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RESEARCH OF THE IMPACT OF THE ENERGY MANAGEMENT CONDITION ON THE SUSTAINABLE DEVELOPMENT OF THE EUROPEAN COUNTRIES

Savchenko Olga, Turan Ugur. Research of the impact of the energy management condition on the sustainable development of the European countries. The article contains researches of the degree of influence of energy consumption (using databases) on the gross domestic product (GDP). Germany, Denmark, Great Britain and Ukraine are selected, since in the result there is the program for the development of the Ukrainian enterprises energy efficiency. As for the research methods, the multiple linear regression analysis was used, the hypothesis, the relation-

ship between the data sets on the energy consumption of selected countries and GDP, are considered. The used data are GDP per capita, renewable energy consumption, fossil fuel energy consumption, carbon dioxide emission, and electric power consumption. The aim is to study the relationships between energy datasets and the GDP of selected countries, taking into account their sustainable development. The results demonstrate the correlation between the data, which means the correctness of the first hypothesis. The electricity and fossil fuel energy consumption have the greatest impact on GDP and this must be taken into account by enterprises.

Key words: energy efficiency, regression analysis, GDP, sustainable development, environmental policy.

Савченко О.І., Туран У. Дослідження впливу стану енергоменеджменту на сталий розвиток європейських країн. У статті визначено, що дослідження сталого розвитку є дуже важливим, з точки зору, як економічних, так і екологічних аспектів. Екологічна політика, енергетична безпека і геополітика, стійкість економічного розвитку, енергоефективність, зелена економіка, ефективна економіка підприємств – головні теми сьогодення. Підхід і стуктура цього дослідження полягає в тому, що вивчається ступінь впливу баз даних зі споживання та використання енергії на валовий внутрішній продукт (ВВП), країн, які були спеціальним чином відібрані. Дані з використання енергії, як змінні, були підібрані для країн зі стійкою енергоефективністю підприємств. До них були віднесені: Німеччина, Данія, Великобританія, з одного боку та Україну, з іншого. Оскільки програма розвитку енергоефективності, саме, українських підприємств є кінцевою метою нашого дослідження. Виділені змінні були згруповані в певні узагаленені індикатори. В якості методів дослідження в роботі використовувався багатолінійний регресійний аналіз. Як гипотеза розглядається взаємозв'язок між групами даних зі споживання енергії обраних країн і їх ВВП. В якості змінних дослідили: ВВП на душу населення, споживання поновлюваних джерел енергії, споживання енергії на викопному паливі, викиди вуглекислого газу та споживання електроенергії. Метою даної статті є вивчення впливу між показниками даних споживання енергії та ВВП країн із врахуванням їх сталого розвитку для можливостей більш детального дослідження макроекономічних показників та визначення зовнішнього середовища роботи підприємств. У свою чергу, країни вибираються за їх економічними показниками та енергоефективністю. У дослідженні визначаються приклади взаємозв'язку даних, і наголошується необхідність подальших досліджень визначення впливу макроекономічних показників на визначення стратегії розвитку підприємств. Отримані результати демонструють кореляцію між даними, що означає, правильність першої Гіпотези. Також висвітлюється, що споживання електроенергії та споживання енергії на викопному паливі (де викиди вуглекислого газу ще нижче) мають найбільший вплив на ВВП і це необхідно враховувати підприємствам.

Ключові слова: енергоефективність, регресивний аналіз, ВВП, стійкий розвиток, екологічна політика.

Савченко О.И., Туран У. Исследование влияния состояния энергоменеджмента на устойчивое развитие европейских стран. В статье была изучена степень влияния энергопотребления (с использованием баз данных) на валовой внутренний продукт (ВВП) стран. Германия, Дания, Великобритания и Украина, поскольку программа развития энергоэффективности украинских предприятий будет результатом. В качестве методов исследования использовался многолинейный регрессионный анализ. Гипотеза– взаимосвязь между наборами данных по потреблению энергии стран и ВВП. Используемые данные: ВВП на душу населения, потребление возобновляемых источников энергии, потребление энергии на ископаемом топливе, выбросы углекислого газа и потребление электроэнергии. Цель – изучение влияния между показателями данных потребления энергии и ВВП стран с учетом их устойчивого развития. Полученные результаты демонстрируют корреляцию между данными, что означает, правильность первой Гипотезы. Потребление электроэнергии и потребление энергии на ископаемом топливе оказывают наибольшее влияние на ВВП и это необходимо учитывать предприятиям.

Ключевые слова: энергоэффективность, регрессионный анализ, ВВП, устойчивое развитие, экологическая политика.

