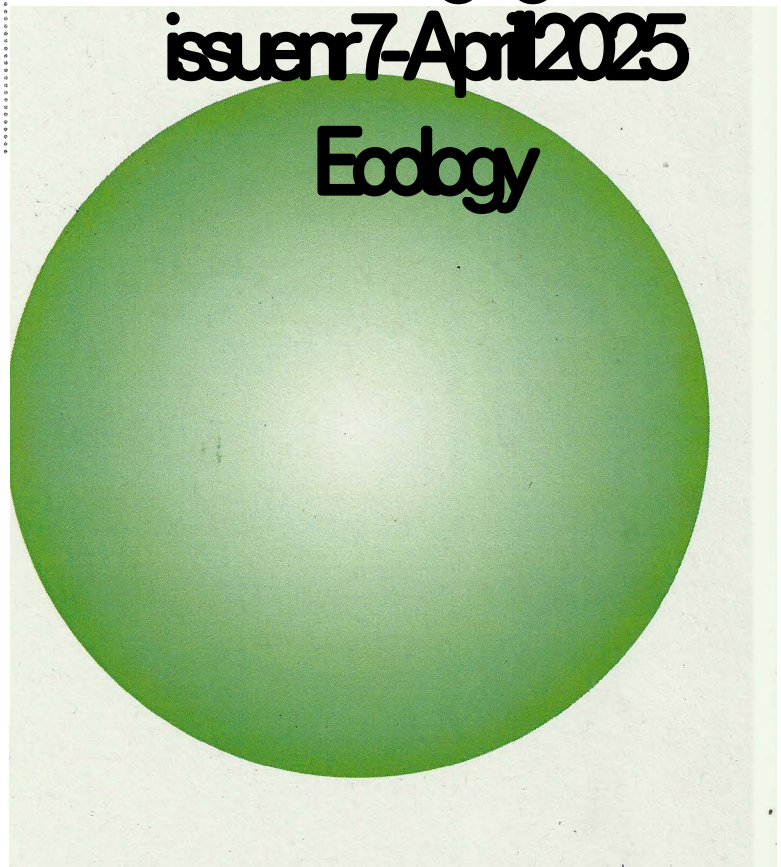
printinginstructions:

print on white paper (90g), black-and-white, recto-verso on the short side, then fold into a booklet.
the dimensions of the printed fanzine are 11x21cm.
cut the margins on the dotted line to reproduce the original dimensions.

reflecting light

issuenr7-April2025

Ecology



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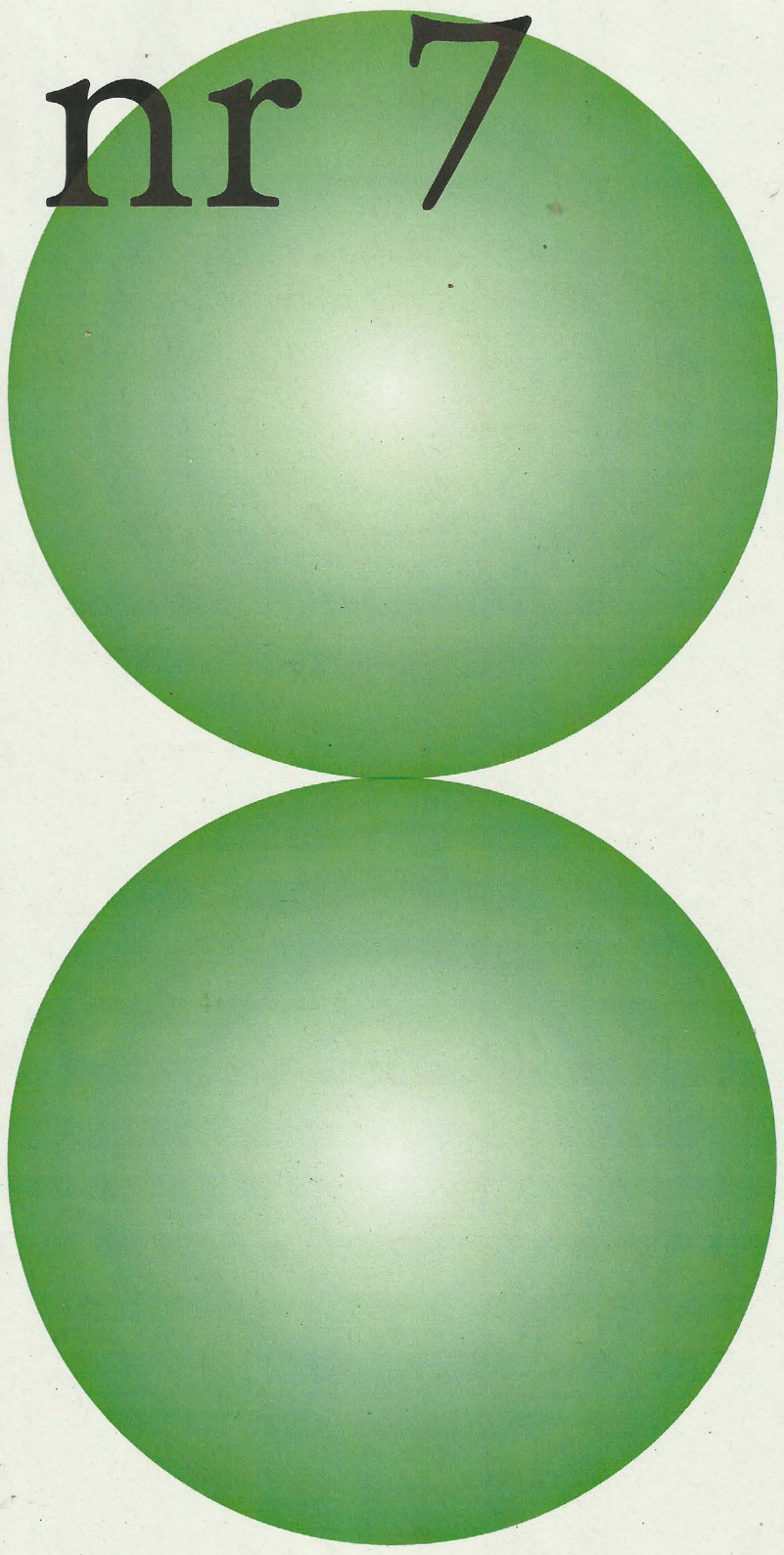

Reflecting Light **Issue Nr 7 — April 2025**
Ecology

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V.u. Geert Belpaeme

design in the arts. The research project *Reflecting Light* is financed by the HOGENT Arts Research Fund and co-financed by BUDA arts centre (Kortrijk), HAUT (Copenhagen) and Mad House (Helsinki).

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ECOLOGY

Subscribe to the electronic version of the fanzine: reflecting.light@hogent.be
or scan the QR code to read or download all fanzines online.

Reflecting Light is a fanzine about *light* and *light*ing design in the arts.

Who wants to start?

Where do we start the conversation?

A text with only questions?

Shall we write collectively questions to feed this text?

How to be critical and solution-driven at the same time?

What is being ecological? What is sustainability?

How can a performance influence a larger scope of ecology?

Does ecology become the subject or the methodology of making a performance?

What is an interaction between the sustainability of a theatre and the one of a performance?

Where do we inform ourself on bottom lines of sustainable lighting?

What can we learn from Tania Beer's concept of 'eco creativity' – what is the aesthetics of an ecological lighting design?

What's our reading of the 'Theatre Greenbook' published in UK ?

What to learn from a lighting design perspective?

What is ecological lighting design?

As lighting designers, Which choices do we have?

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Why don't we write about your stories and your point of view? Would it be interesting?

Shall we rethink lighting design through the prism of ecology?

Shall we work with less material?

Would it be great to recycle existing devices as much as possible?

Shall we go for 'Less is more'?

How does light quality and desired luminosity influence each other?

Do we think about light pollution?

Shall we use both LED and traditional?

Is it valuable to use 100% Led?

Does it really make a big difference at the end of the day in terms of consumption?

Shall we renounce to the LED ?

Is LED, the best solution for ecology?

Is LED a revolution in lighting design?

What's the ecological impact?

