

## РЕГІОНАЛЬНА ЕКОНОМІКА

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### FINANCIAL INCENTIVES TO ENERGY SAVING IN THE HOUSING SECTOR OF UKRAINE

### ФІНАНСОВІ СТИМУЛИ ДО ЕНЕРГОЗБЕРЕЖЕННЯ В ЖИТЛОВОМУ СЕКТОРІ УКРАЇНИ

**Urgency of the research.** The problems of energy efficiency and conservation are priorities in Ukraine owing to inefficient energy policy of the state.

**Target setting.** Residential sector in Ukraine is the largest consumer of natural gas and requires significant investment in thermo-modernization of housing. This fact leads to necessity of finding ways to enhance its energy efficiency.

**Actual scientific researches and issues analysis.** The problems of energy conservation and energy efficiency are the subject of research of following scientists S. Bezv, M. Bulgakov, V. Jiang, Dzhedzhula D. Zerkalov M. Kovalko, A. Komelina, O. Lyakhov, V. Mikitenko, A. Suhodolya, I. Sotnyk and others.

**Uninvestigated parts of general matters defining.** The problems of financial incentives for energy saving measures in the residential sector of Ukraine, including in the context of the coordination instruments of social policy with the policy of energy efficiency are understudied.

**The research objective.** The article represents a comprehensive assessment of the system of financial incentives and anti incentives that influence energy efficiency in the residential sector. Authors also develop suggestions for incentives improvement.

**The statement of basic materials.** The article deals with the system of financial incentives that are used in the residential sector. The effectiveness of the state and local energy efficiency programs implementation is being analyzed. The authors determine the main obstacles to the energy efficiency measures implementation by citizens and define ways of overcoming them. The researchers reveal a contradiction between guaranteeing social protection and incentives to implement energy efficiency measures and suggest the mechanism of converting subsidies to investments in energy efficiency of the housing stock.

**Conclusions.** The proposed activities will: boost public investment in housing energy efficiency, reduce household spending on housing and communal services, reduce expenditures of the state budget for financing the subsidies and purchasing energy.

**Keywords:** energy efficiency; energy saving; financial incentives to energy saving; credit incentives; housing subsidies; ESCOs.

**Urgency of the research.** The problems of energy efficiency and energy conservation in Ukraine are priorities, because without developing an energy-efficient society it is impossible to find the way

**Актуальність теми дослідження.** Проблеми енергоефективності та енергозбереження в Україні є пріоритетними в зв'язку із неефективною енергетичною політикою держави.

**Постановка проблеми.** Житловий сектор України являється найбільшим споживачем природного газу та потребує значних інвестицій в термомодернізацію житлового фонду, що зумовлює необхідність пошуку шляхів підвищення його енергоефективності.

**Аналіз останніх досліджень і публікацій.** Проблеми енергозбереження та енергоефективності є предметом дослідження таких науковців, як С. Бевз, М. Булгакова, В. Г. Дзяна, Дждеджула, Д. Зеркалов, М. Ковалко, О. Комеліна, О. Ляхова, В. Микитенко, О. Суходола, І. Сотник та ін.

**Виділення недосліджених частин загальної проблеми.** Недостатньо вивченими є проблеми фінансового стимулювання заходів з енергозбереження в житловому секторі України, в тому числі в контексті узгодження інструментів соціальної політики з політикою енергоефективності.

**Постановка завдання.** Метою статті є комплексна оцінка системи фінансових стимулів та антистимулів, які впливають на енергозбереження в житловому секторі, а також розробка пропозицій щодо їх вдосконалення.

**Виклад основного матеріалу.** В статті розглянуто систему фінансових стимулів, які використовуються в житловому секторі економіки. Проаналізовано ефективність реалізації державних та місцевих програм енергоефективності. З'ясовано основні перешкоди для здійснення енергозберігаючих заходів громадянами та запропоновано заходи щодо їх усунення. Виявлено суперечність між гарантуванням соціального захисту населення і стимулами до здійснення енергоефективних заходів та запропоновано механізм перетворення субсидій на інвестиції в підвищення енергоефективності житлового фонду.

