innovation peaked in 1873 and has been slowing ever since. In his article, he asked "Will the level of technology reach a maximum and then decline as in the Dark Ages?" In later comments to *New Scientist* magazine, Huebner clarified that while he believed that we will reach a rate of innovation in 2024 equivalent to that of the Dark Ages, he was not predicting the reoccurrence of the Dark Ages themselves.

His paper received some mainstream news coverage at the time.

The claim has been met with criticism by John Smart, founder of the Acceleration Studies Foundation, who asserted that research by technological singularity researcher Ray Kurzweil and others showed a "clear trend of acceleration, not deceleration" when it came to innovations. The foundation issued a reply to Huebner in the pages of the journal his article was published in, citing the existence of Second Life and eHarmony as proof of accelerating innovation; Huebner also replied to this. However, in 2010, Joseph A. Tainter, Deborah Strumsky, and José Lobo confirmed Huebner's findings using U.S. Patent Office data. Additional verification was provided in a 2012 paper by Robert J. Gordon.

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LIGHTING TECHNOLOGIES USING LED

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Lighting is an integral part of the infrastructure of the city, region and country. The security of the population and its operability depend on the lighting. Street outdoor lighting – means of artificially increasing the optical visibility on the street at night to ensure the safe movement of vehicles and pedestrians. Outdoor lighting system consists of the following parts:

– exterior lighting of buildings in residential areas;
– street lighting township, city and main roads;
– lighting of city parks and recreation areas.

Outdoor or exterior lighting should ensure that the functional and security needs of a development are met in ways that do not adversely affect the adjacent properties or neighborhood. The degree to which outdoor night lighting affects a property owner or neighborhood shall be examined considering the light source, level of illumination, hours of illumination and need for illumination in relation to the effects of the lighting on adjacent property owners and the neighborhood.

With the exception of lighting for public streets, all other project lighting used to illuminate buildings, parking lots, pedestrian walkways, bikeways or the landscape shall be evaluated during the site plan review process. The following Table A gives maximum lighting levels for outdoor facilities used at night averaged over the entire activity area.

Table 1

Maximum Lighting Levels

Area/Activity	Foot-candles Maximum unless otherwise noted
Building surrounds	1,0
Bikeways along roadside:	
Commercial areas Intermediate areas Residential areas	0,9 0,6 0,2
Bikeways distant from roadside	0,5
Walkways along roadside:	
Commercial areas Intermediate areas Residential areas	0,9 0,6 0,5
Park walkways	0,5
Pedestrian stairways	0,3
Loading and unloading platforms	5,0
Parking areas in residential zoning district	1,0
Parking areas, including outdoor display and retail areas	2,0
Playgrounds	5,0

Sources: Illuminating Engineering Society of North America (IESNA), Lighting Handbook (1987 and 9th (2000) editions) and Lighting for Exterior Environments (RP-33-99).

All other illuminance shall not exceed IESNA recommendations as published in the Lighting Handbook (9th ed. 2000), Lighting for Exterior Environments (RP-33-99), Recommended Practice for Lighting Merchandising Areas (RF-2), or other applicable IES publications, as these publications are amended; and The amount of nuisance glare (light trespass) projected onto a residential use from another property shall not exceed one-tenth (0,1) footcandle at the property line.

All exterior lighting, including public street lighting as applicable, shall meet the following design standards:

1. Background spaces like parking lots shall be illuminated as unobtrusively as possible to meet the functional needs of safe circulation and protection of people and property. Foreground spaces, such as building entrances and outside seating areas, shall utilize local lighting that defines the space without glare.

2. Light sources shall be concealed or shielded to the maximum extent feasible to minimize the potential for glare and unnecessary diffusion on adjacent property and rights-of-way. At a minimum, on-site parking areas, pedestrian walkways and sidewalks shall use full cutoff-type lighting that provides consistent illumination of at least one (1) foot-candle.

3. The style of light standards and fixtures shall be consistent with the style and character of architecture proposed on the site.

4. All outdoor lighting not necessary for security purposes shall be reduced, activated by motion sensor devices, or turned off during nonoperating hours.

5. Light fixtures used to illuminate flags, statues or any other objects mounted on a pole, pedestal or platform shall use a narrow cone beam or light that shall not extend beyond the illuminated object.

6. For upward-directed architectural, landscape and decorative lighting, direct light emissions shall not be visible above the building roofline.

7. Light fixtures shall be located on the periphery of the areas with light sources directed into parking areas. No light sources shall be located on building facades directed outward toward property boundaries or adjacent rights-of-way.

8. Lighting sources shall be color-correct types such as halogen or metal halide, and light types of limited spectral emission, such as low-pressure sodium or mercury vapor lights, are prohibited even in service areas.

Installation of artificial lighting are the most massive engineering devices (more than 1,5 billion. of light points total capacity about 150 million. KW) and consume about 20% of all electricity generated (over 220 billion. KWh). Therefore a professional approach to their implementation and operation is directly related to energy saving and reduction of labor costs.

