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GREEN OFFICE – FUTURE OF NEW AGE

Abstract: *Inefficient useage of natural resources (water, land, energy ...) and pollution of natural ecosystems as well, resulted as imbalance in ecosystem and available resources. Alarming data that shows negative impact of humanity on the environment, lead to reforms in environmental policy (waste management, water, energy, soil protection, agriculture ect.) Thus, many companies tend to behave responsibly towards the environment because of the trend and prescribed law, but also because of a growing awareness environmental protection. Purpose of this paper is to point those companies that are aware and responsible to environment. The first step to show is to start in your own company by reducing energy, water consumption and to be consistent in those processes. Paper will show how the green office business responsibly*

Keywords: *Environment, Environment protection, Humanity, Green office*

1. INTRODUCTION

Humankind is now affected by many existential crises, but ecological crisis is especially important one. Man was not able to create an ideal system of civilization till today, nor to avoid the crisis situations in the same system.

One of probably the biggest problem when we speak about cause of pollution and its reducing is firstly neglecting. That is why companies must firstly act inside the own property and employees; to learn them about awearness.

The other one is simply profit. Aim is to produce cheaper product, regardless the applied technology, or harmful effects they have on the environment.

Environmental awareness is a necessary foundation for future, sustainable development of environmental protection. It is very important to find a way for a rational usage of natural resources, finding and introducing environmental measures.

In this paper green office is inside those companies that are socially responsible as well. They have plan and well done strategy how to reduce energy, water, garbage and work in environmental friendly office.

2. ENVIRONMENTAL AND CLIMATE OVERVIEW

Our economies rely heavily on fossil fuels. According to IPCC [1] global emissions of greenhouse gases due to human activities have grown drastically since pre-industrial times, including an increase of more than 70 % over the past four decades. (CO₂-eq concentrations are nearly 60% higher than pre-industrial levels. Due to carbon emissions which leads to substantially change the global carboncycle, increasing this element in atmospheric concentrations as a result has changes to the climate system. Figure 1 given below represents anthropogenic

climate change drivers, impacts and responses and their relations.

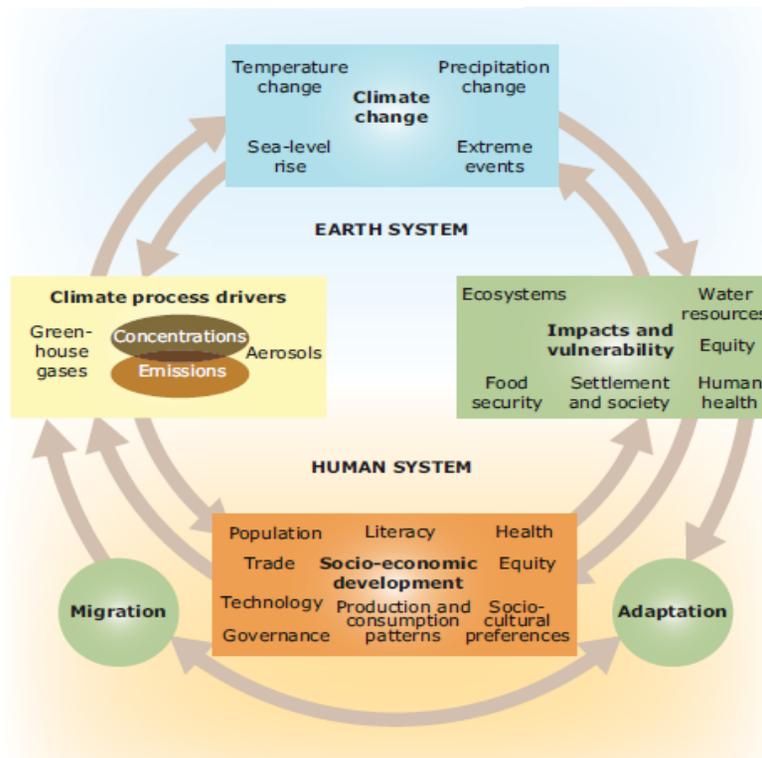


Figure 1. Anthropogenic climate change drivers, impacts and responses and their relations [1]

