

Light Pollution & Climate Change

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Climate Change

- ▶ Climate is the average weather in a place over many years.
- ▶ Climate change is defined as “any change in climate over time, whether due to natural variability or as a result of human activity.”
- ▶ Climate takes hundreds, thousands, even millions of years to change with the natural facts.
- ▶ But with the man-made lights and other facts, we’re now face to face with global warming.

Europe Targets 2020

▶ **1. Employment**

75% of the 20-64 year-olds to be employed

▶ **2. R&D / innovation**

3% of the EU's GDP (public and private combined) to be invested in R&D/innovation

▶ **3. Climate change / energy**

greenhouse gas emissions 20% (or even 30%, if the conditions are right) lower than 1990

20% of energy from renewables

20% increase in energy efficiency

▶ **4. Education**

Reducing school drop-out rates below 10%

at least 40% of 30-34-year-olds completing third level education

▶ **5. Poverty / social exclusion**

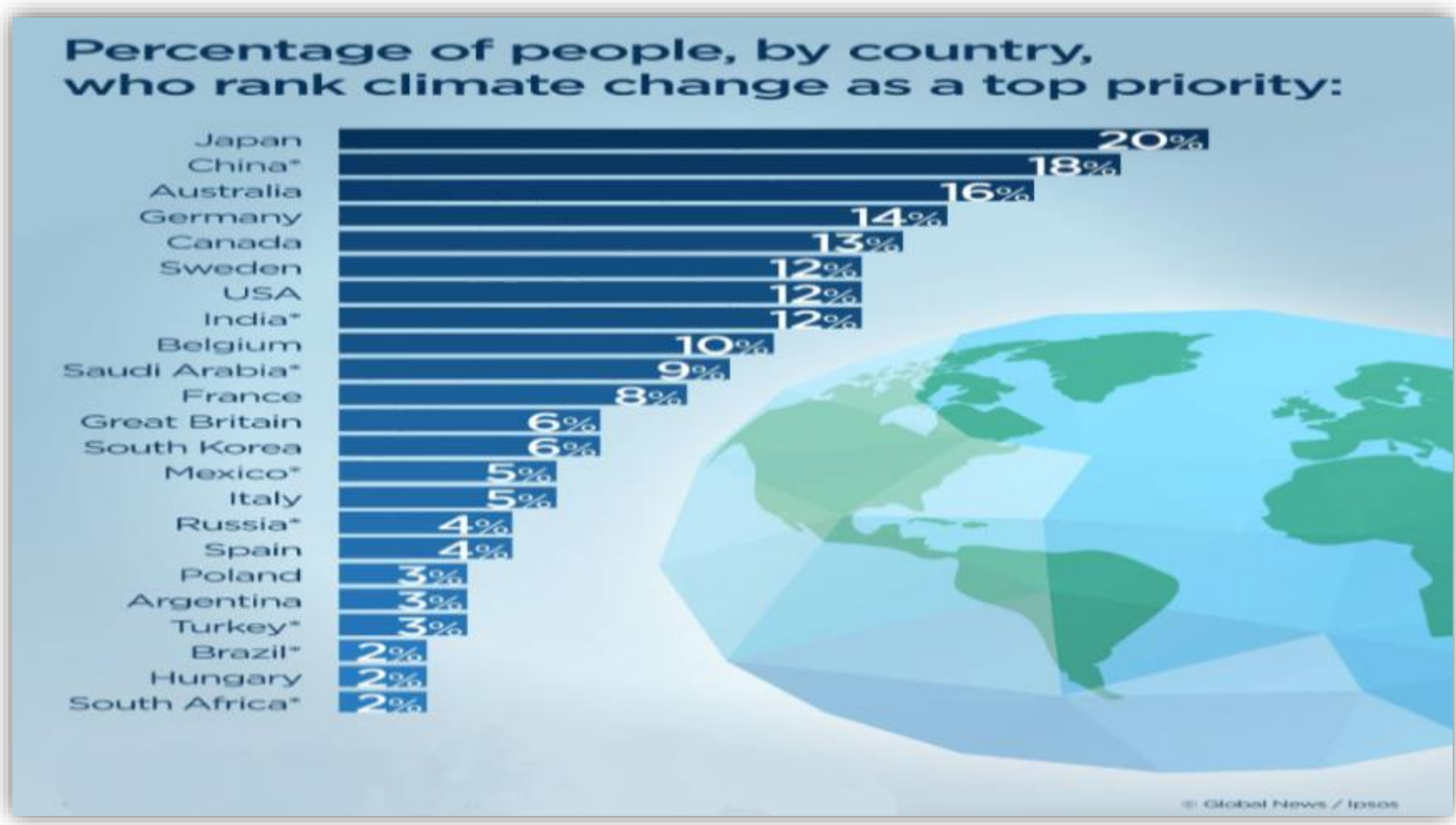
at least 20 million fewer people in or at risk of poverty and social exclusion

