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Part 1
International Conferences
Chapter 1

Development Strategy of Electricity Production from Biomass

*International Conference, Turkey, Antalya*  
*14-17 October 2008*

**Abstract:** Development strategy of electricity production from biomass is of a critical importance to economic growth in the XXI century. There is a rapid growth of energy demand, in general, and electric energy in particular. The specialists predict that the average annual rate of growth of energy consumption will be about 2%. Taking into consideration that conventional fossil fuels used to generate electric energy are limited, there is the need to develop and introduce an alternative energy sources. In such situation the renewable energy sources can play an important role.

Among possible renewable energy sources, the electric energy production from biomass, besides wind power generators, is the most important one. Intensive research and development of an advanced technologies to generate electric energy in various countries have been conducted. The three key technologies that are
being developed are: direct combustion steam turbine, pyrolisis and gasification. The first one is the principle process currently used to convert biomass into electricity. The second and the third one is in a process of intensive study and development. The biomass based technologies can generate electricity at any time, unlike wind and most solar technologies, which only produce when the wind is blowing or sun is shining. The biomass crops provide opportunities for farmer, rancher, other agricultural producer, or rural small business for growth and development which is very important for local economies.

Electricity production from biomass is friendly to natural environment, because it does not emit CO$_2$, SO$_2$, or NO$_X$. This research is focused on: (1) environmental issue, including development of feedstock (specifically grown or reserved for electricity production); (2) development of tools to facilitate analysis of lifecycle energy and greenhouse gas emissions; and (3) small-scale production, local, and crops on-farm; and (4) energetic security.

**Key words:** Management, electricity production, biomass.

**INTRODUCTION and LITERATURE REVIEW**

The specialists predict that the average annual rate of growth of energy consumption will be about 2%. Increasing demand across our economy has, at times,
strained our energy system. Demand for energy is predicted to continue to rise, by at least 50% by 2030 (World Energy Outlook, 2006). At present about 80-85 % of global energy is supplied by fossil fuels: coal, oil and natural gas (Jakubiak and Borowski, 2007). The fossil fuels were formed long ago from the carbon-rich remains of dead plants and animals. Mainstream climate scientists warn greenhouse gas emissions, caused by burning fossil fuels and other human activities, must be substantially reduced to avoid dangerous climate change. Fossil fuel combustion needs to be substantially reduced for three main reasons: energy security, human health and climate change mitigation. Pressure to replace fossil fuels has focused more attention on renewable sources – e.g. biomass, solar, geothermal, wave or wind. So now, there is the time to work out the strategy for the future. A strategy is a long term plan of action designed to achieve a particular goal. Strategies are used to make the problem easier to understand and solve (Romanowska, 2004). In case of electricity production from biomass the strategy is predicated on the energy production and delivery of products and services (e.g. energy transmit). The objective is to lead the energy industry in terms of price and convenience. The strategy of electricity production is the bridge between policy or high-order goals on the one hand and tactics or concrete actions on the other. The main steps of strategy are shown in Figure 1.
The strategy of electricity production from biomass is intended to:

- promote innovation and low-carbon technology development
- contribute to overall environmental benefits and the health of ecosystems through the achievement of multiple benefits from land use
- maximize the potential of biomass to contribute to the delivery of our climate change and energy
- facilitate a shift towards a bio-economy through sustainable growth and development of biomass use
- facilitate the development of a competitive and sustainable market and supply chain policy goals: to
reduce CO₂ and other greenhouse emissions, and achieve a secure, competitive and affordable supply of fuel
• realize a major expansion in the supply and use of biomass in the world
• where biomass can most cost-effectively contribute to decarbonising energy supply
• how biomass can best be used to help meet the renewable energy targets
• how biomass can help deliver low carbon emission (*UK Biomass Strategy, 2007*).

**MATERIAL and METHOD**

In the energy context, the term biomass is used to describe recently living matter that is used to produce energy. Biomass is produced by organic residues and wastes or by specifically growing crops for energy production. Biomass energy, or bioenergy, refers to all forms of renewable energy that are derived from plant materials produced by photosynthesis. Biomass energy can be derived from wood, agricultural crops and other organic residues. Wood is a substantial renewable resource that can be used as a fuel to generate electric power and useful thermal output. Wood for use as fuel comes from a wide variety of sources. Wood for fuel use is also derived from (1) private land clearing and silviculture and from (2) urban tree and landscape residues. A third major wood resource is (3) waste wood, which includes manufacturing and wood
processing wastes, as well as construction and demolition debris (EIA, 2008). Agricultural crops are trees and perennial grasses grown specifically to provide raw materials (feedstocks) for energy producers and industry. The poplars, willows and grasses have the greatest potential for dedicated energy and raw material (fiber) crops across a wide geographic range. Trees and perennial grasses can often be grown on farm land and could be grown on any of the million acres of cropland available in the world. (Energy Crops and the Environment). Categories of biomass material are shown in Figure 2.

Figure 2. Categories of biomass material

The main method of the research was the qualitative research. Qualitative research methods was used primarily as the prelude to quantitative research. This method was used to define the problem, generate hypotheses, identify determinants, and develop quantitative research designs in the next step of research. Desk research method was involved to gather data that already exists either from internal sources of
the enterprises, publications of governmental and non-governmental institutions, from free access data on the internet, in professional newspapers and magazines, in annual reports of companies and commercial databases.

ENVIRONMENTAL ISSUE

Using biomass as a fuel to displace fossil fuels can reduce carbon emissions and can offer fuel security without the need to rely on imported fuel. Bioenergy is neutral in terms of carbon dioxide (CO₂) emissions. Biomass can pollute the air when it is burned, though not as much as fossil fuels. Burning biomass fuels does not produce pollutants like sulfur, that can cause acid rain. When burned, biomass does release carbon dioxide, a greenhouse gas (*Biomass and the Environment 2007*). The burning of biomass fuels merely releases the CO₂ that the plants absorbed over their life spans. In contrast, the combustion of fossil fuels releases large quantities of long-stored CO₂, which contributes to climate change. Using bioenergy displaces fossil fuels and helps slow the rate of climate change.

SMALL-SCALE PRODUCTION

One opportunity for energy crop development is to use land that is currently idle or poorly suited for food crops. First, farmers and ranchers should be encouraged to adopt this land for biomass (e.g. grasses and trees) cultivations. With careful management, farmers could harvest energy crops on many acres of this land. This
would allow them to earn an income and reduce subsidy payments. Rural communities could become entirely self-sufficient when it comes to energy, using locally grown crops and residues to fuel cars and tractors and to heat and power homes and buildings (Clean Energy, 2008).

**ENERGETIC SECURITY**

The most effective way to secure the nation's energy supply is with a diverse renewable energy portfolio of clean, efficient, and domestically-produced energy sources. Energy security has become a priority as the World's population increases and their standard of living improves thus increasing energy consumption. The finite nature of fossil fuel reserves and the political instability of many of the countries which supply fossil fuels have caused concern over future energy security and costs. The likely result of fossil fuel deficit is that, as the cost of these commodities increases, they will only be affordable for large industrial processes and therefore cheaper renewable sources must be found for domestic purposes.

**CONCLUSION**

Biomass could offer near-term business advantages and more strategic, long-term value. The benefits obtained from biomass power generation, such as waste reduction, emissions offsets, and local economic growth, can enhance the technology's overall appeal to utilities. The future of biomass electricity generation depends also on biomass integrated gasification/gas turbine
technology, which offers high energy conversion efficiencies and will be further developed to run on biomass produced fuels.

REFERENCES
Chapter 2

Power Plants Management Under Tight Environmental Requirements

*International Conference, Turkey, Izmir*

*15-19 June 2009*

**ABSTRACT**

Worldwide, the power plants that provide electricity to run our homes, businesses, and factories also account for a high percent of carbon dioxide, roughly two-thirds of sulfur dioxide, 22 percent of nitrogen oxides, and roughly a third of all mercury emissions. Power plants are major contributors to global warming and emit dangerous toxins like mercury, a neurotoxin especially harmful to children and developing fetuses (human embryos). The importance of strong environmental laws cannot be overstated. Reductions in sulfur dioxide and nitrogen pollution from power plants are a direct result of strong rules all over the world, but it took more than 30 years. Now it's time to demand cuts in carbon dioxide pollution to fight global warming. Power plant emissions are a major cause of changes in the chemistry of the atmosphere. Sulfur dioxide and NOx are the chemical...
precursors of acid rain and urban smog. And, carbon dioxide is a greenhouse gas that ultimately might change global climate. **Keywords:** management, power plant, environmental requirements

**INTRODUCTION AND LITERATURE REVIEW**

I would like to begin this paper with the core question of whether and why environmental regulations are needed, considering the fact that under many conditions unconstrained markets produce socially desirable outcomes. What about in the environmental sphere? Under what specific circumstances will governmental intervention be appropriate? The fundamental theoretical argument for government activity in the environmental realm is that pollution is a classic example of an externality — an unintended consequence of market decisions, which affects individuals other than the decision maker. Because enterprise-level decisions do not take into account full social costs, pollutant emissions tend to be higher than socially efficient levels. As environmental quality is thus naturally underprovided by competitive markets, a possible role arises for government regulation. Government regulation may be necessary to improve environmental quality when market transactions fail to generate socially efficient allocations of resources, such regulation is by no means sufficient to improve welfare or even environmental quality. This is because government regulation itself may not be
efficient, that is, government may under-regulate or over-regulate, and/or it may regulate in ways that require unnecessarily large costs of compliance. (Revesz and Stavins, 2007).

Power plants are major contributors to global warming, emitting billions of tons of carbon dioxide (CO₂) each year. Because of the "above normal" level of CO₂ already in the atmosphere we are already committed to a certain amount of global warming because the excess CO₂ will remain effective for many years. In addition the continued burning of fossil fuels will continue to add to the atmospheric burden of CO₂. This warming will inevitably cause some climate change. In addition, power plants emit millions of tons of sulfur dioxide (SO₂) and nitrogen oxides (NOx). NOx refers to mixtures of nitric oxide (NO) and nitric dioxide (NO2) as well as N2O, NO₃, N2O₄ and N2O₅. Nitric oxide and nitric dioxide contribute to low-level ozone, smog and are hazardous to the environment and humans. Environmental and public health impacts associated with the emissions evaluated include: acid deposition in forests, lakes, and streams (NOx, SO₂); ground-level ozone, or “smog”, a lung irritant (NOx); fine particulates implicated in lung disease (NOx, SO₂); regional haze (NOx, SO₂); and global warming (CO₂). Environmental regulation addresses the air pollutant emissions by tightening limits. Power plants emit dangerous toxins like mercury, a neurotoxin especially harmful to children and developing fetuses. About two-thirds of the heat energy that is
consumed at a typical coal-fired power plant is wasted, and that inefficiency contributes directly to high CO$_2$ emissions from these facilities. In many cases eliminating CO$_2$ emissions from existing power plants is currently technically unfeasible, but reducing electricity demand, through energy efficiency and conservation measures, would yield significant CO$_2$ reductions in the near-term, while new technologies develop. As suggested by Institute of Power Engineering Efficiency Problems, the sphere of activities in power plant management involves management, design, and improvement of effectiveness in the use of fuel, heat, cold and other power resources. One more task is to lower the industrial pollution level in hopes of protecting the environment. These tasks hold highest importance for modern civilization, for the industry is the most powerful fuel and power consumer (more than 50%) and environment polluter. At the same time, the industry is the widest sphere for research and design works aimed at economy of fuel and energy resources.

**Types of plants**

**Electricity plants** refer to plants which are designed to produce electricity only. If one or more units of the plant are a CHP unit then the whole plant is designated as a CHP plant. **Combined Heat and Power plants (CHP)** refers to plants which are designed to produce both heat and electricity (sometimes referred to as co-generation power stations). Where possible, fuel inputs and electricity/heat outputs are reported on a unit basis.
rather than on a plant basis. **Heat Plants** refers to plants designed to produce heat only. Heat delivered from CHP or heat plants may be used for process or space heating purposes in any sector of economic activity including the residential sector. It should be noted that the reporting of data on fuel use and electricity and heat production according to plant type is normally conducted at the level of the plant, assuming that if a plant comprises at least one CHP unit then the entire plant is considered a CHP plant. (*Electricity information, 2008*)

**Nowadays management system**

Today’s power plants are dynamic facilities that can be supervised and managed via the Internet by powerful control systems. The operation of the industrial equipment and the generation of electric and thermal energy are impossible without all-round automation and control. The efficiency, safety and reliability of industrial processes depend on the perfection of the management system. In many cases it consolidates all of a plant’s functions and is easy to use, thereby increasing efficiency and cutting operating costs. Modern management practices minimize energy use. The modern control system is composed of various apparatuses for data acquisition, microprocessor controlling devices, computer networks, and the software realizing algorithms proved by the theory of control. For example the station management system will attend to the protective technology of power systems with the remote
setting, monitoring and reading out of protection device data being part of standard scope and supply of service. Furthermore the system is enable to automatically change parameters, each according to the selected operating mode. Energy Management meaning that with the aid of the control technology, we provide cost-effective solutions, among which – in addition to the integration of control technology systems – there are not only counters and system state indications but the management of load shedding and imported power, as well. There is a strong positive correlation between management practices and productivity. Policies aimed at improving management practices – such as encouraging competition, reducing labour-market regulations and eliminating tax-incentives for family ownership – may improve environmental outcomes. (Bloom et al., 2008). Well run firms use energy inputs more efficiently, thereby increasing profitability and productivity, while at the same time reducing carbon emissions. Better managed firms use less materials in their production process, but more physical capital and more skilled labour. Pollution controls that dramatically reduce emissions of conventional pollutants, like sulfur dioxide and mercury, are widely available and already being used at many plants. In order to reduce pollutions produced by new power plants they should perform many requisites, e.g. in Wisconsin there are Requirements for Power Plant and Power Line Development. A power plant with a rated capacity of 100
megawatts (MW) or more must have a Certificate of Public Convenience and Necessity (CPCN) from the Commission before plant-related construction may begin. Power plant projects rated less than 100MW may require a Certificate of Authority (CA) from the Commission prior to construction.

**Tight Environmental Requirements**
The main topic of this research is power plants management in tightening limits condition. Sustainable solutions to the climate crisis require the development of new technologies, appropriate policy approaches and innovative business models of power plants. The tight environmental requirements may bring competitive edge. The tight requirements support cutting costs and creating technical innovations and thus the country can e.g. become a forerunner in some areas of an environmental technology. Tight environmental requirements favoured the new clean fossil energy technologies because of their superior performance in this area. Environmental and other regulations needed to be developed, provided and enforced so that a level playing field would be provided. From the viewpoint of environmental protection global requirements should be met with globally fixed measures. The global, regional and local requirements should be laid down on the basis of available, reliable, scientific facts with the aim of taking adequate precautions. (*Environmental requirements... 1999*). The research and technology
development objectives must be met in order to successfully make the transition to a low carbon economy. Global emissions of energy-related CO$_2$ would be about 57% higher in 2030 than in 2005 under the International Energy Agency’s (IEA) reference scenario. The emission of CO$_2$, SO$_2$ and NOx in US is shown in the table 1.

**Table 1. Emissions from Energy Consumption at Conventional Power Plants and Combined-Heat-and-Power Plants** (Thousand Metric Tons)

<table>
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<tbody>
<tr>
<td>Carbon Dioxide (CO$_2$)</td>
<td>2 516 580</td>
<td>2 459 800</td>
<td>2 513 609</td>
<td>2 456 934</td>
<td>2 415 680</td>
<td>2 395 048</td>
<td>2 389 745</td>
<td>2 441 722</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO$_2$)</td>
<td>9 042</td>
<td>9 524</td>
<td>10 340</td>
<td>10 309</td>
<td>10 646</td>
<td>10 881</td>
<td>11 174</td>
<td>11 963</td>
</tr>
<tr>
<td>Nitrogen Oxides (NOx)</td>
<td>3 650</td>
<td>3 799</td>
<td>3 961</td>
<td>4 143</td>
<td>4 532</td>
<td>5 194</td>
<td>5 290</td>
<td>5 638</td>
</tr>
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**CO$_2$ Controls**

Carbon dioxide, one of several greenhouse gases that contributes to climate change, is released into the atmosphere when fossil fuels (oil, natural gas, and coal), wood, and solid waste are burned. The CO$_2$ content of the atmosphere is usually expressed in parts per million (ppm) by weight and the use of fossil fuels is expressed as so many tons of carbon burned per year. At present the burning of fossil fuels releases 7 billion tons of carbon into the atmosphere each year in the form of
carbon dioxide gas, CO$_2$, so burning 7 billion tons of carbon we will produce 26.7 billion tons of CO$_2$. Power plants are responsible for about 40 percent of all man-made CO$_2$ emissions. Power plant CO$_2$ emissions are directly linked to the efficiency with which fossil fuels are converted into electricity, and coal-fired power plants are inherently inefficient. A typical power plant converts only about a third of the energy contained in coal into electricity, while the remainder is emitted as waste heat. Many electric power companies have made long-term commitments to clean up their plants, either to settle legal actions or in anticipation of future regulation. Many companies are making business decisions to upgrade pollution controls. Eliminating CO$_2$ emissions from existing power plants is currently technically unfeasible, but reducing electricity demand, through energy efficiency and conservation measures, would yield significant CO$_2$ reductions in the nearterm, while new technologies develop. There are a handful of old, dirty power plants which continue to generate a disproportionate amount of, SO$_2$ pollution, but many power plants are finally starting to clean up their sulfur dioxide pollution, thanks to a combination of factors including enforcement actions, tough and tight law. Many plants are installing scrubbers to control sulfur dioxide, and mercury emissions should decline as a co-benefit of SO$_2$ controls. *According to the new EIP report (2008)* it can be highlights ways to reduce CO$_2$ emissions from power plants. First, the time has come to phase out
and permanently retire the oldest and least efficient plants, and reduce dependence on coal. Recent coal-fired power plants of high efficiency use pulverised coal combustion (PCC) with supercritical (very high pressure and temperature) steam turbine cycles. Reducing electricity demand, through smarter building codes, and low-cost conservation efforts such as weatherization of homes and installation of more efficient home and business appliances, will lead to CO$_2$ reductions. Investments in renewable energy sources, such as solar and wind power, should be encouraged, and investments in fossil fuel-based electric generation should be a last resort. And, if new coal plants are to be built, then they must be designed to drastically reduce CO$_2$ emissions. Carbon capture and sequestration have promise, and currently available and economically viable technologies – for example, "ultra-supercritical" designs for steam boilers, gas turbines (instead of steam), blending cleaner fuels with coal, such as natural gas and biomass – can almost double fossil-fuel-fired plants' thermal efficiency, up to 60 percent, thus lowering CO$_2$ emissions.

