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The Innovative Model of Energy Efficient Village under the Conditions of Sustainable Development of Ecological Territories

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Abstract:

The topicality of raising the level of rural territories' energy independence is substantiated in the article. Using the Ukrainian and foreign experience in creating and implementing the projects "energy efficient village", the stages of its introduction have been determined. Taking into account the results of these projects in Ukraine, the conditions as to providing their efficiency have been defined.

The peculiarities of creating the energy independent and effective village have been considered; its conceptual model has been created. Some aspects of using biomass and its effectiveness as an alternative source of energy have been presented. The factors of ecological, social, and economic efficacy of developing and implementing the projects of "energy efficient village" on the rural territories of Ukraine have been determined. The actuality of developing and introducing the projects in the creation of energy independent rural territories is put into practice on the territory of Ukraine.

Keywords: power supply; energy saving; ecological territories; energy efficient village; energy independence

JEL Classification: O13; P28; Q42; Q56

Introduction

The organization of rational energy using belongs to the most topical problems of the modern society. The problem can be solved in the complex with the minimal negative impact on the environment, thrifty use of energy resources, reasonable and sufficient satisfaction of technological and everyday needs of the citizens in all the kinds and forms of energy.

Besides, at present the actuality of developing and effective functioning of rural territories in Ukraine is not doubtful which have to be based on such priority directions as: ecological compatibility, energy saving, and alternative power engineering. Working out and introducing such target programs for the development of the rural territories will allow not only to provide their ecological, social, and economic independence, but also ensure the stable development on the basis of rational resource using.

At the same time, rural territories have enough potential for using alternative sources of energy (bio-fuel, wind power engineering, and solar power engineering, etc.). It is connected with their larger availability and a small number of infrastructure facilities which are subject to the transition to such energy sources. Nevertheless, first of all, the lack of financial resources and the experience of introducing innovative technologies impede their development, implementation, and effective functioning on the territory of Ukraine. It should be noted that the projects "energy efficient village" actively function in such European countries, as Federal Republic of Germany, France, and Poland. The given projects are long-term target programs consisting of a number of micro-projects, the aim of which is providing energy stability of rural communities and decreasing the spending of the local budgets on energy sources. Innovative technologies are introduced by investors, allowing to advertize them in action.

1. Literature Review

Theoretical and applied research as to developing and implementing the measures in energy saving was held at the beginning of the XXth century. The question of energy saving and energy providing in the agro-industrial complex of Ukraine has always been paid constant attention by such scholars, as: V.M. Lisnychiy (2006), M.T. Lut (2010), O.V. Sereda (2016), A.V. Kalinichenko (2014-2016), M.M. Khvorov (2001), O.O. Gorb (2016), S.M. Chumachenko (2015).

The problems as to creating and functioning energy independent rural territories have recently been investigated in the work by T.O. Chaika (2016). Thus, using the foreign and Ukrainian practical experience it is expedient to work out the conceptual model as to creating and functioning of such territories in Ukraine.

2. Methodology

The aim of the article consists in the following: using the foreign and Ukrainian practical experience of introducing and functioning of the projects "energy efficient village" it is necessary to work out the conceptual model of energy effective village under the conditions of Ukraine.

Dialectical cognitive method and system approach has been applied in studying scientific works by Ukrainian and foreign scholars devoted to energy supply and energy saving in agriculture, especially in the rural districts of Ukraine. Using the practical experience of investigated questions helps to form the theoretical and methodological foundations of the research.

3. Case studies

The projects connected with using the alternative energy have been implemented in complex since 2005 in the village of Severynivka (Vinnytsia region) (The Practices of Energy Efficiency, 2015) and since 2013 in the village of Vesele (Kharkiv district, the project "Energy effective village"), which is being implemented by the Institute of Sustainable Development. The latter was the first in the National competition "The best social projects" among the projects in the field of energy efficiency.

The model of the power sufficient rural populated area has been created within the framework of the project. The objects of the local heat-and-power engineering (2 boiler-houses), which use the local biomass, have been built on the first stage. Heating of the medical-obstetrical center with a heat pump and its complete thermal modernization have been provided on the second stage. 5 km of roads have been illuminated on the third stage. Light-emitting diode illumination and solar panels (pvs) have been used for this purpose.

At present, the project of the local solar electric power station has been completed, the capacity of which is 1,8 MWt, and the investor has been found for its construction. It will be the largest object of the alternative power in Kharkiv region (Energy Effective Village, 2017). Thus, the Ukrainian experience of implementing the project

“Energy effective village” is a “green” project, which passed its way from small heat-and – power engineering to electric power generation in industrial scales and it can be the example for other rural territories.

Also, the using of already existing experience of functioning energy efficient village in Ukraine and foreign experience (Gorb, Yasnolob and Protsiuk 2016) allows to work out the strategy of attracting resources of private companies and international technical assistance for providing power effective technologies on the social sphere objects, decrease the share of expenditures of the village budget on power sources with the following spending of money to the implementation of the local program of ecological, social, and economic development. Modern technologies permit to build dwelling houses of excellent, elite level of quality with the minimal cost for their maintaining, that is, energy efficient, having modern architecture, and durable.