Introduction and formulation of the problem. The world economy has become irreversibly global and integrated; it has become a global place where interdependence and influence between nations and resources are playing a role of growing importance. Today world energy management has a decisive priority for countries' economies and plays an important role in their sustainable development decisions.

Although the importance of energy management has always been recognized, the 21st century is now becoming a turning point in the development of energy conservation policies. A typical example of this is the fact that the European Union is very actively putting energy issues related challenges on the agenda. This is developed in such Commission reports known as the Lisbon Strategy, the EU Climate and the Treaty of Lisbon [7]. It has to be noted that in the Global Risks Report of the World Economic Forum, environmental risks, including climate change, were identified as one of the most serious hazards to be addressed. They will influence the world's economy over the next three years and risks have ascended to reach their level of 2016 [21].

The tenth Strategy Plan of Sustainable development of the European countries is being created and updated in accordance with national and worldwide advancements, for example, the Sustainable Development Goals of the United Nations, adopted in 2015, and the Paris Agreement signed by 194 countries and the EU, so far it assessed by 185 coun-

tries and the EU. It should be noted that general studies on climate change and environmental risks are conducted by the UNEP, the United Nations Environment Program. The whole world is undergoing difficult times; the UN report on goals to be achieved in the field of sustainable development has highlighted 17 structural orientations.

We underline those that deserve special attention: quality of education, the issue of poverty, gender equality, available energy, economic growth, carbon dioxide levels, clean water, world development, global warming, etc. [18]. As an example, the international electric supply system has become an integrated network that is still growing nowadays, becoming one of the main indicators of global integrated systems.

According to the report of SERI (Sustainable Europe Research Institute) [16], people are extracting and consuming natural resources by 50 percent more than they did thirty years ago and these accounts for an estimated 60 billion tons of raw materials yearly. Studies show that as long as this trend is on the increase, this number may well reach 100 billion tons by 2030.

As the above-mentioned problems subsist, it becomes more and more difficult for countries to meet their essential needs. For this reason, it is now necessary to clearly understand and adhere to goals set in terms of sustainable development, in order to create a worldwide sustainable economic structure. In the real economy, it can be said that the difference between productivity and production costs is related to the export of manufactured goods to countries where there is a corresponding demand [1]. Considering the fact that each country wants to increase its economic growth rates reaching the optimum level of growth per year, appropriate government policies are needed. It has to be created to maintain investment and government spending to ensure the task of achieving a reasonable economic growth [13]. Countries spread their investments to different destinations to minimize the risk and build a safer investment portfolio. Their desire to increase the ROI (Return on Investment) forces them to follow the industrial and technological advances, thus investing in foreign countries. As a result, along with the trade actions, political relations between countries have developed as well [3].

The sudden economic crisis affects countries' budget balance. Meanwhile, low-resources economies, such as Turkey or Ukraine, are always struggling with their dependency on foreign resources, as it is the case, for example, in the energy sector. The consequences of this dependence on foreign energy sources are the current shortage of energy sources and negative manifestations [9]. In European countries in recent years, special attention has been paid to the issues of "in excess" consumer behavior. Consumerism has become one of the important factors in today's society. Therefore, the optimum use of resources and the thrifty use of natural resources has become one of the main responsibilities that consumers now bear. These issues involve such orientations as circular economy options offer. Governments in their policies, on the one hand, should focus on productivity issues, and on the other hand, ensure the promotion of savvy natural resources limitation. It becomes crucial to prevent situations where countries may start arguing over a lack of resources [17]. Governments should develop policies and strategies that will take into account the development of future generations. In doing so, basic needs must be carefully identified.

Energy resources are of decisive magnitude for any country, and every crisis will finally lead to energy crises, therefore it is necessary to act proactively. This article will analyze the relationship between energy variables and the GDP of the most developed European countries, provides an assessment of the macro-level of the current situation. And a specific set of indicators has been proposed for the future study of energy efficiency of Ukrainian enterprises (micro-level).

The following sections of the article explain in detail the need for energy efficiency as a prominent condition when using resources and while implementing sustainable development policies then followed by the literature section, a study on energy indicators relation and performances on GDP is observed.

Literature review of recent analysis and researches. Instant world, energy inputs are directly influencing economic variables. One of the main outputs of the economy is energy consumption, which influences economic growth [12]. The rapid population increase and the changes in geopolitics in the world lead to challenges and threats to supply in the energy sector. For example, the 2014 Ukrainian and Russian conflict directly affected energy prices in Ukraine. On the other hand, energy security has always been one of the trendiest topics of the government's policies. For the sustainable economy, energy security is significant. For instance, it is known that Turkey, Ukraine and also Europe are highly dependent on energy resources from Russia. However, every year this dependency decreases steadily with green politics [5]. In order to identify and analyze the countries that are dependent on energy, it is important to understand their economic politics in the energy sector. In today's world, the increasing awareness of the sustainable environment has major importance. It has been understood that conventional resources such as oil and natural gas have no future; on the other hand, renewables have an increasing trend in countries' politics. In literature, there have been various studies on energy sustainability, efficiency, green economy, etc.

