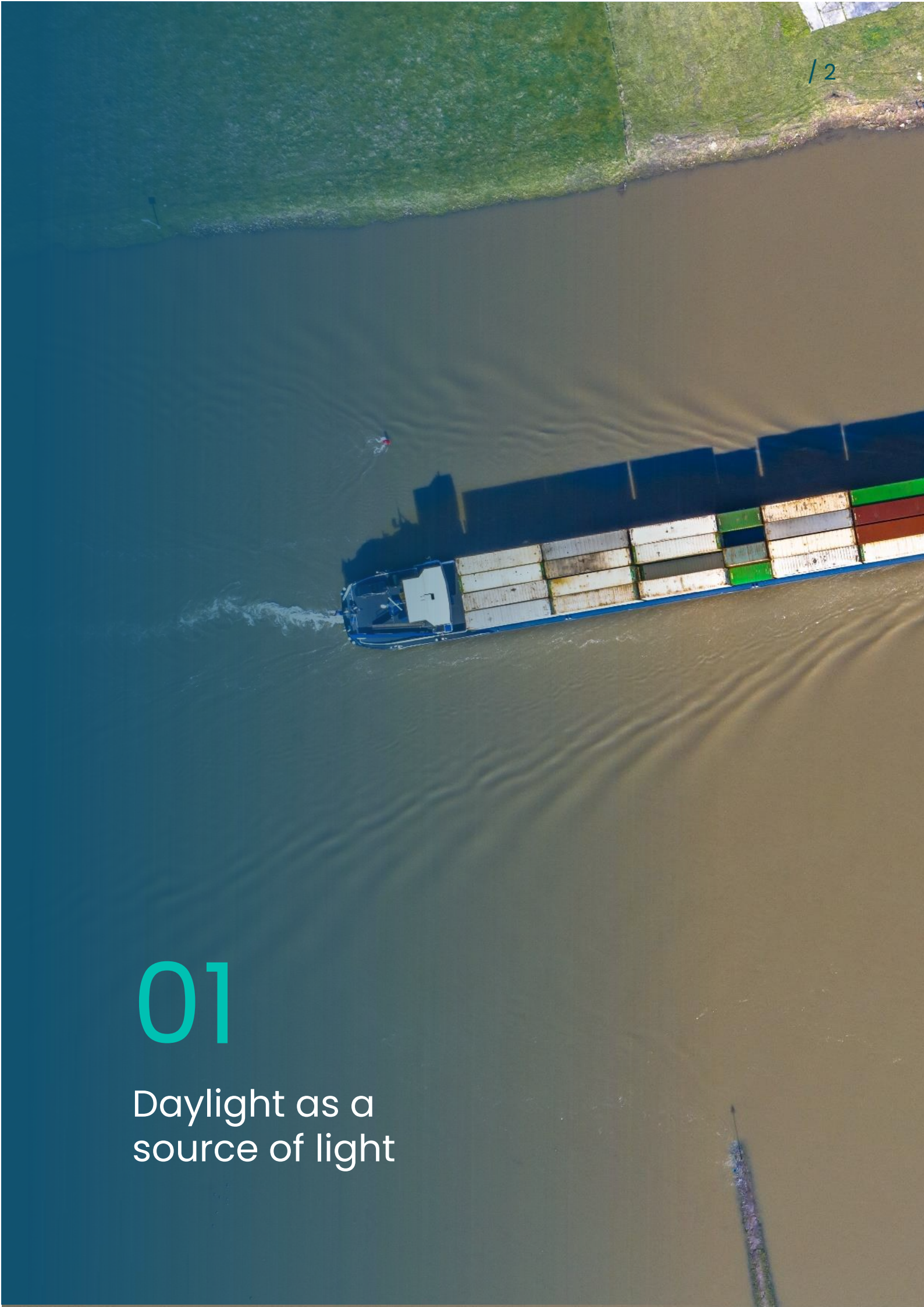

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Daylight as a source of light

1.0 Daylight as a source of light

1.1 Description

Artificial lighting refers to the light that is produced from artificial sources such as candles, fire and electricity, and has become one of the most important factors of modern living (TEKLED, 2023).

However, artificial lighting is not desirable everywhere and the number of places where it is dark during nighttime is becoming more and more limited. This can pose a problem, as light can have a disruptive impact on human health, flora and fauna (RIVM, n.d.). Artificial lighting may lead to sleep disturbance due to light pollution but can also disrupt sleep due to the background noises of artificial lights.

A survey conducted in the Netherlands estimates that around 5% of the Dutch population experiences light pollution and around 3% experience sleep disturbance (RIVM, n.d.). People become more dependent on artificial lighting and less dependent on the sun, which could lead to a higher likeliness of people suffering from depression because of lack of exposure to ample sunlight, and deficiency of vitamins D and C, which are some of the fundamental elements of maintaining the human immune system (TEKLED, 2023). Artificial lighting is also financially straining, especially within port areas, where many fixtures are necessary and the more fixtures are used, the more expensive lighting will be.

Toxic gases required to make artificial lighting are highly toxic for humans and the environment and the disposal of light bulbs is often a major concern (TEKLED, 2023). Artificial lighting is responsible for a high energy consumption and the corresponding greenhouse gas emissions. Worldwide, light emissions are estimated to be equivalent to at least 1% of world emissions of greenhouse gases (DarkSky, 2022). Artificial lighting also poses a particular problem for light-sensitive animals active at night, which have an unusually high probability of encountering artificial light when migrating between roosts and searching for food supplies, but also plants which show long-term effects, such as disrupted plant physiology, phenology, and composition due to different kinds of lighting, which may also have effects on other organisms in the environment (Mathews, F. et al., 2015, In Defense of Plants, 2018).

