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**THE IMPACT OF DEPRIVATION
ON THE BEHAVIOR OF THE SUBJECT
OF ECONOMIC ACTIVITY:
ENERGY CONSUMPTION AREA**

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Ukraine is characterized by a high level of specific consumption of energy resources and has a significant dependence on imports of energy hydrocarbons. The level of energy dependence of the country (over 51%) is largely determined by inefficient use of energy resources. One of the main indicators in determining the energy efficiency of each country's economy is the energy intensity of GDP. Today, Ukraine is the most energy-intensive country in Europe in terms of a significant level of import dependence. Low efficiency of fuel and energy resources causes a high level of energy intensity of GDP in Ukraine, which at purchasing power parity [1] exceeded the level of energy intensity of GDP of EU countries by 3.12 times; Great Britain — 4.3 times; Germany — 3.1 times; France — 2.8 times; China — 1.7 times, and the average value of the world — 2.2 times. In particular, in Poland, with more than 2.6 times lower energy intensity of GDP, its volumes are 3 times higher than the level of GDP of Ukraine

Inefficient consumption of fuel and energy resources increases the level of import dependence of the country's economy and deepens the problems of its energy security with unrealized, according to the Institute of General Energy of the NAS of Ukraine, energy

saving potential and energy efficiency to 48% . At the same time, according to the International Energy Agency, the unrealized potential for energy efficiency in Ukraine is at least 30% . At the same time, according to EU research, even based on existing achievements, the goal of annual energy savings of around 4% by 2030 may be quite achievable in the EU. This can also be a significant potential for modernization in Ukraine. Despite some recent changes in energy saving, the implementation of projects and measures to improve energy efficiency is quite slow, selective and unsystematic. The dynamics of energy efficiency significantly depends on changes in the species and product structure of energy use [2], while in Ukraine the main sources of primary energy supply are coal and natural gas, which are used for conversion into other energy and final consumption, as well as nuclear energy, which is converted into electricity.

Housing and communal services are defined as one of the areas with one of the greatest energies saving potentials. The level of energy consumption depends on a number of technical and economic factors, so the specifics of energy use in housing depends on a combination of their key parameters, such as affordability, price, quality, interchangeability, direction and flexibility. Thus, for housing and communal services of Ukraine the main source of energy remains gas (58–63%), thermal energy (about 20%) and electricity (12–17%) [2]. In turn, according to the Association for Energy Efficiency and Energy Saving, housing has the potential to increase energy efficiency to a level that will provide at least 20–30% of real savings in fuel and energy resources, but this is hindered by both technical and economic problems [3]:

- high level of energy losses (up to 30% in total) due to low efficiency of power equipment, unsatisfactory condition of communication networks, which requires significant technical and technological re-equipment of housing and communal services infrastructure;
- imperfect system of formation of tariffs for services, which does not contribute to energy efficient use of fuel and energy resources and insufficiently stimulates indi-

viduals and legal entities to save energy in the production and consumption of housing and communal services.

According to GIZ experts, the energy efficiency of Ukrainian buildings is about three to four times lower than in Western Europe. In particular, the use of primary energy is from 3000 cubic meters to 4500 cubic meters of natural gas for heating the average living space (60 sq. m), while in the vast majority of EU countries such a rate for a similar area is only 1000–500 cubic meters of natural gas. This is due to the fact that most of the housing stock in the country was built during the Soviet era. In particular, a significant number of buildings were built before 1950 and, therefore, need immediate modernization. Typical brick or prefabricated buildings built between 1950 and 1999 also require thermal and energy modernization and replacement of energy-intensive equipment, as they were built according to old standards (GOST, DBN) that do not meet modern standards. Thus, the heat transfer resistance of the outer shell (wall) of the first mass series of buildings from 1960 to 1995 is 3–5 times lower than modern figures. These groups of buildings make up more than 80% of the total housing stock, of which the housing sector alone consists of 1.1 billion square meters. Increased requirements for thermal insulation of buildings and preparation of energy passport of the house were established only in 2006 (DBN B.2.6–31:2006) and introduced in stages in 2007, 2008 and 2013.