For instance, the European Union has energy and climate targets focus for the long periods of 2020, 2030 and 2050, which are concentrating on energy efficiency, decreasing carbon emissions and environmental sustainability. On the expression of 2020 environmental targets, which is the European Union's energy and climate change targets, various technologies are dissected in EU-28 nations as far as efficiency, energy savings and fuel trading [2].

Besides, the impacts of expansion inefficiency are observed concerning energy security due to the expanding utilization of renewables. An alternative exciting study in literature identifies waste focuses until 2020. The study recommends that the EU member states will reuse 50% of their household waste [19]. In literature there are various studies about 2030 targets of the EU, for instance, Knopf, Nahmmacher, and Schmid (2015) [11] analyzed the EU's energy targets for 2030 and the study was emphasized on the electricity sector. The EU put targets about the diminishing of carbon emissions and the renewables; moreover, they will continue to follow this strategy till 2030.

For this paper, most of the variables are taken from the World Bank, 2018 database [20]. As it is known that the world is trying to go into carbon-free, with this point of view the study selected mostly from energy variables and the dependent variable is selected Gross Domestic Product (per capita) in dollars. The independent variables are as follows: renewable energy consumption with the percentage of

total final energy consumption, fossil fuel energy consumption by percentages of the total, carbon dioxide emissions by million tons of carbon dioxide, electric power consumption by kilowatt-hour per capita. Selected data and countries were added to the study according to their importance at the macro-level. The most important determinants in the selection process for energy data are the Kyoto Protocol and the Treaty of Paris. The decisions taken for a sustainable climate change framework and energy data have been the focus and decision making of the data in the study. To give an example; the limiting decisions for climate change, global warming, have helped this study in data selection. The goal of reducing carbon emissions is to add data on carbon dioxide emission to paper, to increase energy efficiency, which affects many areas, and to add electric power consumption data. Since the goal of reducing greenhouse gases, which is the most produced from fossil fuels, it has been added to work to compare fossil fuel energy consumption data and renewable energy consumption to compare its use. The selection of countries is considered in two categories as developed and developing countries.

Considering the performance of the countries, the energy data of which are compared and the sustainable energy policies carried out in line with the EU-2020-2030 and 2050 targets, Germany, Denmark, and the United Kingdom were selected as the three most important countries for the developed ones. A decision was made according to the GDP of developed countries and added to the study. Further studies are possible to expand these countries.

In the category of developing countries, Ukraine was selected. The focus was on the dynamics of energy policies and the country was chosen to draw attention to the GDP and other energy data due to the potential position of Ukraine as a potential member state of the European Union. Ukraine, which has intense use of fossil fuels, is observed and known to have great potential in the GDP and development of the country with its policy decisions on environmental policies and renewable energy. The right decisions, regardless of the geopolitics of countries, can establish an independent and powerful energy market.

Briefly, this study aims to observe whether there was a relationship between GDP and energy data of Ukraine, Germany, Denmark, and the United Kingdom. Energy efficiency has become a crucial value. In recent years, green and sustainable environment, economy, policy for energy efficiency has gained utmost importance for countries. Energy efficiency, which has become one of the top alert problems for Ukraine, has a very vital role in the production, economic sustainability and, most importantly, to prevent energy losses [6]. Therefore, it is the goal to show how important the energy data is in terms of energy efficiency while looking at the effect of GDP. The used indicators as shown below,

– GDP (per capita) Source: World Bank, 2018,

– REN: Renewable energy consumption (% of total final energy consumption) Source: World Bank, 2018,

– FCON: Fossil fuel energy consumption (% of total) Source: World Bank, 2018,

– CDE: Carbon Dioxide Emission (mmtcde) Source: BP Stat. Review, 2018,

– ECON: Electric power consumption (kWh per capita) Source: World Bank, 2018

The following chapter will explain about the importance of energy savings, efficiency and data analysis in more details.