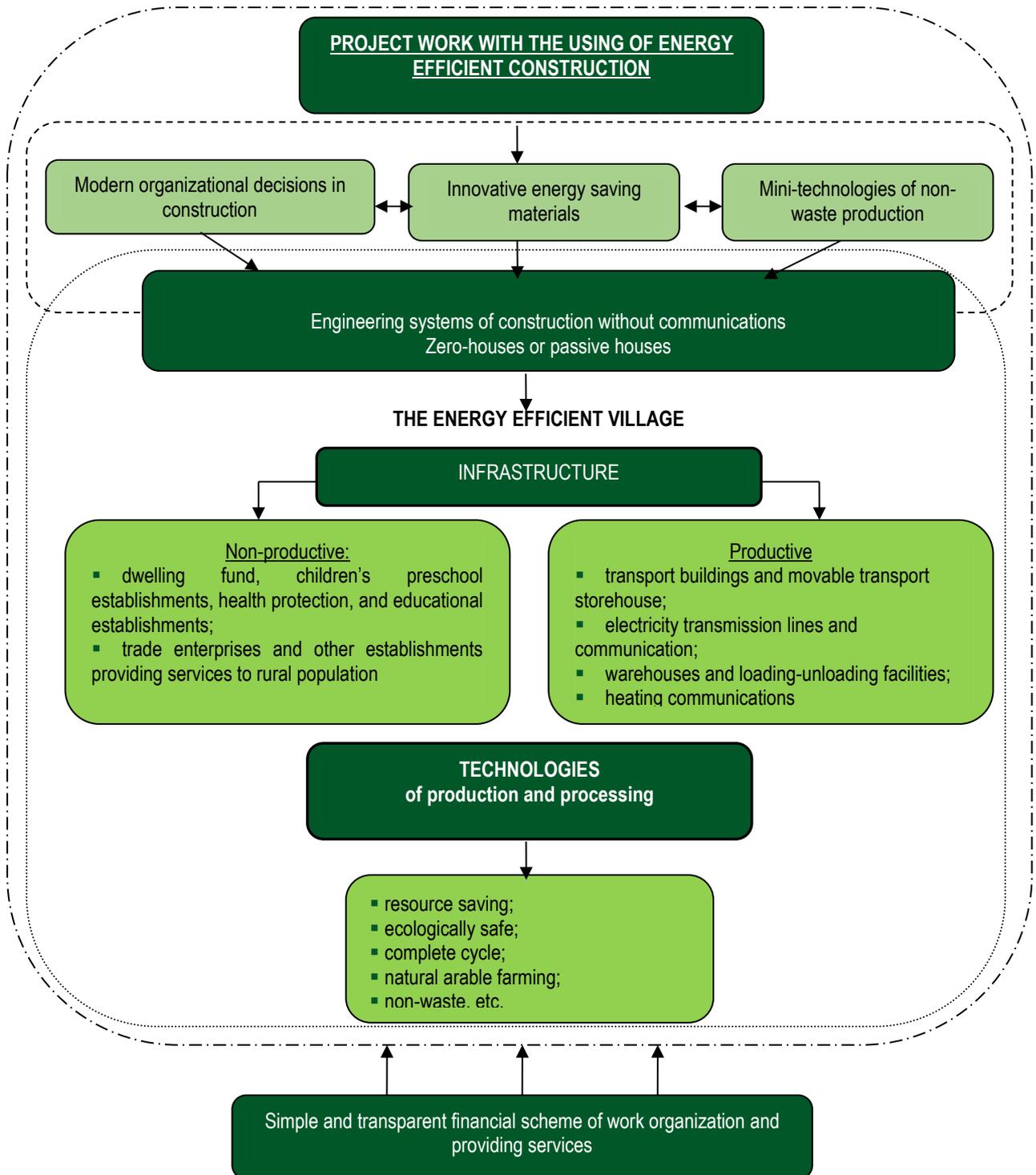
Our investigations of Ukrainian and foreign experience dealing with implementing the projects “energy efficient village” allow us to reveal their certain peculiarities (Table 1).

Table 1. The process of implementing the project of creating energy independent village