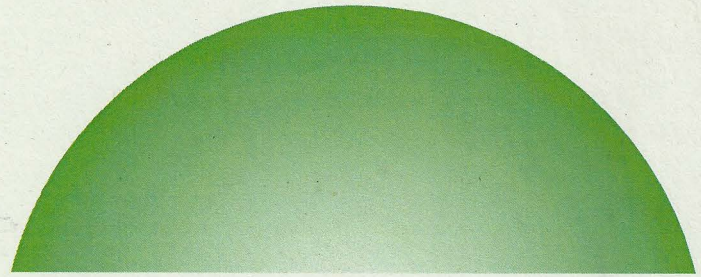
Did you ever consider one of your light plots over-consuming?

Did you ever 'measure' electric/carbon consumption of a light plot?

If we talk driving, I found the following rule of thumb:
If you want to understand what is considered high or low in terms of petrol/diesel/hybrid emissions, here is a rough guide: 150g/km is considered low. 160 to 255g/km is considered medium. Above 255g/km is considered high.
With Tesla Model S 2020 10km of driving (using avg USA grid power to charge) is equivalent to: 0.93kg CO2 emission: https://www.co2everything.com/co2e-of/tesla-model-s-2020

The average estimated carbon footprint of a laptop is around 331kg, which includes the carbon emissions during production, transportation and first 4 years of use.
It should be noted there is a large variation in CO2 emissions depending on the manufacturer and size of the laptop. In all manufacturers' estimates, they suggest their CO2 could be +/- 15 to 20% due to the uncertainty of their calculations. https://circularcomputing.com/news/carbon-footprint-laptop/
As I have touched upon (and will keep doing so) different aspects of transformations of perception, communicational metabolism, social and private nervous system, and society in the computing revolution and communicational paradigm shift in different articles, I will here only mention the following:
Our habits, neurological states, sense of agency, collective organizations, institutions have changed much more in the past 30 years than our needs of collective observation, debate, ritual, belonging and kinship. When we witness something unraveling in real time in front of us, but the viewpoint is less dictated than on the silver screen, multiple discussions can take place between different viewpoints. When words or images are not the sole protagonist, reality that concerns body and soul, thoughts that belong to a body can communicate to us. Collective deconstruction, impersonation or kinesthetic empathy, view-angle change, allowing oneself to be touched, and discussion are all creative practices that can take place among a good piece and its viewers. This is what I cherish as the agency of theatre, and energy consuming as it is (like many other activities of life), it carries the potential to create value beyond the value it directly presents. There is a list of groups and individuals with whom I would assess the risk of losing these values before I do so with lobbyists.

Writing this article gave me the carbon footprint of watching a performance, and I took so long with it that China fully restricted the US on their tungsten export by the time I finished.
In order to enliven an ecologically sustainable theatre-minded practice, regardless if any of my readers or myself still wear that apron, I would like to put forward a request to the willing reader: should we meet in person, regardless if we know each other, please explain in detail a light or lighting phenomena that touched you, or tell me about a web query that lead you to non-spoonfed-truths.



tungstens) to bridge the missing part of the dimming curve, but the curve is diversely uneven all the way.
In effect, the handling of time and space will be determined by the capability of the standardized tool.
Similarly in domestic use, the same bulb can emit its full capacity or less, but most of the levels of dimming get jumpy and it tires the eye. In part that could be an effect of overheating (the practical circumstances do not match the factory testing and/or the testing cycle is nowhere near the predicted life cycle of the fixture), or insufficient ballast in the case of replacing a fluorescent to LED. That visible jumping frequency of light, together with the diffuse light quality I mentioned before leads to nervousness and disorientation, eye strain and twitches.
Back to the theatre, unless hard cuts and sudden jumps benefit the piece, the way time and space is represented, and how they engulf and stage the human body, is best with a lighting modality that is measurable with the sensitivity of the human eye. Oftentimes I see that a simple replacement of tungsten to LED will lead to something we understand and not something that we feel. I am of the opinion that we go to the theatre to feel something, through our skin, through our eyes, through our empathetic capability we can enter realms that lead us to a far wider landscape an hour in a building would assume. When that exchange cannot happen, I would a lot rather write manuals of perception or do speed dating with the question of "what do you ask your search engine on a daily basis?', both would come closer to the miracles of theatre I nurture.

5 Carbon footprints of guilty pleasures and business essentials

Very driven to touch the ungraspable, I was so interested in what our immaterial daily habits take in terms of energy consumption, not minding the repair, the end of life cycle, the precious metals.
Just one of these Google searches can power a 60W light bulb for 17 seconds, plus Google has also said that it spends about 0.0003 kWh of energy on an average search query which translates to around 0.2g of carbon dioxide.
According to ChatGPT, a single GPT query consumes 1567% (15x) more energy than a Google search query: Moomoo/fasthosts.co.uk
The Impact of a Single Query: Each time you send a message to ChatGPT, it produces around 4.32 grams of CO2: balkangreenenergynews.com
The carbon footprint of one hour of streaming video on a smartphone is 0.56g, one hour of streaming the same content on a Laptop is 10.19g, and streaming on a 50 inch LED TV is a whopping 55.56g. (International Energy Agency.)

Digital storage space has a direct impact on sustainability, be it cloud storage or local storage, because the carbon footprint of data is not insignificant.
For example, storing 1GB of data consumes 0.015 of kWh of electricity, and 0.28kg of CO^2 emissions. (Cloudwards.net) a 40-watt light bulb would produce approximately 0.16 kg (or 160 grams) of CO2 emissions after 10 hours of use, assuming an average emissions factor for electricity.
If 20 000 watts of power would be continuously consumed throughout a theatre piece (which is quite excessive for a piece) that would mean 8 kg of carbon footprint for an hour divided by the amount of audience present, let us count with 200 persons. That is 40g per person, less than an hour of streaming on a LED TV
According to Reditec, the theatre stage makes up to 10% of the whole house's energy consumption.
https://reditec.org/activites-projets/developpement-durable/

How can we make sure we include sufficient arrays of criteria to evaluate our ecological impact?

How can we look at ecology as a whole without compartmentalising?

Did we ever measure the carbon-print of LD, and compared to for instance that of the servers?

Shall we seek for numbers that scale the impact of lighting design – in relation to other 'consumers– ' in and outside of the theatre?

Do we have more examples of 'counter' practices – where more a more analog way of working is searched for and embraced?

Is the eco-crisis 'intersectional' in its core? – and how does a carbon-focussed discours is narrowing down the perspectives ?

How do we read the industry-driven 'solutions' proposed by (EU) government?

How does our economical model influence our approach to ecology?

Does that leads to the spiral of the capitalist system? (Would anyone like to work on this subject?)

Is there a common measure for sustainability? Is finances or energy or the carbon footprint the common denominator of sustainability?

What if we could counter the industry-driven governmental proposal with a proposal by ourselves. What could that be?

Because of the experience they have in disseminating aesthetics and creations that break free from the capitalist fictional prism. 3ème vague group could participate to this Fanzine?

Do you think the audience can perceive more sustainable lighting design in a performance? If so, how?

How can the audience access a performance in an ecological way?

What about touring?

Is Netflix less polluting than all the venues in the world together?

Is film an more ecological alternative to life performance?

Is filming a performance and showing through the web more ecological than multiple live showing?

Shall we perform in front of empty audience?

Should we better perform in daylight?

How to create without consuming?

Is it an artistic alternative?

Should we stop?

neglected or inventoried in a general form. The variety of material compositions and manufacturing are not reflected in life cycle assessment studies." (quote from previous source)

Tungsten, the rare earth used in small quantities for an incandescent bulb, is 85% exported by China, who keeps 58% of earth's reserve. Other countries with rich tungsten reserves are Congo and Russia. The export amount used for filament wire for lighting is 2% of the total export.
Despite the massive market takeover of LEDs, and tungsten/wolfram being rarer than rare, China's export is skyrocketing to cover for the needs of the tungsten as an additive in the production of specialty alloys; specialty uses for mobile phone handsets, military, ballistics (defense equipment) automotive parts, aerospace components, drilling, boring & cutting equipment, logging equipment, electrical & electronics appliances, chemical applications and other end-uses in the industry of its foreign trade partners.

(sources: Refining the understanding of China's tungsten dominance with dynamic material cycle analysis by Linbin Tang, Peng Wang, Thomas E. Graedel, Stefan Pauliuk, Keying Xiang, Yan Ren, Wei-Qiang Chenv https://www.busineshttps://almonty.com/tungsten-history/swire.com/news/home/20120710005703/en/GTSO-Why-Tungsten-Is-Rarer-Than-Rare-Earths)

Here the question rises in me, what activities and how are we prompted to feel right, and based on what. How do we as a part of a global trade of our respective countries enjoy our freedom to choose a lifestyle? How do we as individuals counterbalance or implicate green treaties that take effect a decade before their real environmental impact is fully reckoned with.