3rd Target

- ▶ According to European Union Targets For 2020 most developed countries that in EU must :
- ▶ decrease their gas emissions 20% lower than 1990.
- ▶ Get 20% of their energy from renewable resources.
- ▶ 20% increase in energy efficiency

Member States targets	Emissions reduction targets (compared to 2005 levels) ²	Renewable energy (in % of gross final energy consumption)	Energy efficiency ³	Member States targets	Emissions reduction targets (compared to 2005 levels) ²	Renewable energy (in % of gross final energy consumption)	Energy efficiency ³
EU headline target	-20% (compared to 1990 levels)	20%	20%	FR	-14%	23%	236.3
AT	-16%	34%	31.5	HR	11%	20%	9.19
BE	-15%	13%	43.7	HU	10%	14.65%	26.6
BG	20%	16%	15.8	IE	-20%	16%	13.9
CY	-5%	13%	2.8	IT	-13%	17%	158.0
CZ	9%	13%	39.6	LT	15%	23%	6.485
DE	-14%	18%	276.6	LU	-20%	11%	4.482
DK	-20%	30%	17.8	LV	17%	40%	5.37
EE	11%	25%	6.5	MT	5%	10%	0.825
EL	-4%	20%	27.1	NL	-16%	14%	60.7
ES	-10%	20%	121.6	PL	14%	15%	96.4
FI	-16%	38%	35.9	PT	1%	31%	22.5
				RO	19%	24%	42.99
				SE	-17%	49%	43.4
				SI	4%	25%	7.313
				SK	13%	14%	16.2
				UK	-16%	15%	177.6





- ▶ *Note that data for China, India, Saudi Arabia, Mexico, Russia, Turkey, Brazil and South Africa is not representative of the general population - just of highly educated wealthier, often urban residents with internet access.