**NOx Controls**

**Selective catalytic reduction (SCR),** which uses a catalyst bed to reduce NOx to nitrogen and water, can cut NOx emissions by more than 90 percent. Selective non-catalytic reduction (SNCR), which reduces NOx to nitrogen and water using a reducing agent (typically ammonia or urea), achieves up to 75 percent NOx
removal. Large coal plants equipped with NOx controls demonstrate that cleaner power is achievable. SCR is a process for controlling emissions of nitrogen oxides from stationary sources. The basic principle of SCR is the reduction of NOx to N2 and H2O by the reaction of NOx and ammonia (NH3) within a catalyst bed. The primary reactions occurring in SCR require oxygen, so that catalyst performance is best at oxygen levels above 2-3%. Several different catalysts are available for use at different exhaust gas temperatures. In use the longest and most common are base metal catalysts, which typically contain titanium and vanadium oxides, and which also may contain molybdenum, tungsten, and other elements. Figure 1 shows a typical two-pass configuration with selective catalytic reduction (SCR) for NOx control, electrostatic precipitators (ESP) for dust removal and flue gas desulphurisation (FGD) for SO2 control. Boilers may be of recirculatory type, with a large drum for steam/water separation, or onethrough. The latter is necessary for supercritical boilers, whose higher steam conditions allow the highest efficiencies. Some steam is always extracted from the turbine to heat the boiler feedwater, as this raises cycle efficiency.
Selective Non-Catalytic Reduction (SNCR) is a chemical process that changes oxides of nitrogen (NOx) into molecular nitrogen (N2). A reducing agent, typically ammonia or urea, is injected into the comb. Conceptually, the SNCR process is quite simple. A gaseous or aqueous reagent of a selected nitrogenous compound is injected into, and mixed with, the hot flue gas in the proper temperature range. The reagent then, without a catalyst, reacts with the NOx in the gas stream, converting it to harmless nitrogen gas and water vapor. SNCR is "selective" in that the reagent reacts primarily with NOx, and not with oxygen or other major components of the flue gas. (NOx controls technologies)

MATERIALS AND METHODS
To limit environmental pollution and to slow the rate of increase of CO2 concentration, responsive long term energy mix strategies exploiting the maximum potential of non-greenhouse gas emitting energy sources need to
be developed and implemented as rapidly as possible. In many power plants the power generating and emission control equipment was engineered, procured and constructed in order to meet emissions requirements.

The choice of global emissions trajectory will need to take into account technological requirements and costs in the energy sector. The normal cycle of capital replacement is a key constraint on the speed with which low-carbon technologies can enter into use without incurring disproportionate cost. The energy sector has a relatively slow rate of capital replacement in general, due to the long lifetime of much of its capital — for producing, supply and using energy. As a result, more efficient technologies normally take many years to spread through the energy sector (World Energy Outlook, 2008). The future energy mix that evolves will depend not only on environmental considerations, but also on economic, technological, supply and political factors. As a result, even if all power plants built from now onwards were carbon-free, CO₂ emissions from the power sector would still be only 25%, or 4 Gt, lower in 2020 relative to the Reference Scenario.

The specialists predict that the average annual rate of growth of energy consumption will be about 2%. Increasing demand across our economy has, at times, strained our energy system. Demand for energy is predicted to continue to rise, by at least 50% by 2030 (World Energy Outlook, 2006). At present about 80-
85% of global energy is supplied by fossil fuels: coal, oil and natural gas. It is generally accepted that for many decades fossil fuels will continue to be the major energy source, with natural gas, the lowest fossil fuel greenhouse gas emitter, increasing its share. Countries having or exporting fossil fuels cannot easily turn away from their use and likewise the economically dynamic countries of Asia cannot radically shift from fossil fuels towards uncertain and currently costly renewables for their growing baseload power needs. At the figure 2 the emission scenario which assumes rising levels of energy demand and greenhouse emissions, projects a 700 ppmv CO2 concentration by 2100 and an additional increase in surface temperature between 1 °C and 3.5 °C.

![Figure 2. CO2 Concentrations to 2100](image)

Mainstream climate scientists warn greenhouse gas emissions, caused by burning fossil fuels and other human activities, must be substantially reduced to avoid dangerous climate change. Fossil fuel combustion needs to be substantially reduced for three main reasons: energy security, human health and climate change.
mitigation. Pressure to replace fossil fuels has focused more attention on renewable sources – e.g. biomass, solar, geothermal, wave or wind. So now, there is the time to work out the strategy for the future. (Borowski, 2008). CO₂ emissions from power plants keep rising, making an already dire situation worse. Because CO₂ has an atmospheric lifetime of between 50 and 200 years, today’s emissions could cause global warming for up to two centuries to come.

Post-2012 climate scenarios

By 2030, the world’s energy needs are expected to be 50 per cent greater than today. At the same time, scientists are calling for a 25 per cent reduction in greenhouse gas emissions by 2050 to avoid serious changes in the Earth's climate system. Figure 3 shows increase the primary energy demand up to 2030.

![Figure 3. World primary energy demand](image)

Coal sees the biggest increase in demand among all primary energy sources in absolute terms between 2005-2030.
The world’s energy system is at a crossroads. Current global trends in energy supply and consumption are patently unsustainable — environmentally, economically, socially. What emissions limits might emerge from current international negotiations on climate change? What role could cap-and-trade and sectoral approaches play in moving to a low-carbon energy future? The three scenarios analysed are based on differing hypotheses of limited participation up until 2025. All the scenarios assume that the countries that have ratified the Kyoto Protocol will meet their targets. Share of power generation in world energy-related CO₂ emission in primary energy demand is shown on figure 4.

![Figure 4. Share of power generation](image)

Three different scenarios are assessed, one in which the atmospheric concentration of emissions is stabilised at 700 parts per million (ppm) in CO₂ equivalent terms, the second at 550 parts per million and the third at the still more ambitious level of 450ppm. In all three scenario
most of the increase in emission from power stations comes from developing countries, mainly because their electricity production increase faster that of the OECD and the transition economies. In addition, their reliance on coal will remain faster.

The implications for energy demand, prices, investment, air pollution and energy security are fully spelt out. This ground-breaking analysis will enable policy makers to distill the key choices as they strive to agree in Copenhagen in 2009 on a post-Kyoto climate framework. On current trends, energy-related emissions of carbon-dioxide (CO₂) and other greenhouse gases will rise inexorably, pushing up average global temperature by as much as 6°C in the long term. Strong, urgent action is needed to curb these trends. The energy sector will have to play the central role in curbing emissions — through major improvements in efficiency and rapid switching to renewables and other lowcarbon technologies, such as carbon capture and storage (CCS). To make this happen, governments have to put in place appropriate financial incentives and regulatory frameworks that support both energy-security and climate-policy goals in an integrated way.

CONCLUSION
One of the major pathways of reducing the CO₂ emissions from fossil-fired power generation is to maximise the efficiency of new plants built to meet
future demand growth and for replacing older or inefficient plants. To enable the other major pathway, carbon dioxide capture and storage, it is imperative that new plants are designed and operated at highest efficiency. The challenge to the policy makers now is to formulate measures that would enable wider deployment of these technologies globally but particularly in countries which need these most, while also encouraging operational best practice and continued technological improvement towards higher efficiency. The electrical efficiency of a power plant is the proportion of the fuel input energy that emerges as electric power, conventionally expressed as a percentage value. Another widely used measure is the heat rate, which is the fuel input energy divided by the electrical output energy. The efficiency may be stated on either a net (sent out) value or a gross (generated) value. The sent out value will be lower, as it will allow for deduction of the power consumed by the plant itself by equipment such as crushers, fans, pumps, environmental control equipment, etc., and also allow for transformer losses. Coal-fired power generation is essential for the next several decades but at the same time the need to limit CO₂ and other emissions will intensify. Fossil fuel power plant operators must continue to explore and use means to minimise the impact of their operations, including raising efficiency of new plants and introducing even more effective environmental controls. (Fossil fuel, 2007).
The current financial crisis is not expected to affect longterm investment, but could lead to delays in bringing current projects to completion, particularly in the power sector. Just over half of projected global energy investment in 2007-2030 goes simply to maintain the current level of supply capacity: much of the world’s current infrastructure for supplying oil, gas, coal and electricity will need to be replaced by 2030. (Word Energy Outlook, 2008)

The economic adjustment to meet the carbon emission constraints involves substitution away from commodities whose production processes generate greenhouse gas emissions. These are usually commodities characterised by relatively high energy content. the energy sectors playing the most important role in this adjustment process (Analysis of Post-2012, 2005).

REFERENCES
Environmental Integrity Project - EIP report. 2008.
Industrial Heat-and-Power Engineering.
http://www.mpei.ru/LANG/ENG/Main/Structure/IPEEP.asp
Institute of Power Engineering Efficiency Problems.
NOx controls technologies.
http://www.icac.com/i4a/pages/index.cfm?pageID=3399
Requirements for Power Plant and Power Line Development.
http://psc.wi.gov/utilityinfo/electric/construction/powerPlantRequirements.htm
Abstract: Energy, agriculture and climate change under Tight EU Regulations. (1) A first element in the common energy policy is to establish a genuine internal market for the products and services of the energy sector. The establishing of a single market involves removing barriers, establishing common rules, and opening up of the energy markets. (2) Agriculture in the EU uses substantial amount of energy to produce heat in greenhouses and other heat applications. (3) European Commision (EC) climate policy based on the conviction that, if not immediately and drastically limit greenhouse gas emissions and climate change this century will reach a catastrophic level.

Key words: EU regulations, agriculture, climate change,

INTRODUCTION
A basic knowledge of the Earth's energy balance is sufficient to predict that an increase in greenhouse gases leads to a warming of the atmosphere. Nevertheless, the
climate system is very complex and depends on interactions and feedbacks among multiple variables. In order to understand how the Earth’s climate system balances the energy budget, we should consider processes occurring at the three levels: the surface of the Earth, where most solar heating takes place; the edge of Earth’s atmosphere, where sunlight enters the system; and the atmosphere in between. At each level, the amount of incoming and outgoing energy, or net flux, must be equal. The energy budget is shown at the picture 1.

**Picture 1. Surface Energy Budget**

About 29% of incoming sunlight is reflected back to space by bright particles in the atmosphere or bright ground surfaces, which leaves about 71% to be absorbed by the atmosphere (23%) and the land (48%). For the energy budget at Earth’s surface to balance, processes on the ground must get rid of the
48 % of incoming solar energy that the ocean and land surfaces absorb. Energy leaves the surface through three processes: evaporation, convection, and emission of thermal infrared energy. Therefore, in order to describe the climate system accurately it is necessary to use numerical models that describe these complex processes. European Commission (EC) climate policy based on the conviction that, if not immediately and drastically limit greenhouse gas emissions and climate change this century will reach a catastrophic level. The EU also needs a safer energy sources, i.e., less dependence on imported oil and gas. To obtain this set the objectives to be achieved by 2020:
- reduction of greenhouse gases by at least 20 percent. compared to 1990 levels (about 30 %, provided that other developed countries commit to similar restrictions on their emissions)
- 20 % increase the share of renewable energy (wind, solar, biomass, etc.) in total energy production (currently it is about 8.5 percent).
- reduce energy consumption by 20 % in relation to the levels projected in 2020, by a considerable increase in energy efficiency (United Nation Climate Change Conference, 7-18 December, Copenhagen 2009).

Escalations in energy prices, increasing worldwide demand for energy, and the need to ensure energy security have also combined to put energy in the headlines, increasing policy makers’ interest in domestically produced renewable energy. But we should
remember that countries having or exporting fossil fuels cannot easily turn away from their use and likewise the economically dynamic countries of Asia cannot radically shift from fossil fuels towards uncertain and currently costly renewables for their growing baseload power needs (Borowski, 2009).

**ENERGY CONSUMPTION IN AGRICULTURE SECTOR**

Agriculture in the EU uses substantial amount of energy to produce heat in greenhouses and other heat applications (e.g. drying). This accounts for 73 % of total energy consumption of agriculture. Energy is also used for pumping and agricultural machines (23 % of total). The rest of energy consumption in agriculture corresponds to specific electrical equipment and electric motor drives. Liquid fuels used in vehicles by farmers are accounted for the transport sector, according to Eurostat definitions. Energy intensity is shown to decrease on average by 0.9 % per year in the period 2005 to 2030, and energy consumption in agriculture is projected to grow by 0.3 % per year (EUROPEAN ENERGY AND TRANSPORT, TRENDS TO 2030, European Commission Directorate-General for Energy and Transport, European Communities, 2008, p.48)

The agriculture sector is a key source of global greenhouse gas emissions (14% or 6.8 Gt of CO₂ eq.), but with a high technical mitigation potential (5.5-6 Gt of CO₂ eq. per year by 2030). 74 % of emissions from
agriculture are in developing countries. Agriculture is a sector where mitigation action has strong potential co-benefits for sustainable development (food security, poverty reduction among the 70% of the poor living in rural areas, environmental services) and climate change adaptation (improving agro-ecosystem resilience). Fortunately, we already have a good scientific understanding of the different farming practices that can be used to build organic matter in soils and to keep it there. Techniques developed for organic and conservation agriculture, including improved pasture management, agroforestry, mulching, composting, crop rotation, cover crops, low/no-till are relevant, as they help to accumulate soil organic matter. (A. Mueller, Climate Change and agriculture: Challenges and opportunities for mitigation, Food and Agriculture Organization of the United Nations, 2009)

The Commission staff working document "The role of European agriculture in climate change mitigation" concentrates on greenhouse gas emissions and trends in agriculture in the EU and possibilities for reducing them. It also gives an overview of the current instruments of the CAP that facilitate climate change mitigation, examining in particular how the rural development programmes for 2007-2013 contribute to this objective. Result from climate pressures. Agriculture is highly exposed to climate change, as farming activities directly depend on climatic conditions. But, agriculture too contributes to the release of
greenhouse gases to the atmosphere. However, agriculture can also help to provide solutions to the overall climate change problem. By 2020, the sectors not covered by the system of emissions trading, such as transport (except aviation, which will be covered by the scheme in 2012), agriculture, waste and households to reduce their emissions by 10 % compared to 2005 levels.

Climate change mitigation in agriculture should be pursued as part of an integrated approach to sustainable agriculture to limit conflicts with other economic, environmental and social objectives, whilst ensuring a positive contribution to climate mitigation at the global level. Synergies between mitigation and adaptation are particularly important. The mitigation potential of agriculture in Europe can be best realized by maintaining high productivity combined with sustainability. At the same time, EU agriculture will need to adapt to the expected climatic changes which will have serious consequences for the availability of water resources, for the spread of pests and diseases and the quality of soils, leading to significant changes in the conditions for agriculture and livestock production.