3 Life cycle assessments

This is a recurring element of the conversations I have about domestic LED fixtures. The truth of the matter is that the EU found switching to LED a good solution solely because of the new lightsource's luminous efficiency. The life cycle of materials used, their production, assembly, repair, and discard has not been dealt with.
About life-span predictions, they have to be based on a 6000 hours study and for lamps, the life-span is derived from the research results of those hours mathematically.
Different parts of the lamps in terms of life cycle have not been assessed due to the variety of structures, and led-chip failure is the cause of the end of an LED-s life cycle in many cases.
New standards of measurements are currently being invented.
A domestic led bulb is 30% recyclable at the end of its life cycle, the rest ends up in landfills.

(https://www.sciencedirect.com/science/article/pii/S2666790822001239 & https://www.sciencedirect.com/science/article/pii/S1110016823007597)

4 Dimming curve

LED-s both in domestic and theatre use are generally not well crafted in terms of dimming. That means for theatre, one has to double the instruments (with

I will instead note down the results of my google queries, thematized, seeking for the right questions in the area being discussed in making theatre lighting **ecological**, before that apron would have dropped again.

1: Luminosity

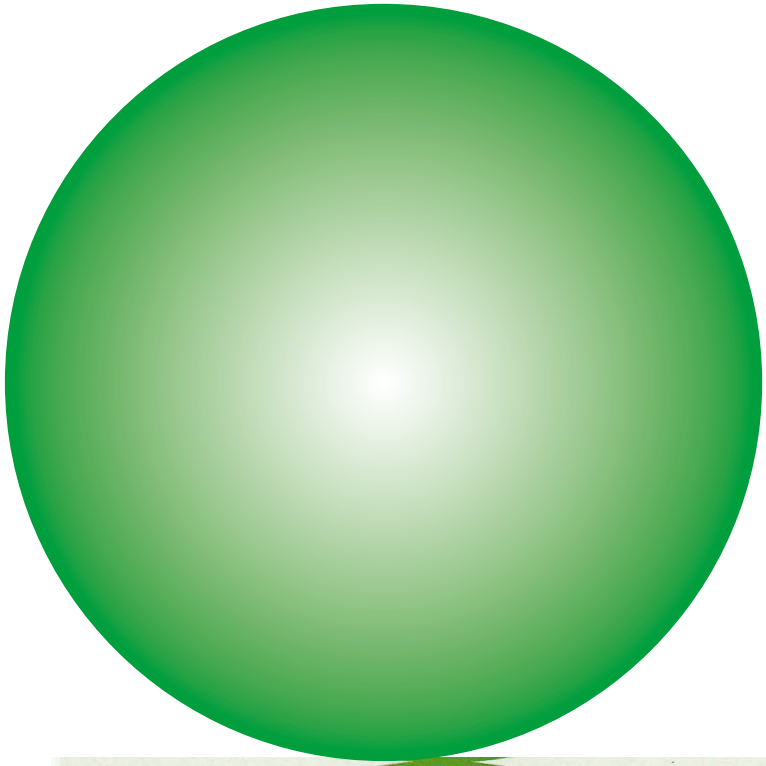
The convention is to count energy consumption relative to luminous output. The directionality of the light is not in question, and health hazards are discussed only from insects and animals point of view.
LED fixtures efficiency is relative to their luminosity, their light output. A LED lamp is 6 times as energy efficient as an incandescent light with the same luminosity. That means that a 40W incandescent reading lamp would be compared with a 7W LED bulb. Whereas it is easy to read with a 40W incandescent, then why does the 7W LED equivalent give my conversation partners a headache? Exactly because of the diffuse quality of light.
The actual light output is measured in cd/m2 (candela-per-square meter, the amount of light coming from an object) or nit (nitere, light density) that take the placement angle of the fixtures in consideration. These measures were developed for displays and not lighting fixtures.
The following quote comes from the 2017 research of Franz P. Wenzl (Critical review on life cycle inventories, and environmental assessments of LED-lamps, Critical Reviews in Environmental Science and Technology).

"A Central Europe case study of Austria states a national value of 15% in the not differentiated category "lighting & IT." Considering only households, the lighting electricity consumption was 3% of the country's total electricity consumption in 2012 (Franz and Nicolics, 2015). Nevertheless, the mentioned case study on power consumption in Austria showed that in the same period of the lighting technology transformation, electricity consumption of all household lamps did not decrease but increased by 29%. The British daily newspaper "The Guardian" reports that due to legally permitted tolerance values of up to 10% in the mandatory production information of the lamps, the declared values for luminosity and power consumption may be responsible for wrong consumption rates of up to 25%".

Do we need, or can we cope with this amount of artificial light? This issue of light pollution starts to be a subject of forming regulations since 2007 but missing maximum values and their auditing. This lack results in light pollution that still makes it as a policy discussion in the EU in 2024 autumn.
General lighting regulations exist in closed workplaces (OSHA) and are defined by kelvin-temperature and mostly only by minimum luminosity and defining distance between fixtures to avoid workplace accidents. Until today there is no maximum value of lighting defined.
OOH illumination is the applicable regulations for exterior advertisement and showcases. These are regionally different, and variously formulated. The publicly accessible websites are more detailed in the USA and Canada, and in Europe there is variation of these restrictions, with no common rule to adhere to that would limit lighting output.

2: Rare earth minerals and strategic metals

"Rare earths and strategic metals are key elements of LED-lamps. They are included in very small quantities as high-tech (nano)materials in LED-dice and color con- verters. In existing life cycle assessment studies, these materials are

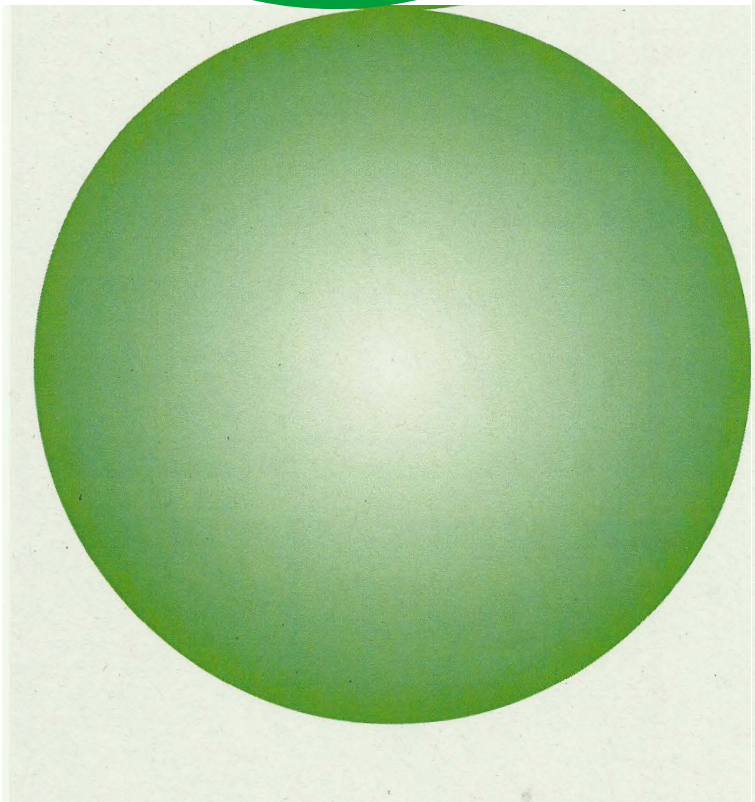


I ran a number of google searches, to understand why we struggle to get information? The answer was coming to me from the type of websites I found answers on.

An overwhelming majority of them were market-leading LED manufacturers. Aside from those, a small quantity of academic research papers and assessment studies, sporadic governmental sites for regulations and EU declarations. Some practical guidelines came from environmental activist organizations.

Most of the information on lighting and practices in theatre I acquired by knowledge sharing and personal experiences on site for a duration of time, and of course reading up on and testing the different LED fixtures that are offered. Still, thanks to my profession I understand I have a better chance to find the right search words for clarity on the subject among information publicly accessible.

