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Article

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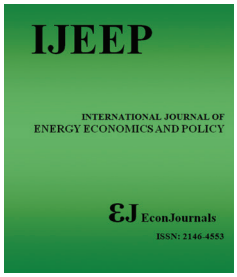

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Technological Modernization of Energy Companies as Basis for their Sustainable Development

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ABSTRACT

The paper deals with the issue of sustainable development and innovative efficient performance of energy sector companies in Ukraine. In scope of the Forth Industrial Revolution and modern state of international business environment the direction of global development is inextricably linked to resource management as well as energy efficiency based on innovative approaches and technological advances. By means of extensive secondary data analysis, a comprehensive overview of current peculiarities of energy sector in Ukraine is given in order to point out major daunting tasks and define future challenges. Following the outcomes of conducted research and empirical studies, using systemic analytical approach, a broad range of the required measures to be taken are proposed. Complex strategy launch for technological modernization and innovative resource management is foreseen as a key driving force for business diversification possibilities with green practices, energy portfolio extension, establishment of full-cycle energy infrastructure and, as a result, sustainable business development. Energy management is also highlighted as a platform for mutually beneficial multi-stakeholder dialogue, the long-lasting and result-oriented one with high social inclusiveness and consciousness.

Keywords: Technological Modernization, Sustainable Development, Sustainability, Energy Efficiency, Innovative Resource Management
JEL Classification: Q49

1. INTRODUCTION

Energy sector in Ukraine – is one of the most significant sectors for substantial economic growth and national development in terms of future perspectives. Strategic vision of sustainable development envisages mainstreaming its socio-economic and political components, predetermined by complex of economic relations and linked to general operating processes on energy market in Ukraine and around the world.

There used to be a long-term policy in Ukraine, aimed at maintaining the required financial balance of energy companies with purposeful state support, which made it impossible to develop the competitive market and significantly reduced the incentives for companies to deliver innovative technological changes. However, the Fourth Industrial Revolution with active formation of post-industrial society and dynamic transition to energy-efficient and green practices in the developed countries forces domestic companies to review their own business models and increase mobility to overcome energy crisis and enter international markets. In particular, low priority of innovative transformations as well as extensive use of inefficient technological capacities of past decades are still among the reasons of the existing lack of appropriate processes of socially responsible and cost-effective functioning of energy sector in Ukraine.

The key determinant of beneficial transition to a new model of energy market in Ukraine lies in the increase of state autonomy in scope of reasonably crucial self-sufficiency in energy resources and energy balance support due to the development of technologically renewed infrastructure. Therefore, the key priority in ensuring the sustainable development of business sector in Ukraine is to identify the starting basis for future technological changes, as well as strategic indicators and perspectives for implementing modern approaches to corporate social responsibility system within energy sector. It is also essential to ascertain the issue of establishing a

trilateral dialogue (state - business - society) in order to facilitate the process of conscious consumption of energy resources, taking into account the primary interests of all stakeholders – both known and potential ones.

2. EVOLUTION OF SUSTAINABLE DEVELOPMENT CONCEPT: FROM STRATEGIC GOALS TO SPECIFIC TASKS

Sustainable development as a modern scientific paradigm and a key precondition for global human development in the future is an indisputable guideline mainly for business agents in delivering their entrepreneurial activities, also for public administration and systemic transformation of consumer behavior within the global demand for goods and services.

The idea of sustainable development is a global project of solution the most sensitive problems of contemporary civilization which appeared at the end of twenty century as results of rapid waste of natural resources, growth of environmental pollution, increase of human population, fast urbanization, unsatisfied basic needs of people and global destabilization of natural and socio-economical systems (Plachciak, 2010).