The Commission has recently issued a White Paper presenting an EU framework for adaptation and a specific working document on adaptation of agriculture to climate change2. The latter outlines some no-regret options to foster adaptation and the implications for the future Common Agricultural Policy (CAP). Agriculture has
further possibilities to reduce its influence on climate change by reducing the emissions of methane, nitrous oxide and carbon dioxide released by farming activities and by maintaining and sequestering carbon in farmland soils. Agriculture also provides an indirect contribution to emission reductions in other sectors through the supply of biomass for the production of bioenergy and renewable materials. reducing the emissions of methane, nitrous oxide and carbon dioxide released by farming activities and by maintaining and sequestering carbon in farmland soils. Agriculture also provides an indirect contribution to emission reductions in other sectors through the supply of biomass for the production of bioenergy and renewable materials. (The role of European agriculture in climate change mitigation, p.8) The draft underlines that farmers cannot expect direct support conditions to remain unchanged and wants higher priority given to "non–compulsory environmental services, sustainable farming practices or improving the countryside in high nature value areas". Mitigation from agriculture has been the focus of this research, however, it should not be forgotten that adaptation of agro-ecosystems and farming systems to more anomalous and rapidly changing climatic conditions will be dramatic, costly and in need of urgent action. Action that can serve both mitigation and adaptation needs will be at a premium and some agricultural practices are synergistic in this regard.
Agricultural practices that improve land use and management, through increasing and maintaining soil carbon stocks can, if properly implemented, generate multiple benefits: climate change mitigation, increased agricultural and food production, pro-poor income generation, environmental services and improved resilience/adaptive capacity of farming systems. This constitutes an enormous opportunity for meeting a number of key global and national goals. The challenge is to ensure that the enabling means embodied in a new climate change agreement will encourage the agriculture sector and its farmers to generate these benefits under increasingly adverse conditions shaped by global financial, food and fuel insecurity.

**TIGHT ENVIRONMENTAL REQUIREMENTS**

The European Regulations also establish the framework for longer-term goals that will help the nations to achieve sustainable energy security. European energy regulators put focus on energy consumers. The European Commission has made clear that it favours splitting up energy firms' production and distribution activities as the best way to ensure fair competition and lower prices for consumers. The European energy regulators seek to improve the understanding and consideration of customer interests in the overall energy market. With over 500 million citizens in the European Union, a direct dialogue on energy is necessary at local and national level. The European
energy regulators identify and strengthen the tools at national level which help raise the voice of customers and facilitate their active engagement in the energy market (e.g. through complaint handling methods; indicators to monitor market functioning and customer needs; and smart metering).

The first electricity and gas directives were adopted in the late 1990s, with the objective of opening up the electricity and gas markets by gradually introducing competition. The Commission has consistently argued that liberalisation increases the efficiency of the energy sector and the competitiveness of the European economy as a whole.

1. Ownership unbundling
Under the Commission's preferred option, companies that control both energy generation and transmission would be obliged to sell part of their assets.

2. Independent System Operator (ISO)
The ISO option was a Commission compromise proposal whereby companies involved in energy production and supply would be allowed to retain their network assets, but would lose control over how they are managed.

During the negotiations, it emerged that the ISO option was unattractive to many member states, with most opting for full unbundling or the 'third option'

3. Independent Transmission Operator (ITO)
EU ministers introduced the so-called 'third way' in response to the successful efforts of France and
Germany to build a coalition against full unbundling. They obtained the right for former state monopolies - such as EDF and GDF in France and E.ON and RWE in Germany - to retain ownership of their gas and electricity grids, provided that they are subjected to outside supervision.

On November 2010 the European Commission adopted and published the Enlargement Strategy and Main Challenges 2010-2011 document, explaining its enlargement policy objectives for the next year. Each year, the European Union publishes an enlargement strategy document describing the main objectives of the enlargement process for the coming year, as well as progress or opinion reports on all the candidate countries and potential candidate countries. The EU’s 2010 strategy and progress report provides several interesting updates concerning the main changes and reforms implemented in the energy sector of the reviewed countries, and makes some recommendations regarding the steps that should be taken by them in the future. The following Framework Guidelines for Network Codes are envisaged for completion in 2011:

**Electricity**
- Capacity allocation and congestion management
- Grid connection
- Operational security
- Balancing

**Gas**
- Capacity allocation mechanisms
- Balancing rules
- Harmonised transmission tariff structures
- Interoperability

The Energy Community is working towards a regional energy market and preparing for integration into the EU's energy market. The EU will focus on increasing the number of water and waste water projects in the region, stimulating support for energy efficiency, accelerating investments in the core transport network, and supporting the development of SMEs and mechanisms to encourage economic growth in the aftermath of the financial crisis. The enlargement process helps the EU to better achieve its policy objectives in a number of areas, which are key to economic recovery and sustainable growth, including regulatory convergence and the internal market, energy, transport, the protection of the environment and efforts to limit climate change as well as making the EU a safer place. Further progress has been achieved in the energy chapter, where the level of alignment is high. However, significant efforts are needed to increase the performance of the administration and independence of the energy sector regulatory authorities. Some progress has been made in the energy sector. New energy strategies were adopted. However, the new comprehensive energy law remains to be enacted. Electricity tariffs do not fully reflect costs. Whilst there has been good progress, a final resolution of the dispute with the distribution system operator, a
major EU investor, is still outstanding. The energy regulator and the radiation protection regulator need to become functionally independent.

The main topic of this research is power plants management in tightening limits condition. Sustainable solutions to the climate crisis require the development of new technologies, appropriate policy approaches and innovative business models of power plants. The tight environmental requirements may bring competitive edge. The tight requirements support cutting costs and creating technical innovations and thus the country can e.g. become a forerunner in some areas of an environmental technology. Tight environmental requirements favoured the new clean fossil energy technologies because of their superior performance in this area. Environmental and other regulations needed to be developed, provided and enforced so that a level playing field would be provided. From the viewpoint of environmental protection global requirements should be met with globally fixed measures. The global, regional and local requirements should be laid down on the basis of available, reliable, scientific facts with the aim of taking adequate precautions. (Environmental requirements... 1999). The research and technology development objectives must be met in order to successfully make the transition to a low carbon economy. Global emissions of energy-related CO₂ would be about 57 % higher in 2030 than in 2005 under the International Energy Agency's (IEA) reference scenario.
The emission of CO\textsubscript{2}, SO\textsubscript{2} and NO\textsubscript{x} in US is shown in the table 1.

**Table 1. Emissions from Energy Consumption at Conventional Power Plants and Combined-Heat-and-Power Plants** (Thousand Metric Tons)

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<tbody>
<tr>
<td>Carbon Dioxide (CO\textsubscript{2})</td>
<td>2,412.0 30</td>
<td>2,417.3 27</td>
<td>2,438.3 38</td>
<td>2,479.9 71</td>
<td>2,536.6 75</td>
<td>2,481.8 29</td>
<td>2,539.8 05</td>
<td>2,477.2 13</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO\textsubscript{2})</td>
<td>11 174</td>
<td>10 881</td>
<td>10 646</td>
<td>10 309</td>
<td>10 340</td>
<td>9 524</td>
<td>9 042</td>
<td>7,830</td>
</tr>
<tr>
<td>Nitrogen Oxides (NO\textsubscript{x})</td>
<td>5 290</td>
<td>5 194</td>
<td>4 532</td>
<td>4 143</td>
<td>3 961</td>
<td>3 799</td>
<td>3 650</td>
<td>3,330</td>
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Source: EIA, 2010.

To limit environmental pollution and to slow the rate of increase of CO\textsubscript{2} concentration, responsive long term energy mix strategies exploiting the maximum potential of non-greenhouse gas emitting energy sources need to be developed and implemented as rapidly as possible. In many power plants the power generating and emission control equipment was engineered, procured and constructed in order to meet emissions requirements. The choice of global emissions trajectory will need to take into account technological requirements and costs in the energy sector. The normal cycle of capital replacement is a key constraint on the speed with which
low-carbon technologies can enter into use without incurring disproportionate cost. The energy sector has a relatively slow rate of capital replacement in general, due to the long lifetime of much of its capital — for producing, supply and using energy. As a result, more efficient technologies normally take many years to spread through the energy sector (World Energy Outlook, 2008). The future energy mix that evolves will depend not only on environmental considerations, but also on economic, technological, supply and political factors. As a result, even if all power plants built from now onwards were carbon-free, CO₂ emissions from the power sector would still be only 25 %, or 4 Gt, lower in 2020 relative to the Reference Scenario.

It is generally accepted that for many decades fossil fuels will continue to be the major energy source, with natural gas, the lowest fossil fuel greenhouse gas emitter, increasing its share. Countries having or exporting fossil fuels cannot easily turn away from their use and likewise the economically dynamic countries of Asia cannot radically shift from fossil fuels towards uncertain and currently costly renewables for their growing baseload power needs. At the figure 1 the emission scenario which assumes rising levels of energy demand and greenhouse emissions, projects a 700 ppmv CO₂ concentration by 2200 and an additional increase in surface temperature between 1 °C and 3.5 °C is shown in few different scenarios (A1B, A2, B1, 20th Century)
Mainstream climate scientists warn greenhouse gas emissions, caused by burning fossil fuels and other human activities, must be substantially reduced to avoid dangerous climate change. Fossil fuel combustion needs to be substantially reduced for three main reasons: energy security, human health and climate change mitigation. Pressure to replace fossil fuels has focused more attention on renewable sources – e.g. biomass, solar, geothermal, wave or wind. So now, there is the time to work out the strategy for the future. (Borowski, 2008). CO₂ emissions from power plants keep rising, making an already dire situation worse. Because CO₂ has an atmospheric lifetime of between 50 and 200 years, today’s emissions could cause global warming for up to two centuries to come.
POST-2012 CLIMATE SCENARIOS

By 2030, the world's energy needs are expected to be 50 per cent greater than today. At the same time, scientists are calling for a 25 per cent reduction in greenhouse gas emissions by 2050 to avoid serious changes in the Earth's climate system. Figure 2 shows increase the primary energy demand up to 2030.

Figure 2. World primary energy demand

Coal sees the biggest increase in demand among all primary energy sources in absolute terms between 2005-2030.

The world’s energy system is at a crossroads. Current global trends in energy supply and consumption are patently unsustainable — environmentally, economically, socially. What emissions limits might emerge from current international negotiations on climate change?
What role could cap-and-trade and sectoral approaches play in moving to a low-carbon energy future? The three scenarios analysed are based on differing hypotheses of limited participation up until 2025. All the scenarios assume that the countries that have ratified the Kyoto Protocol will meet their targets. Development of CO$_2$ emissions by sectors under 2 scenarios is shown on figure 3.

![Figure 3. Share of power generation](image)

Three different scenarios are assessed, one in which the atmospheric concentration of emissions is stabilised at 700 parts per million (ppm) in CO$_2$ equivalent terms, the
second at 550 parts per million and the third at the still more ambitious level of 450ppm. In all three scenario most of the increase in emission from power stations comes from developing countries, mainly because their electricity production increase faster that of the OECD and the transition economies. In addition, their reliance on coal will remain faster.

The implications for energy demand, prices, investment, air pollution and energy security are fully spelt out. This ground-breaking analysis will enable policy makers to distill the key choices as they strive to agree in Copenhagen in 2009 on a post-Kyoto climate framework.

On current trends, energy-related emissions of carbon-dioxide (CO$_2$) and other greenhouse gases will rise inexorably, pushing up average global temperature by as much as 6°C in the long term. Strong, urgent action is needed to curb these trends. The energy sector will have to play the central role in curbing emissions — through major improvements in efficiency and rapid switching to renewables and other lowcarbon technologies, such as carbon capture and storage (CCS). To make this happen, governments have to put in place appropriate financial incentives and regulatory frameworks that support both energy-security and climate-policy goals in an integrated way. (Borowski 2009)
CONSERVATION, EFFICIENCY AND RENEWABLE ENERGY

Energy conservation and energy efficiency are presently the most powerful tools in our transition to a clean energy future. As depicted in the Energy Pyramid, renewable energy is very important piece of our energy future, but the opportunities are also in energy conservation and efficiency.

THE ENERGY PYRAMID

While we strongly encourage communities first to evaluate and implement these solutions, the current focus of the word is on renewable energy generation technologies, so we have not developed materials on conservation and efficiency. We should also make conservation and efficiency our top priority, as we work to move our community into our clean energy future.
**Energy conservation** is achieved through efficient energy use, in which case energy use is decreased while achieving a similar outcome, or by reduced consumption of energy services. Energy conservation may result in increase of financial capital, environmental value, national security, personal security, and human comfort. Individuals and organizations that are direct consumers of energy may want to conserve energy in order to reduce energy costs and promote economic security. Industrial and commercial users may want to increase efficiency and thus maximize profit. Electrical energy conservation is an important element of energy policy. Energy conservation reduces the energy consumption and energy demand per capita and thus offsets some of the growth in energy supply needed to keep up with population growth. This reduces the rise in energy costs, and can reduce the need for new power plants, and energy imports. The reduced energy demand can provide more flexibility in choosing the most preferred methods of energy production. By reducing emissions, energy conservation is an important part of lessening climate change. Energy conservation facilitates the replacement of non-renewable resources with renewable energy. Energy conservation is often the most economical solution to energy shortages, and is a more environmentally benign alternative to increased energy production.

A number of barriers exist to realising potential improvements of energy efficiency. The historical low
cost of energy made improvement financially unattractive and also drove more profligate use of energy. Billing of fuel does not discriminate in favour of lower energy consumption – if anything, the opposite is the case, where a lower tariff can be triggered by increased fuel use. The observed phenomenon of increased winter indoor temperatures in improved buildings appears to act to reduce heating energy savings as occupants choose comfort improvement over cost saving (although this effect should saturate once all buildings reach comfortable standards and have effective heating and controls). The impact of recent significant increases in energy costs remains to be seen [Clarke et. al., 2008]. There are many technology options for improved energy performance and energy systems and it is not yet clear which will prove to be the most economic. Therefore, flexibility is needed in legislation and energy-efficiency initiatives.

**Energy efficiency** offers a powerful and cost-effective tool for achieving a sustainable energy future. Something is more energy efficient if it delivers more services for the same energy input, or the same services for less energy input. Energy efficiency in the built environment can make significant contributions to a sustainable energy economy. In order to achieve this, greater public awareness of the importance of energy efficiency is required. There is significant potential for reducing consumption, especially in energy-intensive sectors such as construction, manufacturing, energy
conversion and transport. Reducing energy consumption and eliminating energy wastage are among the main goals of the European Union.

Energy-efficient technologies in many instances are mature, although future technological developments are expected to enter the market. However, the efficient option is generally more expensive when compared to the conventional technology and is marketed as such. There is also a marked lack of skilled installers of new technologies and this needs to be urgently addressed. Any energy-efficient solutions must be robust enough to accommodate possible radical changes in the fuel supply and energy infrastructure. The range of stabilization levels assessed can be achieved by deployment of a portfolio of technologies that are currently available and those that are expected to be commercialized in coming decades and that improved energy efficiency will play a key role in task of economy development (Ürge-Vorsatz, 2009).

Security and solidarity are essential factors contributing to an efficient energy policy. The European Union intends to change its energy policy by putting the accent on these two values. The aim is to reduce energy consumption by almost 15% and energy imports by 26% by 2020. In this perspective, the proposed plan, organised around five main points, should contribute to achieving these aims. It is hoped that by 2050 renewable energies will completely replace carbon-producing energies.
European leaders committed themselves to reduce primary energy consumption by 20% compared to projections for 2020. Energy efficiency is the most cost-effective way of reducing energy consumption while maintaining an equivalent level of economic activity. Improving energy efficiency also addresses the key energy challenges of climate change, energy security and competitiveness.

Energy efficiency is both the result of policy developments and the application of concrete measures. Technology development creates the basis and environmental legislation has contributed much, especially the Emission Trading Scheme and transport emissions policies. Taxation and other fiscal measures such as State aid and recent industry policy tools also provide strong incentives for markets to realise cost-effective energy savings. It is important to continue relying on these efficient instruments, especially in the current difficult economic situation.

1. the general policy framework and the actions taken under the European Energy Efficiency Action Plan;
3. the legal framework for the most important consumption sector - buildings - and energy consuming products;
4. flanking policy instruments such as targeted financing, provision of information and networks like
the Covenant of Mayors and Sustainable Energy Europe; and
5. international collaboration on energy efficiency.

Energy efficiency is a proven, cost-effective resource for the European Community. It is one of the cheapest ways of cutting greenhouse gas emissions and contributing to sustainability and security of supply. It supports economic development and creates jobs, and it also reduces energy costs providing lower energy bills for households and businesses alike. The relevance of effective strategies to improve energy efficiency to the EU's integrated climate and energy policy cannot be overstated. Considerable improvements in energy efficiency have already been made but a large untapped potential still remains to be realised. For its part, the Commission will facilitate mutual support in the implementation of the action plans, and introduce a number of new initiatives, notably on eco-design, buildings and combined heat and power, aimed at strengthening the EU framework for energy efficiency in the various end-use sectors.