Stage of the project	Explanations
1. The identification of problems	<ul style="list-style-type: none"> ▪ the tendency to raising the cost of power resources; ▪ the depreciation of the networks and infrastructure of power supply; ▪ the absence of additional incomings to the local budgets ; ▪ low solvency of the rural population
2. The creation of the project proposition	<ul style="list-style-type: none"> ▪ working out a number of micro-projects for providing power independence of the community; ▪ searching and attracting investors and partners for financing and supporting the project among Ukrainian and foreign funds, organizations, institutions, etc.
3. The implementation of the project:	<p>Comprises the following stages:</p> <p>3.1. Preparatory: choosing the objects, making the general plan, projects of buildings, engineer equipment, and also the equipment for the production of materials and construction work, manufacturing and improving the equipment in the process of work preparation according to the project, concluding the agreements with the executors.</p> <p>3.2. Performing all the work, planned by the project.</p> <p>It is envisaged to use :</p> <ul style="list-style-type: none"> ▪ the best organizational decisions and innovative projects, which correspond to the aim of the project; ▪ new and/or adapted for the corresponding climatic conditions materials, which are cheaper, durable, and more effective; ▪ new mini-technologies of waste-free production of high quality materials on the basis of local sources of raw materials; ▪ the best known and also new original decisions for designing new energy efficient houses; ▪ new or adapted to the corresponding conditions engineering systems for the house and village, which will allow to do without the communications (water pipe, sewerage, the usual heating, and in the near prospect, without electricity transmission lines, that is, completely autonomous); ▪ simple and transparent financial scheme, which would lower the administrative barriers, including corruption, fraud of executors by using individual, but organized construction and payment for services after receiving them
4. The results of the project	<ul style="list-style-type: none"> ▪ achieving the aim as to clear demonstration of the examples of substituting the using of classical energy sources by alternative energy sources; ▪ creating the platform for introducing the best practices of power saving and power effective technologies at the level of community; ▪ exchanging the experience as to the used models and technologies, their effectiveness, cost, the conditions of maintenance, and the possibility of buying; ▪ establishing stable partnership between power bodies of different levels, private sector, the community, and donating organizations; ▪ grouping the community around the common goal; ▪ improving social conditions of the population life; ▪ developing further mini-projects as to raising the energy efficiency of the village.

Source: developed by the author

Figure 1. The Innovative model of Energy Efficient Village



Source: developed by the author

It should be noted, that the following conditions for the effective implementing the project of raising the energy independence of the rural territories should be followed (Chaika 2016):

1. Maximal concentration of the social sphere objects on the given territory.
2. The readiness of the community to changes.
3. Reliable and constant sources of financing.
4. Introducing energy passport system of the populated area.
5. Using the maximum number of possible sources of alternative energy.

6. Studying and further sharing the experience.
7. Searching the investors for future projects.
8. The openness to further modernization of objects, cooperation with the neighboring populated areas.

Thus, to create the model of an energy independent village it is necessary to develop:

1) Plans and projects of construction: of a power network from the alternative energy sources for the needs of the community and individual needs of the population; eco-houses for the population and buildings of rural infrastructure; agricultural infrastructure.

2) Plans of crop rotations and technological maps for cultivating crops (mainly, according to the technologies of natural arable farming with the aim of ecological compatibility of agricultural production).

In our opinion, the creation of the model of energy independent and efficient village includes (Figure 1):

- the using of alternative energy sources (wind generators, solar batteries, bio-gas installations, etc.), which are enough to provide energy for the villages by 100%;
- plans of crop rotations and technological maps for cultivating crops according to the technologies of natural arable farming;
- agricultural infrastructure, aimed at satisfying the needs of the village population;
- the projects of eco-houses for the whole village;
- re-utilization and re-circulation of all the wastes;
- 100% employment of the rural territory population.

Investigating the experience of implementing the projects “Energy effective village” enables us to determine their ecological, social, and economic effectiveness (Table 2), which testifies about the expediency of the development and implementation on the rural territories in Ukraine.

Table 2. Ecological, social, and economic effectiveness from creating and functioning of Energy Efficient Village

Factors	Criteria
Ecological	<ol style="list-style-type: none"> 1. Using wastes and by-products of manufacturing. 2. Decreasing the environmental pollution. 3. Minimizing and/or complete terminating of using non-renewable energy sources. 4. Using of renewable energy sources. 5. Searching of additional alternative energy sources.
Social	<ol style="list-style-type: none"> 1. Uniting the populated area community around the common goal 2. Raising the living standard of the rural population. 3. Increasing or full employment of the population. 4. Raising the image of the rural territory 5. Popularizing energy saving for rural territories. 6. Exchanging the experience in using innovative technologies.
Economic	<ol style="list-style-type: none"> 1. Decreasing the local budgets’ spending on power carriers. 2. Attracting investors for the project implementation. 3. Raising incomes of the rural population. 4. Increasing income sources of the local budget and the population. 5. Differentiating the kinds of production on the territory. 6. Forming the platform of partnership relations among the participants of the project. 7. Advertizing innovative technologies in their action.

Source: developed by the author

At present the experience of working out and implementing the projects “energy efficient village” has been planned in the frames of the Plan of implementing the Development Strategy of Poltava region for the period of 2015-2017. The planned project “Developing the model of energy independent village” has envisaged (The Plan of Measures 2015):

- developing of the exemplary model of using renewable sources of energy on the example of a conventional village having the population 1000 people;
- using wind generators and bio-gas installations for receiving power;
- using the technologies of organic farming for cultivating agricultural products with the aim of providing the population with safe, high quality food products, decreasing the negative influence on the environment;
- using ecologically safe materials for construction.

It is expedient to note, that at present energy efficiency of rural territories considerably depends on using alternative sources of energy by introducing the latest technologies using the Sun, wind, water, and biomass. It is connected with exhausting of organic fuel reserves, sharp increase of prices on them under the conditions of

lowering the level of the population living standards (especially in the rural locality), and low efficiency of their using technologies, and also harmful impact on the environment; the consequences of such impact are more and more dangerous for the world community.