Sustainable development concept continues to undergo significant changes and amendments since its official presentation by World Commission on Environment and Development in 1987 and global recognition after the Brundtland Report. Thus, in the 21st century, a fundamental approach to human activity was stated as following "to meet the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). Sustainable development was predominantly a concept of global development with a focus on solving crucial socio-economic issues on a planetary scale. In 2000 United Nations adopted 8 Millennium Development Goals (UN, 2000), aimed at improving the living standards of Third World countries, especially combating poverty and hunger, as well as reducing mortality rates. The 2002 World Summit on Sustainable Development laid the foundation for defining a new world order, formally endorsing the primacy of sustainable development concept as a prerequisite for qualitative changes within three directions - economic, environmental and social. In 2012, the United Nations Conference on Sustainable Development (Rio+20) launched the process of identifying sustainable development goals based on 8 Millennium Development Goals. Rio+20 placed high emphasis on such issues as green economy and policy discussion on giving financial support for measures to implement sustainable development programs worldwide by 2015. Due to constant changes in the priorities for achieving several separate goals or their complex at once, the list of these goals was extended in 2015 (UN, 2015). Eventually, 17 Sustainable Development Goals and 169 targets were proclaimed and a time lag (by 2030) for reaching these goals was also set. According to the stated goals, socio-economic and political actors are able to choose among alternative and complementary methods and practices of doing business, thereby encouraging the process of innovative techniques generation and highlighting the ways of ensuring conscious life of citizens and sustainable development of business and society within the framework of international benchmarks.

The United Nations has defined the key principle of gradual future transition to civil society (sustainable and inclusive) by means of "ensuring that no one is left behind" (UN, 2017). It envisages the revision of key concepts of economic development, focusing on the priority of social component in the prevention of discrimination in all forms (inequalities of opportunities, inequalities of outcomes).

Substantial changes were made in formal content: The list of sustainable development goals was extended and specified with targets and indicators.

Despite the fact that the pursuit of goals is carried out by international actors mainly on a voluntary basis, within a number of certain industries (energy, food industry) this process has already become a prerequisite for a successful implementation of goals essentially required for improving corporate social responsibility both for companies and government agencies as well as non-governmental organizations. Those actors who recognize the priority of introducing new methods of extensive and intensive use of exhaustible resources and capacities receive support and encouragement from the world community to prevent the aggravation of socio-economic crisis and preservation of global environment for future generations, thus contributing to the improvement of international cooperation and raising social awareness.

Along with changes in the priorities of global development, the process of evolutionary enrichment of categorical apparatus is considered a significant achievement in terms of sustainable human development goals and comprehensive understanding of several basic categories (i.e., sustainable development, sustainability) as well as international cooperation within the framework of United Nations Global Compact. This study suggests that the abovementioned categories have "the same dimensions and the same policy implications", and therefore are identical in sense of content (Holden et al., 2014).

Therefore, the widespread use of such terms as sustainable development, sustainability, green economy, corporate social responsibility, responsible business reveals gradual shifts in the system of main principles of doing business. Moreover, it proves the necessity to maintain the process of conscious human existence as an individual or a member of global society and constant rethinking of some fundamental categories (consumption economics, primacy of industrial production, extensive development), which are closely related to globalization and the Fourth Industrial Revolution.

3. ENERGY SECTOR IN THE SYSTEM OF GOALS FOR SUSTAINABLE DEVELOPMENT OF UKRAINE BY 2030

All 17 Sustainable Development Goals by 2030 are interrelated, since activities in one areas cause positive or negative effects

in others (externalities), and therefore the latter affects final performance and result analysis.

Having thoroughly considered the world experience in scope of reaching global development goals within 2000-2017-year period, we may conclude that modern sustainable development, already outlined by 2030 in five key areas – people, prosperity, planet, peace, partnership – is impossible without the intentional implementation of three mutually causal practices – responsible consumption, energy efficiency, civilian control (Figure 1).

In general, governmental and non-governmental organizations, including business structures (on a competitive basis) define the needs in energy and other resources, level of conscious consumption and minimum loss. However, the function of complex control over the activity is given to a civil society able to optimize its own operating processes through innovative technological development and transparent responses.

The undeniable component of modern sustainable development paradigm lies in the support of global ecological balance and avoidance of significant shifts towards its deterioration because of the need to achieve the utilitarian goals of social development. This ecological balance is analyzed in context of environmental modernization in various social spheres, including technological development of the industrial sector within the global economy.

In general, ecological modernization rests on four core themes, being the win-win relationship between the economy and the environment, the necessity to integrate the environment into all sectors, the use of flexible and market-based environmental policy instruments instead of top-down command-and-control type of instruments and the role of science in fostering the innovation and diffusion of new environmental technologies (Sezgin, 2013).