DISCUSSION

Energy is the backbone of European prosperity, as it is vital to the functioning of every facet of our society. It is a commodity that is essential to the well-being of every citizen alike, and the right to energy is fundamental. Global energy consumption is growing rapidly and the specialists predict that the average annual rate of growth of energy consumption will be
Increasing demand across our economy has, at times, strained our energy system. The International Energy Agency projects a doubling of world electricity demand by 2030, creating the need for some 4,700 GWe of new generating capacity in the next quarter century. Worldwide energy investment will be directed primarily at satisfying local baseload requirements. Throughout the 20th century and today, the dramatic increase in energy use for industrial, residential, transportation, and other purposes has been fueled largely by the energy stored in fossil fuels and, more recently, supplied by renewable and nuclear power. So now, there is the time to work out the strategy for the future. A strategy is a long term plan of action designed to achieve a particular goal. Strategies are used to make the problem easier to understand and solve. In case of electricity production from renewables the strategy is predicated on the energy production and delivery of products and services (e.g. energy transmit). The objective is to lead the energy industry in terms of price and convenience. The strategy of electricity production is the bridge between policy or high-order goals on the one hand and tactics or concrete actions on the other (Borowski 2010). Energy efficiency combats climate change, improves energy security, contributes to the attainment of the Lisbon goals, and reduces costs for all EU citizens. Realising energy efficiency gains and at least reaching the 20% energy saving objective must continue to be a priority and the Community's common goal.
Energy efficiency when applied to the built environment can contribute greatly to a sustainable energy economy in both the short term (before 2015) and the longer term (up to 2050). Against both of these timeframes, there are a number of challenges to be addressed and technological advances to be deployed. In the short term, one of the key challenges is the delivery of energy-efficiency applications to reduce energy demands. This is dependent on energy-efficient appliances/technology being available, the cost of implementation having clear economic benefits, and users' acceptance of and willingness to implement them. Policy implementation efforts should be intensified - in particular through the National Action Plans - and the initiatives of this package must be steered swiftly through the legislative process. The proposed measures together with financing incentives, energy taxation and raising awareness will bring about permanent, concrete results.

The direct cost of our inability to use energy efficiently amounts to more than 100 billion euros annually by 2021. Realising our savings potential in a sustainable manner is a key element in Community energy policy. It is by far the most effective way concurrently to improve security of energy supply, reduce carbon emissions, foster competitiveness and stimulate the development of a large leading-edge market for energy-efficient

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1 390 Mtoe at USD 48/barrel net of taxes.
technologies and products. This remains equally true when the investment costs required to achieve this savings potential are taken into account. The need for a strengthened policy aimed at more energy efficient consumption and production patterns was underlined in the Commission Green Paper on "A European Strategy for Sustainable, Competitive and Secure Energy" COM(2006)105 final of 08.03.2006. The 2006 Spring European Council (Presidency Conclusions of 23/24 March 2006. 7775/1/06 REV1 of 18.05.2006) called for the adoption as a matter of urgency of an ambitious and realistic Action Plan for Energy Efficiency, bearing in mind the EU energy saving potential of over 20% by 2020.

One of the major pathways of reducing the CO₂ emissions from fossil-fired power generation is to maximise the efficiency of new plants built to meet future demand growth and for replacing older or inefficient plants. To enable the other major pathway, carbon dioxide capture and storage, it is imperative that new plants are designed and operated at highest efficiency. The challenge to the policy makers now is to formulate measures that would enable wider deployment of these technologies globally but particularly in countries which need these most, while also encouraging operational best practice and continued technological improvement towards higher efficiency. The electrical efficiency of a power plant is the proportion of the fuel input energy that emerges as electric power,
conventionally expressed as a percentage value. Another widely used measure is the heat rate, which is the fuel input energy divided by the electrical output energy. The efficiency may be stated on either a net (sent out) value or a gross (generated) value. The sent out value will be lower, as it will allow for deduction of the power consumed by the plant itself by equipment such as crushers, fans, pumps, environmental control equipment, etc., and also allow for transformer losses. Coal-fired power generation is essential for the next several decades but at the same time the need to limit CO₂ and other emissions will intensify. Fossil fuel power plant operators must continue to explore and use means to minimise the impact of their operations, including raising efficiency of new plants and introducing even more effective environmental controls. (Fossil fuel, 2007).

The current financial crisis is not expected to affect longterm investment, but could lead to delays in bringing current projects to completion, particularly in the power sector. Just over half of projected global energy investment in 2007-2030 goes simply to maintain the current level of supply capacity: much of the world’s current infrastructure for supplying oil, gas, coal and electricity will need to be replaced by 2030. (World Energy Outlook, 2008)

The economic adjustment to meet the carbon emission constraints involves substitution away from commodities whose production processes generate greenhouse gas emissions. These are usually commodities characterised
by relatively high energy content. the energy sectors playing the most important role in this adjustment process (*Analysis of Post-2012, 2005*).

**REFERENCES**


BOROWSKI P. 2010: Energetic and ecological aspects of agricultural production, Warsaw University of Life Sciences, Warsaw.


Energy and environment report 2008, EEA, Copenhagen, 2008 p.37

The role of European agriculture in climate change mitigation, Commission of The European Communities, Brussels, 2009, p.8
Presidency Conclusions of 23/24 March 2006. 7775/1/06 REV1 of 18.05.2006
COM(2006)105 final of 08.03.2006
Environmental Integrity Project - EIP report. 2008.
Abstract: This paper describes the results of the research realized in the scope of energy independence and CO2 reduction in the transport sector. The analyses of the research focused on new methods of CO2 reduction and search new methods and technologies of transport biofuels production. Biomass, biofuels and new technologies become a challenge for researchers in the transport sector.

1. Introduction
The transport sector is one of the fastest growing energy demand of the branch of worldwide economy. Transportation is very closely related and associated to oil sector. We can produce electricity from many different fuels but 96% of transportation runs on fuel made from oil [1]. The challenge that faces today from the world of science is finding a solution to increase the independence from oil and to reduce CO2 emission in the transportation. By 2030 heavy-duty vehicles will have
become the largest transportation demand segment just like aviation and marine transport which grow significantly. The trend mentioned above is shown at Figure 1.

![Figure 1. Global transportation demand by sectors and types](image)

Reducing emission of CO$_2$ is a global priority developed among others at a conference in Kyoto. By 2020, the sectors not covered by the system of emissions trading, such as transport (except aviation, which will be covered by the scheme in 2012), agriculture, waste and households should to reduce their emissions by 10 % compared to 2005 levels.
[2]. Because different countries are at different stages in their economic development CO₂ emission patterns through 2030 vary enormously between OECD and non-OECD country groups. Growth in CO₂ emissions will be dominated by China, India and others non-OECD countries while through 2030 and beyond OECD countries will lead more efficient and smaller carbon and oil consumption. There is significant potential for reducing consumption, especially in energy-intensive sectors such as construction, manufacturing, energy conversion and transport [3]. Estimate of CO₂ emission is shown at Figure 2.

Figure 2. CO₂ emission in OECD and non-OECD countries
The pollution reduction is also important subject of scientific and academic research. The solution is in developing of clean fuels. Clean fuels in the process of complete combustion emit only carbon dioxide and water vapor without any burning residues or emission of black smokes. The clean fuels contain the lowest amounts of aromatics, either as single or multiple benzene rings, beside the minimum traces of sulphur and nitrogen compounds. Clean gasolines are free from alkylated lead compounds, which are used to achieve the requested octane numbers. [4] The research realized under grant of Ministry of Science and Higher Education in Poland focused on new methods of CO$_2$ reduction and search new methods and technologies of transport biofuels production. Interest in environmental protection had already begun in the 70s of the previous century, after the first energy crisis and the development of the Environmental Report for the Elite Club of Rome. At the beginning of last decade, in 2001 and 2003 two important directive promoting the use of renewable energy sources for use in electricity, 2001/77/EC [5] and Directive 2003/30/EC [6] - latter concerned the promotion of transport bio-fuels were developed and implemented. Unfortunately not met indicative targets set in Directive 2003/30/EC, as it was not mandatory and there were many barriers to the development of biofuel sectors. Therefore, instead of 5.75% biofuels in transport by 2010 achieved rate was 4.8% in terms of
energy. Taking into account the experience gained from previous implementations of the Directive 2003/30/EC, and as a result of growing environmental awareness of the EU Directive 2009/28/EC [7] was (and related directives) to promote the use of renewable energy. According to this directive, Poland adopted a mandatory duty not less than 15% share of renewables in total final energy use by 2020. Special attention was paid to the transport sector, for which in 2020 set the objective indicator of 10% share of renewable energy (in energy terms) in total transport fuels used. Transport is one of the branches of the EU economy, in which CO₂ emissions are increasing at a rapid pace. Also in the Polish case, the transport sector, especially road transport requires, has special efforts because of the growing greenhouse gas emissions. The Directive imposes the recognition of the implementation of compulsory targets for biofuel to meet the strict criteria for sustainable production and a correspondingly high rate of emissions reduction, which mainly affects the emission of CO₂. This means that the target of 10% biofuels share in transport fuel market should be made only in a sustainable manner, i.e. without the negative social and environmental consequences. Establishing criteria for sustainable production means, therefore, that the quality rather than quantity will be put at first place in pursuit of this goal. This opens up a wide scope for innovation in improving the quality of biofuel. The second indicator, the reduction of CO₂ emissions, is an indicator which is changing
dynamically over time. Requirements (described in the Directive 2009/28/EC) in this field are increasing as follows:
1. after the 1st quarter of 2013, the reduction of CO₂ emissions should not be less than 35%
2. after 2016, reducing CO₂ emissions should not be less than 50%
3. after 2017, reducing CO₂ emissions should not be less than 60%.
These indicators are difficult to achieve by Polish producers of transport biofuels. For example, bioethanol produced in the 2-phase system (agricultural distillery-transport-company-transport-dehydrating plant blending) has reduced CO₂ emissions of just about 20%. In the case of advanced biofuel production plants to reduce CO₂ emissions 1. generation reaches 50%. It can be concluded that all 1. generation transport biofuels, to which Poland has a substantial production capacity (in most modern, created after 2004) after 2016, will not meet the requirements of the Directive 2009/28/EC. It should take steps to improve this disadvantage after analyzing the existing facilities, possibly to work to build 2. generacjii biofuels (high CO₂ emission reduction), or produced from different waste materials. If we do not adapt production capacity to the requirements of Directive 2009/28/EC we will bear concrete, measurable impact, reducing revenues to the firms, capacity utilization, reduce agricultural production in the sectors of transport biofuels, and the whole country (and limited
tax revenue to the state budget, the penalty Directive 2009/28/EC for failure and derivatives).

2. Methodology
The methods of this research were the qualitative research and experimental research. Qualitative research methods was used primarily as the prelude to quantitative research. This method was used to define the problem, generate hypotheses, identify determinants, and develop quantitative research designs in the next step of research. Desk research method was involved to gather data that already exists either from internal sources of the enterprises, publications of governmental and non-governmental institutions, from free access data on the internet, in professional newspapers and magazines, in annual reports of companies and commercial databases [8]. In order to determine the technical condition and the degree of engine wear the research experiment was conducted. Conditions of active experiment allow you to control the value changes in the set of excitations in a very wide control limits is often difficult to achieve in reality, or even impossible to achieve. Experiment allows for comprehensive research and obtaining as much information about the behavior of an object as well as the controlled modification of parameters of the test system. To accomplish this method of testing was necessary to develop and build a laboratory bench. The concept of the test station was based on the use of the
injection system Common Rail diesel engine used in the OM611 produced by Daimler-Chrysler. The material of the injection was a rapeseed oil as biofuel give lower emissions of toxic compounds.

3. Discussion
We can achieve sizeable benefits by working with environmental issues in a systematic, cohesive and organized way. There is no one single solution if it comes to cutting carbon dioxide emissions in an effective way. Rather, it’s all about a range of measures. It is necessary to optimize every link the chain – every little bit counts and every single detail is important. One of the way to reduce CO$_2$ is using engines with higher level of effectiveness and vehicles with higher degree of efficiency to carry the goods. The new generation of engines is characterized by, among others, mature motor control of ancillary units, a new generation of electronic power steering, engine off system when not needed to operate, and Brake Energy Regeneration system. Design strategy was to get more power with less weight and lower fuel consumption. All together also provides a lower exhaust emissions. The diesel engine of heavy commercial vehicles is the most energy efficient engine for the transport of goods. For example: based on the scientific facts that for every litre of diesel fuel that is burned, roughly 2,5kg of CO$_2$ are produced, a fully loaded truck (40 tonnes) using 32 litres of fuel per 100km produces roughly 80kg of CO$_2$. To compare car
and vehicles transport we can notice that: if a car would have to carry 40 tonnes with a fuel efficiency of 8 litres per 100km and its normal weight of 1.5 tonnes, the car would produce over half a tonne of CO₂, or six times more than a heavy commercial vehicle.

4. Results
Already recognized as a reference in the development of advanced petrol and diesel engines, the group of researchers at SGGW (Warsaw University of Life Sciences) has introduced key technological innovations (e.g. common rail), along with the associated systems to control pollutant emissions. The project concerned the study of combustion of rapeseed oil and its mixtures with additives in a test chamber with variable parameters of air and fuel supply.

![Figure 3. Common Rail Research Station - Laboratory at Warsaw University of Life Sciences](image)
The objective of the research: to cut fuel consumption and protect the environment by reducing CO2 emission were achieved. Advantages: better fuel economy, lower fuel consumption, low emissions, engine is softer, lower noise level compared to traditional solutions, ease of obtaining high performance engine. Drawbacks of the system: system requires high-quality diesel fuel as a small contamination can cause damage to the injectors working under great pressure, high prices for parts in case of failure.

5. Conclusion
Potential future source of energy used in transport is electricity, biofuels, synthetic fuels, methane (natural gas) and, as a supplement – liquid LPG. Road transport over short distances should be covered by electricity; at medium distances by eg methane, in the case of long routes the best will be biofuels or LPG.

Reducing CO2 emissions in the transport sector is a priority in the European Union. In order to facilitate the measurement of emissions, the European manufacturers of commercial vehicles have developed a calculator that allows to determine the level of actual CO2 emission of trucks and buses before they would be purchased. Market realities play a key role in reducing CO2 emissions in road transport, so accurate tool will soon assist potential buyers in the decision to choose energy-efficient vehicle, with optimal parameters tailored to the specific area of transport. Emissions in the individual
utility cars (trucks, LCV, buses) is varied and depends on primarily on the total weight of the vehicle, its shape and the type of carriage performed. Therefore - in contrast to passenger cars - we can not determine the average CO$_2$ emissions for a single commercial vehicle. The method used in the calculator is a computer simulation carried out based on actual tests, using trucks and buses nearly all categories, ranging from city buses and garbage trucks through vehicles, a vehicle for ending long-distance transport. Each car emits different value of CO$_2$. Biomass could offer near-term business advantages and more strategic, long-term value. The benefits obtained from biomass power generation, such as waste reduction, emissions offsets, and local economic growth, can enhance the technology's overall appeal to utilities. The future of biomass electricity and energy generation depends also on biomass integrated research which offers high energy conversion efficiencies and will be further developed to run on biomass produced fuels.

**References**


Chapter 5

Adaptation strategy of the energy companies to the energy sector policy and regulations in the sustainable development context

*International Conference, United Arab Emirates, Dubai 26-28 December 2011*

Abstract. Development of energy companies is done in a changeable environment. Adaptation of activities to energy regulatory requirements and signals from the business environment is a guiding principle of this article. The tight requirements support among others cutting costs and creating technical innovations and thus the country can e.g. become a forerunner in some areas of an environmental technology. The ability to adapt in a manner considered appropriate by principal decision makers in the firm informs about their dynamics capability. The adaptation is the basic goal of strategic management. How the companies are architected to address the combined challenges of innovation, speed and growth in turbulent domains.

Keywords: adaptation, management, energy companies, sustainable development.

* this article was accepted by reviewers to oral presentation but due to the financial crises author couldn't participate in the conference
1. Introduction

The primary purpose of strategic management is to ensure a fit between an organization's external environment and its internal situation. The external environment includes among other things, the regulations, technologies, demographic and cultural factors. To ensure compatibility and survival, organizations must be able to comprehend those significant environmental shifts taking place around them and to equip strategically their organizations to succeed in the new environment. Therefore the adaptation is the basic goal of strategic management. The main question in this scope is about companies' flexibility in the changeable environment. Ability, agility, versatility, resilience and robustness are measurers of adaptation process [1]. It is important to possess knowledge whether firms have the capacity to adapt and innovate, as well as how they should adapt over time. There have been several researches in the field of business model adaptation conducted by Papakiriakopoulos [2], Swatman and Schumarova [3] or Andries and Debackere [4]. The term developing, evolution or change is also synonymous of adaptation and describes strategic development path.

We can achieve sizeable benefits by working with environmental issues in a systematic, cohesive and organized way. There is no one single solution if it comes to realizing environmental requirements e.g cutting carbon dioxide emissions in an effective way or raising
the level of energy independence. Rather, it’s all about a range of measures. It is necessary to optimize every link the chain – every little bit counts and every single detail is important. One of the way to reduce CO₂ is using power plants, engines with higher level of effectiveness. And to achieve satisfactory level of energy independence is using differentiated sources production or supply [5].

2. The ability to adaptation
2.1. The capacity to adaptation in terms of sustainable development
The ability to adapt in a manner considered appropriate by principal decision makers in the firm informs about their dynamics capability. Whether this leads to superior performance will then depend on the decision makers’ ability to understand correctly the context and import of their decision, as well as the management and deployment of the dynamic capabilities under requirement of sustainable development. Sustainable development is the progress which meets the needs of the present without compromising the ability of future generations to meet their own needs. All definitions of sustainable development require that we see the world as a system—a system that connects space and a system that connects time. When we think of the world as a system over space, we grow to understand that air pollution from power plants of North America affects air quality in Europe and Africa, and that tragedy of nuclear
station in Fukushima could harm fish stocks off the coast of Australia. And when we think of the world as a system over time, we start to realize that the decisions of our grandparents made about how to farm the land continue to affect agricultural practice today and the economic policies we endorse today will have an impact on urban poverty when our children are adults.