Essentially, ecology mainly came up in my working context as a potential means to lower my costs, I seldom felt in theatre productions some structural shift towards the more **ecological** would be welcome. I have seen it as a trickle-down of politicians to cultural fundings, fundings to institutes and programmers, them to productions, and productions to me. I have seen some venues having a more dedicated **ecological** mindset, it seemed like they are key players in this discourse.
I often thought my eco-ease has to do with timing too, when I arrive at the theatre I see the beautiful inventory of the house, lamps resting on pipes for decades, all repairable in house, spare parts accessible, thanks to regular inventory the fixtures can be very well kept, everything recycled.
When the rest of the production arrives all is on the rig, there are a number of people busy with preparations, there is an array of lights, a cacophony of information, a multitude.



I would enjoy a sincere consideration on the **ecological** impact of staged work.
I would love to compare a Hollywood movie's carbon footprint divided by each viewer to that of an independent dance piece.
What I feel instead is that we are having a discussion based on hardly explored facts on the eco-efficiency of theatre productions, similar to the one I had years ago with that regular guest with a lucrative business. It results in mere virtue signaling to wealthy donors.

I would like to discuss what a loss theatre suffered by inviting managerial principles external to itself.
I would like a broad discussion on how literally adhering to short term political planning makes performing arts a propaganda or advertisement tool.
I could enjoy talking with law- and theatre makers and audiences of theatre, how applying a system of regulations external to its organizing principles, misses the unique chance to propose society small scale blueprints of collaborative methods.
I would like to discuss various viewpoints on how theatre gradually loses its audiences.
I would love multifaceted discussion about how the lovechild of academia and theatre, the authorship of the singular, is flattening theatre into indeed a dead form of arts.

* De Martelaere, P. (2006), Taoïsme: de weg om niet te volgen. Amsterdam: Ambo|Anthos.

* Elcott, N. M. (2016). Artificial Darkness, an Obscure History of Modern Art and Media. Chicago: The University of Chicago Press.

* Sartwell, C. (2021) Humans Are Animals. Let's Get Over It. New York: New York Times. https://www.nytimes.com/2021/02/23/opinion/humans-animals-philosophy.html?action=click&module=Opinion&pgtype=Homepage

Southern Reach-trilogie:
*VanderMeer, J. (2014) Annihilation. New York: Farrar, Straus and Giroux.
* VanderMeer, J. (2014) Authority. New York: Farrar, Straus and Giroux.
* VanderMeer, J. (2014) Acceptance. New York: Farrar, Straus and Giroux.

*Van Droogenbroeck, M. (2020) De creaturen van H.P. Lovecraft en Jeff Vandermeer. Brussel: Rekto:Verso. https://www.rektoverso.be/artikel/de-creaturen-van-hp-lovecraft-en-jeff-vandermeer

*Verschaffel, B. (1990). Rome: over theatraliteit. Mechelen: Vlees & Beton.
https://www.dbnl.org/tekst/vers077figu01_01/vers077figu01_01_0002.php

PROMPTED ECOLOGY
(EMESE CSORNAI)

15 years ago I was working as a waitress to support my visual art and lighting design careers in the pricey West of Europe, which exactly at that time tried to deal with the ripple effects of the credit crisis.
In the restaurant there was a regular guest from the USA, who owned a runway for private aircrafts.
He used to keep telling me that theatre is a dead artform and I should just find a rich husband to marry. I thought to myself that men with advice like this could soon be a dead form in society, as I was an idealist in my mid-twenties not knowing what was coming.
Given the status differences, his provided by his wealth, mine by my waitress apron, I kept my feminist guidelines to myself. He, however, happened to be there on my last workday, so after I shoved my apron aside for good, I joined him on his table, to discuss what theatre is for me and what it can give to what surrounds it in my point of view.

And on that note of idealism, that is a guest more stubborn in my life than youth, I am very happy to live in the day and age where ecology is a broadly discussed topic. In my experience, it is passionately discussed, discussions adhering to some facts commonly available. Oftentimes though I find the passion of the discussion greater than the diversity of the facts that serve for the base of them. I find myself in habitually narrow conversations that don't tend to open up. When I compile the arguments that are discussed, for example the frequently recurring one, on LED lighting in domestic settings, I normally find ungrounded conclusions that have been given to us to talk about by lobbyists. As it happens in a dialogue with a lobby, a discussion is narrowed to a poor collection of binaries.

IT'S THE ECOLOGY, STUPID!
(JAN MAERTENS)

Dealing with today's ecology crisis in terms of performing art production in general, or lighting design in particular, is not an easy one. Although solutions to tackle the environmental crisis are thought to be simple, all over and readily at hand. That we just would need to be brave or bold enough embracing new technology — it seems there's always a new technological solution to deal with the flaws of former technological novelties — and installing stringent protocol and we would be able to deal with business as usual forever after. The show must go on after all!

Swapping ecology by economy in the above title, we remember a former political voice (1) criticising all too neoliberal market politics for its arrogant ignorance of the complexity in how a durable economic system fits together... in vain alas, leaving us now, amongst many other problems, a seriously aggravated biosphere crisis, a crisis which was already on the agenda back then! And todays approach to *the rule of ecological law* shows similar arrogance in ignoring complexity. Let's face it: we're not dealing with just problems here anymore, we're dealing with a *predicament*: we manoeuvred ourselves in a complex and difficult position. And this asks for a multitude of responses in stead of a focus on simply enlisting discrete solutions to some problems.

Besides its complexity, or maybe as a consequence of it, another issue we're facing when dealing with today's eco-crisis, is the information dump that is falling on our heads in the form of factoids -partial, trivial or even false chunks of information that present themselves as facts. Especially the authoritative quality of this falling is problematic: it evokes, despite the inherent complexity, reactions of all sorts leading to newly installed simplifying green(washing) protocol everywhere... Claiming to be able to make things graspable and swiftly overcome the problem. Also in the theatre thus. Also towards lighting design indeed: ladies & gentlemen, here is the unique and universal problem solver: the Light Emitting Diode!

Indeed, when linking lighting design to the eco-crisis, the LED is systematically positioned in the frontline to find relief for the energy-demanding business of lighting up a performance. Despite being a welcome new tool with seemingly inherent advantages — low energy versus light output, small, durable, advanced additive colour mixing proposition, ... — there's so many more things to hold in perspective here. But by applying simplifying green (washing) protocol, we are thoughtlessly replacing all what is not LED by this new-technology wonder. And this replacement is systematically narrowing down our toolbox rather than enlarging and enriching it! Thoughtless not only in ignoring technical, artistic and ecologic complexity. But also, and not in the least, by thinking we've resolved the problem and can now keep the eco-crisis out of our thoughts. Shouldn't we, as an art scene, honour our core business a little more by taking a more critical stance? Let me mark some questions as a starting point for a more holistic debate allowing some complexity to *the rule of lighting design law.*

Is our lighting business that energy-demanding?

I would want to put this into perspective by the following calculation: A recent light plot of mine for the medium scaled stage counts for 36# pars,

12# fresnels, 12# profiles and 4# floods in conventional incandescent version besides 3# sodium lamps and a set of LEDastera tubes, all playing their intrinsic role. All together a potential energy output of largely 75kW. But calculating roughly the effective power consumption based on the temporary and dimmed use of all this equipment during the performance, I hardly end up with 17,5kWh used... which is the estimated power consumption of a Tesla over 100km. Serving a venue of 300 people for an hour, my rather conventional plot is consuming less than that 1 potential conscious Tesla driving couple just having made it back and forth to the theatre:-)

*Is LEDlighting after all more **ecological**?*

Is the direct energy efficiency and longevity of LED proportional to the collateral damage coerced by its production for and application in the theater lighting business while literally trying to imitate incandescent lighting standards? The energy and material production cost as well as the broader environmental production cost (mining, disposal, ... but also consequent geopolitics, overexploitation and industrial colonisation, ...) are rarely taken into account. And for sure, a new technology needs a substantial time to become sustainable, but still then will remain the questions of sustainability to who's account and on who's account. Also, how to put in the balance the direct and indirect environmental costs for maintaining altered performance art industry modalities (price, weight, data, control modalities, technical and touring complexity, standardisation, repairability, interchangeability, a far more complex and global supply-chain, ...)? And what about the industry's endless hung for novelty? It might turn out that longevity largely gets overruled:-)

How to overcome sensorial poverty withholding only LEDlighting?

