FOR A FUTURE LESS BRIGHT
Noa Hudepol, Heleen van Leur, Daniel Perez Rico and Guido Puijk
Pristine night skies are disappearing
Light pollution is a big problem...

- There are over **300 million streetlights** worldwide.
- About **30%** of artificial light is **wasted**.
- **23% of the land area** in the world is exposed to artificial light, and this number is growing by 2% annually.
- **80% of the world population** is affected by light pollution in some form or other.
- Streetlights can comprise **15-40% of a city's energy** budget.

**Light pollution types**

- **Skyglow** illuminates the light sky and is caused by light emitted upwards.
- **Glare** is visible as blinding rays from unshielded lights.
- **Light trespass** is unwanted light shining into homes
Ecosystem problems

- Artificial light is detrimental to animal navigation, affecting fish, birds and turtles.
- Streetlights can kill over 60 billion insects in a single summer.
- Skyglow can negatively affect algae-feeding zooplankton in lakes, reducing their ability to control algal blooms.
- Light pollution alters natural plant rhythms, causing them to bloom at different times with knock-on effects on animals.

Human problems

- Glare from LED lights causes blinding in visually impaired people and the elderly.
- Light trespass disrupts sleep and circadian rhythms.
- Skyglow prevents people from seeing the night sky, severing a valuable connection to nature.
...which is caused by:

**Misused LEDs**

LEDs are currently the best light sources. They are highly efficient, using little energy to generate intense illumination from a single point, but they are being misused. Old armatures designed for traditional sodium lights have not been adapted to LEDs, causing extra glare and overlighting.

**Misplaced lights**

Light is a modern necessity, but we are exceeding such need. Streetlights being placed where they are not required and pointing upwards are major contributors to light pollution. Any light emitted above a 63° angle is useless.
A solution for modern technology

DElight is a streetlight based on nature-inspired design. Designed with LEDs in mind, it minimizes glare and light pollution by directing all light where it should be - and not into our eyes and homes.

The lobster lives at the bottom of the ocean. In order to see, the lobster eye looks very different from a human eye, redirecting all light onto the retina. This principle inspired DElight's unique hood, catching all stray light.

The Saharan Silver ant lives in the desert. In order to survive in this extreme heat, the ant has hairs on its body that reflect all sunlight. DElight takes inspiration from this principle to direct all light downward.
We incorporate refuge for various insect species. Plants will be carefully selected, using indigenous species as much as possible to increase biodiversity. When our lights are implemented, this will establish an insect highway throughout the city. In rural areas, it can create connections between nature reserves.

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Rainwater will be collected underneath the plants to keep the substrate moist. Any excess water will be redirected to a gutter. An energy absorbing material will cause this gutter to heat up in the sun, inducing evaporation of excess water, resulting in a cooling effect.

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The market

**Market size**
- There are over 3 million streetlights in the Netherlands alone.
- With a turnover rate of 15-20 years, approx. 200,000 streetlight armatures are to be sold per year.
- The smart lighting market is expected to grow at a **CAGR of 28.5%** in the period 2021-2026.

**Customer profile**
- Municipalities
- Hospitals, (elderly) care centers
- Hotels and resorts
- Nature reserves

**Trends**
- **Light colour**: Blue light disrupts ecosystems the most, orange light the least.
- **Smart lighting**: Dimming lights when no one is around.
- Modularity
- Environmental sensors
- WiFi connection

**Requirements**
- Armature lifetime of >15 years
- Safe lighting
- **Sustainable**, energy-efficient lighting
- Costs between **200 and 600 euros**

**Competition**
Major players are:
- Schneider Electric SA
- Cisco Systems Inc.
- Honeywell Inc.
- Signify Holding (Philips)
- Eaton
Value proposition

Offering
Streetlight armature

Customer
Conscious municipalities

Value
Reduction of light pollution

Differentiator
A bio-inspired, sustainable and comfortable way of lighting that improves biodiversity within cities

Business Model

Licensing

Long established players

Leverage resources and partnerships

Production and distribution

Fast to market and easier to scale
Future and milestones

**Problem definition**
During a Utrecht University MSc. course we researched the problem of light pollution. The scale and impact of the problem made us wish to work on a solution.

**Stakeholder interviews**
Over the course of a few months we conducted interviews with various stakeholders to get a good overview of the problem, from all points of view.

**Design phase**
We looked to nature for sustainable inspiration. We kept in contact with our stakeholders and conducted various customer interviews in all stages of the design process.

**Global Biomimicry Design Challenge**
We were selected as finalist in the Global Biomimicry Design Challenge. This gave us our entry ticket in their 10 week start-up Launchpad.

**Proof of concept**
Through many small scale experiments we will create a proof of concept.

**(Scalable) prototype**
In a prototyping lab we will work on a life-size prototype. We will also measure light pollution reduction and regenerative biodiversity impact experimentally. We will start to research joint business venture options.

Q4 2020 - Q1 2022

Q4 2020
Q1 2021
Q1 & Q2 2021
Q3 & Q4 2021
Q4 2021 - Q1 2022
Q1, Q2 & Q3 2022
Funding
At various stages of our project different kinds of funding will be necessary, we will apply and look for that accordingly. We have already acquired some initial funds and a prototyping spot.

Production/joint venture options
Once we have a working prototype we will try to produce a few prototypes and work towards a scalable production process.

Test locations
We will have various test streets and locations for our streetlight. We already have confirmation of various parties in Utrecht that they would be willing to provide a test location if our prototype proofs viable.

Find early adopters/customers
From Q1 2023 onward

Scale up production
From Q1 2023 onward

Big Hairy Audacious Goal (BHAG)
Worldwide sales of DElight cause a significant light pollution reduction and ecosystem services contribute to better cities. This way DElight helps regenerate cities and improve well-being of humans and nature.
Our team came together during the Bio-Inspired Innovation masters which focuses on gaining design skills, systems thinking, regenerative design and nature inspired design. Being a part of this masters program has given us the skills and resources to make this project a success.
Want to learn more or reach out to us?

You can find us on Linked-In at: linkedin.com/company/de-light

You can email us at: DElight.streetlight@gmail.com