International experience demonstrates the following crucial tendency: Economic welfare creates opportunities for improving civil protection and social development within the framework of international cooperation. Energy sector is one of the strategic ones. That is why it is highly important to achieve the balance between resource consumption and resource management, as it constitutes an appropriate precondition for the future of consciously green world development.

Among the key Sustainable Development Goals, Goal 7 – Affordable and Green Energy – is of considerable importance due to its substantial correlation with Goal 9 (Industry, Innovation and Infrastructure), Goal 11 (Sustainable Cities and Communities), Goal 12 (Responsible Consumption and Production) and Goal 13 (Climate Action). The extent of goal prioritization within this category, directly related to green economy, is different for the population of various countries around the world. Thus, according to National Consultations on Adaptation of Sustainable Development Goals for Ukraine (UN in Ukraine, 2016), the most urgent and important goals for Ukrainian society are the following (Figure 2): No Poverty (Goal 1); Decent Work and Economic Growth (Goal 8); Good Health and Well-being (Goal 3); Industry, Innovation and Infrastructure (Goal 9); Peace, Justice and Strong Institutions (Goal 16).

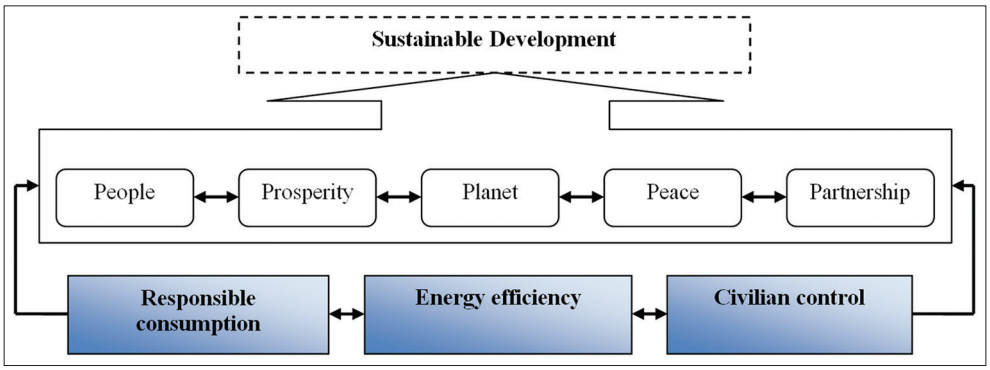
The logical conclusion is the following: Ukrainian population recognize the impossibility of recovery from social, economic and political crisis without justice, proper level of employment and reliable health care system. However, it is worth mentioning that Ukrainian economy is still a commodity economy, with considerable mineral resources base. At the same time, effective electric power industry is the basic one for Ukraine, which cause a great impact on the welfare of Ukrainian population. That is why energy sector modernization will ensure the progress of country as well as its future development and set the required conditions for qualitative improvement of the living standards for population in Ukraine.

4. ENERGY SECTOR IN UKRAINE: CURRENT SITUATION AND FUTURE TRENDS

4.1. Research Methodology

Energy sector is one of the most vulnerable in the Ukrainian economic structure, because it requires a detailed analysis of factors not only in terms of current performance of energy companies, but also taking into account possible qualitative changes in the future, given the rapid development of innovative resource management and increasing competition on global market.

Figure 1: Modern preconditions for sustainable development



Source: Own compilation, based on (UN, 2015).

It is worth clarifying that for a multifaceted analysis of energy sector within the economy of any country Behavioral Monitoring is widely used. It is the most general monitoring, which aims at detecting changes in the biding strategy. Further, a more precise element of the monitoring is market power monitoring, concentrated on the monitoring of detailed parameters regarding any possible abuses of market power. Market performance monitoring is related to the monitoring of electricity market power by way of monitoring parameters such as the weighted average price, the minimum price, the maximum price, the amount of electricity sold within a particular price range (Pinczynski and Kasperowicz, 2016). At the same time, the range of indicators and parameters may vary because of national peculiarities.