**Висновки.** Запропоновані заходи прискорять інвестування населенням в енергоефективність житла, зменшать витрати домогосподарств на оплату житлово-комунальних послуг, скоротять видатки державного бюджету на фінансування субсидій населенню та придбання енергоресурсів.

**Ключові слова:** енергоефективність; енергозбереження; фінансові стимули до енергозбереження, кредитні стимули; житлові субсидії; енергосервісні компанії.

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out of the economic crisis, to achieve sustainable economic development and to gain competitive advantage in the global community. According to the World Energy Council, which publishes the evaluation results of energy policy implementation effectiveness by the countries around the world, – The Energy Trilemma Index, – in 2016 Ukraine took 63 place, improving its position by 2 points compared to the previous year [1]. Despite the progress in rating, the state remains far behind with energy intensity 2-3 times lower than in European countries.

**Target setting.** It is reasonable to study the characteristics of energy saving policy implementation in the residential sector of Ukraine, as it has the untapped potential of energy efficiency, consuming a significant share of natural gas in Ukraine (58% of total). Meanwhile annual energy loss is about 60% which is 3 bln. US dollars reimbursed by the state and the final consumers of services. The total need for investment in thermo-modernization of the housing stock is more than 830 bln. UAH, 300 billion of which should be invested till 2020 [2].

**Actual scientific researches and issues analysis.** The study of energy saving and energy efficiency engaged scholars such as S. Bevz, M. Bulgakova, V. Jiang, Dzhedzhula, D. Zerkalov, M. Kovalko, A. Komelina, O. Lyakhov, V. Mikitenko, O. Sukhodolia, I. Sotnyk and others.

**Uninvestigated parts of general matters defining.** The scientists have not yet explored the problem of financial incentives for energy saving measures in the residential sector of Ukraine since incentives for energy efficiency and conservation by the population have spread only in 2015. In addition, this issue is closely related to the national social policy. Particularly we are talking about the urgent need to harmonize methods and tools of social policy with measures of energy efficiency in the context of promoting energy efficiency in the residential sector of Ukraine.

**The research objective.** Purpose of the article lies in a comprehensive assessment of the system of financial incentives and anti-incentives which influence energy efficiency in the residential sector of Ukraine. The goal also implies the elaboration of suggestions for energy efficiency incentives improvement.

**The statement of basic materials.** Currently to encourage energy conservation by the citizen governmental institutions use instruments of pricing, crediting and co-financing energy saving measures by the state and local authorities (Tab.1). Rapidly increasing cost of energy serves as a vivid example of price tools application. Though unpopular, it was a very effective measure, which forced much of the population to reduce energy consumption.

Table 1

**Factors influencing Energy saving in the residential sector of Ukraine \***

<b>Financial incentives</b>	<b>Anti-incentives</b>
<i>Price incentives:</i> - Higher energy prices; - Electricity prices differentiation depending on the amount and timing of consumption	Lack of heat and natural gas consumption meters and high cost of their installation
Free installation of residential gas meters until 2018	Low resource consumption culture
Co-financing of energy-saving programs and projects by state and local authorities	Low incomes that do not allow energy-saving measures with a prolonged payback period
<i>Credit incentives:</i> - 35% state reimbursement of the loans, obtained for energy saving measures by private owners and 40% state reimbursement of the loans received by condominium associations and housing cooperatives; - 20% state reimbursement of the loans received to replace gas boilers; - Partial (15-30%) reimbursement of the loans by local authorities, compensation of all or part of the interest on loans obtained for energy-saving purposes under regional energy efficiency programs	<i>Inefficient energy subsidies:</i> - Covering 40% of the population; - Increase annually and significantly exceed state expenditures for energy conservation; - are based on excessive resource consumption norms; - Do not encourage people to save energy and carry out energy-saving measures; - Increase the burden on the State budget; - Create obstacles for investments in energy saving technologies, do not stimulate heat and power distribution companies to modernize