The renewable sources of energy are the following: hydroelectric stations (large, medium and small), geothermal, sun, photoelectric, and thermal energy, the energy of ocean tides, waves, wind, hard biomass, gases from biomass, liquid biofuels and renewable municipal wastes, and also thermal energy, which is "created" owing to thermal pumps, turf, mine methane, and secondary sources of energy, such as: waste heat, industrial wastes, pressure of blast-furnace gas and natural gas during its transportation (Gorb, Yasnolob, Dedukhno, Kaliuzhna 2017).

The share of renewable sources of energy in the production of energy in the world is still not sufficient, but their potential surpasses the level of the world consumption of fuel-energy resources by many times. The rates of increasing the volumes of producing renewable sources of energy also considerably surpass those for the traditional kinds of energy.

Thus, let us consider the expediency of using the existing alternative sources of energy for providing energy independence of rural territories, characterizing the advantages and disadvantages of their using (Kalinichenko and Tytko 2014):

1. Wind energy:

1) advantages:

- it is ecologically pure method of producing energy; it does not pollute the atmosphere, does not use fuel and does not cause heat pollution of environment;
- maximally efficient using of wind energy in Ukraine will enable to produce 5,71 mln MW-hours annually and to ensure 2,5% of the general annual electric power consumption in Ukraine;

2) disadvantages:

- low recoupmnt of the projects of wind mill construction, which are expedient to construct on the shores of the Black and Azov seas, in steppe regions, and also in the Crimean and Carpathian mountains;
- wind electric power stations create high frequency noise, that is why they require large plots of land for their placing, and also they are not good for populated areas;
- generators of big wind engines revolve with the speed of 30 rotations per second, as a result, they can prevent from receiving television at a distance of up to 1,6 km.

2. The Sun energy:

1) advantages:

- general accessible and not exhausting source;
- theoretically complete safety for the environment;

2) disadvantages:

- because of relatively not large amount of sun constant energy for solar power engineering, the using of large areas of land is necessary under electric power stations, but photo-electric elements on big solar electric power stations are installed at 1,8-2,5 m height, which enables to use lands under electric power stations for agricultural needs, for example for grazing livestock;
- the flow of solar energy on the surface of the Earth greatly depends on latitude and climate;
- the dependence of solar electric power station capacity on the time of the day and weather conditions;
- high cost of solar photo-elements;
- photo-elements contain poisonous substances, for example lead, cadmium, gallium, arsenic, etc.

3. Small hydro- power engineering:

1) advantages:

- supply of energy, constantly renewable by nature itself;
- the simplicity of maintenance;
- the lowest cost of electric power production;
- the absence of environmental pollution;
- improving the working conditions of river transport;

2) disadvantages: flooding of large areas of fertile soils for water reservoirs.

4. Bio-fuel and biomass:

1) advantages:

- using production wastes for receiving ecologically pure energy;

- comparable sums of expenditures on the production of electric and thermal energy in bio-gas installations with traditional energy resources;

- diversification of power supply;
- decreasing the emission of CO₂ to the atmosphere owing to partial refusal from using traditional sources of energy;

- improving sanitary-hygienic state of rural territories;
- substituting artificial fertilizers with manure;
- raising the efficiency of manufacturing ecological food;
- creating new places of work, increasing the recoupment of farm products;
- non-waste technologies;

2) disadvantages: low economic efficiency of some kinds of bio-fuel (for example, bio-diesel from rape oil).

5. Geo-thermal power engineering;

1) advantages:

- constantly renewable by nature itself energy reserve;
- is used in glasshouses, industry, fishery;

2) disadvantages:

- low thermodynamic quality;
- the necessity of using heat near places of extraction;
- the cost of borehole construction increases with increasing depth;
- using of this energy creates ecological problems, for example, the emission of harmful gases from geo-liquid (hydrogen sulphide), radon, the product of radioactive uranium dissociation, taking place simultaneously with vapor from geo-thermal spring, also creates treat to health.

To introduce alternative sources of energy for providing energy independence of the rural territory, it is necessary to perform definite stages:

1) determining local sources of alternative energy for separate infrastructural objects and their analysis according to the criteria of ecological, social, and economic efficiency;

2) developing the plans of project implementation according to every object of infrastructure;

3) conducting negotiations and collecting cost confirmation of the necessary equipment, terms and conditions of supplying all its elements;

4) signing agreements with investors and suppliers, fulfilling the complete plan of financing project implementation as to introducing alternative sources of energy;

5) ordering delivery and installation of equipment according to the plans of project implementation, preparing the territory under the construction of alternative energy sources' objects, overcoming possible local obstacles, preparing roads, connection to energy networks;

6) assembling equipment and selecting service organizations, training of servicing personnel;