This work was established within a highly extensive methodological framework. Secondary data analysis was used as a main research method that implies the evaluation of factual qualitative data in an accurate and meaningful way. In the evolutionary perspective we studied the period of more than 50 years, from 1975 to 2030, aiming at gathering full scope of information, connected with functional peculiarities of modern companies in energy sector of Ukraine. However, the highly essential unit in this research is the company.

The systemic analytical approach is considered to be the most appropriate one while examining both internal peculiarities and external circumstances. It was applied particularly to data analysis in scope of business effectiveness estimation and grounded performance evaluation within the whole energy industry, following the macroeconomic situation and current demand level. Synthesis and deduction were used to generalize the outcomes and propose the ways on technological modernization and energy efficiency improvement.

In general, practical rather than theoretical approach is more constructive in the way of suggesting future steps on how to ensure sustainable development of energy business in Ukraine, following national background as well as up-to-date world trends.

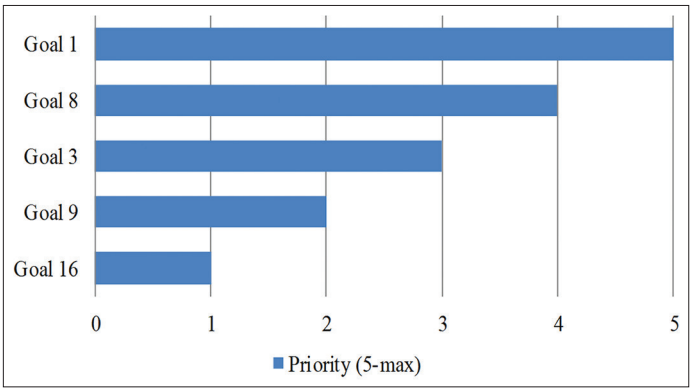
4.2. Technological Capabilities Assessment of Energy Companies in Ukraine

Currently, the electric power industry in Ukraine has many open questions that significantly impede the efficient functioning process within the country.

Firstly, significant technological backwardness of energy industry and high level of fixed assets depreciation. According to data given by state company Energorynok (SC Energorynok), as of January 1, 2016 84.3% of power-generating units (86 units) of thermal power plants (TPP) and combined heat and power plants (CHPP) are physically depreciated and obsolete, as they have already worked out their marginal resource (200,000 h is a physical depreciation limit). These capabilities are to be modernized or replaced. Another 6.9% of power-generating units of TPP and CHPP (7 units) are to be decommissioned during 2019-2021, as they exceeded the 170,000-h marginal limit of physical depreciation (Figure 3).

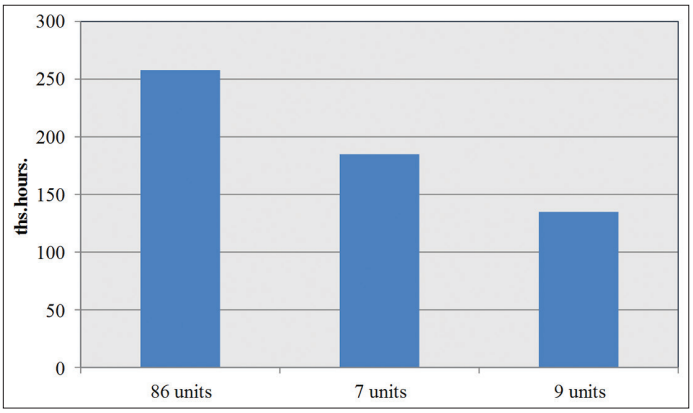
Technical and economic indicators of Ukrainian TPPs performance show even lower efficiency than in 1975-1980. Domestic thermal

Figure 2: Ranking of 5 most important Sustainable Development Goals for Ukraine



Source: Own compilation, based on (UN in Ukraine, 2016).

Figure 3: Technological state of TPP power-generating units (by operating life as of January 1, 2016)



Source: Data from *SC Energorynok*

power-generating units show an extremely low Coefficient of Performance (efficiency) – 25–33%, as well as exceptionally high level of specific consumption of equivalent fuel, reaching 450 g per kilowatt-hour. For comparison: A similar indicator for modern European TPPs that use coal of lignite group is 300-320 g of equivalent fuel per kilowatt-hour (Kilnitskiy, 2016).