Formulation of the goals of the article and main definitions of the data analysis. Energy efficiency in general meaning is gained by using less energy. It means using the same amount of energy but the benefit is more. It also means the minimization of the energy consumed without changing the amount and quality of the production and without impeding the economic development and social welfare. Energy efficiency is obtained by decreasing the consumption of energy without changing the amount produced and economical balances [15]. This is only possible by avoiding any loss in the process of energy-consuming and making waste reusable with recycling and increasing efficiency while decreasing consumption through technological innovations. Most of the expenditures of the households and businesses are made up of energy costs. In the market (open market) where industries determine the prices of products and services, companies cannot determine the prices of their own products anymore. Therefore, it is only possible by decreasing the costs to be able to compete within market prices without having to decrease the quality [4]. Regarding the households, the energy consumed is reflected in the bills per month. For example, one of the most common ways in energy production among households is to use energy-saving bulbs.

For daily observations into energy efficiency, it is possible in several ways; one way is to prefer energy-saving household appliances and changing our daily habits using energy more efficiently in our daily lives. Another way is to employ technologies consuming less energy. In terms of natural resources, nuclear energy seems to be the leading one considering efficiency. One reason is that it is sustainable and its production cost is based on fixed figures. Whereas it poses safety risks regarding technology and waste management, it is a leading energy input in terms of energy efficiency. It is clear that fossil fuels are behind nuclear energy in terms of energy efficiency. One reason for that is the costly extracting in fossil fuels [8].

The biggest fight against global warming is possible through energy efficiency. The Kyoto Protocol, the starting point of sustainable energy future, was a project, which drew attention from the European countries, and all over the world as well [14]. The Kyoto Protocol, which is signed by all of the countries except the United States of America and China, is a step towards the decreasing of the carbon emissions in countries. Greenhouse gases consist of the commonly consumed fossil fuels and the industries are the leading of these consumers. Countries should decrease their average carbon emission yearly through environment-friendly technologies with high efficiency. The Kyoto Protocol will lapse in 2020 and is right now under planning for the new universal convention to supplant Kyoto. In this specific circumstance, various systems are connected for moderation and adjustment investigations of climate change. This is critically essential for future generations. The International Energy Agency thinks that, in the long term, the global temperatures will rise 2°C at most and one of the greatest contributions to decreasing emission will belong to energy efficiency with 40 percent [10]. It is obvious that the global energy systems have a long way to be able to decrease carbon emission and achieve the goals of climate change. No doubt, that using energy efficiency is the most important method in achieving these goals. Governments should create awareness for suitable efficiency with an incentive for both the public and private sectors through supplementary budgets.

The following table shows the study's regression summary outcome. As it is mentioned before, GDP is the dependent variable. The data set contains between 1990 and 2015 years and four independent variables were used from the energy data sets. The four countries' data were pooled to the excel format. Some of the missing data variables were found by the technique of estimating the trend line and the formula was fitted to the data set. After pooling the data to observe them with a simple econometric analysis in Excel format, dependent and independent data were analyzed by multiple linear regression analysis. The development of regression aims to examine the performance of countries and to see the effect of independent data on GDP. To observe carbon dioxide emissions data separately, to examine the change of data on dependent data, and to draw attention to climate change. The hypothesis of the study;

H0: The variables have a relation,

H1: The variables have no relation

Since the R-square is 0.83 in Table 1, we may say that GDP has a quite high relationship with the independent variables. Electric power consumption has the highest effect on GDP; the second following independent variable is renewable energy consumption. When we check the t-statistics, because of the huge data set we took the critical value 1.96, and carbon dioxide emissions and GDP variables are insignificant where the other variables are significant. One of the most significant variables is the carbon dioxide emissions are going to decrease steadily and fossil fuel consumption also decreases, on the other hand, the data set shows us that the renewable energy share is going up smoothly. The following figure shows us the graph of the variables with included residuals.

In table 2, it is seen that the R-square is 0.91 for only Ukraine. GDP has a high relationship with the independent variables. Fossil fuel consumption has the highest effect on GDP; the following independent variable is electric power consumption. When it is compared with the previous regression summary for the countries, it is vital to point that carbon dioxide emissions influence GDP rather than renewable energy consumption.

Above the table, it is understood that the R-square is 0.83 for Ukraine, Germany, Denmark and the United King-