The specialists predict that the average annual rate of growth of energy consumption will be about 2%. Increasing demand across our economy has, at times, strained our energy system. Demand for energy is predicted to continue to rise, by at least 50% by 2030. At present about 80-85% of global energy is supplied by fossil fuels: coal, oil and natural gas [6]. Fossil fuel combustion needs to be substantially reduced for three main reasons: energy security, human health and climate change mitigation. Pressure to replace fossil fuels has focused more attention on renewable sources – e.g. biomass, solar, geothermal, wave or wind. So now, there is the time to work out the strategy for the future. Decision making process nowadays is in many companies, especially in energy sector is conduct under tight regulation. The main topic of this research is power plants management in tightening limits condition. Sustainable solutions to the climate crisis require the development of new technologies, appropriate policy approaches and innovative business models of power plants.
Energy security has become a priority as the World's population increases and their standard of living improves thus increasing energy consumption. The finite nature of fossil fuel reserves and the political instability of many of the countries which supply fossil fuels have caused concern over future energy security and costs. The likely result of fossil fuel deficit is that, as the cost of these commodities increases, they will only be affordable for large industrial processes and therefore cheaper energy sources must be found for domestic purposes and energy companies should adapt to market requirements.

2.2. The capacity to adaptation in terms of management sciences
Organizations are both creators and prisoners of their environments. Firms develop within the internal and external environment. Well managed firms require that viability should be established, in both the internal (micro) and external (macro) environments, at each intermediate stage of their development.
Figure 1. Micro and macro environment

As the process unfolds, and more information becomes available, top management is able to evaluate the adaptive potential of the new activities for the organization. Adaptation to existing environmental demands may reduce the organization's capacity to adapt to future changes in the environment or to seek out new environments. The new world order of global competition dictates that companies must consistently improve their performance. The energy industry, highly regarded as the ‘industry of industries’, is facing intense competition in a rapidly changing business environment. As such, industry players must advance not only their products and services, but also, more importantly, their processes and capabilities [7].
2.3. **Tight environmental requirements**

The tight environmental requirements may bring competitive edge. The tight requirements support cutting costs and creating technical innovations and thus the country can e.g. become a forerunner in some areas of an environmental technology. Tight environmental requirements favoured the new clean fossil energy technologies because of their superior performance in this area. Environmental and other regulations needed to be developed, provided and enforced so that a level playing field would be provided. From the viewpoint of environmental protection global requirements should be met with globally fixed measures. The global, regional and local requirements should be laid down on the basis of available, reliable, scientific facts with the aim of taking adequate precautions. (Environmental requirements... 1999). The research and technology development objectives must be met in order to successfully make the transition to a low carbon economy. Global emissions of energy-related CO$_2$ would be about 57% higher in 2030 than in 2005 under the International Energy Agency's (IEA) reference scenario [8].

To limit environmental pollution and to slow the rate of increase of CO$_2$ concentration, responsive long term energy mix strategies exploiting the maximum potential of non-greenhouse gas emitting energy sources need to be developed and implemented as rapidly as possible. In many power plants the power generating and emission
control equipment was engineered, procured and constructed in order to meet emissions requirements. The choice of global emissions trajectory will need to take into account technological requirements and costs in the energy sector. One of the major pathways of reducing the CO$_2$ emissions from fossil-fired power generation is to maximize the efficiency of new plants built to meet future demand growth and for replacing older or inefficient plants. To enable the other major pathway, carbon dioxide capture and storage, it is imperative that new plants are designed and operated at highest efficiency. The challenge to the policy makers now is to formulate measures that would enable wider deployment of these technologies globally but particularly in countries which need these most, while also encouraging operational best practice and continued technological improvement towards higher efficiency.

The electrical efficiency of a power plant is the proportion of the fuel input energy that emerges as electric power, conventionally expressed as a percentage value. Another widely used measure is the heat rate, which is the fuel input energy divided by the electrical output energy. The efficiency may be stated on either a net (sent out) value or a gross (generated) value [9].

As governments seek ways of reducing their dependence on fossil fuels, researchers are investigating new sources of renewable energy. One of these is "bio-fuel", a term used to describe any kind of fuel derived from cultivated crops. Not only are bio-fuels infinitely renewable, but
they can be burned without increasing the amount of carbon dioxide in the atmosphere - the CO₂ released in burning is balanced by an equal amount removed from the air via the photosynthesis process when the crop is growing. This energy resource thus reduces the problem of global warming.

In this point, technical, regional and economical factors should be considered altogether. Especially regional advantages should be benefited in terms of renewable energy resources. For example, in the regions having important geothermal energy potential, total costs can decrease in comparison to fossil fuelled systems. In regions having much solar radiation, solar systems could be used as the main or auxiliary heating systems with economical advantages.

The current financial crisis is not expected to affect longterm investment, but could lead to delays in bringing current projects to completion, particularly in the power sector. Just over half of projected global energy investment in 2007-2030 goes simply to maintain the current level of supply capacity: much of the world’s current infrastructure for supplying oil, gas, coal and electricity will need to be replaced by 2030.

3. **Recommendations**

Companies should adjust their activities and their development to market requirements. Companies should read all the signals coming from the environment and adapt themselves to changing conditions. The legal environment, directives and regulations are forcing
companies to build a new strategy in continuous way. For example in transport sector researchers and companies should looking for new solution in engine construction.

In the development of advanced petrol and diesel engines, the group of researchers at SGGW (Warsaw University of Life Sciences) has introduced key technological innovations (e.g. common rail), along with the associated systems to control pollutant emissions. The project concerned the study of combustion of rapeseed oil and its mixtures with additives in a test chamber with variable parameters of air and fuel supply.

![Common Rail Research Station - Laboratory at Warsaw University of Life Sciences](image)

**Figure 2. Common Rail Research Station - Laboratory at Warsaw University of Life Sciences**

The objective of the research: to cut fuel consumption and protect the environment by reducing CO2 emission were achieved.
4. Acknowledgements
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5. References


Part 2
International Lectures and Official Speeches
Chapter 1

Management in Agriculture

Lectures at Akdeniz University, Turkey, Antalya, 16-29 April 2008

Management Activities
- Training
- Planning
- Negotiating
- Sales
- Dealing with regulatory officials

Basic management action
- Identify what is needed or has to be done
- Organize resources
- Monitor performance and task completion
- Plan ahead for future requirements
- Deal with any problems that arise
Basic Managerial Functions

The five functions of management: planning, organizing, leadership, staffing and controlling, assume a great worth in the success of any business every day.

Planning
• Vision
• Mission
• Goals
• Objectives

Organizing
• Division of labor
• Delegation of authority
• Departmentalization
• Span of control
• Coordination

Leading
• Motivation
• Communication
• Performance appraisal
• Discipline
• Conflict resolution

**Staffing**
• Recruiting
• Selecting
• Hiring
• Training
• Retraining

**Controlling**
• Establishing standards based upon objectives
• Measuring and reporting performance
• Comparing the two
• Taking corrective/preventive action
• Directing

**The Five Management Functions**

Planning
Planning is the first tool of the four functions in the management process. The difference between a successful and unsuccessful manager lies within the planning procedure. Planning is the logical thinking through goals and making the decision as to what needs to be accomplished in order to reach the organizations’ objectives. Managers use this process to plan for the future, like a blueprint to foresee problems, decide on the actions to evade difficult issues and to beat the competition. (Bateman, Snell, 2007). Planning is the first step in management and is essential as it facilitates
control, valuable in decision making and in the avoidance of business ruin. Firm has a global vision to lead the way to better health. Employees at every firm are committed to excellence and through Wyeth’s clearly written Mission and Vision Statement, firm must live by its values which clarify the company’s objectives and goals. Quality in the results that are achieved and how the results are reached doing what is right, respect for others, value those that lead and take pride in all they do, and the value of teamwork to reach common goals. The continuous use of a plan is imperative as Wyeth has divisions throughout the world. Planning allows Wyeth to be at the top of the pharmaceutical industry and a healthcare leader.

Organizing

In order to reach the objective outlined in the planning process, structuring the work of the organization is a vital concern. Organization is a matter of appointing individuals to assignments or responsibilities that blend together to develop one purpose, to accomplish the goals. These goals will be reached in accordance with the company’s values and procedures. A manager must know their subordinates and what they are capable of in order to organize the most valuable resources a company has, its employees. (Bateman, Snell, 2007). This is achieved through management staffing the work division, setting up the training for the employees, acquiring resources, and organizing the work group into a productive team. The manager must then go over the
plans with the team, break the assignments into units that one person can complete, link related jobs together in an understandable well-organized style and appoint the jobs to individuals. (Allen, G., 1998). Organization is strong at firm with the ability to be flexible, except change and search for new products, firm’s leadership provides needed direction for staff to achieve personal success that leads to organizational success. Managers at Wyeth are responsible for keeping communication lines open between departments to eliminate any issues from forming. Firm would not be a healthcare leader if there was little or no organization.

Leading
Organizational success is determined by the quality of leadership that is exhibited. "A leader can be a manager, but a manager is not necessarily a leader," says Gemmy Allen (1998). Leadership is the power of persuasion of one person over others to inspire actions towards achieving the goals of the company. Those in the leadership role must be able to influence/motivate workers to an elevated goal and direct themselves to the duties or responsibilities assigned during the planning process. (Allen, G., 1998). Leadership involves the interpersonal characteristic of a manager's position that includes communication and close contact with team members. (Bateman, Snell, 2007).

Managers at firm are there to motivate workers to fulfill the goals of the company and out-perform their competitors. They as leaders have day to day contact
with workers using open communication and are able to give direction individually as well as within teams, departments and divisions. Management is there to inspire subordinates to ‘step up to the plate’ and find innovative means to solve department problems. Authorizing staff to have the capability to deal with situations is a significant part of leading. (Allen, G., 1998).

Staffing
Staffing means also: Occupation & employment issues, career planning, job searching, employment opportunities, employment agencies, salaries, benefits, law and more. The term career is used to refer to the particular job, occupation, or vocation a person has chosen to pursue. There are many factors that must be considered when planning a career. It must be determined whether there are certain goals that one wishes to obtain through the work that will constitute his career. One must consider whether there are certain special skills or interests that should be incorporated into a career. Finally, one must decide if there are any monetary requirements for a fulfilling career and if so, what those requirements will be. The links included herein related to occupation and employment issues. Staffing (including recruiting, selecting, hiring and training of employees) is among the skills that become more important as the complexity and overall level of performance of a business increases. Staffing is the process of acquiring, deploying, and retaining a
workforce of sufficient quantity and quality to create positive impacts on the organization's effectiveness. Staffing is a process that involves knowing what mix of skills and knowledge a company needs, discovering and practicing the best recruiting, using talent where it can be most effective, and making sure that talent (namely the workers) wants to stay and work toward the organization's goals.

Controlling
The process that guarantees plans are being implemented properly is the controlling process. Gemmy Allen stated that ‘Controlling is the final link in the functional chain of management activities and brings the functions of management cycle full circle.’ This allows for the performance standard within the group to be set and communicated. Control allows for ease of delegating tasks to team members and as managers may be held accountable for the performance of subordinates, they may be wise to extend timely feedback of employee accomplishments. (Allen, G., 1998). Meetings are used to review the daily schedule, prevent problems and to ascertain when problems do exist in order to address and solve those that occur as quickly and as efficiently as possible. Control is the process through which standards for performance of people and processes are set, communicated, and applied. (Allen, G., 1998).
Vision
Corporate vision is a short, succinct, and inspiring statement of what the organization intends to become and to achieve at some point in the future, often stated in competitive terms.

- Vision refers to the category of intentions that are broad, all-inclusive and forward-thinking. It is the image that a business must have of its goals before it sets out to reach them. It describes aspirations for the future, without specifying the means that will be used to achieve those desired ends.

- Your vision performs both a directional and a motivational function. The purpose of your coherent vision of a desirable future is to focus you on those things you could do now to bring that future state about.
Mission
An organization’s MISSION

- Reflects management’s vision of what firm seeks to do and become
- Provides clear view of what firm is trying to accomplish for its customers
- Indicates intent to stake out a particular business position

The mission takes on the issue of what the company is today, and what it will be in the future. Many companies put the mission statement into writing and use it as the overarching principle by which the company operates.

A **mission statement** is a brief statement of the purpose of a company or organization. Companies sometimes use their mission statement as an advertising slogan, but the intention of a mission statement is to keep members and users aware of the organization's purpose. In the case of public commercial companies, the primary purpose must always be to uphold the interests of shareholders, whatever the mission statement.

The following elements can be included in a mission statement. Their sequence can be different. It is important, however, that some elements supporting the accomplishment of the mission be present and not just the mission as a "wish" or dream.

Purpose and values of the organization (products or services, market) or who are the organization's primary "clients" (stakeholders)
What are the responsibilities of the organization towards these "clients"
- What are the main objectives supporting the company in accomplishing its mission

The best mission statements are short and state the obvious. Your statement's length and complexity depends on what your organization wants to do, but keep it as brief as possible. You should be able to use the statement frequently, so make it brief and succinct. The mission statement should be "...short enough to remember and easily communicate. Strong enough to inspire."

A mission statement is a key tool. It captures, in a few succinct sentences, the essence of your business's goals and the philosophies underlying them. Equally important, the mission statement signals what your business is all about to your customers, employees, suppliers and the community.

The mission statement reflects every facet of your business: the range and nature of the products you offer, pricing, quality, service, marketplace position, growth potential, use of technology, and your relationships with your customers, employees, suppliers, competitors and the community.

"Mission statement help clarify what business you are in, your goals and your objectives"

**Objective vs. goal**

An “Objective” is a specific description of what is required to be achieved. They are usually described
using “objective” language. In other words, **precise and non-emotional terms.**

A “Goal” is a softer and more general description. It is something that you would like to achieve that can be described “subjectively”. The big difference is that there is **no pressure to be specific.** And, it’s perfectly acceptable to use **emotional language.**

Use “**Goals**” initially, to express the physical and emotional outcomes you seek to achieve. Then, use “**Objectives**” to describe the more detailed specifics that your action or implementation plan is designed to achieve.

A clear set of goals helps a business continuously improve, compete more effectively, and fine tune its operations and processes over time. To be clear, goals are used to directly support a strategic objective or business plan.

**Ansoff Matrix**

The Ansoff **Product-Market Growth Matrix** is a tool created by Igor Ansoff and first published in his article "Strategies for Diversification" in the Harvard Business Review. The matrix allows marketers to consider ways to grow the business via existing and/or new products, in existing and/or new markets – there are four possible product/market combinations.

This matrix helps companies decide what course of action should be taken given current performance. The matrix consists of four strategies:
Market penetration (existing markets, existing products): Market penetration occurs when a company enters/penetrates a market with current products. The best way to achieve this is by gaining competitors' customers (part of their market share). Other ways include attracting non-users of your product or convincing current clients to use more of your product/service, with advertising or other promotions. Market penetration is the least risky way for a company to grow.

Product development (existing markets, new products): A firm with a market for its current products might embark on a strategy of developing other products catering to the same market (although these new products need not be new to the market; the point
is that the product is new to the company). New products, it can gain new customers for these products. Hence, new product development can be a crucial business development strategy for firms to stay competitive.

Market development (new markets, existing products): An established product in the marketplace can be tweaked or targeted to a different customer segment, as a strategy to earn more revenue for the firm.

Diversification is a form of corporate strategy for a company. It seeks to increase profitability through greater sales volume obtained from new products and new markets. Diversification can occur either at the business unit level or at the corporate level. At the business unit level, it is most likely to expand into a new segment of an industry which the business is already in.

**CONCENTRIC DIVERSIFICATION**
Concentric diversification occurs when a firm adds related products or markets. The goal of such diversification is to achieve strategic fit. Strategic fit allows an organization to achieve synergy. In essence, synergy is the ability of two or more parts of an organization to achieve greater total effectiveness together than would be experienced if the efforts of the independent parts were summed. Synergy may be
achieved by combining firms with complementary marketing, financial, operating, or management efforts.

**CONGLOMERATE DIVERSIFICATION**

Conglomerate diversification occurs when a firm diversifies into areas that are unrelated to its current line of business. Synergy may result through the application of management expertise or financial resources, but the primary purpose of conglomerate diversification is improved profitability of the acquiring firm. Little, if any, concern is given to achieving marketing or production synergy with conglomerate diversification.
What is a business plan?
A business plan is a formal statement of a set of business goals, the reasons why they are believed attainable, and the plan for reaching those goals. It may also contain background information about the organization or team attempting to reach those goals. Business plans may also target changes in perception and branding by the customer, client, tax-payer, or larger community. When the existing business is to assume a major change or when planning a new venture - a 3 to 5 year business plan is essential.
On the one hand, in the consulting and academic world, what is meant by a business plan is a fairly comprehensive research project with thorough analysis of issues including customers, markets, competitors, pricing, marketing strategies, risks – always followed with detailed multi-paged financial projections looking three to five years into the future.
On the other hand, in most of the business world, what is generally meant by a business plan is a brief written statement indicating goals and overall steps for achieving
those goals. The goals might relate to customers, sales, units sold, profits, facilities. It looks out a year, maybe two. This is something the owner or management puts together in a few meetings, when then gets updated every year or two.