The significant rise in emissions in the last few centuries disrupts capacity of the climate system to absorb, ultimately leads to less stable climate. In other words, if this trend continues climate disruption is certain. According to IPCC, all over the world the energy supply, housing, industry and transport sectors, all together constitutes two thirds of emissions, and the last one includes forestry and agriculture. Actually according to previously mentioned situation, the greatest virtue is to prevent and minimize adverse climate changes as closely related to the range of other environmental and social challenges. Therefore the European Union has already committed to reduce emissions by (at least) 20 % from 1990 levels by 2020. Sustainable approach to water

resource management is focused on water quality and quantity, and use it more efficiently. Water exploitation index is above 20%, it may indicate that the water resource is under stress due to water extraction. One third of freshwater abstraction is used by agriculture, the second one is from process of cooling in energy production, water supply uses approximately one quarter, and the rest is used in industry. When we speak about water abstraction for power plant cooling in Europe, it has decreased overall by more than 10 % over the last 10–15 years, mainly due to implementation of advanced new cooling technologies that require less water consumption.

The Figure 2. given below is presenting a part of freshwater cycle.

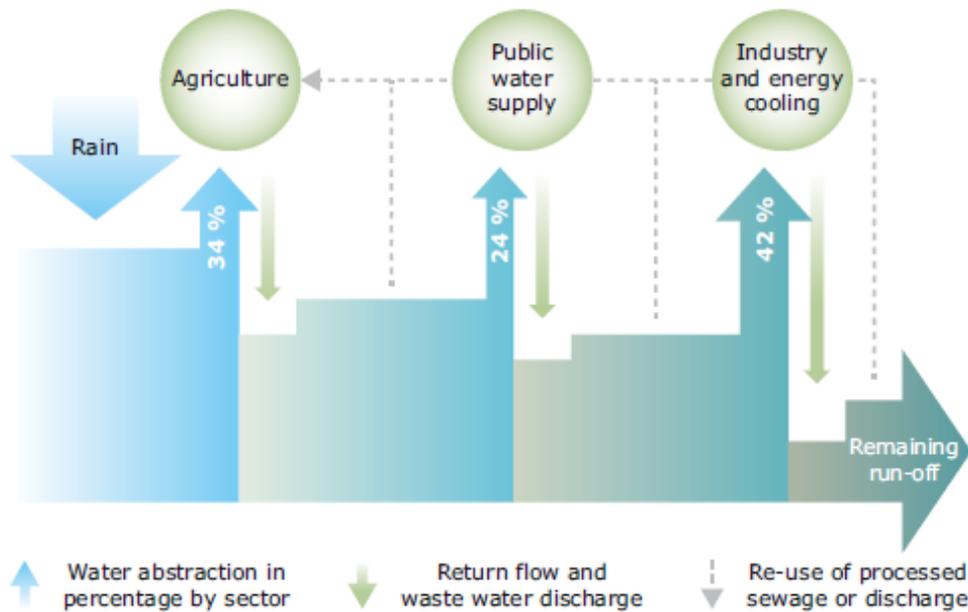


Figure 2. Freshwater cycle [2, 3]

Today's economies are based on the usage of material resources. That means renewable resources, such as biomass (including agricultural products or timber), and non-renewable resources, such as fossil fuels, metals and non-metallic minerals (including sand, gravel and limestone). Over the last century the use of materials has increased globally. This has facilitated our way of life, but also has resulted in negative environmental consequences. The use (and in some cases over-use) of renewable resources and biomass has put the sustainability of these natural resources at risk. Another case is deforestation, which has led to erosion washing away nutrients from soils, and to some degree threatened the ability of ecosystems to absorb greenhouse gas emissions. The use of non-renewable resources has raised similar concerns. Use of fossil fuels leads to concerns about the ever increasing emissions of greenhouse gases, and destruction of habitats.

Extraction of non-metallic minerals for construction affects landscapes, changes local hydrogeological conditions, and results in huge volumes of wastes. These problems are also common to the extraction and melting of metals, that additionally requires huge amounts of energy and leads to air emissions. Hence an unprecedented speed and scale of changes in the use of resources observed over the past few decades has increased the need for having improved data and indicators to describe key material resource trends at all levels of the economy — the macro, sectoral and product. However there is a need for such analyses that will convey significance of various materials and the related impacts and also their potential for re-use, recovery, reduce or recycling. Figure 3. shows links between usage of different material resources and waste generation in an economy [4].