Table 1

Regression Summary for Ukraine, Germany, Denmark, and the United Kingdom

ВЫВОД ИТОГОВ								
Регрессионная статистика								
Множественный R	0,913714059							
R-квадрат	0,834873381							
Нормированный R-квадрат	0,828133519							
Стандартная ошибка	7650,386034							
Наблюдения	103							
ANOVA								
	df	*SS*	*MS*	*F*	*Значимость F*			
Регрессия	4	28999886669	7249971667	123,8709903	1,97398E-37			
Остаток	98	5735783833	58528406,46					
Итого	102	34735670502						
	Коэффициенты	*Стандартная ошибка*	*t-статистика*	*P-Значение*	*Нижние 95%*	*Верхние 95%*	*Нижние 95,0%*	*Верхние 95,0%*
Constant	13307,69973	13882,93011	0,958565636	0,340136525	-14242,52325	40857,92272	-14242,52325	40857,92272
Renewable energy consumption	843,8992941	243,1235889	3,471071228	0,00077255	361,4284445	1326,370144	361,4284445	1326,370144
Fossil fuel energy consumption	-470,3321245	162,008378	-2,90313458	0,004564371	-791,832478	-148,831771	-791,832478	-148,831771
Carbon Dioxide Emission	-7,46395063	4,456964624	-1,674671275	0,097187209	-16,30865187	1,380750612	-16,30865187	1,380750612
Electric power consumption	9,431104295	0,889182453	10,60648944	5,86855E-18	7,666550657	11,19565793	7,666550657	11,19565793

Table 2

Regression Summary for Ukraine

ВЫВОД ИТОГОВ								
Регрессионная статистика								
Множественный R	0,953275364							
R-квадрат	0,908733919							
Нормированный R-квадрат	0,892861557							
Стандартная ошибка	358,9264598							
Наблюдения	28							
ANOVA								
	df	*SS*	*MS*	*F*	*Значимость F*			
Регрессия	4	29502996,11	7375749,028	57,25259551	1,26584E-11			
Остаток	23	2963048,682	128828,2036					
Итого	27	32466044,8						
	Коэффициенты	*Стандартная ошибка*	*t-статистика*	*P-Значение*	*Нижние 95%*	*Верхние 95%*	*Нижние 95,0%*	*Верхние 95,0%*
Constant	4006,42213	385,3146882	10,39779238	3,64348E-10	3209,337967	4803,506292	3209,337967	4803,506292
Renewable energy consump	31,53342432	94,07219849	0,335204501	0,740508959	-163,069745	226,1365937	-163,069745	226,1365937
Fossil fuel energy consumpti	-86,34585748	7,953981288	-10,85567772	1,58876E-10	-102,7999214	-69,89179355	-102,7999214	-69,89179355
Carbon Dioxide Emission	-9,065668899	1,202524323	-7,538865308	1,1696E-07	-11,55327999	-6,578057807	-11,55327999	-6,578057807
Electric power consumption	2,453071791	0,234471316	10,46214025	3,23759E-10	1,968030919	2,938112663	1,968030919	2,938112663