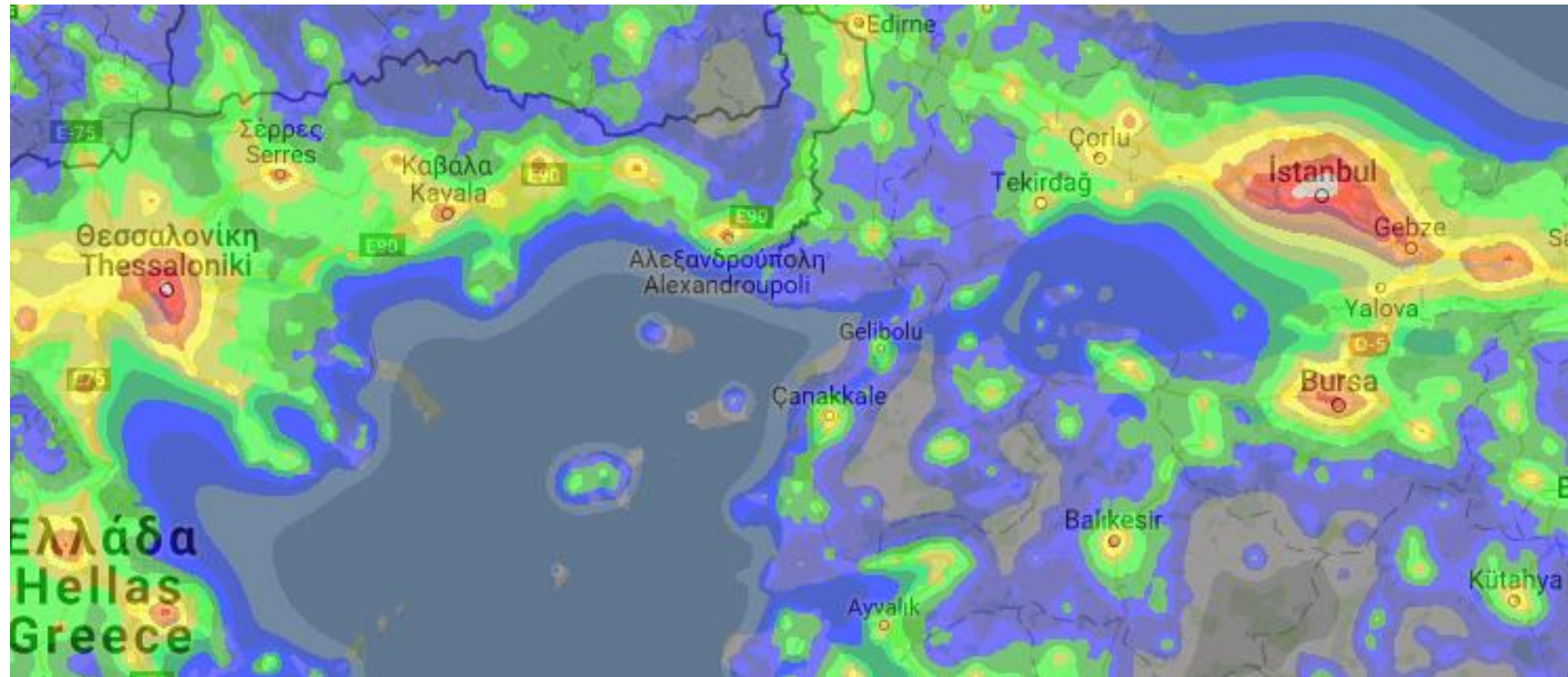
Light Pollution (Photopollution)

