Renewable Energy Resources and Energy Efficiency – Imperative or Choice?

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Abstract: **A new management strategy (or even philosophy), has been developed with a view to create bigger value with fewer negative impact on the living environment. The concept of eco-efficiency, based, among other things, on energy efficiency and renewable energy resources connects ecological performances and economic (financial) benefits. As economic efficiency is realized through the principle of maximal results with minimal inputs, therefore, energy efficiency in the context of enterprise economic efficiency would mean the realization of maximal results (volume of production and services provided) with minimal energy inputs. The topic of this paper is the question whether the realization of above mentioned principles is imperative or choice for companies.**

I. INTRODUCTION

Energy efficiency includes the efforts to reduce the amount of energy required to provide products and services. Improvements in energy efficiency are most often achieved by adopting a more efficient technology or production process. Energy efficiency and renewable energy resources are twin pillars of sustainable energy policy. At the same time, energy efficiency improvements and usage of renewable energy resources pave the cleaner energy path.

Energy efficiency can be used to reduce the level of energy consumption and may slow down the rate at which energy resources are depleted. The idea of meeting energy needs by increasing efficiency instead of increasing energy production is realized through negawatt power - a theoretical unit of power representing an amount of energy (measured in watts) saved. The energy saved is a direct result of energy conservation or increased efficiency.

Energy efficiency used to be known as "the fifth fuel"[1]. It can help to satisfy growing demand for energy just as surely as coal, gas, oil or uranium can and could get the world halfway towards the goal of keeping the concentration of greenhouse gases in the atmosphere below 550 parts per million. Unlike most other schemes to reduce emissions, a global energy-efficiency drive would be profitable.

Nowadays, rational energy use, energy efficiency improvements and renewable energy resources are the key elements of energy policy, and crucial factors of the sustainable development and fight against climate change. The Intergovernmental Panel on Climate Change, a group of scientists advising the United Nations on global warming, believes that profitable energy efficiency investments and renewable energy resources would allow countries such as Greece to cut its emissions by a quarter and Britain by more than a fifth.

Investments in energy efficiency would more than pay for themselves, and fairly fast within 3 to 5 years or, in case of, complex projects within 10 years[2]. But, there are still unfulfilled but potentially profitable opportunities in energy efficiency available to companies. The problem is a series of distortions and market failures that discourage investment in efficiency. Financing energy-efficiency investments can be difficult, especially in the developing world where capital can be scarce. Also, businesses still tend to put greater emphasis on increasing revenues than on cutting costs. One of the key driver for energy efficiency will be the price of the energy. As energy prices rise and more countries adopt limits on greenhouse-gas emissions, banks and consultancies are beginning to sniff an opportunity.

There are three key factors that affects company's response to environmental protection challenges: 1. national and international regulations (laws, standards, policies, different environmental protection instruments), 2. stakeholders pressure (consumers, business partners, investors, insurances companies i local communities) and 3. need for economic, environmental and energy efficiency.

II. ENERGY EFFICIENCY AND RENEWABLE ENERGY RESOURCES – IMPERATIVE?

The companies whose technologies represent the most serious polluters of the human environment and environmental degradation usually resist the requirements of significant ecological investments. The conflict can be characterized as simultaneous aspiration to profit maximization on the one side, and the avoidance to bear

[1]http://www.economist.com/specialreports/displaystory.cfm?story_id=11565685

[2] http://www.mie.gov.rs/sektori/sektor-za-odrzivu-energetiku-obnovljive-izvore-energije-i-stratesko-planiranje/?lang=lat

responsibilities for consequences, on the other side. There is a question now if companies are ready to finance ecological investments. First, their obligation to obey laws passed by the state, and more important, how governmental agencies can control putting the law into effect and apply sanctions for violating it.

Ratifying the Energy Community Treaty in 2006, Serbia has accepted the obligation to apply the European directives in the field of energy to increase share of renewable energy sources and energy efficiency. Serbia is obliged to the Energy Community of South-East Europe and EU countries to increase energy efficiency for 9% from 2011 to 2020, i.e. for 1.5% in 2012 relating to 2011[3].