To create this kind of a plan, management works on it for months, or hires a consultant to do it for them. Either way, it’s not unusual to invest a hundred hours or more into creating it.

Why Do a Business Plan?

Business plans are an important business start-up step for many business owners, especially those who are making their business ideas to investors or credit institutions for funding.

There are numerous benefits of doing a business plan, including:

- To identify an problems in your plans before you implement those plans.
- To get the commitment and participation of those who will implement the plans, which leads to better results.
- To establish a roadmap to compare results as the venture proceeds from paper to reality.
- To achieve greater profitability in your organization, products and services -- all with less work.
- To obtain financing from investors and funders.
- To minimize your risk of failure.
• To update your plans and operations in a changing world.
• To clarify and synchronize your goals and strategies.
• For these reasons, the planning process often is as useful as the business plan document itself.

Do You Really Need a Business Plan?
Business plans can be one of the most effective tools for the business owner who is starting, growing and even managing a business.
Business plans can take a long time to write, require that you have a tremendous amount of data at your fingertips, depend in part on projections, and often are responsible for creating a long list of research you still need to conduct and other work you need to complete.

A Business Plan Helps You Make Decisions
Business plans help you eliminate the gray area because you have to write specific information down in black and white. Making tough/difficult decisions is often one of the hardest and most useful parts of writing a business plan. Every business/enterprise faces a number of different decisions that must be made every day. All of these decisions must be made with the intent of meeting the overall goals and benchmarks of the company. This is especially true of businesses encompassing several different departments pursuing their own goals.
Without a business plan guiding decision making, the different departments are likely to overemphasize their importance, which can be detrimental to the overall goals of the business.

**Decision-making ability**

A business plan hopefully offers readers a complete understanding of the who, what, where, when, why and how of your business. However, it also offers them a look at you, personally. Assuming you plan to work as a key manager of the business, the plan shows readers a sample of your decision-making ability.

The six steps of decision-making process are:

- Step 1: Define the problem
- Step 2: Identify available alternative solutions to the problem
- Step 3: Evaluate the identified alternatives
- Step 4: Make the decision
- Step 5: Implement the decision
- Step 6: Evaluate the decision
Types of decisions.
• Programmed decisions.
  • Involve routine problems that arise regularly and can be addressed through standard responses.
• Nonprogrammed decisions.
  • Involve nonroutine problems that require solutions specifically tailored to the situation at hand

Classical decision theory.
• Views the decision maker as acting in a world of complete certainty.
• The classical decision maker:
  • Faces a clearly defined problem.
  • Knows all possible action alternatives and their consequences.
  • Chooses the optimum alternative.
  • Is often used as a model of how managers should make decisions

Behavioral decision theory.
• Accepts a world with bounded rationality and views the decision maker as acting only in terms of what he/she perceives about a given situation
• Recognizes that human beings operate with:
• Cognitive limitations.
• Bounded rationality.
• The behavioral decision maker:
• Faces a problem that is not clearly defined.
• Has limited knowledge of possible action alternatives and their consequences.
• Chooses a satisfactory alternative.

Five topic areas of business plan

**Business summary** - Describes the organization, business venture or product (service), summarizing its purpose, management, operations, marketing and finances.

**Market opportunity** - Concisely describes what unmet need it will (or does) fill, presents evidence that this need is genuine, and that the beneficiaries (or a third party) will pay for the costs to meet this need. Describes credible market research on target customers (including perceived benefits and willingness to pay), competitors and pricing.

**People** - Arguably (most likely) the most important part of the plan, it describes who will be responsible for developing, marketing and operating this venture, and why their backgrounds and skills make them the right people to make this successful. Ideally, each person in the management team (and key program and technical folks) are indicated by NAME.
Implementation - This is the how-to section of the plan, where the action steps are clearly described, usually in four areas: start-up, marketing, operations and financial. Marketing builds on market research presented, e.g., in a Market Opportunity section of the plan, including your competitive niche (how you will be better than your competitors in ways that matter to your target customers). Financial plan includes, e.g., costs to launch, operate, market and finance the business, along with conservative estimates of revenue, typically for three years; a break-even analysis is often included in this section.

Contingencies - This section outlines the most likely things that could go wrong with implementing this plan, and how management is prepared to respond to those problems if they emerge.
Chapter 4

Different Sources and Efficiency of Renewable Energy

Lecture at Akdeniz University, Turkey, Antalya 12-13 August 2010

Energy from renewable sources

Energy is the backbone of European prosperity, as it is vital to the functioning of every facet of our society. It is a commodity that is essential to the well-being of every citizen alike, and the right to energy is fundamental. Global energy consumption is growing rapidly and the specialists predict that the average annual rate of growth of energy consumption will be about 2%. Increasing demand across our economy has, at times, strained our energy system. The International Energy Agency projects a doubling of world electricity demand by 2030, creating the need for some 4,700 GWe of new generating capacity in the next quarter century. With high energy prices and the concern about global warming and sustainable development, energy efficiency has become a vital part of the energy strategy in many countries
The development of renewable energy is an element of balanced development. The need for the development of production of renewable energy sources comes from the necessity to limit the emission of gases produced in the course of fuel combustion, depleting fossil fuel resources and increasing costs of their production.

**Renewable energy** is generated from natural resources such as sunlight, wind, rain, tides, and geothermal heat, which are naturally replenished. Sufficient domestic renewable resources exist to allow renewable electricity to play a significant role in future electricity generation and thus help confront issues related to climate change, energy security, and the escalation of energy costs. Generation of electricity from renewable resources has increased substantially over the past 20 years.

Solar energy comes from the sun. Just the tiny fraction of the Sun's energy that hits the Earth (around a hundredth of a millionth of a percent) is enough to meet all our power needs many times over. In fact, every minute, enough energy arrives at the Earth to meet our demands for a whole year - if only we could harness it properly. It can also be made directly into electricity using photovoltaic (PV) cells. The best-known method utilises sunlight acting on photovoltaic cells to produce electricity. Flat plate versions of these can readily be mounted on buildings without any aesthetic intrusion or requiring special support structures. PV cells make
electricity without moving, making noise, or polluting. We most often see these in calculators and watches. Solar energy is not available at night, and energy storage is an important issue because modern energy systems usually assume continuous availability of energy. More efficiency can be gained using concentrating solar PV (CPV), where some kind of parabolic mirror tracks the sun and increases the intensity of the solar radiation up to 1000-fold.

**Solar power plants**

Just over 50 years ago, the solar-electricity technology marked a significant modern *tipping point* at Bell Telephone Laboratories when Daryl Chapin, Gerald Pearson, and Calvin Fuller suddenly turned a research curiosity into a viable electricity producer. Their research innovation brought the performances of these crystalline silicon devices from “laboratory interest” (conversion efficiencies hovering at 1%) to efficiencies 5-8 times greater, earning their consideration as real electrical power sources. (Kazmerski 2009).
Currently, photovoltaics as a technology and a business is composed a complex network of co-dependent and intimately related tipping points [1]. Photovoltaics has advanced incredibly from its Bell Laboratories beginnings in 1954—the next decade will likely produce 50 times more technically than that first half century. It has the potential to grow as an energy resource 50 times more. However, this is one of true “intelligent design”. We have to provide the technical expertise, the resources, the creativity and innovation, and the belief—and solar photovoltaics will be significant in our clean energy future. (Kazmerski 2009).

Solar energy is free, available for each people, it needs no fuel and produces no waste or pollution but It is very expensive to build solar power stations, although the cost is coming down as technology improves. In the meantime, solar cells cost a great deal compared to the amount of electricity they'll produce in their lifetime.

Wind is used to generate electricity. Wind power is the conversion of wind energy into a useful form of energy, such as using wind turbines to make electricity,
wind mills for mechanical power, wind pumps for pumping water or drainage, or sails to propel ships. The windmills built long ago had many blades, but today's wind turbines usually have just two or three blades that turn when the wind blows. These blades can be up to 25 m long. They have wind farms where large groups of wind turbines are connected to electric utility power lines and provide electricity to the customers.

Wind farms

The best places for wind farms are in coastal areas, at the tops of rounded hills, open plains and gaps in mountains - places where the wind is strong and reliable but the wind farms can be also placed in agricultural areas that can still be in use and produce income for their owner. Putting windmills does not change the purpose of the land, does not interfere in crops growing, does not require additional activities such
as installation of soundproofing screens. Large-scale wind farms are connected to the electric power transmission network; smaller facilities are used to provide electricity to isolated locations. Utility companies increasingly buy back surplus electricity produced by small domestic turbines. Wind energy as a power source is attractive as an alternative to fossil fuels, because it is plentiful, renewable, widely distributed, clean, and produces no greenhouse gas emissions. However, the construction of wind farms is not universally welcomed because of their visual impact and other effects on the environment.

Compared to the environmental effects of traditional energy sources, the environmental effects of wind power are relatively minor. Wind power consumes no fuel, and emits no air pollution, unlike fossil fuel power sources but there is dangerous for birds. Danger to birds and bats has been a concern in some locations. However, studies show that the number of birds killed by wind turbines is very low, compared to the number of those that die as a result of certain other ways of
generating electricity and especially of the environmental impacts of using non-clean power sources.

Finally, noise has also been an important disadvantage. Wind power stations do not emit over normalize noise or electromagnetic field. It is a fact that windmills emit waves but first of all acoustic waves that is sound. But the manufacturers of wind turbines have the whole row of guidelines and norms that precisely define the level of noise that a turbine can emit. With careful implanting of the wind turbines, along with use of noise reducing-modifications for the wind turbines however, these issues can be easily addressed.

One example of tide energy is a Tidal Barrages. The tide moves an enormous amount of water two times each day, and utilising it could provide a big deal of energy. Although the energy supply is dependable and plentiful, converting it into useful electrical power is a bit difficult.

Large dam (called a "barrage") is built across a river estuary. During the tide goes in and out, the water flows
through channel in the dam. The ebb and flow of the tides can be used to turn a turbine, or it can be used to push air through a pipe, which then turns a turbine. Large lock gates, like the ones used on canals, allow boats to pass. In the world, the largest tidal power station (and the only one station in Europe) there is in the Rance estuary in northern France, near St. Malo. This station was built in 1966.

Major drawback of tidal power stations is that they can only generate when the tide is flowing in or out - in other words, only for 10 hours each day. However, tides are totally predictable, so we can plan to have other power stations generating at those times when the tidal station is out of action.

Geothermal energy is the heat from the Earth. It's clean and sustainable. Resources of geothermal energy range from the shallow ground to hot water and hot rock found a few miles beneath the Earth's surface, and down even deeper to the extremely high temperatures of molten rock called magma. Almost everywhere, the shallow ground or upper 10 feet of the Earth's surface maintains a nearly constant temperature between 50° and 60°F (10° and 16°C). The first geothermal power station was built at Landrello, in Italy, and the second was at Wairekei in New Zealand. Others are in Iceland, Japan, the Philippines and the United States. Geothermal energy is an important resource in volcanically active places such as Iceland and New Zealand. How useful it is depends on how hot the water gets. This depends on
how hot the rocks were to start with, and how much water we pump down to them.

Geothermal energy does not produce any pollution, and does not contribute to the greenhouse effect. Geothermal power plants, however, use steam produced from reservoirs of hot water found a couple of miles or more below the Earth's surface. There are three types of geothermal power plants: dry steam, flash steam, and binary cycle. Small-scale geothermal power plants (under 5 megawatts) have the potential for widespread application in rural areas, possibly even as distributed energy resources. Distributed energy resources refer to a variety of small, modular power-generating technologies that can be combined to improve the operation of the electricity delivery system.

Since the late 1990s renewable has begun an era of strong growth. The amount of electricity produced
from wind and biomass particular began to increase owing to advances in technology as well as favorable policies (Electricity from Renewable Resources, 2010). Over the first timeframe through 2020, wind, solar photovoltaics and concentrating solar power, conventional geothermal, and biomass technologies are technically ready for accelerated deployment. During this period, these Technologies could potentially contribute a much greater share of the electricity supply than they do today. There is a fundamental attractiveness about harnessing such forces in an age which is very conscious of the environmental effects of burning fossil fuels and sustainability is an ethical norm. So today the focus is on both adequacy of energy supply long-term and also the environmental implications of particular sources. In that regard the near certainty of costs being imposed on carbon dioxide emissions in developed countries at least has profoundly changed the economic outlook of clean energy sources. Most electricity demand is for continuous, reliable supply that has traditionally been provided by base-load electricity generation. Some is for shorter-term (eg peak-load) requirements on a broadly predictable basis. Renewable energy sources have a completely different set of environmental costs and benefits to fossil fuel or nuclear generating capacity. On the positive side they emit no carbon dioxide or other air pollutants (beyond some decay products from new hydro-electric reservoirs), but because they are harnessing relatively low-intensity energy, their
'footprint' - the area taken up by them - is necessarily much larger. In Europe, wind turbines have not endeared themselves to neighbours on aesthetic, noise or nature conservation grounds, and this has arrested their deployment in UK. At the same time, European non-fossil fuel obligations have led the establishment of major offshore wind forms and the prospect of more. However, much environmental impact can be reduced. Fixed solar collectors can double as noise barriers along highways, roof-tops are available already, and there are places where wind turbines would not obtrude unduly. As World Nuclear Association report mentioned (The New Economics of Nuclear Power ), WNA Report, p.5), today, given the urgent environmental imperative of achieving a global clean-energy revolution, public policy has sound and urgent justification for placing a sizeable premium on clean technologies. Such environmentally-driven incentives can come through carbon taxes, emissions trading, or subsidies for non-emitting generators of power.

Energy efficiency
There exist various definitions of energy efficiency, among which “the ratio of energy services to energy input” is a popular one. The definition given in the Directive 2006/32/EC of the European Council and the Parliament on energy endues efficiency and energy services is a general one, namely energy efficiency is “a ratio
between an output of performance, service, goods or energy, and an input of energy”. Different definitions of energy efficiency would lead to different indicators being used to monitor changes in energy efficiency, which can yield very different results and policy implications.

Energy efficiency is a proven, cost-effective resource for the European Community. It is one of the cheapest ways of cutting greenhouse gas emissions and contributing to sustainability and security of supply. It supports economic development and creates jobs, and it also reduces energy costs providing lower energy bills for households and businesses alike. The relevance of effective strategies to improve energy efficiency to the EU's integrated climate and energy policy cannot be overstated. Considerable improvements in energy efficiency have already been made but a large untapped potential still remains to be realised. For its part, the Commission will facilitate mutual support in the implementation of the action plans, and introduce a number of new initiatives, notably on eco-design, buildings and combined heat and power, aimed at strengthening the EU framework for energy efficiency in the various end-use sectors.

Energy-efficient technologies in many instances are mature, although future technological developments are expected to enter the market. However, the efficient option is generally more expensive when compared to the conventional technology and is marketed as such. There is also a marked lack of skilled installers of new
technologies and this needs to be urgently addressed. Any energy-efficient solutions must be robust enough to accommodate possible radical changes in the fuel supply and energy infrastructure. The range of stabilization levels assessed can be achieved by deployment of a portfolio of technologies that are currently available and those that are expected to be commercialized in coming decades and that improved energy efficiency will play a key role in task of economy development [Ürge-Vorsatz, 2009].

**Recommendation**
Cracddock D., 2008. Renewable energy made easy, Atlantic Publishing Group, USA.
Chapter 5

Нові концепції функційовання управління в XXI столітті

*Lectures at Agriculture University, Ukraine, Lvov September 2008*

Резюме У статті розглядаються питання, пов'язані з управлінням компанією XXI століття. Менеджери повинні подолати кордони і зробити в компанії більш тісну взаємодію з різними елементами простору за межами компанії і повинні будувати більш тісні відносини зі своїм оточенням. Успіх у двадцять першому столітті на ринку підприємств буде вирішувати два основні параметри: швидкість і гнучкість, з якою компанія буде адаптуватися до змін і впровадженню інноваційного потенціалу. Все частіше компанія розглядається як динамічна система, яка повинна працювати на основі динамічних процесів і компонентів.

Світ навколо нас повинен бути організованим і систематизованим, а всіякий прояв безладу тягне за собою хаос і сум'яття.