Thus, in Ukraine, an average of 260 kWh/sq.m is spent on housing heating, while in Poland — 90 kWh/sq.m, and in Germany — 45 kWh/sq.m. Therefore, energy efficiency experts [3] quite rightly note that the existing mechanism for reimbursing the cost of housing services is based on normalized energy consumption, which does not contribute to its reduction. In particular, the norms of hot water consumption are overestimated by about 1.5 times against the actual consumption, and the method of calculating tariffs for thermal energy for the population is based on 1 sq. m of total floor space. Homeowners with different housing characteristics than the area pay the same, so there is a situation when the owner of a less comfortable home subsidizes the owner of a more comfortable one.

The building as a whole account for about 40% of world energy consumption. For this reason, it is necessary not only to increase the energy efficiency of already constructed buildings, but also to stimulate the development of innovative design of new ones, reconstruction and re-equipment of previously constructed ones. The introduction of current heating, air conditioning and control systems will ensure a higher level of energy efficiency. An example is the concept of a “smart” home that produces more energy than it consumes.

Today, the EU does not allow the construction of facilities that consume more than 60 kWh/sq.m per year (standard “house of low energy consumption”). From 2019, the maximum allowable specific energy consumption of the building will be up to 15 kWh/sq.m per year (standard “passive house”). Since 2020, the transition to the construction of houses with “zero” energy consumption has begun. In the future — buildings that will produce more energy than they consume (standard — “house energy plus”). Existing operational characteristics of buildings, lack of proper accounting of energy consumption (mostly heat consumption), lack of technical capacity to regulate the level of energy consumption leads to irrational use of energy and water in the residential sector. However, even the established standards largely do not correspond to the existing norms in the EU [4]. It should also be noted that so far Ukraine has not implemented policy instruments of state policy on energy modernization of existing buildings.

The introduction of market mechanisms should solve the problem of energy saving, primarily among households in Ukraine [5]. But the introduction of state financial support has not yielded significant changes. Since October 2014, the government program “Warm Loans” developed and implemented by the State Agency for Energy Efficiency has been in force for the population and associations of co-owners of apartment buildings, which provides for the following reimbursements:

- 20% of the loan amount (but not more than UAH 12,000) for the purchase of non-gas / non-electric boilers for individuals;

- 35% of the loan amount (but not more than UAH 14,000) for the purchase of energy efficient equipment / materials for individuals — owners of private homes;
- 40% of the loan amount (but not more than UAH 14,000 per apartment) for associations of co-owners of apartment buildings / housing and communal services, as legal entities, for common house events.

However, the vast majority of the population, in contrast to energy modernization of housing and reducing the cost of housing, tends to receive direct assistance from the state in the form of subsidies. Thus, in 2018, the volume of subsidies allocated for housing and communal services amounted to UAH 2.7 billion. Although it decreased compared to 2017 by 32.1%, but the amount of budget funds allocated for the program of “Warm Loans” in 2018 was much less — about UAH 400 million. In contrast to the absolute values of the number and amount of “Warm Loans” (Table 1), only 0.34% of households and 10.2% of associations of co-owners of apartment buildings used them in a comparative ratio.

In the world as a whole, subsidies for traditional energy amounted to \$ 550 billion, which is more than four times their level for renewable energy sources. The need to modernize the program becomes especially relevant, given its high cost [5]. With

Table 1

Lending to households under the “Warm Loans” program

YEAR	Issuance of loans		Compensation from the government
	Number of credits	Sum, UAH	Sum, UAH
2015–2016	33 182	592 088 862	242 123 789
2017	16 572	452 070 773	151 625 924
2018	5 405	181 878 820	60 410 665
Total	55 159	1 226 038 455	454 160 378

Source: [6]

the increase in tariffs, which began in 2015, the volume of funding and coverage of housing subsidies has increased tenfold.