The Law on Rational Energy Use should enable and stimulate responsible, rational and the long-term sustainable energy use in households, industry, local communities, traffic, civil engineering, and so on. This Law will force obligations of rational energy use on organizations, but it will also include stimulating mechanisms for energy efficiency projects and the use of renewable energy sources. The application of the Law would decrease energy consumption, i.e. it would advance energy efficiency, which, broadly speaking, would bring to economic efficiency. Although energy consumption per capita in Serbia is lower relating to some developed countries, three to four times more energy per product unit is spent in Serbia than in Europe. This Law would force enterprises to establish energy management. Without it, laws and strategies would be a dead letter. Besides, it is very important to inform and educate companies about advantages and benefits of applying the measures of energy efficiency, i.e. applying the 'Dutch model motto': talk, talk, talk. Therefore, it is not enough to pass the laws; we should inform the public because something cannot be applied if nobody knows about it.

Besides the law on Rational Energy Use, an important document in this field is the Strategy of Energy Development in Serbia until 2015, where, except energy efficiency, the importance of renewable energy use for stabile, sustainable economic development of the country is emphasized[4].

United Nations Environment Programme (UNEP) and United Nations Industrial Development Organization (UNIDO) have partnered together to promote Cleaner Production. According to UNEP Cleaner Production means the continuous application of an integrated preventive environmental strategy to processes and products to reduce risks to humans and the environment. For production processes, cleaner production includes conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and wastes before they leave a process. For products, the strategy focuses on reducing impacts along the entire life cycle of the product, from raw material extraction to the ultimate disposal of the product. The goal of cleaner production is to avoid generating waste in the first place, and to minimize the use of raw materials and energy.[5] In 2007, Clener Production Center is established in Serbia with the aim to help companies to minimize waste and emissions and maximize product output.

TABLE I.
CLEANER PRODUCTION FRAMEWORK

Processes – Raw material, energy, water savings – Emission reduction – Assesment of different technological options – Risks and costs reduction
Products – Waste reduction with better product design – Waste usage for new products
Services – Efficient environmental management within service providing

III. ENERGY EFFICIENCY AND RENEWABLE ENERGY – THE ANSWER TO THE CHALLENGES OF CONTEMPORARY BUSINESS?

Expectations of the companies increasingly grow, not only in relation to profit realization but also for environmental protection, corporative management and human rights. Human activities, including economic competition, too, exert pressure largely on natural functions of the Earth that the capabilities of the Planet ecosystem to 'endure' the future generations cannot be understood. Ecosystem degradation does not threaten only to decrease the life quality of humankind, but it deeply exerts influence on entrepreneurial business.

The Millennium Ecosystem Assessment underlines it as an imperative that business communities, especially companies as dominant institutions, should take the leading role in creating a sustainable society6. The duty of corporations is to do business in the way, which means sustainable development and social responsibility. The role of companies is to maximize profit legally, but also to include the long-term social price of natural resources use and the environmental protection. The Director of the DuPont Company emphasized that there would not be business success if the state of global ecosystems would continue to aggravate.

Preservation and advancement of the environment should become the structural part of almost all business activities.

[3] [3] http://www.mie.gov.rs/sektori/sektor-za-odrzivu-energetiku-obnovljive-izvore-energije-i-stratesko-planiranje/?lang=lat

[4] http://www.tent.rs/images/stories/TENTA/strategija_energetika_lat.pdf

[5] http://www.cleanproduction.org/Steps.Process.UN.php

[6] http://millenniumassessment.org/documents/document.356.aspx.pdf

The important number of multinational companies usually has bigger financial power and influence than some countries relating to preservation, restoration and advancement of the living environment. Today, multinational companies have become an important factor of economic and social development.

Within the framework of the corporative development strategy, an increasing number of companies 'give' answers to sustainable development because they are under pressure of responsibility imposed by the public opinion, reacting on some environmental problems which companies themselves create through production and other business activities.