Will we ever be able to control both quantity and quality aspects of LED light as fine-tuned and standardised as we can now with incandescent light? How to deal with the threshold switching-to-minimum, the inadequate behaviour in the low range and the focal punctuality & lack of spaciness of LEDlighting? Will the additive colour mixing with a limited amount of base ingredients ever be adequate and complexity-free enough in order to forget about subtractive filtering out from a full & continuous spectrum? While navigating with discrete steps in the spectral colour space, aren't we replacing the issues around the amber flood (that all of a sudden became an issue) by the ones of a multi-colour flood (that we seem to miss out on)? And, maybe most importantly, what about *lighting identity* — the individual intrinsic qualities of each of the various lighting instruments in our toolbox, including LED indeed: should we simply forget about diversity and proceed towards a monoculture lighting design desert? Modernists might have predicted other wise in due time, but also the synthesizer didn't make the symphonic orchestra disappear:-)

I believe that narrowing down the toolbox is not only drastically eroding the craftsman's or artist's potential approach on lighting control and design, but will slowly reset perception of lighting as such, in a similar way mp3-sound and further poor-quality mobile audio producers we're sadly exposed to is clearly resetting listening in a way we stop caring for quality. Don't get me wrong here: incandescent (or whatever other form of) artificial light is not more or less "naturally right" than LED light in our quest to imitate "natural" light. But the fact that full and continuous spectral artificial light comes much closer to what light "naturally" is, explains my gut-feeling to reject (the believe mentally alien to us. It is precisely the doubt about what constitutes "soul" or agency, and how far it can extend, that shakes our own dominant position.

The biotechnical environments in ecofiction writer Jeff VanderMeer's Southern Reach trilogy tantalisingly portray the way a theatre hall could come to life. In the mysterious "Area X", all possible life forms, as well as buildings, machines and language itself, seem subject to an unknown force that regurgitates everything and breaks down demarcated boundaries between biology and technology, artificiality and nature. The individual crumbles and merges with what lies beyond. The apparatus of a theatre auditorium lends itself perfectly to the staging of such a technical biosphere, a mysterious environment whose rules of play remain beyond our reach and spectatorship is an ongoing quest.

The challenge of rethinking and experiencing man's place in the world differently - a real metaphysical 're-rooting' - is enormous. What we can discover in a theatre has limits, but is meaningful because our anthropocentric view can be so strongly subverted there. Letting go of the human as the measure of things and opening ourselves up to the non-human is a form of 'de-worldification' because, in a sense, Western thought rests on the belief in the moral elevation of human beings above everything else. When human values are exposed as relative, perhaps any fixed touchstone of what is 'real' falls away - a pretty frightening and disorienting finding.
Perhaps the almost impossible Taoist pursuit of a form of 'egolessness' is still closest to a thinking and practice that embraces the total relativity of any foundation. And perhaps the jellyfish also offers us some perspective. A jellyfish begins its life cycle 'rooted' on the seabed as a polyp, only to break free and float uncontrolled through the ocean. But the jellyfish retains the ability to re-establish itself somewhere else on the seabed (as a polyp). The terrestrial equivalent of the jellyfish is the Western-famous tumbleweed. Both occur, perhaps not coincidentally, in disrupted areas.

Those who find themselves in Area X experience both the horror and existential dread of dissolving as individuals, and the sublime ecstasy of new sensations and new connections with what surrounds them.

What if spectators in a theatre no longer know exactly where the drama is iunfolding in space, and they may well find themselves in the middle of it? What if fly bars with lights descend from spaces we did not know were above the stage, and the feedback from a transmitter microphone leans sometimes to a voice, sometimes to a storm? Perhaps in a redrawn theatre apparatus we can touch an uneasy and temporary new 'us', or we can, for a moment, float egolessly like jellyfish, to settle down somewhere else outside the theatre.

This text was originally written at the invitation of performing arts magazine Etcetera in 2021 and can still be read in Dutch on their website.

The staging of Area X imagined in the end of the text later became Indoor Weather, a large stage performance made by Bosse and Ezra at Toneelhuis (the city theatre of Antwerp)

SOURCE LIST

* Agamben, G. (2009). What is an apparatus? And other essays. Stanford: Stanford University Press. 15). Choreographing Problems. Houndmills: Palgrave Macmillan.

teenth-century play, a couple of people stand in the footlights pondering some kind of relationship problem. In the background, we see the painted face of a mountain range. Moreover, if we find ourselves in the pre-Wagnerian part of the nineteenth century, chances are that the lights in the auditorium have not been dimmed. This allows spectators, most importantly, to get a good look at each other - the sightlines of the royal boxes are atrociously bad, but everyone has seen you there.

So it is interesting to consider precisely the classical theatre as a place where we can exercise our attention to things that we often disregard in advance. We do so without thinking about it, for instance because they are elements we automatically assume are not 'signifiers'. Lamps, speakers, the fly bar from which a black drape hangs, the transmitter microphone on a performer's cheek: they do not take part in the staging, but support it. We automatically block out unwanted by-products or residuals - the hum of all kinds of machinery, the emergency exit signalling - because they only disturb the narrative presented to us.

Does such a clearly delineated attention regime suit our times? In a classical theatre, without wanting to, we repeatedly find ourselves in an archetypal form of spectatorship, which bears particular resemblance to man's often problematic relationship with his environment.

It has become clear how limited our awareness is of the countless links, networks and connections that make up our world. Perhaps we should be more curious about everything we usually fail to notice, or even outright ignore because it does not fit into our worldview or simply doesn't seem to matter.

Those who are open to it are daily made aware of unsuspected human and non-human processes, presences or forces resulting from ecological mutation. But how far do we jump with this information? At what point are (at least initially) cerebral insights sufficiently lived through to fundamentally change anything in the way we metaphysically root ourselves in the world?

The theatre can be a place where we are not only informed about the extent to which the world is stranger and more confusing than we thought, but where we can also be addressed in an affective, sensory and attentional way about what we do and do not notice.

AREA X

A mutating world demands a mutating theatre apparatus.

Questioning - and who knows, perhaps even reinventing - our presence as makers and spectators in the ecosystem of a theatre is a concrete way of unmasking the old distinction between active (the human) and passive (the non-human world). What we as humans are only beginning to discover is that it is not the world that is silent. It is ourselves who often fail to look and listen to the way the world 'answers'.

If we want to learn to read it again, we better not do so by humanising the world around us (by Disneyfying it by analogy with, say, Beauty and the Beast), but rather by confronting ourselves with everything that is funda-

in) a simple substituting transition to an exclusive-LED-toolbox for stage art lighting design. The french instinctively use the quip "laide" in this context ... but i don't want to discriminate:-) I do believe in diversity: i'm convinced, both technically, artistically and environmentally, that a more diverse gamma of tools will lead to more adequate choice and will only enhance genuine quality. Quality of lighting design as such, but also quality in the approach to further research and development of our the toolbox.

Light is never just light. So let's embrace the LED technology with its intrinsic *lighting identity*, yes... But not as a replacement, not as an imitation... though rather as a genuine enrichment of our toolbox. Let's use it for what it is good at: output efficiency, additive colour mixing, inconspicuous and mobile applications, ... We will only be losing twice when thinking, in vain, that a blunt replacement of all other adequate tools — incandescent light fixtures with fine-tuned dimming control and delicate subtractive colour filtering possibilities on top of also the rich gamma of gas light bulbs with singular intrinsic qualities — in favour for exclusively LED technology, will bring us closer to solving the ecology crisis we're living today. Let us not commodify light!

But how to deal with the eco-crises then? It is merely eco-realist to think in terms of technological replacement. Not necessarily eco-logic. Clearly, LED as a substitute for incandescent light is a very carbon-oriented proposition to enhance "sustainability". Approaching things from a more holistic, high enough point of view might prove things less "sustainable" than presented... if environmentally advantageous at all. And what exactly would we be sustaining? Is the environment really the cause? Or are we just trying to sustain our business model(s), so the show can go on despite the ecology crisis? I'm not claiming that the deterioration of our habitat — be it climate change in particular or biosphere degradation in general — is not at play here. It is for sure the trigger. But i suspect an economic fix rather than an ecologic one. An unprecedented opportunity for a new, green technology market has announced itself on the account of the environmental crisis though without too much consideration for that environment after all. OK, new technology, such as LED technology indeed, allows us to use resources more efficiently. But more importantly, new technology basically creates new ways for us to consume and therefor build higher future requirements for energy and materials... leading to more complexity... requiring more energy... and we're back to square one. And once more, we're confronted with the paradox of Jevons(2): in the end, efficiency gains lead to increased consumption. Hence technology might not hold the solutions after all... it might even be a stakeholder in the problem. This might seem to be too big a windmill to fight, but it hurts to see the art scene, all of us, almost thoughtlessly turn along in this vicious circle (royally financed by lobby-induced politics) without even trying to think further or deeper, let alone breaking out. As if the scene is too afraid to have to change its own modalities itself. What if we, artists, try to formulate some answers instead of the consumerist tech-industrial-complex for us?