Compliance with science-based lighting standards contributes to the exclusion of any interference with the objective of solving a particular problem and comfortable visual perception of visual information without eye strain and fatigue. If these standards are not carry out, a significant part of human vitality is spent on overcoming the consequences of "bad lighting".

High-qualitative, "good lighting" that satisfies the standards of lighting, allows a person navigate safely, easily and quickly, move in the environment and perform a particular work.

The theme is relevant because the lighting systems in cities must be ensure the requirements of safety movement of the transport and people and be part of harmonious composition of evening look of the city, and also to be costeffective and have ergonomic features.

To solve the problem regarding security can be in the same way as many years ago – using of lanterns (in other words, the console lights). These lanterns require estimation of power, they should be given an amount of light onto the sidewalk or driveway, which will be enough to not dazzle drivers and help pedestrians.

Outdoor lighting helps to improve security level. Thus, according to a number of investigations (unfortunately, conducted mainly in Europe and the United States), road lighting leads to a decrease of the number of deaths in road accidents by about 65%, while the number of accidents with injuries – by 30%. The strongest influence on the number of accidents involving pedestrians in the dark – a decline of about 50%.

Over the past two to three decades, artificial lighting has become an integral part of urban planning to create new and reconstruction of old cities. Naturally, in this regard, there is a need in the theoretical understanding of issues related to its design in the architectural and art, lighting and electrical, economic aspects (for architectural and artistic aspect refers not only aesthetic issues, but also the convenience and comfort of city life).

The choice of a illumination source is determined by the requirements for lighting (chromaticity emitting, visual comfort, glare index and others.) and is performed by comparing the advantages and disadvantages of existing light sources. In this case, preference should be given discharge illumination source as the most cost-effective, having luminous efficiency of more than 50 lm/W, and in this regard to ensure minimum power consumption. Therefore, it was offered the option of LED lamps.

Let's try to compare such different light sources. The main parameter, we assume the effectiveness of the illuminator source, that is, how much light it produces requiring 1 watt (lm/W).

Table 2

Number	Name of the light source	luminous efficiency
1	Incandescent lamp	20 lm/W
2	Discharge gas lamp (Energy Saver).	90 lm/W
3	LED lamp	130 lm/W
4	Sodium lamp	150 lm/W

Relatively recently, the revolution in lighting has been the development of innovative LED technology provided by global manufacturers of LEDs such as the Cree Lighting (USA), OSRAM Opto Semiconductor (Germany), Philips Lumileds Lighting (USA), Nichia (Japan). and others. The new Russian projects use LED lighting company «Hella», «Lighting Technologies», «Osram». Thus, we get a lot of advantages. When designing outdoor lighting using LED lamps are provided: the normalized value of quantitative and qualitative indicators of lighting installations; efficiency installations and rational use of energy; reliability of lighting installations; security staff and the population; convenience of maintenance and management of lighting systems. And a warm and comfortable light in front of the entrances provides by the sodium lamps.

Selecting any of the light source is determined by the lighting requirements (color light, visual comfort, dazzling brightness index et al.) And is performed by comparing the advantages and disadvantages of existing light sources. In this case, preference should be given discharge light sources as the most cost-effective, having light output of more than 50 lm/W, and in this regard to ensure minimum power consumption. Therefore, it was offered the option of LED lights.

LED lighting has several advantages: the consumer can save energy; not need to frequently change incandescent bulbs, which further reduces the cost of their operation and maintenance; all power-saving devices of light that are used today have a much shorter life, they are very vulnerable to shock and vibration and poorly tolerate the frequent turning on.

Distinguish between street and interior LED lighting. Now they are used in lighting of buildings, vehicles, as well as for street advertising billboards, fountains and bridges. A distinction is also office LED lights (which are used for industrial and office buildings) and lighting fixtures for homes (which are used for interior and furniture). Lighting using LEDs became relevant in translating design ideas in modern interiors. Decorative LED lights are used mainly for holiday illumination on the streets of the city (such as garlands), as well as to decorate the facades of houses and trees.

Among new products include LED spotlight, which is used for illumination of advertising billboards, different landscapes and architectural structures. It is also used for industrial buildings, streets, squares and others. This spotlight can operate for several years All LED street lamps are resistant to adverse weather conditions (freezing temperatures, rain, ice and snow). Moreover, their service life and the light intensity at low temperatures even increase. Reliability of LEDs that can operate up to 50 000 hours, dramatically reducing operating costs.

Cost effectiveness of such lamps is not their only advantage over traditional lighting systems. It should also mention their ability to provide more uniform brightness and higher quality light. Because of these qualities perception of objects is improved and as a result, increased safety. Due to the small size of the LED manufacturers get more opportunities in the design of lighting fixtures. In addition, LEDs do not contain harmful substances (such as lead, mercury, etc.), allowing you to use them in the perspective of sustainable technologies, outdoor lighting, and also solves the problem of disposal of obsolete lamps.