The housing subsidy program covered almost half of the population and in a year became almost the largest social security program of the consolidated budget, second only to transfers to the Pension Fund. In 2016 and 2018, about a third of the social protection expenditures of the consolidated budget were directed to housing subsidies, in 2017 — a little less than half. Housing and communal services enterprises were reimbursed UAH 211.7 billion in 2015–2019, which is comparable to the size of the country's defense budget for 2017–2018 and one and a half times more than the size of the new IMF program.

Thus, the number of households in Ukraine according to the State Statistics Service averages 14.9–15.0 million units [7]. 67% of households live in urban settlements, of which 39% live in large cities (with a population of 100,000 or more). The average household size in Ukraine is 2.58 people, but larger households are typical in rural areas (2.67 people vs. 2.54 in urban settlements). One of the main characteristics of living conditions of households is the provision of housing and the level of its improvement. The vast majority of Ukrainian households (95%) have separate housing, 5% of households still live in communal apartments, dormitories or part of an individual house. 94% of households live in their own housing, in rural areas almost all households have their own housing, in cities — 93%.

Most households have two-room or three-room housing (35% respectively), 18% of households live in four or more rooms, 12% — in one room. A significant share of households is insufficiently provided with living space. Living area of 39% of households is below the sanitary norm (13.65 sq. m per person), in large cities — 48%, in small — 35%, in rural areas — 32% of households.

According to the survey, 54% of the population of Ukraine lives in overcrowded housing. In the European Union in 2015 this figure was 17%, the largest share of people living in overcrowded housing has Romania (50%) and Poland (43%), the lowest — Cyprus and Belgium (1.4% and 1.6% respectively). At the same

time, almost every fifth household lives in housing built before 1960. The housing stock of 70% of households was built in the 1960s and 1980s. 12% of households live in relatively new housing built after 1991.

Among households living in housing built before 1970, one in three reported that their home had never been overhauled. Housing 37% of households are equipped with central heating, and 44% of households have an individual heating system.

Despite this disposition of factors influencing energy-saving behavior, all the obvious signs of deprivation are seen [8]. The

Table 2

The structure of aggregate household expenditures in Ukraine

Index	2010	2012	2014	2016	2018
Aggregate expenses per household on average, UAH / month.	3073,3	3592,1	4048,9	5720,4	8308,6
Structure of total household expenditures, %					
Consumer aggregate spending	89,9	90,8	91,6	93,2	92,0
food and soft drinks	51,6	50,1	51,9	49,8	47,7
non-food products and services	34,9	37,2	36,3	40,5	40,9
<i>including</i>					
clothes and shoes	6,0	6,1	6,0	5,6	5,4
housing, water, electricity, gas and other fuels	9,2	9,9	9,4	16,0	15,2
household items, household appliances and routine maintenance	2,3	2,3	2,3	1,7	2,1
Non-consumer aggregate spending	10,1	9,2	8,4	6,8	8,0
<i>For reference: payment for housing, utilities and services</i>	7,6	8,3	8,1	14,7	13,9

Source: [9]

initial sign of deprivation is seen in the structure of household expenditures (Table 2). Deprivation is a state when the subject of economic activity is unable to meet some of its basic (vital) needs sufficiently for a long time. That is, the loss of something that the subject needs to meet certain important needs, which in turn leads to various moral and psychological deviations in behavior and activities, including disinterest in their own actions, and the expectation of full assistance from the state.