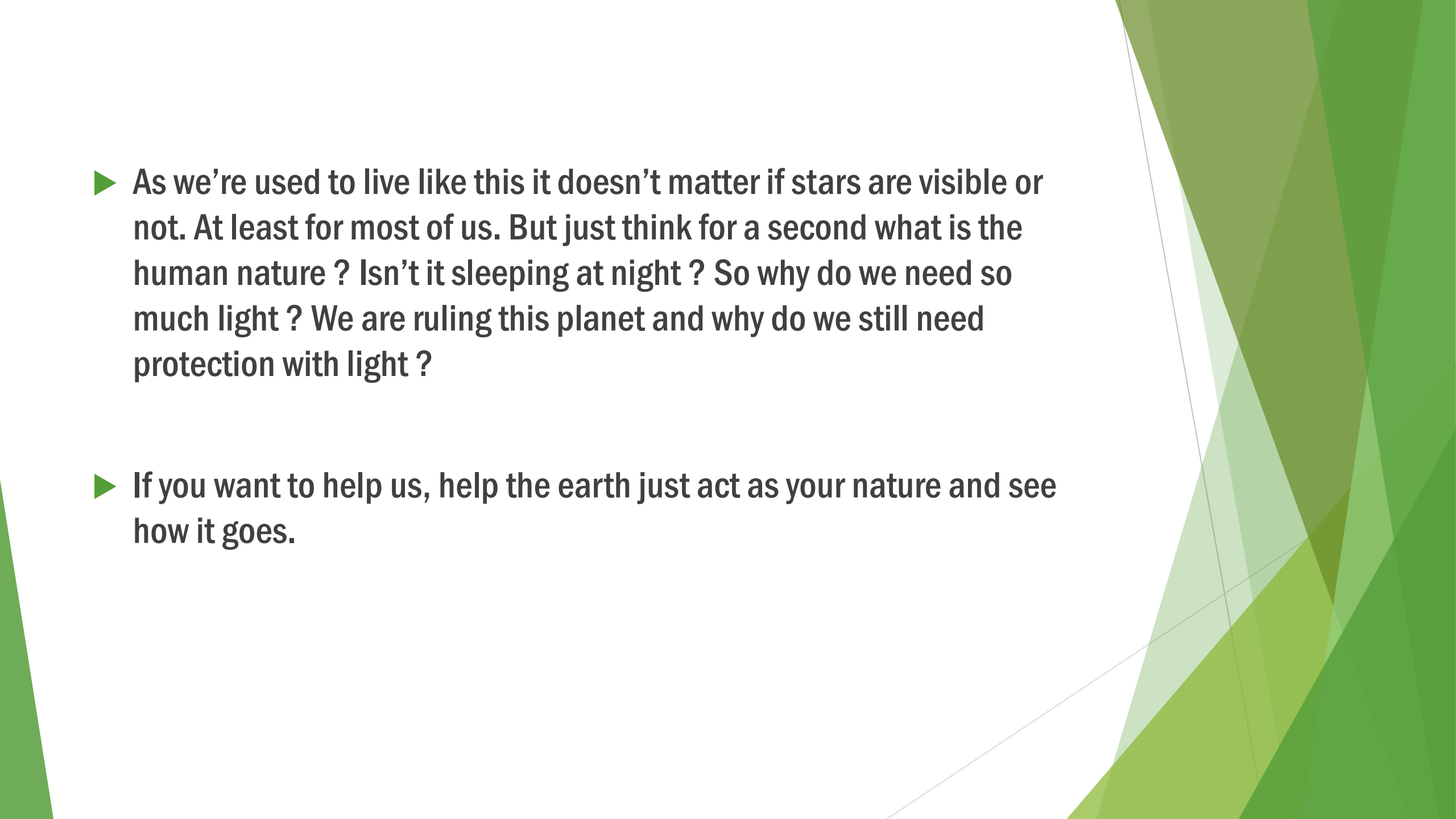
- ▶ Light pollution is a type of pollution. It is defined as “any adverse (or bad) effect as a result of man-made lights.” Usually, this means too much light. Several species, including plants and humans, are badly affected by light pollution. Light pollution is an unwanted consequence of outdoor lighting and includes such effects as sky glow, light trespass, and glare.

25 March World Light Pollution Awareness Day

- ▶ Every year on 25th March the Earth will turn dark for just one hour all around the world.
- ▶ Dozens of building around the world will switch off all electricity including Big Ben, Harrods, the Gherkin, the Eiffel Tower, Sidney Opera House and Bangkok Grand Palace.
- ▶ It's all about helping to protect the planet and everyone doing their job to reverse global warming.
- ▶ While the idea is saving electricity during 'Earth Hour', it is actually more about the symbolism and getting people to be more aware about what they use.
- ▶ It's organised by the World Wildlife Fund (**WWF**) and members of the public are encouraged to take part as well in their homes.

- ▶ Ever wanted to go a light isolated place ? It will be really hard if you live in a big city. It even might take hundreds of kilometers to reach that goal. Isn't that just sad ?



- 
- The background features abstract, overlapping green geometric shapes in various shades, ranging from light lime green to dark forest green. The shapes are primarily triangles and polygons, creating a dynamic, layered effect. The overall aesthetic is clean and modern, with a focus on natural colors and geometric forms.
- ▶ **As we're used to live like this it doesn't matter if stars are visible or not. At least for most of us. But just think for a second what is the human nature ? Isn't it sleeping at night ? So why do we need so much light ? We are ruling this planet and why do we still need protection with light ?**
 - ▶ **If you want to help us, help the earth just act as your nature and see how it goes.**

What do we see

What we MUST see



A photo taken before a blackout and after a blackout.