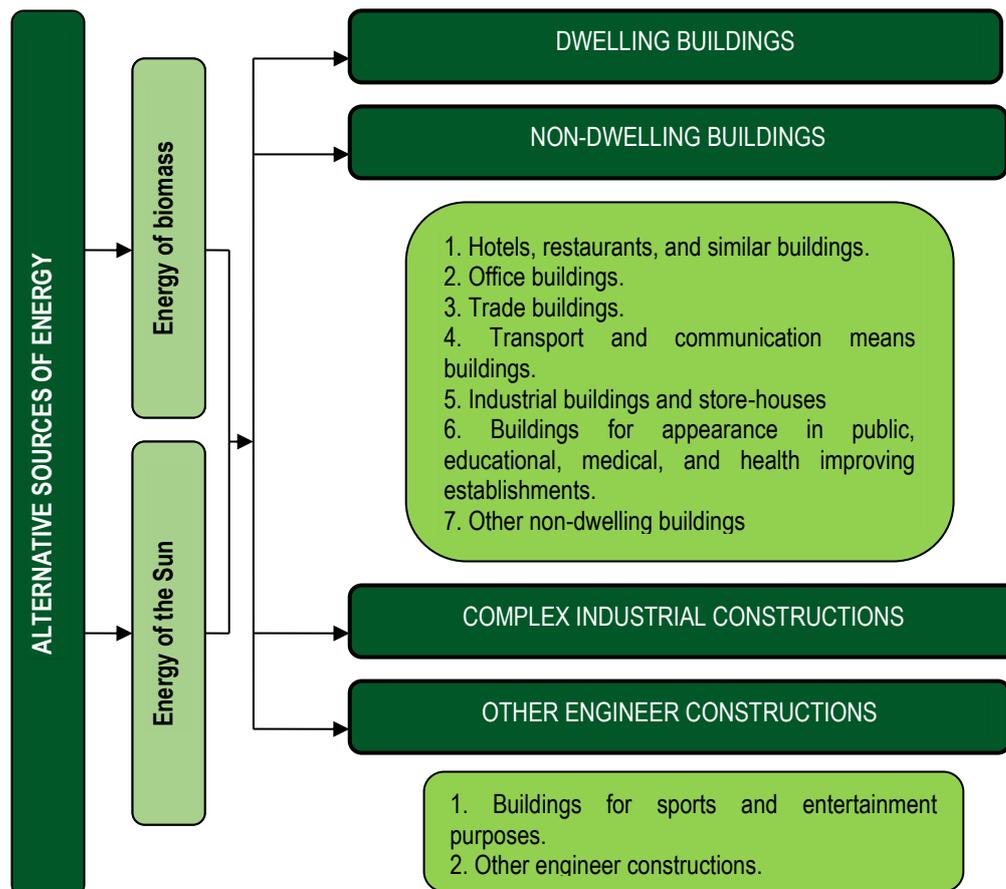
7) receiving the concession on manufacturing and possible selling of electric power;

8) signing the agreement on supplying power resources to the local electric power net, the principles of settlements;

9) determining the value of possible taxes, which will be paid from constructing the objects of supplying alternative sources of energy.

Thus, using the energy of biomass and the Sun energy are the most effective alternative sources of energy for the majority of rural territories in Ukraine, taking into account ecological, social, and economic criteria. According to the State classifier of buildings and constructions (Sharma and Goel 2016), we have defined, that they can be provided with power not only from traditional sources, but also from alternative ones in different proportions (Figure 2).

Figure 2. The directions of using alternative sources of energy for buildings and constructions of ecological territory



Source: developed by the author

Energy independence of rural territories, as a rule, is based on using biomass (Selling Energy from Biomass, 2015) the modern resources of which can be used both for personal needs and sold to receive additional financial resources for further development of rural territory.

1. Grain crops (food and feed grain of not high quality during the period of its vegetation, harvesting, storing, and processing).

2. Wood (dry logs and green chips).

3. Straw (some varieties of straw, such as rape straw, have no other using as for burning down. Straw is economically effectively to burn down in the equipment having the capacity of more than 600 kilowatts).

4. Wastes after plant processing (bran, wastes after grain cleaning, flax and hemp stock, etc.; granulating of these materials gives the maximal added value).

5. Energy plants (annuals, (hemp, triticale, sorghum), perennial grasses (miscanthus, red millet), and trees (willow, poplar).

6. Hay (only granulated).

The effectiveness of using biomass as an alternative source of energy is confirmed by the following practical data (Yasnolob *et al.* 2017):

1) it is enough to heat one family house with biomass harvested from approximately 1,5 hectares of land;

2) each house, in which bio-mass is burnt down, brings income to the farmers in the region;

3) according to the data of the European statistics, the share of biomass in the overall energy spending is: 21% in Austria; 28% in Denmark; 35% in Sweden. The new areas of the EU have to create 8% of biomass share in the total energy sources.