The same peculiarity applies to CHP plants, mostly put into operation during 1950-1980. Ukrainian CHP plants have one of the lowest levels of technical, economic and environmental indicators in Europe.

In the nuclear power industry about 80% of power-generating units (12 out of 15) were put into operation several decades ago, at the time of the USSR. The operation lifetime (30-year) has already exceeded the designed maximum or is close to the end of life cycle (Table 1).

Currently NNEGC Energoatom does not have resources for decommissioning of power-generating units. Therefore, the strategy is to set up a lifetime extension practice. On December 8, 2015 State Nuclear Regulatory Inspectorate of Ukraine decided to extend the operation lifetime of several power-generating units for 10 years (Gardus, 2015).

It is worth mentioning that the ongoing safety programs at the NPPs are aimed at improving the operating conditions, taking into account those lessons learned from the accident at Fukushima NPP (Japan). They also cover the tasks of increasing the efficiency of highly echeloned defense; strengthening the emergency preparedness and response capabilities; maintenance and intensification of capacity building work; protection of population and environment from ionizing radiation. Today, nuclear reactors of the 3rd generation are widespread all around the world; however, in 20-30 years the usage of 4th generation reactors is planned (Razumkov Center, 2015).

To be precise, the Generation III reactors have the following characteristics:

- Reduced capital expenditures and construction period;
- Higher ratio of capacity utilization and longer operation lifetime (on average – 60 years);
- Simple and more reliable design, easily manageable and less vulnerable to operational disruptions;
- Reduced probability of breakdowns with active zone melting;
- Minimal impact on the environment;
- Greater extent of fuel burn-out in order to reduce waste and fuel needs;
- Usage of burnable absorbers to extend the lifetime of fuel cells.

Generation IV reactors will be more cost-effective and safe, produce less long-life radioactive waste and provide requirements for the non-proliferation of nuclear technologies and materials.

Research and development of Generation IV reactors is carried out within the framework of Generation IV International Forum, which involves Argentina, Brazil, the United Kingdom, Canada, South Korea, South Africa, South Africa, the United States, France, Switzerland, Japan and Euratom and within the IAEA-initiated International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO), with Ukrainian membership as well. Therefore, in Ukraine Generation IV reactors may enter the stage of commercial implementation after 2030.

Considerable extent of fixed assets depreciation also takes place in the field of supply and transmission of electrical energy. More than 90% of power transmission lines with voltage of 220 kW and more as well as 55% of station main equipment have already reached the estimated technical resource (25 years), 56% of transmission lines and 17% of substations are operated for more than 40 years (NPC Ukrenergo, 2015).

Meanwhile, the high extent of fixed assets depreciation at all power-generating companies leads to fuel over-consumption, operating capacity reduction and deterioration of environmental indicators. Such a condition of generating equipment may lead to further accelerated reduction of electric power generation, significant limitation of national possibilities in scope of energy self-sufficiency, and therefore reduce the level of state energy security. This inappropriate practice threatens with unpredictable negative environmental consequences, up to an anthropogenic catastrophe.

Secondly, substantial problems in the Integrated Power System (IPS) of Ukraine arise due to the lack of transmission capacity through power transmission lines for power generation of NPPs (Rivne, Khmelnytskyi, Zaporizhzhya) and excess energy transfer from Western region to Central and Eastern regions of Ukraine. Among the reasons are also insufficient reliability level of power supply in Odessa and Kiev regions as well as power grid non-compensation by reactive capacity and the complexity of required voltage quality provision (Central, Eastern and Southern parts of Donbas power system).

Thirdly, high energy consumption is indisputable. Thus, consumption of primary fuel and energy resources per unit of GDP in Ukraine remains 3.4 times higher than in EU countries, 2.8 times than in neighboring Poland, 1.5 times than in China and 1.2 times in comparison with Russia.

Fourthly, there is a lack of sufficient investments for technological modernization of energy industry in Ukraine (Table 2).