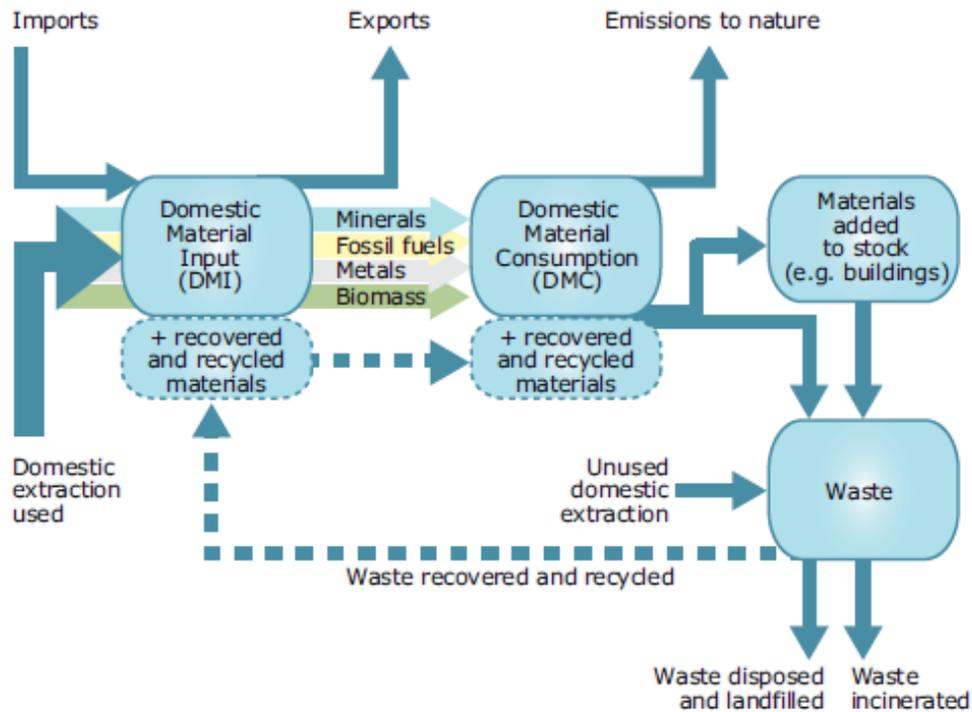


Figure 3. Waste generation[4]

3. GREEN OFFICE

3.1. General about Green Office

Green office purpose is encouraging people (employees) to “reduce, reuse, recycle and turn off” all with aim to provide better environment for living and working. Few years ago Green offices started as a pilot program in USA Universities all over the country, with simple strategy where in the focus of implementation are young. American youth is involved in every action of “going green” while they are studying. This is very effective way for them to become aware how much they can contribute to environmental protection, and how to behave responsibly later in green business environment. In Europe it has begun in Finland, and it exists in South Africa, too.

Recycling is a very energy intensive process but it is certainly more useful than landfilling or incinerating waste. Key is to use less and buy less in order to save costs and environment, too. It is easy after you succeed reducing to reuse things you already have and give them a new life. And at the end those items that become worn you can recycle.

We can reduce our carbon footprint by first reducing our consumption and minimizing demand for new products, reusing what we can, and then recycling whatever we can no longer use. – It’s the smart and easy way to cut waste and save our natural resources. Generally, the concept of so called “green economy” in the context of sustainable development is given as Figure 4. It is presenting aims of individual, and integration of the three in the “green economy”.

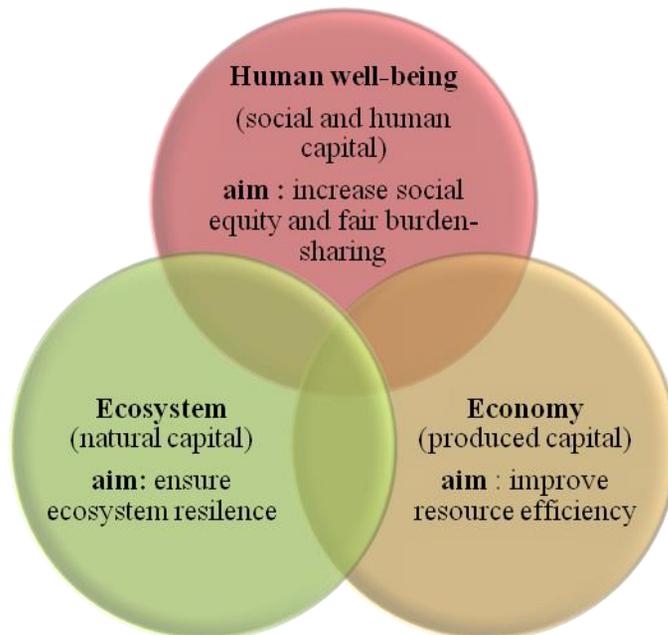


Figure 4. Green economy in the context of sustainable development, adapted to [5]