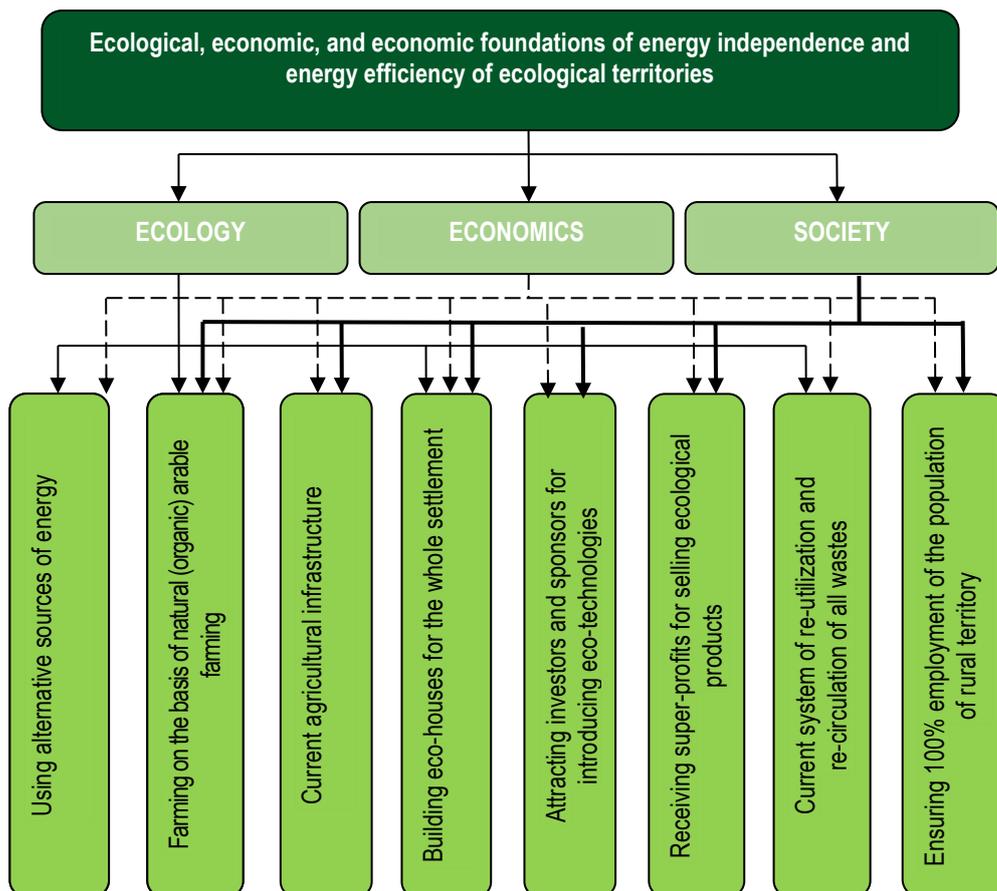
On the whole, introducing the objects of alternative power engineering in villages ensures the following:

- raising energy and economic independence;
- lowering power consumption of production;
- efficient using of fuel and power resources;
- decreasing the volumes of attracting traditional fuel- power resources;

- creating the market of energy efficient and scientifically substantiated equipment, corresponding machinery and technologies;
- technical and technological re-equipment of production;
- competitiveness of national goods;
- raising the well-being of the citizens;
- raising the level of the population employment;
- raising the level of labor safety and production culture;
- improving people's health;
- decreasing the volumes of harmful emissions in the environment;
- reproduction of natural resources;
- raising the level of ecological safety.

In our opinion, for creating and effective functioning of independent rural territories, it is necessary to develop and introduce innovative technologies and decisions, which are based on triune concept of sustainable development; this concept ensures balanced dynamic equilibrium during a definite period of time between the components of integrated ecological, social, and economic system. Its aim consists in searching of the paradigm of uniting the improving of the environment in rural territories with their economic growth and raising the living standards of the population. The theory of sustainable development is based on other values, methods, persuasions, and it differs from economic growth, which ignores ecological danger as a result of developing according to extensive and intensive models.

Figure 3. Interdependence and synergic effect of the components of developing energy independence and energy efficiency of ecological territories



Source: developed by the author

The complex of measures having stimulating character and which was developed taking into account this concept, is to assist in achieving the state of equilibrium and long-term sustainable development of ecological, social, and economic system of rural territories. These measures envisage the achieving of:

- sustainable development as a strategic goal;
- dynamic equilibrium;

- optimal correlation of qualitative and quantitative characteristics;
- correlation between ecological, social, and economic spheres, that is, achieving competitiveness;
- the ability to self-reproduce and avoid the impact of destabilizing factors, and finally, to achieve the safety of sustainable development.

In our opinion, the model of developing energy independence and energy efficient policy of rural territories conforms to the triune conception of their sustainable development. The model is based on the following directions (Figure 3).

Thus, at the present stage the development of rural territories, first of all, is determined by ecological factor. The impact of ecological conditions of all social and economic components is evident not only on the present and short-term development, but it also determines long-term period of sustainable development.

As a result, it is necessary to develop new innovative ecological-economic conception for rural territories, the development and implementation of which in practice by legislative and executive bodies will assist in "ecologization" of thinking and reconsideration of many stereotypes in the process of making ecologically oriented decisions.

At present, the innovative development of rural territories, first of all, is based on substituting traditional sources of energy with alternative and renewable ones. Introducing energy efficient technologies will increase energy independence of rural territories, which will facilitate solving many acute social problems, and also will ensure rapid development of new business and create a huge market for the latest national scientific-technical innovations in different areas.