At the same time, the vast majority of electricity producers currently have limited investment opportunities, especially for nuclear power plants, hydroelectric power plants, pumped hydroelectric energy storages and some TPP. In particular, it is due to the decrease in size of investment premium in the wholesale market price of electricity. For example, according to SE Energorynok, the investment premium for reconstruction and modernization for TPP power-generating companies in 2014 has decreased by 24.8% in 2013 or by UAH 607 million, and in 2015 (compared to 2014) – by 54% or UAH 995 million, respectively.

However, companies of DTEK group demonstrate higher investment activity in comparison with other energy companies in Ukraine (Table 3).

In general, investments in energy sector are constrained by political risks, the impossible reimbursement of invested funds as well as absent guarantee of normal return on investment. There is every reason to believe that investment processes in the electric power industry will become more intense only with the improvement of socio-economic situation and investment climate in Ukraine.

5. CONCLUSIONS

Comprehensive performance data analysis of energy sector companies in Ukraine demonstrates the downward trend in scope of power-generating efficiency and energy distribution processes due to the high extent of fixed assets depreciation and outdated technologies. High maintenance cost of power-generating units, various supply chain disruptions as well as considerable amount of industrial delays connected with energy generation and distribution have long been the real evidence that reveal quite low level of technological development on enterprises of national energy sector.

One of the lowest levels of energy efficiency in Europe is predetermined by a critically low rate of investment attractiveness of Ukraine due to high risks of investing in business processes

Table 1: Operation lifetime extension of power-generating units of nuclear power plants in Ukraine

Name of nuclear power plant (NPP)	No. power-generating unit	Electricity generating capacity, megawatts	Type of reactor	Unit commissioning	Unit decommissioning deadline	NNEGC *Energoatom* extension policy
Zaporizhzhya	1	1000	B-320	10.12.1984	23.12.2015	Ongoing
	2	1000	B-320	22.07.1985	19.02.2016	Ongoing
	3	1000	B-320	10.12.1986	05.03.2017	Started
	4	1000	B-320	18.12.1987	04.04.2018	Started
	5	1000	B-320	14.08.1989	27.05.2020	Planned
	6	1000	B-320	19.10.1995	21.10.2026	Planned
South-Ukraine	1	1000	B-302	31.12.1982	02.12.2013	Extended till 02.12.2023
	2	1000	B-338	09.01.1985	12.05.2015	Ongoing
	3	1000	B-320	20.09.1989	10.02.2020	Planned
Rivne	1	420	B-213	22.12.1980	22.12.2010	Extended till 22.12.2030
	2	415	B-213	22.12.1981	22.12.2011	Extended till 22.12.2031
	3	1000	B-320	21.12.1986	11.12.2017	Started
	4	1000	B-320	10.10.2004	07.06.2035	Unstated
Khmelnytskyi	1	1000	B-320	22.12.1987	13.12.2018	Started
	2	1000	B-320	07.08.2004	07.09.2035	Unstated

Source: Gardus, 2015

Table 2: Investment needs assessment in development of power-generating capacities and trunk (inter-state) power grid facilities for 2016-2018

Investment directions and funding sources	Total estimated cost (preliminary), ths. UAH	Investment needs for 2016-2018, ths. UAH	In years, ths. UAH		
			2016	2017	2018
Investment needs for Integrated Power System of Ukraine – total, by means of	487 679 485	274 827 959	109 356 270	87 612 826	77 858 862
Company's own funds		81 973 897	31 466 252	25 738 524	24 769 121
Borrowed capital		183 165 172	76 002 336	59 480 269	47 682 567
State budget		0			
Other funding sources		9 688 889	1 887 682	2 394 033	5 407 174
incl., by investment directions					
Development of power-generating capacities	414 490 402	244 572 990	98 772 199	79 422 366	66 378 424
Development of trunk (inter-state) power grid facilities	70 386 345	27 452 231	9 130 655	7 460 718	10 860 858
Measures implementation on incorporation of Integrated Power System of Ukraine in European power system	2 802 738	2 802 738	1 453 416	729 742	619 580

Source: NPC Ukrenergo, 2015

with average ROI, constant exchange rate fluctuations (based on purchasing power parity) and political instability. One more downside is connected with insufficient legislative regulation in terms of human rights protection and legal interests of entrepreneurs or investors (both residents and non-residents).