\* **Source:** compiled by the authors based on [3; 4; 5; 6]

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It should be noted that in contrast to stimulating factors, there is a number of barriers to energy saving measures in the residential sector. Lack of heat and natural gas consumption meters, and technical impossibility to establish individual heat meters in all apartments and houses do not stimulate people to save energy. According to the National Ecological Center of Ukraine as of Nov. 2016 provision with heat energy meters was only 61%. In case that the Law of Ukraine "On the commercial accounting utilities" will be passed it is planned that service providers should equip all consumers with heat meters before October 1, 2018. Corresponding work will be financed with consumers' contributions spread over five years.

However, home meters also do not encourage consumers to conserve energy. The effective incentives will arise when consumers will be able to influence the amount of consumed heat. Therefore, metering devices should be complemented with Individual Heat Points (IHP) which automatically adjust in accordance with weather conditions. Such solution will allow to pay for the actual energy consumption in the same way as in the private sector.

Furthermore, according to the EU Directive on Energy Efficiency (2012/27/EC), all end-users should be equipped with individual meters for all kinds of communal services, where it is technically and financially possible, and relevant in terms of the energy saving benefits. However, considering substantial need of funds in order to provide housing stock with individual meters, this problem is not urgent for state funding. At present, even in the EU, not all homes are equipped with individual meters, but generally home metering devices in apartment buildings were installed long ago.

Passing the Law of Ukraine "On the commercial accounting utilities" is a vital decision at the moment since it lays the groundwork for further reform in the sphere of residential sector energy efficiency. In terms of financial resources shortage state should spend money for financing the projects with a prolonged payback period that are too burdensome for the population, thus it will be appropriate for the governmental institutions to further co-finance the establishment of IHP.

In recent years substantial number of energy efficiency programs has developed, including the famous credit program for the purchase of energy efficient equipment and insulation of the building, regulated by the Cabinet of Ministers resolution "On approval of the use of funds provided by the state budget for state support of energy efficiency measures through the inexpensive loans mechanism" [5].

Today energy saving programs are financed primarily from budget funds and foreign organizations. It is assumed that in 2017 when Energy Efficiency Fund will start work, it will attract about 20 billion UAH from international donors and private investors. 400 million UAH will be funded from the state budget. The main objectives of the Energy Efficiency Fund are: attracting investments for the implementation of energy efficiency measures, energy audits and certification of buildings for energy efficiency classes, the introduction of the full-scale accounting of all consumed energy resources etc. [2].

Given the dire situation in the field of energy efficiency of the economy, we can state that the Energy Efficiency Fund was established with great delay. In Poland, for example, the necessity of reforming this sector was realized much earlier. In 1998 they stopped subsidizing energy consumption and embarked on funding modernization and repairs of buildings by means of Modernization Fund. This Fund provided loans for 10 years at a rate from 3.8% to 8.5% per year and covered 25% of the loan if the energy audit conducted after the upgrade confirmed annual energy savings of at least 10% [7, p. 13].

It should be emphasized that measures to encourage energy saving in Ukraine are not comprehensive, are inconsistent and not always effective. For example, the funds received from the EU funding program "Support of the Energy Strategy of Ukraine implementation in the field of energy efficiency and renewable energy" in the amount of 498.1 million UAH in 2011-2013 has never been used. In 2014 this amount was utilized only by 0.5% (2.4 million UAH). In 2015 the number raised to 60.9% (301.9 million UAH). Expenditures from the state budget for state support of energy efficiency measures through the mechanism of cheaper loans in year 2015 were ceased. These measures were funded only through foreign aid. 90.4 million UAH were not dispensed and returned to the budget [8].