It is above all eco-nomic to think in terms of sustainability and lighting design. Not necessarily eco-logic. Respecting the diversity in light(ing)-quality differently produced by the variety of instruments out of our toolbox, is adding value to what at first might seem indeed merely an interchangeable good. Moreover, a deliberate choice for a lighting design, is adding value to what at first might

seem indeed merely a functionality-plot to make things visible. And awareness for artistic practise and its needs is adding value to what at first might seem indeed merely skillful entertainment. In the other direction, commodification leads to undoing goods, services, practices, ... from their intrinsic value, replacing it by pure economically-modelled numbers. Quantifiable protocol takes over from qualifiable choices. All becomes interchangeable in favour of rentability: calculating with numbers while losing all respect for the complex relations at play. It is more and more in this reality our dear lighting design business in particular, but also generally the contemporary performance-art practice, needs to operate. The calculated interchangeability of how and by whom things are being produced leads to a competition where there's little place left for a quality approach. In other words, we tend to lose artistic awareness in the very business of making art. A bit similar I believe in how we tend to lose ecological awareness in the very business of dealing with the ecological crisis.

Both ecology and art have too much become a market, a model for revenue, and I believe that might be the real problem. The introduction of LED as a green-light-source and other first degree remediating protocol will only soothe some environmental pain... temporarily... before the problem might even aggravate. In the mean time, the economic benefits to a "green-light-industry" are indisputable. And also the art-business is back in business-as-usual. The environmental issue though is left behind... and with it, the existential value of art. We're producing art and looking out for it to be consumed both in a "calculated" way while losing inherent quality doing so... and even inherent reason to do so. The commodification-thinking of and within our art scene has become too much standard procedure. And more and more apparently, also ecological values have become commodities in our consumerist attitude towards the biosphere... can you believe we've come to trade clean air while buying ourselves a clear conscience! Isn't it about time for new systemic thinking to redirect the scientist-technologic-capitalist paradigma we're seem to be locked up in?

Ecology, just as economy indeed, isn't an exact science. It is merely a model. A model looking for validation in relying on assumptions about the essential nature of the world we're inhabiting. In our dualist-technological approach we're assuming our environment to be something "makeable"... something we can shape form from outside, ... thus also "repairable" from that outside when things tend to go wrong. That is exactly how we behave in how we're proposing new technology and installing new protocols trying to remediate the derailing environment. But we are essentially part of that environment. It's also we that are derailing. We are part of the world and the world is not something we can't shape from outside. We cannot solve the environmental crisis externally. We will not become environmentally more righteous in producing (and consuming) art by organising an external quick fix. We won't relieve our lighting design footprint by enforcing the next replacement for "cleaner" technology. Because there's only one way for a lighting designer to be environmentally "neutral"... and that is opening the window blinds and perform in broad daylight.

Since we inherently take part in our own ecology, it might be better to address the crisis as the disturbance of the default disturbance of our relationship with/in the world. As a consequence, we might finally become aware of our constant interference instead of ignoring or even denying it while having found the next fix to tackle a problem. Only by effectively being aware of our actions and anything that somehow has the capacity to capture, orientate, determine, intercept, model, control or secure the gestures, behaviours, opinions or discourse of living beings'. (2009, 14)

All the conventions of a theatre visit and the unconscious assumptions and expectations of spectators evoked by the setting of the theatre are also part of that apparatus or dispositif. For example, visitors expect to see a fictional, mirrored world on stage, or there is the assumption that a sudden blackout marks the end of the performance. The apparatus 'theatre' goes a long way in defining what our spectatorship means — partly also independent of what an artist is trying to convey with a performance.

It is important to stress that the apparatus of theatre is not a static and unchanging given. By scrutinising and thematising its functioning, the possibility of transforming a theatre arises.

STIMULUS POVERTY

A venue is more than a void we fill with performances, and theatre technique is much more than packaging or finishing touches. It regulates our attention and is ideological. If we want to transform the theatre, venues need to disclose their technical apparatus more often to artists. There also lies an opportunity to experiment more with the working relationships between theatre technicians and performing artists. A fly bar can do more than hoist, it can also dance. A spotlight can do more than illuminate, it can also be a sun.

A theatre is a specific site, where it is possible to work in situ. In situ projects usually derive their vitality from the makers' openness to look at what a place itself has to say, or could be. The theatre is another place that, instead of just using it, we can approach more curiously.

What we find so special about the theatre hall is the poverty of stimuli inside, which contrasts sharply with the unrestrained presence of signs outside that space, or even on the devices in our pockets. The theatre hall is one of the few places where attention regimes can be experimented with in a fundamental way. By witnessing from start to finish how a cardboard set is reduced to pulp by an artificial rain (think of Meg Stuart's Blessed or Phia Ménard's Maison Mère), we can become aware of processes that too often go unnoticed in our daily dealings with the world.

The power to command attention and evoke a different perception is a trait shared by most theatres. But some also show themselves recalcitrant in other ways.

THE CLASSICAL THEATRE AS AN ECOSYSTEM

Classical theatres, often built in baroque or neoclassical style, present specific challenges. After all, they were developed at a time when very different human and world views reigned. There is a strong spectatorial hierarchy in the construction of a theatre like the Bourla in Antwerp. It is a viewing box in which the technical apparatus is hidden as best as possible behind a gilded frame, and our attention is drawn to a central point.

The classical theatre is a place where humans traditionally celebrate themselves as the centre of things. In the archetypal scene of a bourgeois nine-

choices leading to those actions, we might overcome our short-cut attitude in commodifying sustainability in a far too complex realm where we can't find anymore what exactly to sustain. We might have been focussing too much towards (a set of) discrete solution(s), green protocol, an end-of-environmental-history ... where there's little hope for. We'll always have a disturbing relation to our environment (that's what it exactly means being part of it). Matter is to truly be aware of it in order to minimise it, to balance it, to respond to it. Matter is to be conscious about also un-intended consequences of our actions without hiding behind new technology and green protocol. Let us become effectively **ecological**ly aware and we might find a way to take *responsabilities* in a much more sustainable way!

A lighting designer knows that light is not something to watch... it is to be lived, in order to grasp it. And just as all art is to be lived, in order to understand its beauty, we urgently need to live our world again... living it in **ecological** awareness in order to care for it.

Let us re-claim our "nom de guerre" as free(?)-art-scene while answering the eco-realist contra-revolution with a genuine modality shift stepping away from lighting design as a commodity in the "producing & consuming" of performing art, by deliberately choosing what to use energy for... and what not, but in no case just consuming it just because it is at hand. Choosing to yet and foremost add (artistic) value and not just to produce to be on the market. Only by making choices, we can become aware also about their unintended consequences.
Being **ecological**ly aware truly in our art making!

Opinionated Jan

inspired by the lecture of:
* De ogen van de panda, een kwart-eeuw later by Etienne Vermeersch
* In onze tijd, Leven in het calamiteitperk by Tim Fransen
* What if we stopped pretending by Jonathan Franzen
* Less is More by Jason Hickel
* Oog in oog met Gaia by Bruno Latour
* Being **ecological** by Timothy Morton

(1) A phrase that was coined by James Carvill as a strategists in Bill Clinton's US presidential election. Clinton's campaign advantageously used the then-prevailing economic recession in the USA as one the campaign's means to successfully unseat George H. W. Bush.

(2) In 1865, the English economist William Stanley Jevons observed that technological improvements that increased the efficiency of coal use led to the increased consumption of coal in a wide range of industries. He argued that, contrary to common intuition, technological progress could not be relied upon to reduce fuel consumption. Meanwhile, there are numerous examples demonstrating the paradox, and todays eco-crisis has made it topical again.