Thus, according to population surveys conducted in 2017 by the State Statistical Service [10], more than 95% of respondents considered the following economic deprivations, or financial insolvency of households, to be signs of poverty:

- do not deny yourself the most necessary inexpensive food;
- eat meat, chicken, fish (or their vegetarian equivalent) every other day.
- if necessary, update outerwear and footwear for the cold season for adults once every 5 years; buy new clothes and shoes for children if necessary;
- to have housing in a normal condition — water supply in the home, bathroom or shower inside the home;
- increase the available living space not exceeding 5 square meters. m per person;
- timely pay bills for housing or maintenance services; maintain a sufficiently warm temperature in your home (buy fuel, heater, etc.) during the heating season, and more over.

According to experts from the State Statistics Service [10], the level of poverty on the grounds of deprivation in 2017 was the largest for the period 2007–2017 in almost all household groups. The largest increase was in the group of households with single-parent families (by 11%), in households with all persons of working age (by 8%), and in large households (by 6%). The increase in poverty over the past two years on the grounds of deprivation was mainly due to the deterioration of households' ability to maintain a sufficiently warm temperature in their homes, have housing in normal condition, pay housing and communal bills on time and in full, as well as rent, mortgage and consumer payments, loans, etc.

The prevalence of these symptoms among households increased 1.1–2 times, compared to 2015. At the same time, in comparison with the EU countries, the population has suffered the most from the inability to afford unexpected necessary expenses at the expense of their own resources. However, this figure was 1.6 times higher in Ukraine (60% vs. 36% in the EU) (Table 3), and only 0.4% of the EU population (1.7% in Ukraine) was unable to purchase a color TV, which are the lowest indicators from the list of identified features, on other grounds, the deprivation of the population in Ukraine was 2–7 times higher than in EU countries.

Therefore, the long experience of energy efficiency in EU housing has shown that to achieve significant changes and obtain quality results is possible only with well-established and close cooperation between the public and private sectors [11]. This makes it possible to overcome difficulties with access to capital, increase the alternative sources of funding needed both for energy efficiency

Table 3

Indicators of material deprivation of households

Country / region	Insufficient funds for (% of respondents)				
	Eating meals with meat or fish every other day	Maintaining a sufficiently warm home temperature	Family vacation outside the home once a year	Allow unexpected expenses at your own expense	Payment of mortgage payments, loans, housing and communal services
EU-28	8,3	8,7	32,8	36,4	10,4
Germany	6,5	3,7	18,4	30,0	4,2
France	7,4	5,0	23,4	31,8	8,8
Poland	6,4	7,1	41,2	37,9	11,0
Sweden	1,3	2,6	8,2	20,7	5,4
Great Britain	5,2	6,1	27,8	38,0	8,7
Ukraine	24,5	25,6	51,7	59,9	28,3

Source: [10]

and for the conversion of brownfields, the restoration of housing, and the reconstruction of public institutions and schools. Thanks to technical and organizational measures for energy efficiency, such levels of savings are achieved that can be comparable to the rates of return on shares of venture corporations. Another promising area is the introduction of “smart” technologies for accounting, control and management of housing and communal services — through the equipment of “smart” meters, which are able to optimize consumption not only according to the established algorithm, but also in accordance with current environmental conditions. Such devices can operate both automatically, using a system of sensors, and controlled through various communication channels [12]. Experts note that this intelligent platform allows you to analyze consumption on the basis of previous parameters, depending on the temperature outside, from the day of the week, which ultimately allows you to minimize consumption, and thus contribute to energy efficiency. In Norway and the United Kingdom in particular, the government has already required service providers to equip all households with “smart” meters by 2019 and 2020, respectively. Thus, the priorities for improving Ukraine’s energy efficiency in housing and communal services should be to ensuring economic interest in increasing the return of energy resources in obtaining housing services; and the use of a functional approach in housing and communal services in the development and implementation of energy efficiency measures, which will justify their key areas.

This will create an appropriate level of entrepreneurial motivation for energy efficiency initiatives, prevent excessive state regulation in this area and will ensure further approximation of Ukraine’s housing and communal services to the best world practices in energy efficiency.

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