The funding of energy efficiency programs in Ukraine in 2016 amounted 993.8 million UAH, which is almost three times more than in 2015. Local authorities were also developing their own programs to compensate citizens either portions of the loans or interest on loans obtained for the implementation of

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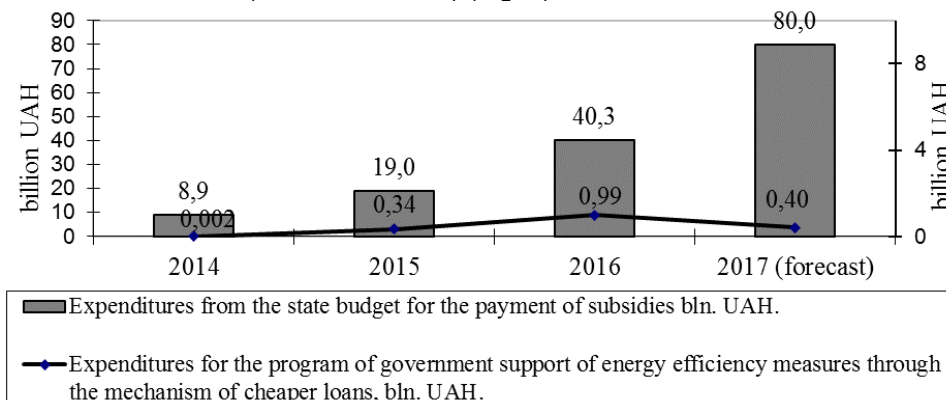
energy efficiency measures. In 2017 Ukraine adopted 189 local programs for co-financing energy efficiency measures. Additional compensation of the credit portions (15-20%) in Lviv region has allowed to increase number of loans for buying “no gas” boilers 6 times compared to the national average [3]. Lutsk has adopted a “Program of capital repairs of housing stock in Lutsk for years 2015-2019”, according to this program the installation of heat energy metering units in homes is set to co-financing: 60% are reimbursed by municipal council, and 40% - by residents.

Obtaining funding from the government in order to carry out energy efficiency measures in 2017 will be much harder. First applicant needs to undergo energy audits, and after the reconstruction they are obliged to verify the developed effectiveness. In contrast the current credit mechanism does not involve control of the State Agency for Energy Efficiency over the use of credit. The new approach is based on the experience of countries that have achieved significant results in reforming the housing in terms of enhancing its energy efficiency. Participation in the program will be open merely to the owners of private homes and whole condominiums (individual apartments not included). We believe that it will have the best effect, as insulation of separate apartments rarely has a significant impact on energy resources consumption in the whole house. In addition, the condominium is almost the only effective tool for attracting significant amount of funds for comprehensive thermo-modernization of the residential sector because they can accumulate reserve funds and repair funds that can be used for attracting credits and cost-sharing. In 2015-2016 condominiums participation in the programs of energy efficiency in comparison with private households was much smaller. Condominiums received 10.7 million UAH compensation from the state budget while private owners received about 1 billion UAH [3].

Increased energy resources saving measures resulted in improved energy efficiency of the national economy, as reflected in the stable downward trend of natural gas consumption – in 2016 the economy consumed 30.3 billion m<sup>3</sup> of gas, in 2015 – 33.7 billion m<sup>3</sup>, in 2014 – 42.5 billion m<sup>3</sup>, in 2013 – 50.4 billion m<sup>3</sup> of gas. In 2005 consumption of natural gas amounted to 76.4 billion m<sup>3</sup>. The fall in consumption in Ukraine 15.8% was the largest among the world countries in 2015. However one of reason for this could have been a decline in GDP to 10.4%. Therefore it is difficult to calculate how much energy state was able to save thanks to energy policy.

A significant deterrent that restrains people from carrying out active energy saving measures is a soft social policy reflected in the establishment of inefficient subsidies for housing and communal services. The new system of subsidies does not encourage people to save resources and implement energy efficiency measures, as these costs are covered by the state. In other words social policy today has priority compared to the energy conservation policy. Such ill-considered policy might undermine long-awaited modernization of the housing sector.

In 2014 government spent 8.9 billion UAH from the state budget for subsidies, in 2015 – 19 billion UAH, in 2016 – 40.3 billion UAH (6 million families) (Fig. 1).