A FLY BAR CAN DANCE, A SPOT CAN ALSO BE A SUN,
WHAT CLASSICAL THEATRE INFRASTRUCTURE CAN TEACH US
ABOUT THE WORLD AROUND US
(EZRA VELDHUIS & BOSSE PROVOOST)

Is the classical theatre still a suitable space to mould the stories of our time? Yes, say Bosse Provoost and Ezra Veldhuis, provided we do not take the apparatus of the theatre as a given, but take it into our own hands and transform it. In this artistic reflection on the history of theatres and spectatorship, they make a case for the theatre as a site for ecosystemic experimentation.

THE THEATRE AS AN APPARATUS

The central premise of a theatre hall is controllability: most halls allow maximum darkness and silence, temperature and air circulation can preferably be controlled. This emptiness can be filled in at will with in-house lighting and sound. A theatre hall is equipped with a technical 'apparatus': lights, black canvases, speakers, networks of cables, fly bars, trusses and optionally even smoke, snow or wind machines. All this enables the theatre maker to generate fiction and world.

Just because such bits of tamed space are empty does not mean they are neutral and that anything can emerge. In fact, the presentation and production of Western performing arts, since its professionalisation in the eighteenth century, has to a large extent been shaped by the 'apparatus' of the theatre. Just think of the fundamental impact that the ubiquitous and for the actors blinding footlights had on the acting style and the actor's relationship with the audience.

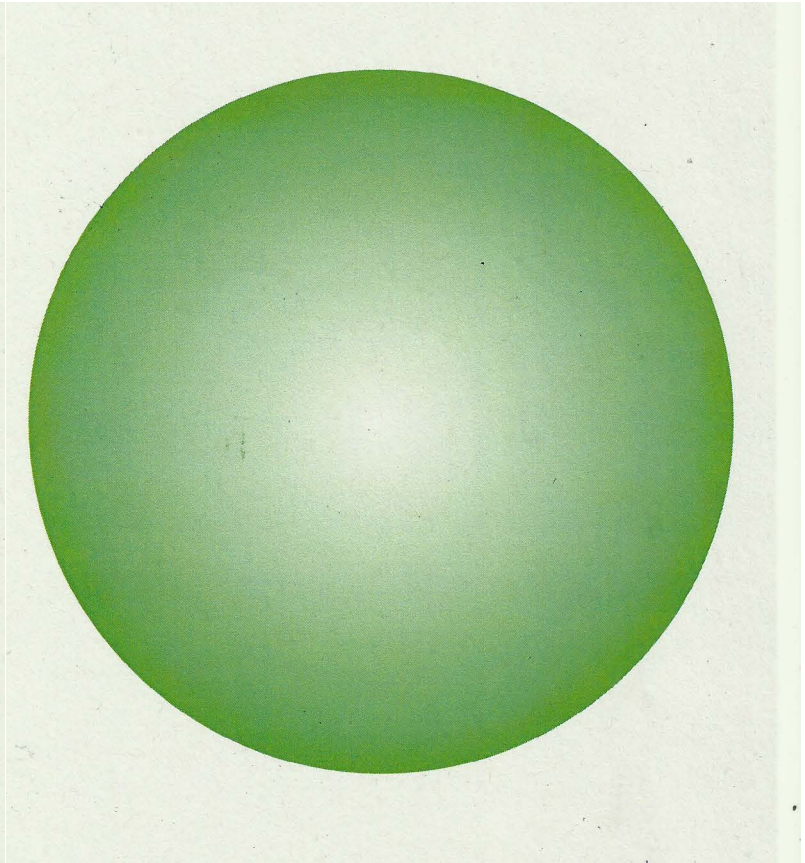
The word 'apparatus' refers to the technical and material underpinnings of any imagining created in a theatre. The term is simultaneously synonymous with 'dispositif'. Philosopher Giorgio Agamben defined the dispositif as 'literally

INSPIRATIONS AND PROTOCOLS — REVIEWING THE *THEATRE GREEN BOOK* (TOMI HUMALISTO)

In this text, I have interviewed four lighting designers from the Reflecting Light research project in relation to the ecological sustainability guidelines presented in the British publication, the *Theatre Green Book* . Freelance lighting designers **Ezra Veldhuis, Emese Csornai, Jan Maertens, and Henri Emmanuel Doublier** share their own ecological practices and reflections, without shying away from criticism.

In the cultural sectors, various projects have emerged aiming to find their own ways to address the broader awakening to climate change that occurred in the 2010s. This movement often began by examining traditional art-making methods and processes in relation to ecological sustainability. For example, in Finland, large institutional theatres such as the Finnish National Opera and Ballet and the Helsinki City Theatre have launched their own projects aimed at improving the recycling of production materials and developing more ecologically sustainable production methods. Around this topic, companies have also emerged, such as Ekokompassi, an independent consulting company owned by the Finnish Association for Nature Conservation, which has been selling environmental management systems for 10 years. Mystash specialises in consulting for the creative industries, while the Goodstock platform focuses on recycling materials for the creative industries. **Henri Emmanuel Doublier** mentioned in his interview that in France, cultural eco-projects similar to the *British Theatre Green Book* sustainability project have been established, such as the sustainable development information packages by the Reditec organisation and the recycling-focused website recupscene.com.

Locally, it is certainly easier to start in a small group or theatre, but due to the global scale of the problem, cooperation between different actors is essential. As one of the founders of the *Theatre Green Book* project, Paddy Dillon, states: "it makes no sense for every theatre to write its own guidance and rules every theatre to follow its own methodology... We need to learn from each other, we need to share best practices." It is easy to agree with this ethos, but how does the *Theatre Green Book* appear outside the British context? I asked the small Reflecting Light network how the lighting design guidelines in this publication appear from their perspective as freelance lighting designers in continental Europe.



it is clear that goals and guidelines should and can be critically evaluated. Even in the comments of this small readership, the question of the differences between rules and attitudes, as well as superficiality and impact, clearly emerges. The contexts and material qualities of artistic activities differ and may conflict with the goals of ecological sustainability. If anything, cross-reading between different actors and contexts, as in this article, is necessary to enable more impactful development that takes into account the specific qualities of the arts.

possibility for light and matter to speak for themselves and develop their own agency. He hopes for a new opening where we could abandon the eco-realist counter-revolution in favour of a genuine modality change that moves away from lighting design as a "production and consumption" commodity of performing arts and instead consciously chooses the use of energy primarily to achieve added value.

Henri Emmanuel Doublier's impression of the *Theatre Green Book* is very comprehensive. He mentions studying the publication's guidelines for calculating the carbon footprint of productions, but he emphasises how the book directs understanding the importance of collaboration with other designers and technical directors if sustainable practices are to be pursued. It is essential to collectively recognise the unintended consequences of lighting design practices and minimise negative impacts. Besides the artistic team, it is also crucial to convince the technical directors of the venues, as they play a key role in implementing sustainable development principles. Technical directors can select suppliers based on sustainability criteria and avoid multiple material deliveries by consolidating them. They can plan the setups of multiple productions so that the same lighting fixtures can be used in different productions. Doublier has already tried this on shared stages at some festivals, and according to him, it is entirely possible if preparation and planning are done well. The number of stage setups can be reduced. Technical directors can also influence the choice of consumables in their theatres by banning the use of PVC tape and favouring marking pens and fabric ties. The theatre can prioritise high-quality and durable materials, repair as much as possible, reuse as much as possible, donate, and recycle. He believes that the *Theatre Green Book* can help him convince productions to make higher-quality material purchases. Doublier also aims to use LED lights as much as possible in the future because they consume less energy, and due to the versatility of the fixtures, their number can be smaller than conventional fixtures. He also aims to design his lighting plans with fewer fixtures and adapt them to the technical requirements of theatres to reduce the need for additional equipment rentals. Doublier fully agrees with most of the points presented in the *Theatre Green Book* regarding lighting designer choices – for example, minimising the lighting plan. He mentions realising how, as a young lighting designer, he aimed for perfection through addition. Now, with over 30 years of experience, he asks himself a more ecologically sensible question: "What could I take away to make this creation perfect?"

Finally, Doublier presents a few small recommendations he cannot accept. Focusing light at 80% intensity does not work because potential leaks, iridescence manifestations, or diffusion problems are not visible compared to 100% intensity. However, the amount of electricity saved is insignificantly small. Instead, a big problem for him is the transition to using 3D simulation software. Doublier sees himself primarily as a craftsman and loves the physical experimentation phase in his work the most because he wants to physically feel what the light truly produces. 3D can never simulate this with sufficient accuracy. Doublier finds 3D useful only when drawing the lighting plan, and it can be used to check that the fixtures are drawn on the correct hanging pipe and that their direction does not hit the stage frame.