Conclusion

Thus, today the substitution of the traditional energy sources for the alternative and renewable ones is supported all over the world. That is why the concept of creating energy independent rural territories in Ukraine is rather topical and real, which allows to provide their stable development.

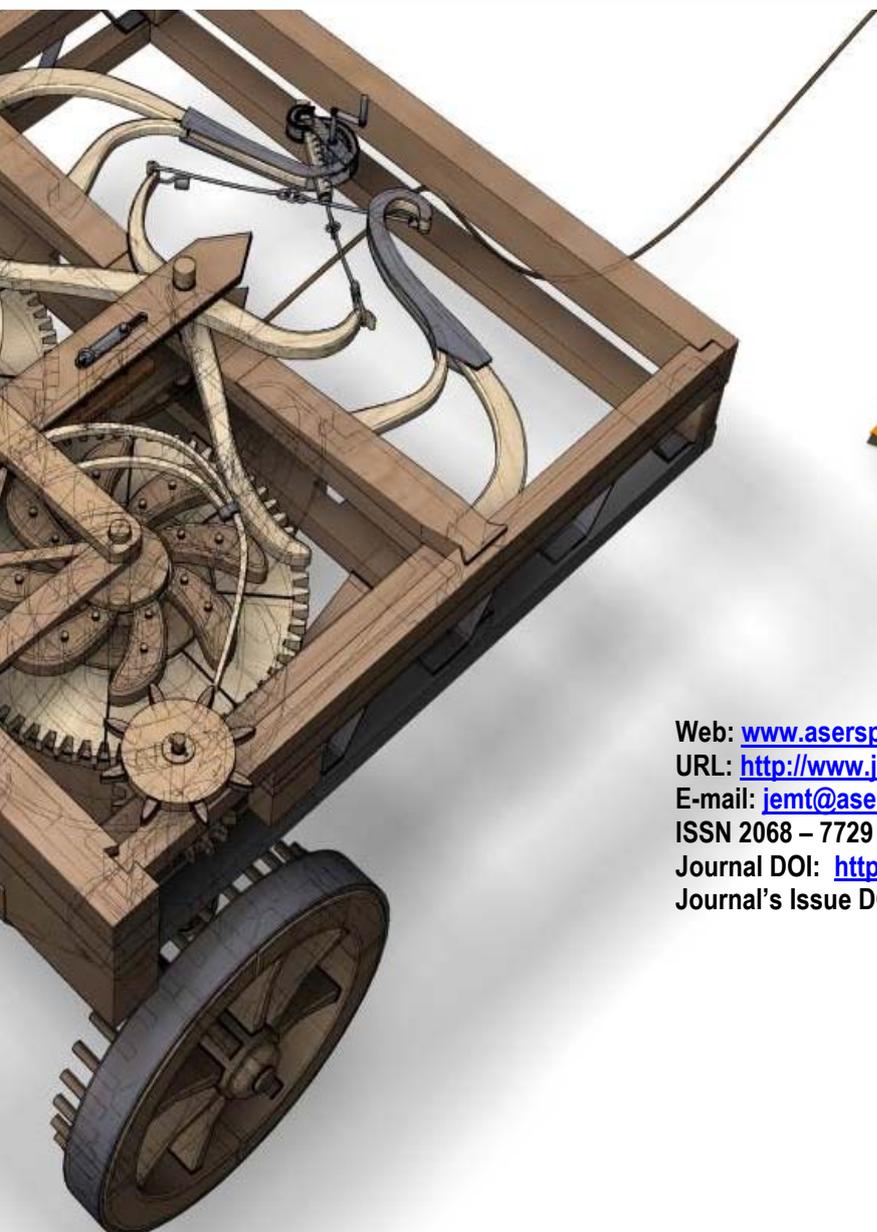
Also the creation of such energy independent village will facilitate solving numerous social problems, and also provide rapid development of the new businesses and create a large market for the latest Ukrainian scientific-technical developments in various fields, including alternative power engineering, waste utilization, "smart house" with using of informational technologies, which are now not in real demand in Ukraine. Great demand on construction materials of high quality will assist in developing of their production in our country.