**Fig. 1. Expenditures from the state budget to finance energy efficiency programs and payment of subsidies in the years 2014-2017, billion UAH**

\* Source: compiled by the author based on [3; 6; 8]

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As of September 2016, 40% of the country population, or every third family received a housing subsidy. In December 2016 the average size of subsidies assigned for one household equaled 1365 UAH [9]. According to the forecasts of the Ministry of Social Policy, after the heating season 2016-2017 the number of subsidies recipients will increase to 9 million people (60% of total households). This situation poses a serious threat to the financial security of the state, because the costs for social purposes annually significantly increase in the conditions of economic growth deficiency. Keeping this trend in the future is unacceptable and contrary to the declared policy of reducing social benefits.

One of the disadvantages of subsidies system is overstated size of social norms underlying the calculation of subsidies. During the 2015-2016 heating season gas subsidies were credited in the amount almost twice more than enough to finance the actual consumption of gas. In addition, end users do not receive aid directly, as the state finances natural monopolies (heat and power distribution companies). The latter are not encouraged to invest in modernization, because their excess expenditures are covered by state and population. Therefore, first and foremost state should improve communal heating enterprises' tariffs setting mechanism, which should boost efficiency of such institutions.

Overcoming the contradiction between guaranteeing social security and the introduction of market principles of management in the energy sector requires reform of social policy. The procedure for granting subsidies should be urgently improved by establishing stricter requirements for recipients. It is necessary to refocus state support from funding part of the population to financing energy efficiency all over residential sector. First of all, the state should help citizens to consume less energy, control and expose the process, and after that to support only the poorest. The gradual reduction of subsidies – is the fastest step towards energy efficiency provided protection of the most vulnerable citizens. Today the budget is unable to finance up to 40% of the population. Among the EU Member States the largest number of vulnerable consumers is in Romania – 11%. Typically, only 5-8% of the most vulnerable EU citizens receive support [6].

Scientific research shows that the maximum share of the family budget for utility fee should be 25%. Accordingly, assistance should be provided to families for which the threshold is exceeded. This type of threshold was established in the Czech Republic, Romania, Armenia, Georgia, Moldova and Uzbekistan in terms of reforming the housing subsidy [10, p. 5]. In some transitive economies there were even higher thresholds. After the unification of East and West Germany in the early 90s the price of communal services in eastern Germany increased by 5 times. In between 1991 and 1992 average household in Germany was spending 28% of income for communal services. For poor families threshold spending on housing was set to 20%. Today, subsidies for heating in Lithuania are provided if the household heating costs are higher than 25% of total family income [11, p. 12].

Only Hungary and Canada do not support families with low incomes by means of improving energy efficiency of their homes, yet they provide direct subsidies. The vast majority of other countries provide assistance to households by improving energy efficiency of housing without direct subsidies [11, p. 31-33]. The most common forms of assistance are the interest-free or low-interest loans from special funds and partial reimbursement of the energy-saving products cost. A. Abakumenko also notes a global trend of approaching to energy efficiency incentives by reviewing fiscal instruments - direct budget expenditures are replaced by tax incentives (tax relief on individual income tax, "green" tariffs for private power generation, etc.) [12, p. 10].

For Ukraine we offer to increase the proportion of family income spent on utilities to 20%, and a year later – up to 25%. Spared funds must be invested in the thermal modernization of housing. According to the State Agency of Energy Efficiency saving gas after thermal modernization of private homes is about 30%. As of 11.01.2016 p. 1 billion UAH were spent from the budget on the implementation of energy efficiency programs. For private households accounted for 2.8 billion UAH of investments to the economy in the form of the energy-efficient goods purchases and 512.7 million UAH of energy savings. After the installation of IHP and insulation of apartment buildings, heating costs decrease more than 2 times, and in the case of implementing additional energy efficiency measures (replacing windows, upgrading lighting), costs can be reduced by 3-4 times. In other words the need of assistance from the government for housing and communal services becomes significantly reduced, if not completely eliminated. 1 UAH budget expenditures to finance energy efficiency programs in con-

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dominiums accounts for 3.2 UAH investment in the economy and 3 UAH savings of energy resources [3].