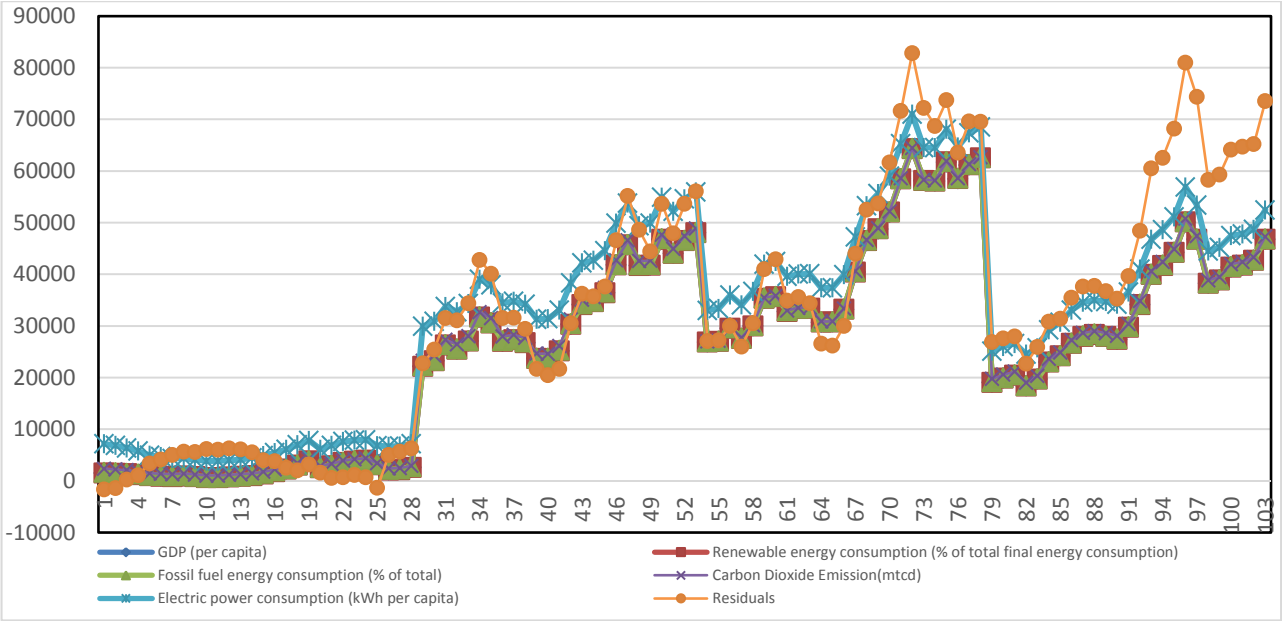

Figure 1. Relationship of the data with Residuals

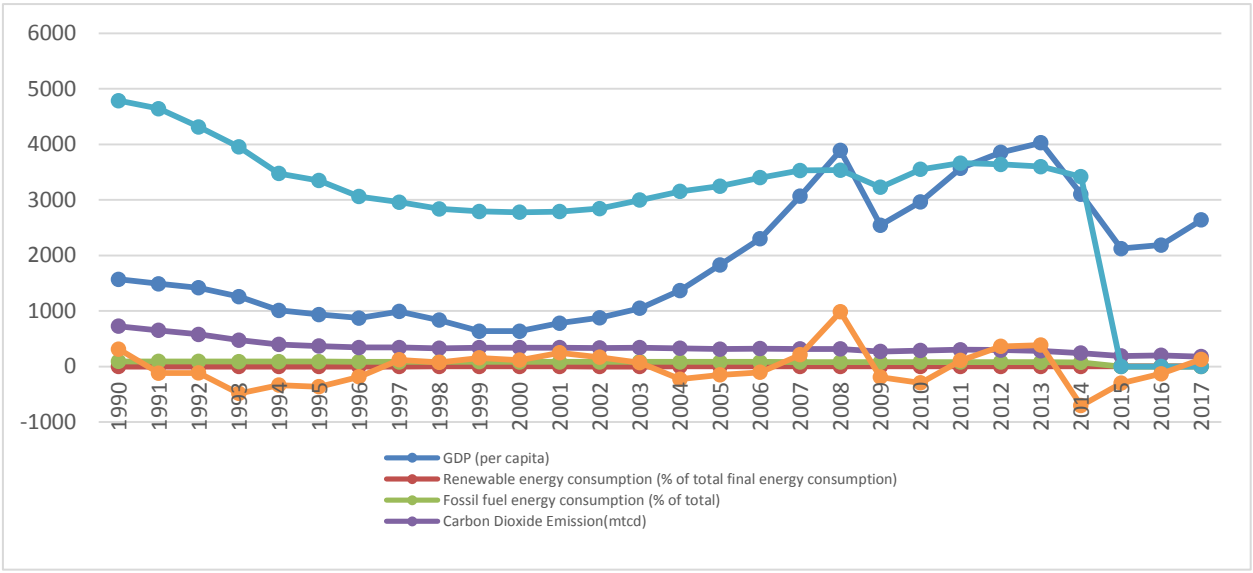

Figure 2. Relationship of the data with Residuals

dom. When it is compared with the first table, carbon dioxide emissions have no vital effect when the data set taken out from independent variables. It is obvious that GDP has almost the same relationship with the independent variables. Electric power consumption has the highest effect on GDP; the second following independent variable is renewable energy consumption. Rather than Table 2, fossil fuel energy consumption has a minor effect on GDP.

Conclusion. Saving energy by enterprises has many benefits because energy resources are not unlimited. The depletion of energy resources has gained importance as it threatens sustainable development. Therefore, for a sustainable future, it is better to pay attention to saving energy while maintaining development of enterprises. For instance, turning off the unnecessary lights, using energy saving technologies, turning off the technological devices are some of the measures enterprises can take to save energy. While meeting their energy needs, enterprises must pay attention to using recycled products and turning to renewable energy resources, in their daily lives. The path entered by the Kyoto and Paris Conferences to reduce carbon dioxide emissions can be taken as a starting point to understanding the importance of renewable energy and using energy efficiency for sustainable development. In summary, the enterprise's sensitivity to energy efficiency is one of the foremost issues. While highlighting the subject, briefly, the effects on energy data are quite connected with GDP per capita and the highest effect on GDP is changing in each regression. For Ukraine, Germany, Denmark and the United Kingdom with carbon dioxide emission data set and without, Table 1 and Table 3 show that electric power consumption has the highest effect, on the other hand for

Table 3

Regression Summary for Ukraine, Germany, Denmark and the United Kingdom without Carbon Dioxide Emissions