In the future, only those company management strategies will survive, i.e. those companies that simultaneously increase economic efficiency and decrease (or eliminate largely) the negative influence on the living environment, i. e. they increase eco-efficiency. Basically, eco-efficiency means an efficient production process and the production of better products and rendering services with a simultaneous decrease of resource use (energy, among others), waste creation and pollution in the whole chain of values.

The concept of eco-efficiency, as well as energy efficiency connects ecological performances and economic (financial) benefits. A new management strategy (or even philosophy), based on this concept, has been developed with a view to create bigger value with fewer negative influence on the living environment. As economic efficiency is realized through the principle of maximal results with minimal inputs, therefore, energy efficiency in the enterprise economic efficiency would mean the realization of maximal results (volume of production and rendered services) with minimal energy inputs.

IV. Energy Efficiency and Renewable Energy Resources – Choice?

Making businesses more efficient, through energy efficiency and usage of renewable resources, is seen as a largely untapped solution to addressing the problems of pollution, global warming, energy security, and fossil fuel depletion. Companies recognize the effects that a changing climate could potentially have on the sustainability of business operations and supply chain. Threats to water availability, increased energy prices and regulation could cause additional costs and reduce ability to manufacture and distribute products. Therefore, companies strive to minimize climate impact by reducing emissions, increasing efficiency and changing the way they use energy as well as sources of energy. In this context, definition of company's goals and principles, as well as indicators of business performances have changed. Both include and reflect consideration for the environment protection.

The following selected examples presents how companies and public authorities can reduce costs and improve economic efficiency through energy efficiency and usage of renewable resources.

A.Coca-Cola Enterprise Inc

Company is committed to reduce overall carbon footprint of business operations (manufacturing, distribution and product cooling) by an absolute 15% by 2020 as compared to 2007 baseline. In 2010, Coca-Cola Enterprise Inc invested $10.4 million of capital expenditures on carbon project reduction [7].

Manufacturing operations make up 22% of company's core business emissions and around 80% of this comes from energy used at manufacturing and distribution sites. In 2010, company used nearly 2% less energy in manufacturing operations than in 2009 – a total of 494,000 megawatt hours (MWH), down from 504,000 MWH – while increasing production volume. This reduction is achieved through monitoring energy use, planning and training, energy efficient technologies, and investing in renewable energy. Company placed energy meters on production lines and energy intensive equipment such as bottle blowers, compressors and chillers in order to discover where energy is being used and how efficiently the equipment is working. Coca-Cola also invests in new, energy efficient technologies - new lighting, compressed air and heat recovery. In facility in Sidcup, Great Britain, company have invested $125,000 to replace standard fluorescent light tubes with new Light Emitting Diode (LED) technology. Each new LED uses a quarter of the energy of a fluorescent tube, so the company will save 416 MWH of energy per year, (one percent of Sidcup's total usage) and around 197 tonnes of CO2e. As LEDs last longer, it will also make annual maintenance savings of around $6,000. Company is exploring the most suitable renewable and low-carbon energy solution at each site, depending on geography and location (water turbine, wind turbines, solar panels, combined heat and power).

Transporting products currently accounts for 16% of core business emissions. In the Netherlands, company has introduced five new 'Eco-Combi' trucks. This improve the carbon efficiency of company's deliveries by transporting 38 rather than 26 pallets at once, reducing CO_2 emissions by 20 percent per pallet. In Great Britain, company is trialing biogas-powered vehicles and in Belgium, piloting hybrid vehicles.

Cold drinks equipment makes up the greatest proportion (62 %) of core business emissions. At the end of 2010

[7] http://www.corporateregister.com/a10723/39362-11Co-10627740Y4906158404N-Eu.pdf

Coca-Cola Enterprise Inc had approximately 490,000 coolers, vendors and fountain machines in the marketplace (not including Norway and Sweden). Coca-Cola have approximately 21,000 open-fronted coolers across Europe. By fitting doors, energy use can be reduced by up to 50 percent. By replacing standard fluorescent lighting with long-life LEDs which can be up to 80 percent more efficient. Company has installed energy management devices which recognize patterns of use and responds by shutting off lights and adjusting temperatures when the cooler is not being opened regularly. In this way it can reduce energy consumption by up to 35 percent per cooler.