Inner City Sky

Suburban / Urban

Suburban Sky

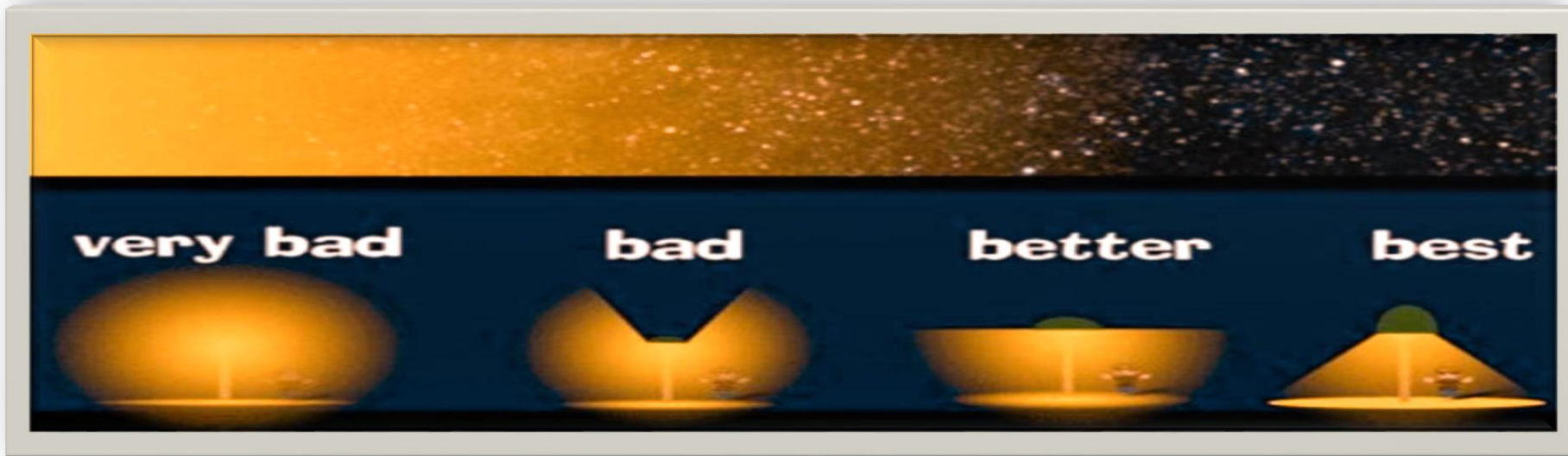
Rural Sky

Excellent Dark Sky



Reasons of Light Pollution

- ▶ There are several causes of light pollution, including over illumination, sky glow, glare and light trespass.