You can save energy, money and help the environment by using "green office" equipment. Many people do not realize that the usage of office equipment is costing more than its original price. Emissions of "greenhouse gases" emitted by power plants, factories for the production and disposal of paper you use can not exceed 80 tons of carbon dioxide, which is more than the average household broadcasts for seven years. In increasingly, large companies care not only about the cost of maintenance but also how much it will impact on the environment made by buying equipment. For example, they are aware that if you buy an energy efficient photocopier, designed to work well with recycled paper and toner cartridges, copy both sides whenever possible, set up an efficient system for recycle, set the copier to save energy when it is not in use and after seven years of use it can :

- Reduce power consumption by 80%,
- Reduce the electricity bill by 80%
- Divide the cost of paper, toner,

- Reduce emissions of "greenhouse gases" that come from electricity, paper and toner by 75%
- Save 50 trees that would be cut down for paper,
- Engage employees to do something good for the environment,
- Increase productivity by increasing staff morale,
- Increase company profits.

Only by reducing the use of paper and using the recycling scheme can reduce costs and environmental impact about 75-95%. In order to achieve such a spectacular result, it is essential to train operating personnel and control implementation.

3.2 Why going green?

There are very good reasons to turn your office into economical and environmentally friendly. The purchase of energy-efficient equipment saves the company money. You can only save on

electricity significantly by reducing the electricity bill by 80%. It will also cooling device to consume less power by reducing the radiation of heat from office equipment. You can cut paper costs by printing double-sided pages, and save money by amending cartridges from printers and photocopiers. This also saves the cost of waste disposal, recycling toner because it automatically produces less waste. The usage of energy efficient equipment has a huge positive impact on the environment. By reducing the electricity you use, you will reduce water pollution and air pollution from power plants and every 1,000 kilo-watts to prevent save one tonne of greenhouse gas

into the atmosphere to come. By recycling, reusing office supplies green office reduces waste and general environmental pollution. And yet, for every kilogram of equipment, which is made from recycled metal and plastic, green offices save two pounds of greenhouse gas. Using recycled paper is saving trees. Every 100 lynx recycled paper that is printed double-sided saves two trees, more than a tonne of greenhouse gas and one cubic meter of used space compared to 100 lynxes securities that are not recycled or printed unilaterally.

3.3 Green Office Policies

Table 1. American`s University policies, aims and actions [6]

Snapshot	Action	Benefits
<p>Who: public safety What :paper efficiency Why :to protect forests and reduce waste</p>	<p>In 2009, AU's Office of Public Safety mandated the use of processed-chlorine free, 100% post consumer waste (PCW) recycled content copy paper, along with mandatory double-sided printing.</p> <p>Double sided printing reduces paper consumption by an estimated 45%. The office directed employees to select double-sided when printing. In addition to double-sided printing, the office converted most of their paper forms to electronic forms, including parking permit applications, vacation requests, money requests, bureau directives, and timesheets. They also implemented a shared network drive where electronic files are easily available, which they expect to reduce the need for paper files.</p>	<p>Copy paper was the number one product for which environmental attributes are considered during purchasing. By focusing on paper consumption, Public Safety is setting a highly visible example for staff and students alike, on an issue that people feel is important.</p> <p>Using the Environmental Defense Fund's Paper Calculator, based on the use of 500 reams of paper per year, Public Safety estimates the following savings from switching from virgin to 100% PCW copy paper:</p> <ul style="list-style-type: none"> • 22 tons of wood • 71 million BTUs of energy • 18,181 lbs of greenhouse gas emissions • 81,455 gallons of wastewater • 5,505 pounds of solid waste.
<p>Who: Public Safety What: Replace bottled water with filtered water Why: Save money, water, waste, and energy.</p>	<p>In 2009, AU's Office of Public Safety decided to cease the purchase and delivery of water in plastic containers and to eliminate petro-based plastic cold cups. Instead of petroleum-derived plastic cups, Public Safety now uses plastic cups made from corn starch, certified by BPI as compostable.</p> <p>Bottled water is sometimes perceived as better looking, smelling, and tasting, as well as</p>	<p>Bottled water is often perceived as being safer than tap water. But according to the Natural Resources Defense Council (NRDC), "22% of tested bottled water brands contained chemical contaminants at levels above strict state health limits." While tap water is required to be tested for e.coli and other contaminants, bottled water typically escapes government testing. Tap water also gets a bad rep for smell and color. As a result of these safety and aesthetic perceptions, many people</p>