References

- [1] Aranchiy, V., Makhmudov, H., Yasnolob, I., and Radionova, Ya. 2017. The developing of conceptual foundation of the process of organizing innovation activities at agro-industrial enterprise based on outsourcing and the program business process model and notation", *Economic Annals-XXI*, 165(5-6): 84 – 89. DOI: <https://doi.org/10.21003/ea.V165-18>. Available at: <http://soskin.info/userfiles/file/Economic-Annalspdf/DOI/ea-V165-18.pdf>
- [2] Chaika, T.A. 2016. The Preconditions of Creating and Effective Functioning of Energy Independent Village. *Modern Power and Resource Saving Ecologically Stable Technologies and Systems of Agricultural Production: Riazan FGBOU VO RGATU*, 245–247 (in Russ.).
- [3] Chumachenko, S.M., and Pisia, L.A. 2015. Introducing Wind Power Potential of Ukraine for the Medium and Small Businesses in Agro-Industrial Complex. Retrieved from: http://irbis-nbuv.gov.ua/cgi-bin/irbis.../cgiirbis_64.exe (in Ukr.).
- [4] Energy Effective Village: from the Local Electric Power Engineering to Large-Scale Projects (2017). Available at: <http://aew.com.ua/energoefektivne-selo-vid-mistsevoyi-elektroenergetiki-do-masshtabnih-proektiv/> (in Ukr.).
- [5] Gorb, O., Yasnolob, I., Dedukhno, A., and Kaliuzhna, Yu. 2017. The formation of the management system of ecological, social, and economic development of rural territories using the experience in European Union", *Journal of Environmental Management and Tourism*, 8(3): 516-528. DOI: [https://doi.org/10.14505/jemt.v8.3\(19\).03](https://doi.org/10.14505/jemt.v8.3(19).03)
- [6] Gorb, O.O., Yasnolob, I.O., Protsiuk, N.Y. 2016. Organizational-economic mechanism of management of food industry enterprises competitiveness, *Annals of Agrarian Science*, 14(3): 191 – 195. DOI: <http://dx.doi.org/10.1016/j.aasci.2016.07.004>

- [7] Kalinichenko, A.V., Tytko, R. 2014. Ecological and social aspects of optimal farm energy supply in Poland, *Actual Problems of Economics*, 157 (7): 284-297. Available at: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84906093098&partnerID=40&md5=a42abf667f72abf461da8d7e4962bf37>.
- [8] Khvorov, M.M. 2005. The Potential of Geo-Thermal Power Engineering of Ukraine in the System of Controlling the Volume of Greenhouse Gases Emission, *Renewable Power Engineering*, 3–4: 56–60.
- [9] Lisnychyi, V.M., Klius, V.P., and Masliukova, Z.V. 2006. Power Resources of Bio-Gas from Livestock Farming Wastes in Ukraine, *Renewable Power Engineering*, 1: 88–91.
- [10] Lut, M. T., Miroshnyk, O.V., and Trunova, I.M. 2008. Fundamentals of the Technical Maintenance of Power Equipment in Agro-Industrial Complex. Kh.: Fact (in Ukr.).
- [11] Selling Energy from Biomass, Maintenance of Power Generating Equipment Was, Is, and Will Be Interesting (2015). Available at: http://www.verner.com.ua/verner_offer (in Russ.).
- [12] Sereda, O.V. 2016. Renewable Power Engineering as a Promising Direction of Providing Sustainable Development of Rural Territories, *Economic Forum*, 2: 145–151.
- [13] Sharma, R. and Goel, S. 2016. Stand-Alone Hybrid Energy System for Sustainable Development in Rural India. *Environment Development and Sustainability*, 18 (6): 1601–1614. DOI:10.1007/s10668-015-9705-3
- [14] The Plan of Measures in Implementing the Development Strategy of Poltava Region for the Period of 2015-2017 (2015). Available at: https://doc-0o-08-docs.googleusercontent.com/docs/securesc/ha0ro937gcuc717deffksulhg5h7mbp1/pg82rred3bn8cju58ra4aulukqbj9uhr/1489608000000/16845297220588197654/*0B66r6E-akcQWbnZCdmxqZkNleE0?e=download (in Ukr.).
- [15] The Practices of Energy Efficiency of the Pilot Community in the Village of Severynivka, Vinnytsia region (2015). Available at: http://zhytlo.in.ua/ua/napryamok/energozberezhennya/praktiki_energoefektivnost_plotno_gromadi_s.severinivka_u_vnnickij_oblast.html (in Ukr.).
- [16] Yasnolob, I., Chayka, T., Aranchiy, V., Gorb, O., and Dugar. T. 2018. Mycorrhiza as a biotic factor, influencing the ecosystem stability, *Ukrainian Journal of Ecology*, 8(1): 363–370. DOI: <http://dx.doi.org/10.15421/2018%25x>. Available at: <http://ojs.mdpu.org.ua/index.php/biol/article/view/223>
- [17] Yasnolob, I., and Radionova, Ya. 2017. The organizational fundamentals of innovation development management of agro-industrial enterprises, *Economics, Management and Sustainability*, [S.l.], 2(1): 60-66. DOI: <https://doi.org/10.14254/jems.2017.2-1.5>
- [18] Yasnolob, I.O., Chayka T.O., Gorb, O.O., Shvedenko P.Yu., Protas N.M., and Tereshchenko, I.O. 2017. Intellectual Rent in the Context of the Ecological, Social, and Economic Development of the Agrarian Sector of Economics, *Journal of Environmental Management and Tourism*, (Volume VIII, Winter), 7(23): 1442-1450. DOI: [https://doi.org/10.14505/jemt.v8.7\(23\).13](https://doi.org/10.14505/jemt.v8.7(23).13)
- [19] Yasnolob, I.O., Pysarenko, V.M., Chayka, T.O., Gorb, O.O., Pestsova-Svitalka, O.S., Kononenko, Zh.A., and Pomaz, O.M. 2018. Ecologization of tillage methods with the aim of soil fertility improvement. *Ukrainian Journal of Ecology*, 8(2): 280–286 DOI: http://dx.doi.org/10.15421/2018_339

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