ВЫВОД ИТОГОВ								
Регрессионная статистика								
Множественный R	0,9111245							
R-квадрат	0,830147855							
Нормированный R-квадра	0,82500082							
Стандартная ошибка	7719,794933							
Наблюдения	103							
ANOVA								
	df	*SS*	*MS*	*F*	*Значимость F*			
Регрессия	3	28835742355	9611914118	161,2866249	5,64933E-38			
Остаток	99	5899928147	59595233,81					
Итого	102	34735670502						
	Коэффициенты	*Стандартная ошибка*	*t-статистика*	*P-Значение*	*Нижние 95%*	*Верхние 95%*	*Нижние 95,0%*	*Верхние 95,0%*
Constant	-25,56783493	11476,25359	-0,00222789	0,998226885	-22796,94475	22745,80908	-22796,94475	22745,80908
Renewable energy consum	1169,961253	146,9238278	7,963046367	2,87987E-12	878,4325035	1461,490003	878,4325035	1461,490003
Fossil fuel energy consump	-307,4756301	130,7509151	-2,3516136	0,020672792	-566,9138121	-48,03744799	-566,9138121	-48,03744799
Electric power consumptio	8,36486168	0,626336002	13,3552305	7,07369E-24	7,122075167	9,607648193	7,122075167	9,607648193

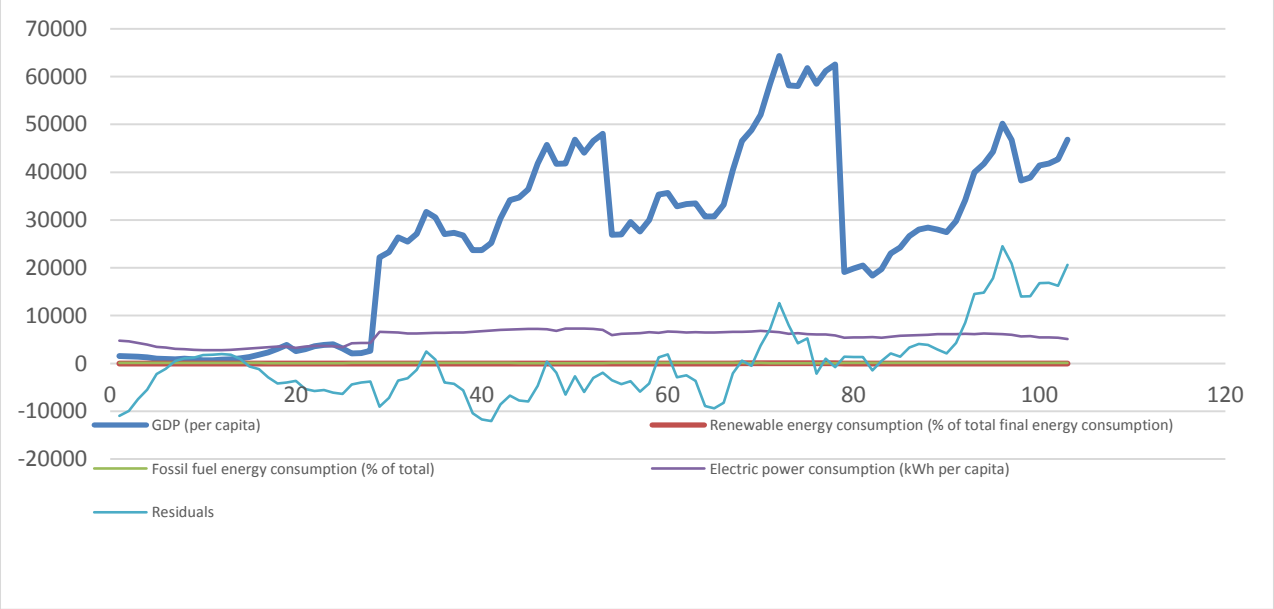

Figure 3. Relationship of the data with Residuals

only Ukraine in Table 2; fossil fuel energy consumption has the highest t-statistics. Briefly, the energy issue, which is one of the most important inputs of the economic data of the countries, plays a major role in the vulnerability of the economic data of enterprises. As it is seen in this study, there are significant differences between energy management of the developed countries and energy management of the developing ones. In further studies, by adding the current account deficit, economic growth, etc. data to these regressions, different studies can emerge and comparative economic analysis studies can be put forward. The importance of climate change and it influence on the energy system of enterprises, renewable energy, and energy saving has been explained by simply establishing an economic regression and is aimed to add to the research from different perspective.

References:

1. Bellone, F., Kiyota, K., Matsuura, T., Musso, P., Nesta, L. International productivity gaps and the export status of firms: Evidence from France and Japan. European Economic Review. 2014. Vol. 70, pp. 56–74. Available at: https://doi.org/10.1016/j.euroecorev.2014.01.017 (accessed 10.11.2019).