Considering the multiplier calculated by the State Agency for Energy Efficiency expenditures from the state budget for the implementation of energy efficiency programs, redirection of 10 billion UAH, prescribed for the payment of subsidies for investments in energy efficiency of the residential sector will attract about 30 billion UAH investment in the economy and save over 5 billion UAH for energy resources consumption, including reduced government spending on their purchase. Such measures will also reduce household spending to communal services and create new jobs.

Reform of housing subsidies will inevitably mean their monetization on the feasibility of which experts in Ukraine have divided. Opponents of monetization claim that low incomes will contribute to spending the proceeds inappropriately and therefore it is inappropriate to monetize subsidies now. In the Concept of implementation mechanisms for stable funding of Energy Efficiency measures authors proposed an interesting solution to the problem – they suggest to give citizens who receive subsidies an opportunity to use subsidy savings on Energy Efficiency measures [2]. However, the mechanism of channeling funds for energy efficiency measures is not detailed, as well as it is not articulated who will control it.

We believe that subsidies need to be monetized, no matter for spending targets – either as the payment for municipal services, energy efficiency or other expenses. In case of misuse, the subsidy should be canceled. In addition, when calculating subsidies social officers should carefully check the financial status of applicants and the availability of indirect revenue. They can also consider the option of providing assistance only to those households which undergone at least minimal energy efficiency measures or those who spent aid at least partially on energy efficiency measures.

Economically expedient will be the passing of legislative acts that regulate the responsibilities of individual condominium associations' members for failing to participate in financing energy efficiency measures and simplify the mechanism for imposing sanctions for non-enforcement of majority decisions. Good example for this is Poland where they practice forced eviction for owner who does not want to participate in financing condominium activities.

Taking into account international experience it is necessary to assess the country's housing stock and categorize apartments according to their energy efficiency. This approach will help to provide diversified assistance on the basis of the need for each class of building's energy-efficiency. At the initial stage of reform (2-3 years) lower energy consumption standards need to be set for more efficient buildings and vice versa, in the next step the standards should be set to the middle-class energy efficiency (assuming that prior to this stage the inhabitants of inefficient buildings will carry out measures to thermally modernize their housing). And the last stage standard should be set to the level of energy needs for the most efficient homes.

In order to encourage private sector participation in the housing energy efficiency many countries have come up to the solution – Energy Service Companies (ESCO) [13]. They provide a wide range of services in the field of energy efficiency (from energy audit to installation of energy saving equipment). ESCO projects are carried out at the expense of anticipated savings (credits) from the implemented measures. Most frequently funding for energy service companies is carried out by means of loans, which is a major obstacle to the functioning of such organizations in Ukraine. Financial instability, high interest rates on loans impede ESCOs' access to finances, especially when it comes to implementation of projects with a prolonged payback period [4, p. 195].

Given the complexity of reaching an agreement between the condominium associations on a joint management of housing, it is necessary to improve the institutional mechanisms of ESCO in Ukraine since specialized companies will proceed better with implementing energy efficiency projects compared to condominiums. Thereby it will be helpful to provide companies of this type with certain preferences (soft loans, tax breaks, etc.).

Encouraging people to conserve energy should be carried out in conjunction with energy efficiency measures in spheres of energy production, transformation and supply. These measures will reduce the cost of energy resources for the end-consumers since a major cause for the rise in prices and tariffs for housing and communal services is their inefficiency and inability to upgrade to self-sufficiency.

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**Conclusions.** Scientific novelty of the research lies in the comprehensive assessment of financial incentives for energy conservation in the residential sector of Ukraine. The assessment identifies contradictions between social policies and energy efficiency policy that are objectified with anti-stimulating nature of energy subsidies. Implementation of the measures proposed in the article will speed up population's investment in a housing energy efficiency measures, reduce household spending for housing and communal services, reduce the amount of costs from the state budget for financing the subsidies purchasing energy resources etc.

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