However, in Europe the situation with energy sector is different. Across diverse areas of public policy, behavior change interventions are now commonly deployed in an effort to shift people's behavior in desired directions − for example, toward healthier lifestyle choices, wiser financial decisions, and more environmentally-friendly practices. This extends to the specific domain of residential energy use, where a multitude of behavioral interventions and programs have been designed to shift the behavior of consumers and households in some desired way, e.g., toward greater energy efficiency, lower total and peak electricity usage, optimal responsiveness to dynamic tariffs, greater uptake of renewables and low-emission technology (Frederiks et al., 2016). In particular, energy consumption in buildings accounts for 40% of the end-use of energy in the EU and reductions in this consumption are a key to achieving the substantial reductions in CO_2 emissions that are part of the EU-2020 target (Gram-Hanssen, 2014). When one aims to reduce environmental problems by increasing the use of smart energy systems it is important to focus on the benefits

Table 3: Total investments in modernization of TPP production capacities of DTEK company in 2014

Investment object	Description of technological modernization directions	Total investments
Power-generating unit No. 8DTEK Dobrotvirska TPP	Completed modernization; increased installed capacity of power-generating unit by 10 MW to 160 MW; installed system of flue gases cleaning, which reduced the dust concentration to 25-35 mg/m^3 (lower than European requirements)	UAH 500 million
Power-generating unit No. 13 DTEK Luganska TPP	Increased capacity of power-generating unit by 35 MW (up to 210 MW); increased efficiency of coal combustion by 16%; newly installed electric filter, which led to dust emissions reduction (complies with the requirements of Directive 2001/80/EC)	UAH 400 million
Power-generating unit No. 3 DTEK Zaporizska TPP	Increased capacity of power-generating unit by 25 MW (up to 325 MW); extended range of maneuverability up to 160 MW; reduced specific fuel consumption by 5%; reduced solid particles emission to the atmosphere up to the level of European requirements – 50 mg/m^3	UAH 500 million

Source: DTEK, 2014

for the environment of smart energy systems. The more important people find these consequences, the more likely it is that they will participate (Werff and Steg, 2016).

Unlike other countries, in Ukraine the modern energy-efficient infrastructure in the list of state priorities is inferior to the urgent issue of reconstruction, modernization and renewal of obsolete, depreciated equipment within the technological chain. It is mainly about power-generating capacities, trunk power grids and power distribution networks, etc. Stabilization and development of electric power industry, and national economy in general, are to base only on the latest scientific and technical achievements.

All things considered, it is crucial to emphasize the importance of reaching the following strategic goals in scope of sustainable development of energy sector in Ukraine:

- Prioritize key target zones with principle "no one left behind";
- Finalize the directions of development interventions;
- Define clearly the areas of high-, middle-, low risk;
- Strengthen the critical social support policies in terms of future changes in human resource management while dealing with technological improvements;
- Guarantee the inclusiveness in broad scope (from key stakeholders to distant contractors in value chains);
- Analyze the gaps in infrastructural development and decrease the level of inequality in access channels (in terms of power consumption).

Taking into account global vision as well as substantial national peculiarities, collaboration between business sector and governmental authorities should focus on urgent steps given below:

- Maximum diversification possibilities in order to obtain the required energy resources for the establishment of state energy supply model;
- Nuclear power generation remains essential on unarguable support of Ukrainian energy potential; at the same time, the expansion of potential energy resources portfolio by means of green energy should be of high priority for state in the context of investment subsidies;
- It is crucial to raise the issue of building national full-cycle energy infrastructure – from industrial power generation to commercial usage – excluding inappropriate distribution and excessive consumption;
- There is a need to improve the system of power distribution, gradually reducing the load on obsolete power-generating units and developing new, technologically advanced equipment;
- Considerable increase of public control and active support of new energy system implementation in Ukraine.

Unique programs based on innovations and corporate social responsibility predetermine sustainable development of energy sector in Ukraine. By means of targeted approaches and energy management schemes, businesspeople as well as entrepreneurs in mutually beneficial collaboration with governmental authorities and NGOs will establish environmentally friendly, cost-effective and socially responsible way of doing business in Ukraine.

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