2. Blesl, M., Kober, T., Bruchof, D., Kuder, R. Effects of Climate and Energy Policy Related Measures and Targets on the Future Structure of the European Energy System in 2020 and Beyond, Energy Policy, 2010. Vol. 38, pp. 6278–6292.

3. Bodie, Z., Treussard, J. Making Investment Choices as Simple as Possible, but Not Simpler. Financial Analysts Journal. 2019, vol. 63(3), pp. 42–47. Available at: https://doi.org/10.2469/faj.v63.n3.4689 (accessed 11.11.2019).

4. Busso, M., et al. The Causal Effect of Competition on Prices and Quality: Evidence from a Field Experiment. 2015. Available at: https://www.povertyactionlab.org/sites/default/files/publications/811%20Competition-Prices-Quality%20February%202015.pdf (accessed 10.11.2019).
5. EEA, 2015. Trends and Protections in Europe 2015: Tracking progress towards Europe's climate and energy targets. European Environment Agency. EEA Report No: 4/2015, Issn 1997-8449.
6. EIA (2012). Country Analysis Briefs, Energy Information Administration: EIA.
7. European Commission (EC), Europe 2020: A European strategy for smart, sustainable and inclusive growth, Brussels: European Commission, 2010. Available at: http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf (accessed 10.11.2019).
8. Forsberg, C.W. Sustainability by combining nuclear, fossil, and renewable energy sources. Progress in Nuclear Energy, 2009. vol. 51(1), pp. 192–200. Available at: https://doi.org/10.1016/j.pnucene.2008.04.002 (accessed 10.11.2019).
9. Gareth W. Geopolitics and Energy Security in the Wider Black Sea Region, Southeast European and Black Sea Studies, 2007. vol. 7(2), pp. 217–235. Available at: https://doi.org/10.1080/14683850701402060 (accessed 23.11.2019).
10. International Energy Agency (IEA), 2018. World Energy Outlook 2018. Available at: https://www.iea.org/weo/energyandclimatechange/ (accessed 22.11.2019).
11. Knopf, B., Nahmmacher, P., Schmid, E. The European Renewable Energy Target for 2030-An Impact Assessment of the Electricity Sector, Energy Policy, 2015. Vol. 85, pp. 50–60.
12. Lee, C.C., Chang, C.P. The impact of energy consumption on economic growth: Evidence from linear and nonlinear models in Taiwan. Energy, 2007. Vol. 32(12), pp. 2282–2294.
13. Michael Laitman (2012). Yeni Ekonominin Yararları: Küresel Ekonomik Krizlerin Ortak Sorumluluk Yoluyla Çözümlenmesi, Ari Enstitüsü.
14. Miyamoto, M. et al. Climate agreement and technology diffusion: Impact of the Kyoto Protocol on international patent applications for renewable energy technologies. Energy Policy, 2019. Vol. 129, pp. 1331–1338. Available at: https://doi.org/10.1016/j.enpol.2019.02.053 (accessed 09.11.2019).
15. Raptsun, M. Greenhouse gas emissions reductions in Ukraine through energy efficiency policies and technologies implementation. Greenhouse Gas Control Technologies 7 (2005). Vol. 2, pp. 1663–1668.
16. Sustainable Europe Research Institute (SERI) (2018). Available at: http://www.seri.at/en/ (accessed 22.11.2019).
17. United Nations (UN). Toolkit and Guidance for Preventing and Managing Land and Natural Resources Conflicts: Renewable Resources and Conflict. United Nations New York. 2012. Available at: https://www.un.org/en/events/environmentconflictday/pdf/GN_Renewable_Consultation.pdf (accessed 15.11.2019).
18. United Nations (UN). The Sustainable Development Goals Report 2018. United Nations New York. 2018. Available at: https://unstats.un.org/sdgs/files/report/2018/TheSustainableDevelopmentGoalsReport2018-EN.pdf (accessed 15.11.2019).
19. Waite, S., Cox, P., Tudor, T. Strategies for Local Authorities to Achieve the EU 2020 50% Recycling, Reuse and Composting Target: A case study of England. Resources, Conservation and Recycling. 2015. Vol. 105, pp. 18–28.
20. World Bank (2018). World Development Indicators. Available at: https://data.worldbank.org/indicator/EG.USE.ELEC.KH.PC (accessed 11.12.2019).
21. World Economic Forum (WEF), 2019. The Global Risks Report 2019. Available at: http://www3.weforum.org/docs/WEF_Global_Risks_Report_2019.pdf (accessed 11.12.2019).