Двадцяте століття характеризувалося формуванням гармонійних організацій, побудованих на основі
закону і порядку, а ХХІ століття є перехід до так званої хаотичної організації, що базується на гнучких, короткострокових облігацій, орієнтованих систем і функціонування “тут і зараз”, використовуючи можливість проявитися на ринку [2]. Нова концепція сучасної економіки, заснована на знаннях з використанням ноу-хау у всіх виробничих процесах і послугах. Світ організації, повинний бути заснований на глибоких, багатомірних змінах, в результаті яких, як видається, наступає реальність, яку складно проаналізувати і описать, спираючись на теоретичні концепції та інструменти, які використовувалися раніше. Існує особлива, характерна для багатьох, нова тенденція в економічному розвитку. Нова концепція підприємства знання пронизує всі аспекти вашого бізнесу. Зустрічається в мережі цифрових документів і пов'язаної мережі знань працівників. Мережа використовується в новій інфраструктурі обміну та управління знаннями всередині та між підприємствами.

Дозволяє створювати веб-посилання на людський інтелект, ноу-хау інновації та винахіджливість. За словами Ф. Glasla організація повинна будувати тісніші відносини зі своїм оточенням і керівники двадцять першого століття повинні перевищувати межі компанії та встановити більш тісне співробітництво з різними зовнішніми елементами бізнес-простору [3]. Ця нова модель створена при взаємодії з різними змінами в економіці. Підприємства
діють в глобальній економіці, де існує національний тісний зв’язок між організацією та політичною системою, і банківськими регулюючими органами. У просторі, сформованому компанія Investor Relations, клієнти які впливають на компанію [4]. Таким чином, управління відносинами між компанією та її клієнтами, постачальниками, конкурентами і зацікавленими сторонами повинні бути більш складними, але і простішими у використанні[5]. Зміни політичної системи, поява віртуальних транснаціональних зон впливу, зростання конкурентоспроможності на ринку призвело до хвилі злиття великих компаній, з метою зміцнення співробітництва між існуючими конкурентами (співробітництво opetition), Якісно новим очікуванням споживачів, незрівнянно швидше, процес розвитку і застарілої продукції, швидкий розвиток сектора послуг, це лише деякі приклади еволюції відмічені реальністю вже сьогодні. Компанії, що борються за виживання, використовують всі доступні методи й інструменти: стратегічна переорієнтація Реінжиніринг, скорочення, Аутсорсинг, лобістську діяльність [6]. Швидкий розвиток інформаційних технологій та універсальний доступ до Інтернету сприяв появи віртуальних організацій. Формування нової економіки на основі передових технологій, Інтернету і мережевих систем призводить до необхідності переосмислити нинішні концепції [7]. Розмивання кордонів призводить до відсутності чіткої
організації простору в реальний простір: немає офісу, цеху виробництва. Вся організація - це команда людей, які працюють на дому або в суміжній галузі інформатики тільки облігації: комп'ютер, електронна пошта, обмін миттєвими повідомленнями (Skype, MSN), мобільна телефонія. [8] Організації двадцять першого століття її являють собою поєднання самоорганізації та управління, і можуть служити в якості моделі організації і влади в цьому столітті.

Прикладом країни, спрямованої на створення сучасних організацій може бути Фінляндія, яка привертає ідеї з усього світу, перетворюючи їх на товар. Фінляндія формує природну думку інформації, яку розміщує в системі. Держава виділяє близько 40% коштів з країн ЄС для наукових досліджень, організацій та на підтримку наукових колективів. Фінляндії та фінської компанії стали в цьому відношенні, справжнім посередником між Сходом і Заходом, так як це сприяє міжнародному співробітництву операцій у "виробництві" знань. [9]

Віртуальна організація

Концепція віртуальної організації (ВО) розуміється по-різному. Віртуальна організація являє собою зовсім новий тип організації, часто згадується, як організація майбутнього. Така організація могла б виникнути в зв'язку з розвитком інформаційних технологій, в особливості функціонування глобальних інформаційних мереж і великих баз даних.
також є відповіддю на вимоги вільного ринку і необхідності адаптації її до конкурентоспроможності. Віртуальна організація є одним з найважливіших елементів сучасної економіки. У літературі ми знаходимо, зокрема, такі визначення віртуальних організацій:

- Тимчасова мережа незалежних компаній - постачальників, клієнтів, конкурентів, ще раніше - пов'язаних - інформаційними технологіями для обміну досвідом та витрат на отримання доступу до нових ринків. Організація в майбутньому нагадуватиме минуле, у відповідності з моделями Друкер бізнес, але його структура буде нагадувати симфонічний оркестр. [10]

- Штучна Істота, що у зв'язку з максимальною користю для клієнта і на основі індивідуальної бази компетенції, здійснює інтеграцію третьою стороною процесу (ланцюг) створення продукції, що не вимagaє додаткових зусиль з координації, і не руйнують її значення wirtualność клієнта. [11]

Може розглядатися як Kisielnickimi J., Z. Szyjewskim віртуальна організація є організацією, створеною на добровільній основі, учасники якої об'єдналися в різні типи відносин для досягнення спільної мети. Участь в організації не вимagaє офіційної угоди по цивільному праву. Тривалість об'єднання визначається кожним учасником створення організації. Рішення про її ліквідацію або реконструкцію може приймати будь-хто з учасників, який перший приходить до висновку,
що існування цих відносин є несприятливим для них, і це відбувається в першу чергу. ВО працює в цьому попередньо кіберпросторі. ВО постійно змінює свою форму, укладаючи альянси з іншими організаціями. Це дуже гнучка організація, яка, в залежності від ситуації змінює вид діяльності та інтереси. Віртуальна організація, як уже згадувалося, поки відносно організації в цілому, так і для її корисною. Корисно тому, що функціонування організації продовжується по той момент, поки учасники переконані, що це вигідніше, ніж кожному з них функціонувати окремо. ВО може працювати скрізь, де ви очікуєте на користь. Приносить вигоду в широкому сенсі і є об’єктом такого роду організації. Говорячи про сертифікацію слід розуміти цей термін у подвійному сенсі: по-перше як організацію, яка відповідає за раніше згадані завдання і вирішення цілей, поставлених перед нею, і по-друге, з точки зору моделі, що дозволяє удосконалення управлінських навичок і, отже, розвиток характеристик визначає термін підприємництва.

Вплив ВО на підприємництво підтверджує той факт, що створення таких організацій та підприємців є дуже простим. Єдина вимога, щоб стати підприємцем буде достатньо мати комп’ютер з доступом в Інтернет і володіння такими знаннями, яких не існує в конкуренції. [12] Віртуальна організація може швидко адаптуватися до потреб клієнта і характеризується ієрархією продукції або послуг, а не організаційної
ієрархії. [13] Тим не менш, глибокий аналіз свідчить про наявність в сучасній організації тих функцій, які були присутні в традиційних організаціях. Незалежно від тривалості життя організації та функціонування системи, де взаємовідносини та ділові операції завжди базуються саме на структурованій співпраці людей, що прагнуть досягти чітко визначених цілей. Поява Інтернету призвела до розширення традиційного ринку космічних послуг. Є нові райони, в яких оператори можуть розшукувати інформацію, ділитися та обмінюватись інформацією, спілкуватися та заключати угоди. Було прийнято рішення щодо чотирьох основних сегментів: інформаційному, комунікаційному, розподілу і розрахунків. На додаток до традиційної форми інформації про ринок з'являється інфопростір. Віртуальний Інформаційний простір це, в першу чергу, нові канали комунікації. Оператори, які використовують World Wide Web можуть надавати інформацію про себе, свою профілюючу діяльність і пропонувати свої комерційні пропозиції або послуги. Віртуальний інформаційний простір існує на величезній території, з якої можна отримати інформацію, необхідну для прийняття рішень. Нові канали зв'язку дозволяють будуvalu відносини, обмінюватись думками та робити висновки.

В концепції мережевої економіки, особлива увага приділяється новим бізнес-моделям, які суттєво відрізняються від вертикально - інтегрованих
корпорацій в епоху управлінського капіталізму чи промислової економіки. Концепція компанії є стандартом в багатьох галузях, переміщених в результаті більш ефективної і конкурентноздатної моделі, що використовують Інтернет у процесі створення вартості. У кожної з них, значення розбивки, а не тільки багаті знання або вдосконалених продуктів до послуг, але і до нової конфігурації організаційної структури, що Tapscott створив Е-бізнес-співтовариства (електронний бізнес спільноти).

Нові організаційні форми являють собою мережу постачальників, дистриб'юторів і клієнтів, які роблять значні взаємодії в бізнесі та угодах через Інтернет та інші електронні засоби масової інформації. Ці нові організаційні форми дозволяють створенням маркетингу унікальним. Нові організаційні форми то мережі постачальників, дистриб'юторів і споживачів, які вчиняють значні бізнесові взаємодії і транзакцію через інтернет і інші електронні медіа. Ці нові організаційні форми уможливлюють творення і маркетинг унікальних нових цінностей для споживачів в такий спосіб, котрий значно зменшує час, ділить ризик і знижує кошти.

У новій моделі економіки цифрові медіа відіграють істотну роль не тільки в збагаченні вартості продуктів через інформацію, знання і послуги. Мережа стає також новою підставою
виготовлення продуктів. Появлення бізнесових е-бізнесового споліченьства уможливлює усіткування продукційного процесу. Віртуальна продукційна установа в XXI столітті стає факт. Все ж таки слід пам'ятати, що підприємство XXI століття функціонує в визначеному оточенні і його обов'язок полягає на виконанню праці згідно із новими європейськими регулюваннями, котрі між іншим в 90 роках ввели лібералізацію і незалежність діяльності державним підприємствам з секторів сильно регульованих таких, як пошта чи телекомунікація.

Джерела конкурентної переваги підприємств XXI століття

G. Hamel і C. K. Prahalad вказують на джерело конкурентної переваги в управлінню котре операється на „генетичному коді” підприємств наставлених на перманентну реорганізацію і реалізацію стратегії розвитку. Генетичній код матиме вплив на подальші дії фірми в усіх областях діяльності. Генетичний код визначить направлення розвитку підприємства, вкаже ринок, на якому діятиме фірма, групу клієнтів і конкурентів. G. Hamel і C. K. Prahalad підкреслюють, що тим джерелом не можуть бути поодинокі міцні сторони підприємства, але щось, що називають виділяючою або ключовою компетенцією підприємства.
На архітектуру складаються внутрішні контакти підприємства а також співвідношення із зовнішнім оточенням. Архітектура дозволяє підприємству здобути організаційне знання, а також дозволяє еластично реагувати на внутрішні та зовнішні зміни організації. Репутація служить до переказу, особливо клієнтам, інформації на тему підприємства, його виробів і послуг. Хороша репутація запевняє тривалі позитивні відчуття по відношенню до фірми і її пропозиції, тим самим гарантуючи фірмі різноманітну користь. Інновації- це наступний елемент, котрий проявляє здібності, виділяючи підприємство на фоні інших фірм на ринку а також збільшують його конкурентну перевагу. Прив'язування уваги до розвитку технології, як джерела конкурентної переваги, що до вичерпання можливості інших джерел, таких як: земля, капітал чи праця, є особливо важливим аспектом функціонування сучасного підприємства. Дивлячись на складність і високі кошти процесу впровадження інновації, тільки деякім підприємствам вдається розбудувати свою конкурентну перевагу базуючи на тих джерелах, котрими є інновація. Стратегічні запаси окреслюються, як комплекс важких до отримання та імітації, рідкісних, відповідних та виспеціалізованих запасів і здібностей, котрі надають підприємству конкурентційну перевагу. Стратегічні запаси конструйовані на рівні фірми відносяться до складу специфічних для даної фірми запасів і здібностей,
креативно утворених на шляху відповідного управління, як підстава до отримання і охорони конкуренційної переваги. На перший план в будові і конфігурації, стратегічних запасів фірми ставляться знання та вміння менеджерів. То вони трактуються як чинники, котрі вирішують, що до ефективності фірми в більшому ступені ніж оточення і структура галузі. Будова стратегії знову стає мистецтвом, оскільки складається вона з нематеріальних запасів та вмінь, з тією лише різницею, що мистецтвом, операється на доробках еволюційної економії і сучасної теорії організації.

Теорії джерел конкурентних переваг у фірмі XXI столітті

Все частіше підприємства трактуються як динамічний уклад, управління котрого операється на динамічних процесах і елементах. Для кожного менеджера найважливіше завдання полягає на тим, щоб підприємство мало конкурентну перевагу і розпоряджалося актуальною стратегією, що враховує зміни оточення. Теорії переваг, котрі були опрацювані в XX столітті, можуть бути використовувані в процесі динамічного менеджменту, процес котрого операється на зібранню синтетичних знань про дану фірму.
Teорія Portera- Найстарша концепція конкурентної переваги є концепція М.Е. Портера. Ця теорія пошукує джерела конкурентної переваги підприємства в структурі даного сектора. Створений Портерем модель 5 сил конкуренції опирається на тому, що на характер і силу конкуренції в секторі впливають чотири зовнішні сили, а саме: торгова сила покупців, торгова сила поставщиків, а також небезпека наявності нових конкурентів. Джерелом конкуренційної переваги в законі Портера є конкуренційна позиція підприємства котра знаходиться на фоні сектору. Головний елемент за допомогою котрого можна зберігти конкуренційну перевагу на довший час-це бар’єра мобільності. Портер вирізняє три стратегії котрі призводять до того що підприємство реалізує пересічну величину доходу, тобто стратегія лідера коштовного.

Теорія засобова - на початку 90 років щораз більшою популярністю і визнанням користується так звана школа засобова (РБУ – Ресоурце Басед Вієв). Головним предметом аналізу в засобовій концепції є внутрішність підприємства, тобто стратегічні (головним чином нематеріальні) запаси, котрі творять бізнесову модель, генеруючу петесічні доходи. Згідно з цією теорією запаси і компетенції являються основним джерелом успіху організації. Унікатова комбінація стратегічних активів дозволяє на
дослідження переваги конкуренційної, яка підтримується за допомогою інноваційної бізнесової моделі.

Теорія Hamela, Prahalada – теорія ключових компетенцій а також– Теорія Barneya теорія уміння. На Думку Хамела, Прахалада і Барнея організація є збіркою запасів і уміння, і уміє побудувати на їх підставі ключові компетенції фірми. Базується вона на опартю бізнесової стратегії фірми на її ключових компетенціях. Стратегія означає створення унікальних запасів і умінь, що будуєть тривалу відмінність підприємства на ринку. Підприємство- це одиниця знань, котра формує його конкуренційний потенціал і ключові компетенції.

Концепція Portera а також концепція засобова взаємно доповнюються, оскільки компліментарно описують оточення і внутрішність підприємства.

Теорія Schumpeterа – у своїй концепції господарського розвитку основне значення для розвитку підприємства в умовах господарської незалежності приписується чинникам, котрі знаходяться в підприємстві, а саме: новим організаційним, виробничим і комерційним рішенням, тобто інноваціям. У інноваційності підприємства належить все таки відшукати конкуренційні джерела господарського розвитку. Творцем господарського розвитку– стверджує Schumpeter– є підприємець, котрий здійснює процес продукції через інновації;
підкреслює далі, що в капіталістичній економіці існує безперервна гонка між інноваціями та конкуренцією прибуток існує тільки тому, що в тій гонці конкуренція, привертаюча рівновагу, не встигає за потоком інновації. Та саме обставина є причиною господарського прогресу. У зв'язку з цим, Schumpeter назвою „підприємці” визначає виключно новаторів, які своїми інноваціями знижують кошти продукції і осігають надзвичайний прибуток, творцями господарського прогресу; натомість інших виробників, які не впроваджують „нових виробничих комбінацій”, тобто інновації, і не осігають надзвичайного прибутку, а всього лише визначена зарплата, називає „адміністраторами”.

На Думку Schumpetera господарський розвиток стає започаткований лише в моменті, коли хтось застосує на практиці нову комбінацію ресурсів продукції (інновацію). Така ситуація може мати місце в п'яти випадках:
1. введення на ринок нового товару або нового гатунку вже знаного товару
2. застосування нового методу продажу (ще невипробованої в даній гілці промисловості)
3. розкриття нового ринку збуту (ринок, на якому дана гілка даної промисловості досі не репрезентувалася)
4. підкорення нового джерела сировини або напівфабрикатів
5. новий способ організованості якоїсь промисловості (напр. порушення монополії)

„Функція підприємця полягає в реформуванні взірця продукції через використання нових задумів чи – загально кажучи, нерозпізнавальної досі технічної можливості продукції нового товару або виготовлення знаного нам товару за допомогою нових методів, через доступність нових джерел пропозиції сировини або нових ринків збуту для виготовленої продукції, через організаційні зміни в промисловості.”

Як підкреслює Schumpeter, реалізація інновації, буття підприємцем є спеціальною функцією, привілеєм певної досить вузької групи людей, які мають відповідні ознаки, – „вищі від нормальних переваг помислу і волі”. Їх дія може сформувати нову модель життя, нові системи вартості, як також статися силою руху ринкового господарства. Незважаючи, що від часу оголошення теорії Schumpetera минуло понад пів століття, його погляди не втратили значення. Сьогодні говориться про ренесанс його думок, які обігнали свій час. У цьому трактуванні підприємець тобоватор, котрий впроваджує зміни (нові комбінації), які стають замахом розвитку.