By making use of sunlight as much as possible, electricity consumption for the use of artificial lighting can be minimised, which decreases energy costs and GHG emissions necessary for lighting. Employees see access to natural light and views of the outdoors as one of the most important attributes of a workplace environment, as it makes employees more productive in general; absence of natural lighting can make them feel more tired (Virtrue Health, 2024, Harvard Business Review, 2018). Solutions on how more sunlight can be created within a work environment may start during the initial design phase of an office, as decisions can be made on the amount and the locations of windows that let in sunlight. In office spaces, obstacles of sunlight can be eliminated, such as

furniture, blinds and curtains. Glass walls can be used instead of solid walls. Certain types of industrial flooring, such as vinyl, but also the use of mirrors, aid in enhancing natural light due to their reflective properties. The colour palette of the office may impact how natural light is used, as light colours will reflect light, increasing the amount of light that enters a room (Studio AsA, 2023).

Multiple ports provided examples of what is being done to actively pursue this good practice. This includes increasing the number of windows in building designs, using passive blinds, open interior design and switching off lights when there is sufficient sunlight.

1.2 Specific aim/goal of the measure

The aim of this measure is to reduce the electricity consumption by using more daylight. This can lead to a reduction of GHG emissions, air pollutant emissions, less pressure on the electricity grid, reduction of stress on human health (both employees and local inhabitants that may experience negative effects from light pollution), protecting flora & fauna, and conserving natural resources. The measure means that less energy is used due to sunlight replacing a share of the artificial lighting during the daytime.

Parties that have put effort in increased usage of daylight as a light source

- Ports of Lille
- Port of Dörpen
- Port of Giurgiulesti
- Port of Wittingen
- KOTUG
- Zulu Associates

Stakeholders

- The port authority: As the governing body of the port area, the port authority can draw attention to implementing natural lighting (sunlight) within offices and companies located within the port area. The port authority can implement the good practice as well, and thus take on an exemplary role.
- Terminals and companies located within the port area: They are the main consumers of energy and electricity within the port area. When a large share of the companies are willing to adopt this good practice, a significant reduction in energy consumption can be made, and there will be benefits for the companies as well, such as energy savings and a higher employee productivity.

- Local/national governments: Many governments have the goal of becoming (partly) energy neutral in the future. Port areas in general are large energy consumers and a significant share of energy consumption is artificial lighting. This means that there is a significant energy reduction potential to be achieved within port areas.
- (Local) inhabitants, flora & fauna: A reduction of artificial lighting and increase of natural lighting diminishes the negative effects of light pollution on people, thus protecting flora & fauna.

Voluntary or mandatory

It depends a lot on the country. The Ministry of the Environment of the Czech Republic, (2022) analysed which European countries are taking measures in relation to lighting, including legislation, guidelines, manuals and initiatives to prevent light spills. Around half of countries included have designated legislation or provisions from other legislative acts which can be used regarding light pollution.

Around a quarter of the countries analysed have technical standards in place regarding lighting and possible light pollution. Just over half of the countries have a guidebook/manual for correct lighting in place or underway. Around 80% of the countries are using other means of limiting light pollution, such as specific projects, a dedicated website, or a dark sky area. The vast majority of the above-mentioned initiatives are not binding, so in the majority of the cases, limiting light pollution would not be mandatory.

1.3 Realised/potential impact

The impact of this good practice on ports is relatively unknown. However, research and estimates are present for buildings in general. Kozlowski, D., (2006) claims that a good daylighting design can save up to 75% of the energy used for electric lighting in a building. However, the amount of daylight available, the occupancy pattern, and the control strategy can all affect the amount of energy savings. Electric lights generate significant heat in a building as well, and by turning off or dimming the lights when not needed, 10 to 20% of the energy used to cool a building can be saved. Bashir, F. M. et al., (2023) state that when the daylighting factor in the researched building is increased from 3 to 6%, there is a decrease of 3% in the average amount of CO2 gas that is emitted over the course of an entire year.

1.4 Possible obstacles when implementing

- Day light leads to less control over the intensity of lighting, as the intensity depends on the time of day, weather conditions, the geographical location of the building.
- Depending on where this good practice will be implemented, day light can lead to increased levels of UV radiation and increased temperatures within spaces due to sunlight warming up the room.

- Using designs with maximal utilisation of day light will lead to additional upfront investment costs, such as design costs.
- The second survey that has been conducted for the GRIP project shows that there is a large variety within how difficult ports and other parties consider this good practice. On average, this good practice scores a 4.4 (1 means very easy, 10 means very difficult), which means that this good practice is relatively easy to implement.

1.5 Key learnings

- In terms of design, it is easier to implement this good practice in the design/building stages of companies, offices and warehouses that have yet to be built. However, there are plenty of methods that can be used for existing buildings to boost natural light/sunlight within the building, as mentioned in the description.
- Light consumption is a significant part of energy consumption, and this good practice poses a relatively accessible way to reduce light consumption. The potential can be high, but is largely dependent on the effort and costs companies would like to put in.

1.6 Sources

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