B.Air France & KLM

KLM has voluntarily committed to improve its energy efficiency by on average 2% per year between 2012 and 2020. Since 2009, the reduction achieved has reached 4.8% - by installing curtains that keep cold air inside saved 365,000 kWh/year, changing washing methods for trolleys saved 156,000 m^3 of gas per year and 136,000 kWh per year was saved on cooling computer rooms[8].

In September 2010, Air France also committed to improving energy efficiency by signing the World Business Council for Sustainable Development (WBCSD) Manifesto for energy efficiency in offices. At the end of 2010, 45% of Air France's ground equipment fleet was electrically powered, in line with targets for 2020. For the purchase of new material, electrically powered equipment has priority.

At KLM's Engineering & Maintenance division, a pilot has been launched together with Philips, the Dutch lighting company, with LED lights in the hangars. This reduces energy usage and energy costs, improves the workplace comfort of employees and increases the total amount of light covering the planes that are undergoing maintenance. At the end of 2010, KLM started to replace all cabin lights – tubular lighting – in its F70s by LED lights that use around 20% less energy, have a longer life span, create less heat and are also 8 kilos lighter, thus saving fuel and CO2 emissions. By 2011 all 26 F70s should have their lighting replaced with LED cabin lights.

C. Boutiquehotel Stadthalle

Boutiquehotel Stadthalle in Vienna is world's first city hotel with a zero energy-balance. It means that in the course of a year hotel creates the same amount of energy that is used to run it. For this, renewable energy sources like solar and photovoltaic panels, ground water heat pumps and even three wind turbines are used[9]. Rain water is used to tend plants and flowers and hotel rooms are provided with hot water heated by the solar power.Construction costs for this type of hotels are about 10% higher than for conventional ones. It has been estimated that additional investments would pay off within 8 years, even less if the energy price is about to grow. In order to promote environmental consciousness, each guest that arrive at the hotel by train or by bike, get 10% discount.

D.Green Public Procurement

Green Public Procurement (GPP) is defined as a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured. Public authorities are major consumers in Europe: they spend approximately 2 trillion euros annually, equivalent to some 19% of the EU's gross domestic product. By using their purchasing power to choose goods and services with lower impacts on the environment, they can make an important contribution to sustainable consumption and production[10]. Local and state governments may obtain significant reduction in energy bills by changing purchasing policies to, for example, specify Energy star qualified products. The table below presents a basket of Energy Star products – computers, vending machines, compact fluorescent lamps, and water coolers – applicable to state and local governments.

TABLE II.
SAVINGS ACHIEVED WITH ENERGY STAR PRODUCTS

Action	Annual Energy&Maintenance Savings ($)	Net Life-Cycle Savings ($)
Use Energy Star power management to enable low-power mode on 5.000 computers	13.900	50.300
Replace 50 conventional vending machines with energy star versions	10.600	112.200
Replace 300 incandescent lamps with CFLs	7.800	23.500
Replace 100 water coolers with Energy star versions	3.400	27.900
Totals	35.700	213.900

According to this example, these products combination can save about $214.000 in electricity costs (based on an electricity rate $ 0.095 kWh) and prevent 2.000 tons of

[8] http://www.corporateregister.com/a10723/39677-11Su-10038281K4288964669B-Gl.pdf
[9] http://www.hotelstadthalle.at/hotel-vienna
[10] http://ec.europa.eu/environment/gpp/what_en.htm

carbon dioxide emissions over their lifetime compared to conventional products[11].

V. CONCLUSION

Factors that affects company's response to environmental protection challenges are mainly national and international regulation and stakeholders pressure. In the giving context, energy efficiency and renewable energy resources are the imperative for companies. But, nowadays, energy efficiency improvements and renewable energy resources have become the key elements of company's business strategy because more and more companies, in order to achieve economic efficiency, consider energy efficiency and renewable energy resources i.e. energy management as a chance and choice.

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[11] http://www.energystar.gov/