	<p>safer, than tap water. But the fact is nearly half of bottled water is simply bottled tap water. A double filtration system addresses these safety and aesthetic concerns with tap water. The filtered water system has received positive feedback from Public Safety employees for its taste and drinkability.</p> <p>Next, the department plans to eliminate Styrofoam hot beverage cups by distributing reusable, recycled-plastic mugs to every employee.</p>	<p>have come to expect bottled or filtered water. By installing a tap water filter, Public Safety is providing clean, safe, aesthetically appealing beverage water as a new employee benefit.</p> <p>Bottled water has many hidden environmental costs. Average impacts from consuming 100 single-serve water bottles:</p> <p>Water consumed....16 gallons Water used in production.....31 gallons Energy used in manufacturing.....10 mega joules Oil used to produce plastic bottles.....2 gallons CO2e emitted by bottle production.....19 pounds</p> <p>In addition to saving the above, the inline filter also:</p> <ul style="list-style-type: none"> • Avoids emissions from water delivery trucks • Reduces plastic bottle waste • Reduces Styrofoam cup waste
<p>Who: University Architect What: LED lighting Why: Save energy, money, and labor</p>	<p>In 2008, American University (AU) signed the American College and University President's Climate Commitment. In 2010, AU adopted a Green Building policy, requiring LEED standards for new construction and major renovations. Together, these mandates underpin AU's commitment to carbon neutrality and sustainable building practices.</p> <p>AU installed LED (light-emitting diode) lights in the School of International Service (SIS) parking garage and in lamps along outdoor campus walkways. The garage LEDs last 50,000-70,000 hours, compared to metal halide lights, 50% of which fail after just 15,000 hours. As a result, the LEDs reduce replacement purchases by about three times.</p>	<p>The Spring City Electrical LED walkway lamps are enclosed with globes that are opaque on top and transparent on the sides so light reflects downward where people walk instead of some of the light being emitted upward into the sky, disrupting adjacent neighborhood activities. This prevents light pollution and supports the Night Sky Initiative. Additionally, the longer-lasting LEDs reduce the frequency of burn outs, thus enhancing safety in the parking lot and walkways</p> <p>Environmental benefits from the parking garage installation alone include:</p> <ul style="list-style-type: none"> • 20.2kW of power saved • 635,000 tons of CO2 e avoided
<p>Who: Washington D.C. University What: Zero Waste Why: to protect environment and reduce waste</p>	<p>The zero waste plan shall require an annual waste stream audit; designate staff responsible for implementing the plan; outline proposed actions for reducing waste; describe tracking and review procedures for monitoring the plan; and include deadlines for achieving, at minimum planned goals</p>	<ul style="list-style-type: none"> • Reuse, recycle or compost 50% of ongoing consumables (by weight or volume) • Reuse, recycle or compost 100% of ongoing consumables (by weight or volume) • Reuse or recycle 75% of durable goods waste stream (by weight, volume or replacement value) Reuse or recycle 100% of durable goods waste stream (by weight, volume or replacement

value)

- Divert 70% of construction and demolition debris (by volume) from landfill or incineration
- Divert 100% of construction and demolition debris (by volume) from landfill or incineration
- Recycle all mercury-containing lamps
- Divert 80% of discarded batteries from trash, including single-use and/or rechargeable batteries used in radios, phones, cameras, computers and other dry-cell types of batteries.
- Divert 100% of discarded batteries from trash, including single-use and/or rechargeable batteries used in radios, phones, cameras, computers and other dry-cell types of batteries.

4. CONCLUSION

From previously presented in the paper, we can conclude that main purpose of green office is to encourage people to “reduce, reuse, recycle and turn off” Green office is environmentally conscientious and shows it by: reducing the consumption of

natural resources by improving offices’ environmental efficiency, promoting climate change mitigation by requiring energy saving and use of renewable energy sources, and promoting sustainable practices by increasing environmental awareness of employees.

REFERENCES:

- [1] *Climate change 2007: The Physical Science Basis*, Cambridge University Press, IPCC, 2007.
- [2] *Water Resources Across Europe — confronting water scarcity and drought*, European Environment Agency, Report No 2/2009.
- [3] *Towards efficient use of water resources in Europe*, European Environment Agency, Report No 1/2012.
- [4] *The European Environment — State and Outlook 2010: Material Resources and Waste*, European Environment Agency, 2010
- [5] *Europe’s environment — An assessment of assessments*, European Environment Agency 2012.
- [6] Retrieved from: <http://www.american.edu/finance/sustainability/Get-Involved-Office-Supplies.cfm>