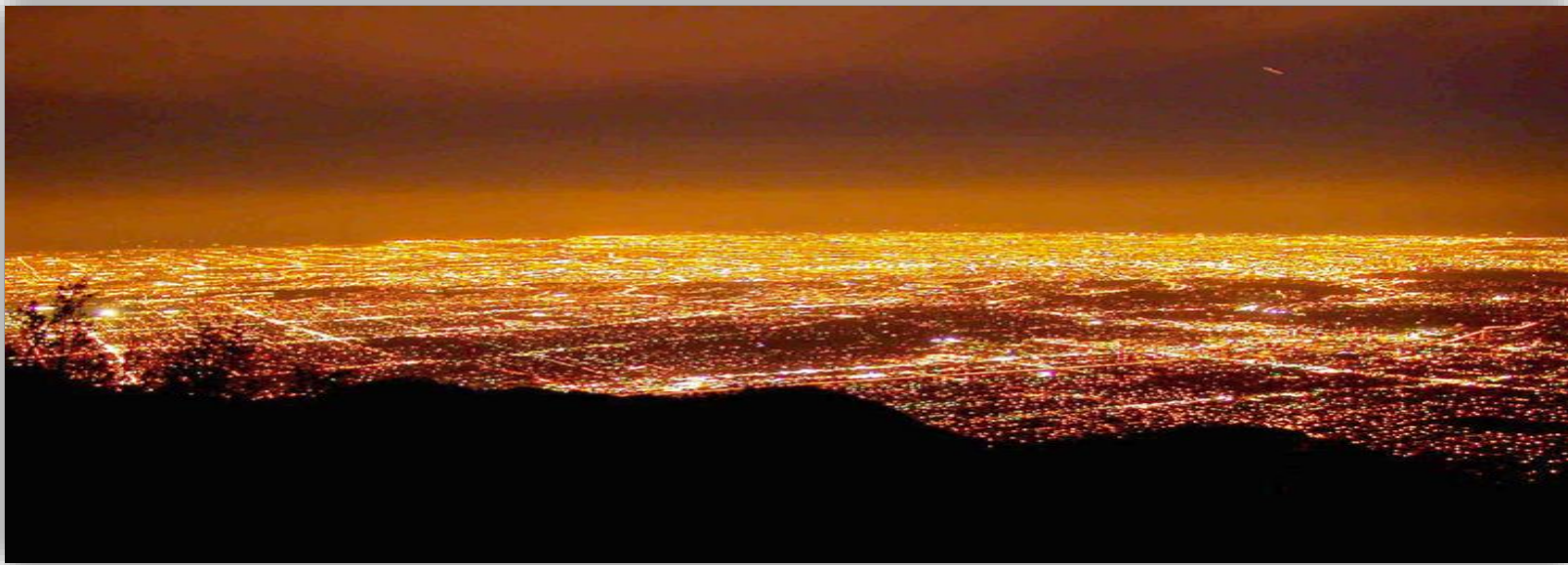
Over Illumination

- ▶ Over illumination is the use of artificial light beyond its specified purpose. It is excessive, for example, leaving workplace lights on after hours.



Sky Glow

- ▶ Sky glow is the haze that appears above cities at night. Sky glow is the result of artificial light being projected upwards then scattered in the atmosphere, and it prevents stargazing.



Glare

- ▶ Glare is light that impairs vision. Some forms of glare produce high contrast shadows. For instance, an unshielded filament creates bright and dark spots within a viewer's field of vision



Light Trespass

- ▶ Light trespass happens as unwanted light illuminates otherwise dark areas. It occurs when a security light shines in a neighboring home.



How Does Light Pollution Effect Climate Change ?



**Climate
Change**

**Global
Warming**

Air Pollution

**Light
Pollution**

How Does Light Pollution Effect Climate Change ?

- ▶ There are two ways for light pollution to affect climate change;
- ▶ Direct Way : With the destruction of nitrate radicals (which cleanse our air)
- ▶ Indirect Way : Wasting resources that pollutes air

Light Pollution Has a Major Effect on Climate Change

- ▶ Each night a process in the atmosphere cleans up the air. Air pollution causes smog in the air. But this wonder chemical only works in the dark because sunlight destroys it. And so, it turns out, does the glare from bright city lights.
- ▶ The lights may be 10,000 times dimmer than the sun, but the effect is still significant. And it is important because it has the potential of increase the daytime pollution levels.

A Recent Research

- ▶ An American Scientist, Harald Stark said: “We showed that city lights decrease the nighttime cleansing of the atmosphere and that could have an influence on what happens the next day in terms of air pollution.” Sunlight quickly destroys NO_3 , which is consequently at extremely low concentrations during the day.
- ▶ Stark and his colleagues determined that the nighttime glow of the Los Angeles Basin was intense enough to do some damage, reducing the nighttime cleansing activity of NO_3 by as much as 7 %.