In conclusion, I can say that the *Theatre Green Book* seems to succeed in its goal of connecting different professionals and sharing knowledge. However,

What ecological practices are already in use and what challenges do they contain?

I start by discussing how the network's lighting designers describe their own sustainable practices and what they find challenging about them. Ezra Veldhuis emphasises the recycling of materials and compact, tour-friendly projects, even if it costs more. According to her, the transition from halogens to LED lights has brought challenges, although she is excited about using high-quality LED lights. Since Veldhuis values working with precise colours and lighting arrangements, it requires the same lamps in every venue. Because the LED lamp arsenal in theatres is not standardised, she often has to buy or rent own LED lamps for the creation process or tour. Therefore, she questions the standardisation of lighting venues that comes with the use of LED lights, which can limit the diversity and specificity of lighting designs. She fears that the significance of light in a performance will diminish and it will revert to merely illuminating the piece when aiming for efficiency and standardisation.

Emese Csornai, on the other hand, says that encountering the conceptual level of the work is important to her, so instead of visualisations, she focuses on the physical manifestation and impact of lighting solutions. The precise adaptation of a touring performance allows for the use of the venue's own character, as well as the house's equipment and colour filters as much as possible, reducing the need for transported or constructed material requirements. Still, she can bring her own special materials, such as colour filters and projectors, with her on public transport. Csornai finds it challenging that the subsidy system does not take into account the different ways of collaboration and operation, leading to inflexible schedules and budgets. In such cases, conditions dictate the working method instead of the working method guiding the workflow. Lighting design is easily seen as merely a technical practice. She is critical of the use of LED spotlights because, although they are efficient in terms of lighting wattage, they are not automatically environmentally friendly or even artistically appropriate. Achieving certain physiological effects is more difficult with LED lights, and the rental and transportation costs of LED lights can negate the energy savings achieved with them. The light quality and dimming curves of LED lights do not always match the physical experience produced by traditional fixtures. She refers to studies published by Wenzl Franz (2017), which indicate that the rare earth metals and strategic metals used in the manufacture of LED lamps are often overlooked in life cycle studies. Csornai also notes that calibrating and reconstructing site-specific performance lighting with special equipment can be challenging if the performance is moved to another location. Affordable and low-consumption lamps that she uses are often unfortunately removed from the selection because they are rarely in demand.

Jan Maertens feels that he does not have the authority to change the context in which he works, but he must adapt to it. Nevertheless, he strives to be aware of the unintended consequences of his lighting design practice and to minimise its negative impacts. It is not just about following protocols but trying to balance ecological awareness and sustainability, avoiding mere protocol obedience. This clinging to symbolic and apparent sustainability, according to Maertens, leads people to act according to the protocol instead of adopting a truly eco-conscious attitude. This attitude means energy management and consideration

of light quality, not just energy savings. Maertens currently feels that sustainability protocols practically limit his practice instead of solving the eco-crisis.

Henri Emmanuel Doublier says he has always tried to adapt his lighting designs to the technical requirements of theatres to minimise the need for additional equipment rentals. For him, the lighting design of a performance is never static after the premiere but evolves and adapts because it makes no sense to repeat exactly the same lighting. This approach has led to pleasant surprises in lighting quality as he has fine-tuned it after several performances. He notes that he has always been aware of the need to save as much electricity as possible and extend the lifespan of colour filters and lamps, for example, by turning off the lights whenever special lighting work was not needed. He has also reused lighting equipment purchased for a specific need as much as possible. For example, he always reuses LED strips hidden in the set with their controllers in another performance if the performance is no longer to be shown. The biggest challenges in implementing sustainable lighting design, according to him, relate to the contradiction between **ecological** principles and protocols and the symbolic and superficial understanding of sustainability, which leads people to act only according to the protocol instead of adopting an eco-conscious attitude. Doublier also experiences a conflict between artistic and **ecological** goals because he still wants to use certain spotlights as part of his expressive palette, even though they are not **ecological**ly sustainable. These include HMI, HQI, sodium, fluorescent, PAR64, 5kw fresnels, but he notes Still, that they can be used sparingly as part of the whole. Doublier also finds it challenging to pre-plan with 3D simulations because, according to him, they cannot replace physical experimentation and the creation of light textures from different light qualities.

How do the guidelines affect lighting designers and where are we heading?

Did the *Theatre Green Book* then affect its readers as its British authors hoped for? What do continental European freelance lighting designers take away from the British context guidelines, and what do they think about the future? The guidelines seem necessary and consistent to **Esra Veldhuis**. She plans to immediately adopt the practice mentioned in the publication of using chalk instead of tape for stage markings. This fulfils the goal of the publication's authors to share concretely good practices, even small ones. Veldhuis hopes that halogen lights and gel filters will remain available alongside LED lights in all theatres in the future. She mentions her previous performance *All Watched Over by Machines of Loving Grace* as an example where using LED and halogen lights together was essential for dramaturgical and aesthetic reasons. The different characteristics of light sources (even vs. dark, "chemical" and "natural" colour tones) were very well suited to playing with the organic and artificial parameters related to the theme of the performance.

Emese Csornai was particularly excited about the trade union-like approach to creating guidelines – standards are negotiated into agreements followed in productions. She believes that in this way, the preparation of productions and their touring activities can be evaluated and developed from an **ecological** perspective. However, she finds the scale of productions described in the *Theatre Green Book* unfamiliar to her. At the same time, she dreams of a festival that would focus on collaborative lighting, a working method where different lighting designers would jointly create a plan to light a single performance in many different ways, or even multiple works. Csornai does not see a very bright future for sustainable lighting design. The more cultural budgets shrink, the more despair takes over the theatre's agency, which reconsiders and finds new ways to collaborate, valuing the horizontal coexistence of combined media. As a refreshing counterexample, she highlights the method developed by Zwoisy Mears-Clarke during the Covid-19 pandemic to guide his collaborators to explore the fringes of their own art form, in this case, imagining the possibilities of future nonvisual dance performances. Csornai sees this as an excellent model for the direction in which sustainable collaboration methods should be developed.

When it comes to evaluating the content of the Theatre Green Book, Jan Maertens notes the didactic tone of the publication, which feels more like a lesson in good, green behaviour than fresh theatre thinking in a new eco-reality. Many of the presented things seem self-evident to him. The eco-crisis is presented as if it were an easily manageable issue. At the same time, it creates the impression that the performance industry is trying to free itself from its obvious footprint by overloading artistic practices with protocols and guidelines. He notes that although the aim is to achieve net-zero computationally, in reality, there is always some footprint left. Maertens admits that it is good that some things are now monitored more strictly than in more carefree times and that newer technology has helped manage things more sustainably. Still, it is peculiar that, for example, when talking about power consumption, the use of LED fixtures is not mentioned, even though their use has become more common.

I make the same observation regarding the misconception of the low power of LED light sources. There is already a regrettable global trend of increasing overall consumption related to the quantitative growth of LED light sources, which is not limited in the same way by the previous size of power supplies and fuses. The research group **Bergesen, Tähkämö, Gibon, and Suh** (2016) has noted that as the production of lighting technologies becomes cheaper and they produce greater energy savings over their lifetime, the demand for lighting services and devices may increase, requiring more electricity generation.

Jan Maertens feels that he is constantly challenged by all sorts of new "eco-protocols." Therefore, he tries to be more aware of them while attempting to understand his actions more profoundly than what guidelines and protocols like the *Theatre Green Book* direct. As he mentioned earlier, it is about a more fundamental **ecological** awareness and attitude, not just mechanical adherence to guidelines. This critical attitude affects him on his journey towards the next level of eco-consciousness. Reading the *Theatre Green Book*'s interpretation of sustainability and future lighting design practices, Maertens sees an emphasis on repertoire planning, modular and standardised design practices, and 3D model design. He wonders if this could even lead to 3D model performances in virtual reality. He fears that in the future, we may no longer be able to talk about lighting design, but we will have to enjoy the commercial form of technical lighting. This would, in his view, be a return to square one, back to the time before the late liberation of lighting design as we know it. We would have to abandon all posthuman or material approaches, giving up the