Підсумовування
Про ринковий успіх підприємства XXI століття вирішувати будуть два основні параметри: швидкість і гнучкість, з якою фірми адаптуватимуться до змін,
що заходять, а також наявний потенціал інноваційності. Головні стратегічні керunkі, які мусимо опинитися в центрі уваги менеджерів то перш за все максималізація вартості для клієнта при одночасній індивідуалізації пропозиції і заглиблених взаємних співвідношень а також максималізація повернення з інтелектуального капіталу, ефективне управління маркою, структурами сіткі та інновацією. Підприємства XXI століття вживають інструменти е-бізнесове які грунтуються на рішеннях телеінформатичних, а також інтернетівських. Ця форма бізнесової діяльності є нині одним з найбільш розвиваючих способів комунікації і пропозиції товарів і послуг потенціальним клієнтам.

**Бібліографія**

[1] Доцент кафедри організації виробництва в Центральну школу сільського господарства і головний редактор двомісячник Управління та освіта.


Підприємство майбутнього, Hawthorne
е Пресс, 1997.


[5] A.L. Platonoff, Динамічне управління, Difin,

Варшава 2009, с.15.

[6] Р. Плосзайский, Б. Мирзейewska, Двадцять перше
Chapter 6

Пошук і використання енергії в XXI столітті

Lecture at Agriculture University, Ukraine, Lvov September 2010

Коротка інформація: В статті піднімаються питання, що стосуються проблем вичерпання світових запасів первісних джерел енергії в масштабі світової економіки Розбудова економіки залежить від енергії, що одночасно призводить до щораз більшого її споживання. Потрібно знайти системне розв’язання проблем, що дозволить прийти до ефективного рішення, яке дасть можливість довготривалого експлуатування не відновлюваних джерел енергії, а також пошук та впровадження нових відновлюваних джерел енергії. В статті містяться елементи, які лежать в основі підйому енергетичного розвитку в країнах Європейського Союзу та інших країн світу.

Ключові слова: керування, енергетика, джерело енергії
І. Попит на енергію
Зраз з розвитком економіки систематично зростає глобальний попит на енергію, яка є ключем і силою господарського розвитку. В XXI столітті не можливо собі уявити світ без використання енергії. На початку цього століття глобальна річна продукція становила близько 15000 TWh з чого:
9000 TWh в країнах з розвинUTOю економікою
1700 TWh в країнах колишнього СССР, Центральної і Східної Європи
1300 TWh в Китаї
3000 TWh в країнах, що розвиваються.2
Однак попит і пропозиція електричної енергії розподіляються нерівномірно. Близько 80% усієї сировини використовують розвинуті країни Землі. Решта 20% енергії витрачають країни, що розвиваються, в яких проживає 4 млд. людей. В основному для видобування потрібної кількості енергії світла витрачається біля 11 Gtoe палива в рік.
Попит на енергію в найближчий час буде систематично зростати. Згідно Міжнародної Агенції Енергії (IEA) гвалтівний ріст економіки Китаю і Ірландії означає, що якщо в двох цих країнах ненаступлять зміни енергетичної політики, то до 2030 року економіка цих країн подвоїть витрати енергії, що приведе до недостачі сировини, такої як: нафта, вугілля, також значно зросте емісія парникових газів.

2 www.ure.gov.pl
Витрати енергії можуть бути на нижчому рівні, якщо будуть правила його ефективного використання в промисловості, а також в щоденному житті (наприклад, проекти енергозаощадження світлення, кліматизація).\(^3\) Альтернативним розв’язанням виснажливого споживання палива може бути використування різних одновлених джерел енергії.\(^4\) Процес планування в енергетичній промисловості розпочався з прогнозування потреби на енергію. Часовий проміжок займає від 15 до 30 років. Опрацювання прогнозу для такого довгого періоду є неймовірно важке, беручи до уваги непевність, щодо економічного росту в шкалі держави, регіону чи світу, а також зміни в тенденціях витрат чи раціонального використання енергії.\(^5\) На думку Міжнародної Агенції Енергії (Energy Information Administration (EIA)) до 2030 року найбільше зросте потреба в найпоширеніших джерелах енергії – вугіллі та газі. Буде зростати попит на ядерну енергію і відновлюваних джерелах енергії, натомість використання водної енергії залишиться на тому самому рівні. Прогноз ЕІА надає рисунок 1.

\(^5\) S. Krawiec, Prognozowanie zapotrzebowania na energię, [w:] A. Chochowski, F. Krawiec, Zarządzanie w energetyce, Difin, Warszawa 2008, s.97.
Рисунок 1. використання перших джерел енергії відносно палива до 2030 року

www.eia.doe.gov/oiaf/ieo/index.html

Жодна з минулих цивілізацій не могла існувати енергетичних ресурсів, які з одної сторони роблять можливим економічний розвиток, а з другої сторони визначають граничні розвитку продиктовані обмеженою кількістю запасів. Початкові джерела енергії будувалися під впливом сонячної енергії сотні тисяч років і не відновляться, якщо їх вичерпати.
Очевидною правдою є постійний пошук і формування нових шахт, однак порівнюючи темп експлуатації з їх істиннимом відкриттям можемо в цілому дізнатись, що ті джерела є обмежені. Людство за остатніх 150 років використало половину первинних запасів енергії. Цей вік є ще більш залежним від енергії, тому що для будь - якого розвитку потрібна енергія. Запасів вугілля вистачить в світовій перспективі на кілька століть, натомість нафти і газу - на кілька десятків років. Держави, які мають доступ до енергетичних запасів впливають на способ їх дистрибуції і можуть диктувати умови на ринках, які контролюють. Володіння відповідною кількістю первинних джерел енергії (власних чи імпортированих) також гарантування невичерпності продукції стає істотним елементом політики держави. Запаси і резерви носіїв первинної енергії в одиницях енергетичної вартості і відсоткової величини в Польщі і на світі представляє таблиця 1

Таблиця 1. величина потенціалу запасів і резервів носіїв первинної енергії

<table>
<thead>
<tr>
<th>Первичный энергоноситель</th>
<th>Од.</th>
<th>Польша</th>
<th>Світ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Резерви</td>
<td>Запаси</td>
</tr>
<tr>
<td>Уголь камінй</td>
<td>EJ %</td>
<td>755</td>
<td>4 440</td>
</tr>
<tr>
<td></td>
<td>88,2</td>
<td>93,8</td>
<td>43,9</td>
</tr>
<tr>
<td>Уголь бурый</td>
<td>EJ %</td>
<td>87</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>10,2</td>
<td>5,3</td>
<td>6,3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>ЕЯ</th>
<th>%</th>
<th>0,1</th>
<th>0,0</th>
<th>10</th>
<th>0,2</th>
<th>6 300</th>
<th>14,1</th>
<th>15 000</th>
<th>4,8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Нафта</td>
<td>ЕЯ</td>
<td>%</td>
<td>0,1</td>
<td>0,0</td>
<td>10</td>
<td>0,2</td>
<td>6 300</td>
<td>14,1</td>
<td>15 000</td>
<td>4,8</td>
</tr>
<tr>
<td>Зимний газ</td>
<td>ЕЯ</td>
<td>%</td>
<td>4,2</td>
<td>0,5</td>
<td>25</td>
<td>0,5</td>
<td>4 700</td>
<td>10,5</td>
<td>11 000</td>
<td>3,5</td>
</tr>
<tr>
<td>Гідроэлектроенергія</td>
<td>ЕЯ</td>
<td>%</td>
<td>9,4</td>
<td>1,1</td>
<td>11,2</td>
<td>0,2</td>
<td>5 600</td>
<td>12,6</td>
<td>12 600</td>
<td>4,1</td>
</tr>
<tr>
<td>Уран</td>
<td>ЕЯ</td>
<td>%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5 600</td>
<td>12,6</td>
<td>32 000</td>
<td>10,3</td>
</tr>
</tbody>
</table>

*ЗВОльдо: [http://www.energia-odnawialna.net/zasobyenergii.html](http://www.energia-odnawialna.net/zasobyenergii.html)*

Величина представлена в таблиці цілий час змінюється, коли ж збільшене видобування палива є врівноважене щораз більшим приростом можливих запасів до економічного видобування, що з’являються в результаті нових геологічних відкриттів чи зростання рівня технології. Зміна якості запасів також конічність збільшення ефективності їх видобування і переправка вимагає вдосконалення вже існуючих, а також опрацювання принципово нових технологій. Застосування таких технологій добування дозволяє розв’язати технологічні проблеми зв’язані з кінцевою експлуатації вуглеводнів в змінених кліматично-природних і термобарних умовах, при вичерпанні запасів мінеральної сировини. Консумпція нафти найшвидше буде зростати в країнах, що розвиваються, які в найближчих роках стануть енергохолодними країнами. Швидкій розвиток економіки буде базований на енергії, передусім з нафти. Використання нафти згідно регіонів в роках 1970-2020 представляє малюнок

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7 А. Ananienkow, Gazprom stawia na technologię, wzrost wydobycia, rozwój, Gigawat Energia, nr 03/2004.
Малюнок 2. Використання нафти згідно регіонів в роках 1970-2020 представляє малюнок 2

źródło: http://www.hubbertpeak.com/curves.htm

II. Peak Oil – обмеження продажу
Належить однак пам'ятати про обмеженість шахтових запасів в світі і про збільшення неприємностей, пов'язаних з пошуком і видобуванням в щораз трудніших геологічних умовах. Видобування нафтових покладів не є звичайним процесом перекачення рідкі зі збірника. Кошт енергії вкладеної в процес видобування є невідємно
скорельований з кількістю нафти, що міститься в даному покладі. Чим менше нафти, що залягає, тим дорожчий є процес видобування. Економісти виражають це показником EROEI (Energy Returned on Energy Invested), описуючи відношення енергії отриманої до енергії вложеної. В перших роках експлуатації нафтових покладів дякуючи 1 барилю можна було віднайти, видобути і перетворити біля 100 барилів, таким чином показник EROEI становив 100:1. різниця та систематично мала аж до теперішнього рівня 3:1 в Америці і в Саудіївській Аравії 10:1. В експлуатації кожного покладу цей показник зменшується, знижується окупність підприємства і при зниженні EROEI нижче 1:1 спричиняє його економічну незбалансованість. В минулих роках показник EROEI для різних носіїв енергії формується:
- вугілля в роках 40-х: 80÷100:1;
- вугілля в роках 70-х: 30:1;
- нафта на цей час: 5:1;
- ядерна енергія: 4:1;
- вітрова енергія (вітраки): 0,3÷2:1;
- піскі: 1÷3:1;
- ланка фотогальванічна: 0,8÷1,7 (при теперешньому часі технології ближче 0,8);
- водород: 0,8:1;
-фузія: 0,65:1 (полягає на поєднання легших первястків в тяжчі: при випадку поєднення звільнюється енергія, нестабільна реакція)\(^8\)

В Америці показник EROEI в 2005 році для продукції етанолу становить 1,2:1, що означало, що для виробництва 14,76 млрд. літрів етанолу використано 12,45 млд літрів етанолу згідно енергетичного показника BTU (British Termal Unit)\(^9\), таким чином енергетична вартість нетто становить 2,3 млрд. літрів.

Видобування і продукція нафти прямує згідно дзвонової кривої (bell-shaped). Пік (peak) кривої припадає на момент, в якому наступає витрата (видобування) 50% запасів. Теоретичний розвиток кривої видобування нафти представляє малюнок 3.

\(^8\) www.peakoil.pl
\(^9\) www.theoildrum.com
Малюнок 3. Дзвонова крива (bell-shaped) видобування нафти

Крива відокремлиних бурових скважин чи країн, що виробляють цю сировину є часто нерівномірною в зв'язку з різними чинниками, величиною і віком злі за 10, геополітичними факторами, однак сума окремих менших кривих відтворює дзвонову криву. Незалежне від докладного напрямку дзвону, найістотніше є те, що продукція нафти на початку зростає, згодом досягає свого піку, а потім спадає.11

11 www.peakoil.pl
Економічний розвиток спирається на швидку зростаючу прогресивність експлуатації збожа „дешевих палив” осьгли вже свою пікову фазу, таким образом тепер держави знаходяться на етапі експлуатації збожа „дорогої нафти”. Залежно від періоду спаду країни мали кризу в 70 роках XX ст. (USA) чи перших роках XXI ст. (Західна Європа), коли наступило перевищення peak oil, чи кількість енергетичних запасів Землі, які були можливі до видобування стали вичерпані на половину. Американський геофізик М.К. Губерт в 1956 році представив в American Petroleum Institute свої прогнози, які стосувалися піку видобування нафти в Америці і світі. Його прогнози знайшли відображення в реальній ситуації. Досягнення peak oil для різних країн представляє малюнок 4.

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Як видно з представленого малюнку світ в глобальному значенні досяг піку можливості видобування в половині сімдесятих років, потім наступив поновний зріст, вершина якого припадає на даний час. Натомість, не враховуючи кран Перської Затоки, світ свій peak oil досяг в половині дев’яностих років. На цей час світова економіка знаходиться на другій стадії по використанню половини запасів нафти. Спадає попит нафти в країнах, які не належать до Організації Держав Експорту Нафти, настало велике зниження продукції на вже довго експлуатованих нафтових полях на Північному морі або в Мексиканській Затоці. Для того щораз частіше
експерти вводять думку про початок кінця великої нафти. Деякі спеціалісти вважають, що глобальний пік традиційної сировини нафти вже наступив. Свої оцінки на попередніх і теперішніх даних про продукцію опублікованих резервах, відкриття нових покладів, оцени резервів поданих через US Securities and Exchange Commission, оцінках керівників фірм нафтови. Не бракує одначас експорту, який не поділяють опіні о закінчуючись запасів нафти і вважають, що запрезентовані дані не відображають реальність стану річі.

III Осяжність, доступність і допущеність джерел енергії

Особливе функціювання кожної економіки залежне від енергетики, для того для кожної держави пріорітетом є забезпечення енергетичної стабільності і незалежності. Політика країн направлена на гарантування безпеки енергетичного краю повинна брати до уваги оброблення відповідних систем. Енергетичні системи таким чином обов’язково мали б бути проектовані в такий с посіб, аби в них замикалися три найістотніші облаши: осяжність, допущеність, доступність ang. accessibility, acceptability, availability). Accessibility – досяжність,

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13 М. Камик, Koniec wielkiej ropy, Przeglad Techniczny, NOT, Warszawa 2005, s. 37.
означає можливість отримання (закуповування) енергії через всіх людей, незалежно від їх фінансових форм. Згідно оцінок URE біля 2 млрд. жителів світу не мають доступу до електричної енергії. Acceptability - допущальність застосування різних розв’язань енергетичних включаючи в собі цілі середовища і призивчання консументів. availability означає забезпечення незалежності і независності джерел енергії. Брак рівноваги в енергетичній політиці приводить до коливання зрівноваженого розвитку чи то через малий натиск, покладений на справи, пов’язані з середовищем, чи теж навпаки через велику увагу на проблеми середовища.14 Ціллю монолітної оцінки впливу на середовище є застосовання в країнах ЄС Оцінка Впливу на Середовище (ОВС). Звіт з ОВС охоплює вплив, які і в окрес експлоатації енергетичного блоку а також ті, які будуть зв’язані з його демонтажем. Крім того в застосованій сфері, подані оцінки впливають на існуючий результат відтворювання і транспорту енергетичного палива чи впливу остаточного складування витраченого палива, як також евентуально інші підприємства зв’язані з вивченю інвестицією чи іх вплив на середовище. В рамках процедури ОВС оцінений перед усім вплив середовища дії реалізованих в районі електровні.

Прикладом дій протянутих поза район електровні є рух транспорту на окрес будови і експлоатації блоку енергетичного. Вплив на середовище в зв’язку з будовою необхідних до пересилання сили (міці) з електровні до національної сітті буде оцінена в рамках особної процедури ОВС.\textsuperscript{15}

Ефективна, логістична, спільна і передбачлива політика держави потрібна, щоб дати стабільний фундамент під довготермінові інвестиції в чисту енергію (чисту технологію). Зменшити використання вугілля на користь вже існуючих альтернативних джерел енергії чи постує зменшення емісій забруднення, прискорення розвитку технології.\textsuperscript{16}

В наступних роках світ буде змушений обдумати багато сцен розвитку економіки в залежності від можливості видобування і використання енергії. Має бити референційний, альтернативний сценарій, але всі будуть використовувати інформацію, яка стосується запасів збожа, їх експлоатація, ефективність чи елементів, зазначених в цій статті.

Библиографія


\textsuperscript{16} Energy and Climate Change, World Energy Council 2007, p. 5.
www.edf.fr
www.gigawat.net.pl
www.hubbertpeak.com/curves.htm
www.peakoil.pl
www.pgi.gov.pl
www.theoldrum.com
www.tvo.fi
International Conference, Antalya, October 2008

International Conference, Izmir, June 2009
Lecture at Esitpa University, Rouen, March 2010

Lecture at Esitpa University, Rouen, October 2010
Lecture at Agriculture University, Lvov, September 2010

International Conference, Cairo, March 2011
Lecture at Akdeniz University, Antalya, May 2011

International Conference, Amman, September 2011