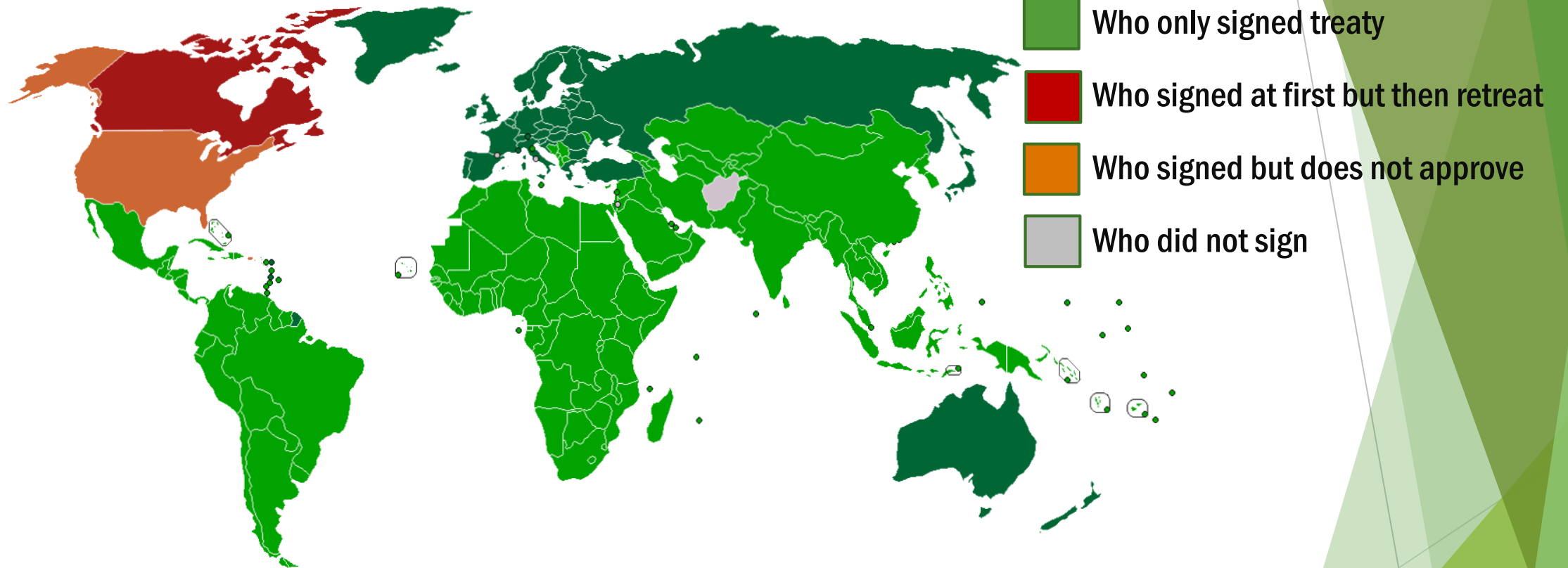
- ▶ **NO₂ is a key ingredient in the daytime formation of ozone, a regulated pollutant that can harm people's lungs as well as crops and ecosystems.**
- ▶ **Light pollution increases the level of these chemicals by as much as 5%.**

Fossil Fuels

- ▶ Fossil fuels are used to produce electricity. Wasted electricity, used for wrong lighting, causes air pollution.
- ▶ All around the world 19% of consumption of the electricity is used for lighting and this equals to 1.9 billion tonnes CO₂.
- ▶ The amount of the energy which a 100 watt light bulb spends every night a year equals to half a ton of coal energy.



KYOTO PROTOCOL



According to Kyoto protocol countries of the world are signed a treaty to reduce carbon emission.

References

- ▶ Hollan, J: What is light pollution, and how do we quantify it?. Darksky2008 conference paper, Vienna, August 2008. Updated April 2009
- ▶ Stark, H : City Lights Affect Air Pollution, University of Colorado December 2010