Today LED lamps on the market in the broadest range. With their help, there are illuminated streets, tunnels, car parks and public areas. For each application has its own types of lamps. Modern technologies allow to renounce the use of secondary optics through the integration of reliable silicone lenses in the design and formation of the oval LED directional characteristics of radiation. This eliminates the need for a reflector system that greatly facilitates the task lighting designers and improves the efficiency of the light source since it now covers only the portion which requires. Compound LEDs made using conventional soldering. To more accurately and efficiently distribute light, they can be combined in a system.

Modern LEDs for use in street lamps, have a wide angle of illumination (up to 170 degrees) and high color rendering index value (up to 80). The design of the body contributes to the efficiency of heat dissipation and low cost installation.

The value of rationing illumination is set depending on adopted light sources and illumination system. LED lamps as more efficient allow to obtain lighting at the same power setting several times higher than incandescent lamps. Therefore, we will use the first as the main and only source of light on the roadway.

Circuit Breakers Series VA47-63 most widely used to protect electrical circuits from overload and short-circuit currents with maximum switching capacity range from 4500A to 6000A. Circuit breaker VA47-63 is a reliable and cost-effective solution for a wide range of applications.

Circuit Breakers Series VA47-63 suitable for use in the residential sector (apartments, villas, cottages, houses, etc.), as well as in office buildings and commercial sector (offices, shops, restaurants, hotels, etc.)

In conclusion we can say that we can designe the lighting and electrical lighting of the residential building as a whole.

We can achieved efficiency, environmental friendliness and comfort by lighting modern lighting LED lights.

Economical use of energy, electrical engineering, creating an economical system operation and control of lighting.

All evening painting, composition of light spots of different functional and artistic values combined pattern constituting the basis of the picture. Drawing of all the architectural details associated with artificial lighting will become expressive, modern, in accordance with a large architectural form.

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LIQUID COOLING VS. AIR COOLING

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What will happened to your PC, if you let it to be overheated? The PC will just burn out. When the processor's temperature increases by 10 degrees, its shelf life is reduced by half. But even half a reduced life spans CPU longer than its "relevance".

The main reason for cooling CPU is its unstable work and, as a result, the output of the processor down above a certain critical temperature for a certain period of time (often quite long). You can't escape from heat, but this problem has many solutions. Currently there are many cooling systems, they all use a common principle of operation – the transferring of heat from a hot body (cooled object) to the less hot (water cooling system). Don State Technical University students are working on improving one of the cooling methods – a liquid cooling system. They are proving that a liquid cooling system is better than a traditional air cooling system, and it is worth an effort putted in researches for improving it.

The secret to harnessing the cooling power of air lies in fans. Your typical air-cooled PC is packed with case fans, graphics card fans, and a CPU fan. They are positioned atop a big metal heat sink to keep computer expensive components nice and frosty.

A water-cooling system, on the other hand, employs a series of coolant-filled tubes, a radiator, water blocks (the equivalent of heat sinks), and a couple of other components to keep your PC being refreshed. However, that system will cost up to $500, while air cooling will cost about $120.

Let's compare both of these systems: thermal conductivity of water is 25 times better than thermal conductivity of air. It means that it will be much more efficient, plus, water pumps are less noisy than fans (25–40 dB – water cooling against air cooling, that can make noise louder than 42 dB).There is also the issue of space. A huge heat-sink/fan combination might perform well enough, but the best CPU coolers eat up a ton of real estate inside your computer case. Liquid cooling requires less space, and it looks a lot niftier to boot. You can't discount the cooling factor of a case full of colorful, liquid-filled tubes.

There are two reasons why a computer might need the increased thermal conductivity and heat capacity of water:

1. Its electronic components produce more heat than the air around them can absorb.

2. The fans required to move enough air to cool all the components make too much noise or use too much electricity.

In liquid-cooling systems water in pure form is rarely used as a coolant (it is connected to the electrical conductivity and corrosion activity of water). It is often distilled water (with various additives anti-corrosive nature), sometimes – oil and other special fluids.

Most computers dispel heat with heat sinks and fans. Heat sinks are basically pieces of metal that provide lots of surface area for the air to touch. The chip warms the heat sink, the heat sink warms the air, and the fan moves the warm air out of the PC case.

This system works most of the time, but sometimes, electronic components produce more heat than simple air circulation can dispel. High-end chips with lots of transistors can overwhelm an air-cooling system. So can chips that have been overclocked, or manually set to work at faster than their default speed.

There is also a way to get into liquid cooling with an all-in-one loop. It consists of a single closed loop with a radiator on one end and a pump/water block combo on the other. It is fairly easy to use.

So, which is better air cooling or water cooling? The answer depends on your particular usage needs.

One size does not fit all when it comes to case cooling, but most people can get by with fans alone. It is easy, and it is cheap. If, on the other hand, you are an enthusiast who needs the best cooling possible for your flaming CPU and a gaggle of graphics cards, a DIY water-cooling setup is in your future. Finally, try a sealed liquid cooler if you are considering liquid cooling either to keep your overclocked processor chilled or simply to benefit from reduced system noise.

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