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Model of Optimal Solutions for Organization of Export Biofuels

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In this thesis was showedclassification bioenergy sources, depending on the production's finite. It is proved that the development of biodiesel production will allow agricultural producers to earn on new markets, introduce modern technologies in production and export as finished goods and raw materials. Showed the economic and mathematical model of the problem of optimal solutions organization biofuel exports.

In the last time questions, associated with prospects for the use of Alternative Energy Source, attracting more and more attention.

There are many factors for this: Climate change, hard-projected oil prices, the desire of some countries to ensure their energy security and independence, the need to develop the agricultural sector and other.

Governments around the world are paying more attention to the benefits of the use of biofuels, because it is potentially a more environmentally friendly energy than traditional fuels.

An important factor in the development and use of biofuels today is that for some countries, this is an opportunity to provide themselves with the necessary energy and to diversify exports, and reduce poverty.

In recent years, the widespread production of biodiesel from vegetable oils. This is reflected in the agricultural sector, agricultural countries, which have begun to actively grow and export crops, which are raw materials for biofuels.

In scientific publications have a small amount of independent work on the integrated consideration of the development of the agricultural sector.

In most cases, these issues are explored in works on general problems of food market and foreign trade [4, 5, 7], or in works devoted to finding ways to optimize the organization of transport and logistics operations and the implementation of the carriage of goods [6]. The modern state and prospects of development of the biofuel industry devoted to proceedings of international conferences and seminars [1, 2, 3, 8]. However, the development of the export market of biofuels poses new problems that require analysis and find ways to resolve them.

Biofuel - fuel from vegetable or animal raw materials from waste products or organisms, organic industrial waste. As is known, biomass is in the form of a number of forms, such as solid or wet biomass, oil or sugar. This biomass can be converted to convenient energy containing substances in three different ways: thermal conversion, chemical conversion, and biochemical conversion. Finally, biomass and bio-energy sources can be classified according to their final destination:

- production of heat;
- the production of electricity;
- biogas;
- Liquid biofuels.

Thus biofuels can be divided into three main states of aggregation: solid (wood chips, pellets, briquettes, etc.), liquid (biodiesel, ethanol) and gaseous (biogas).

Very promising is liquid biofuels. It is mainly used to power the motors. Get a fuel can in the processing of vegetable raw materials: sugar cane, sugar beet, oilseed rape and maize. To include such liquid biofuels: bioethanol, biomethanol, biobutanol and biodiesel.

Bioethanol can be produced from any material containing sugar and starch, so the main criterion for selection of raw materials for the plant - the availability of treatment for 365 days a year and the availability of suitable areas for planting. The gradual development of the industry creates the rise of agriculture and enables manufacturers of wheat and corn earnings in the new market outlets, as suitable for the production of bioethanol, even the leaves and stalks of corn that have not brought tangible profits. One ton of corn produced up to 410 liters of ethanol. In the manufacture of biodiesel enjoys great success rapeseed oil, which, along with soy, peanut and sunflower is one of the most consumed in the world. One ton of rapeseed can be 300 kg of oil, ultimately transformed into 270 kg of biodiesel. The remaining 30 pounds fall on glycerol, it is transformed to the cleaners, liquid soaps and phosphate fertilizers.

Depending on the equipment used in the production of ethanol can be obtained by a number of other products, which often bring factories income. The opening of each plant producing 150 million bioethanol (42 thousand dollars a day), provides 700 permanent jobs and bring $ 1.2 million a year in local and state budgets. The main suppliers of ethanol is North and South America, with most of the production (45%) are in Brazil. However, government programs to increase ethanol production in the U.S. and Canada will soon withdraw North America in the biofuel market leaders/ The European Union also issued a law to increase the share of motor fuel from renewable raw materials up to 6%, increasing volumes of ethanol production in Spain, France, Italy and Germany. The development of the biodiesel industry in the world has increased the interest to the rape, and Ukraine was able to adequately respond to the increased demand by becoming a relatively short time one of the main producers and exporters of rape in the world.The economic - mathematical model that offers the optimum balance of exports of biofuels in the form of raw materials and finished products, which allows the exporter to get the highest return with minimum or fixed costs. The model was considered that the amount of product yield is less than the amount of incoming raw materials for recycling. For this ratio has been introduced out of raw materials into finished products (kper). Evaluating the effectiveness of exports of biofuels compared to the export of raw materials was carried out according to two criteria: the maximum revenue for fixed or minimum cost.

The objective function of the problem

$$\sum_{i,s} d^1_{is} y^1_{is} + \sum_{s,j} d^2_{sj} y^2_{sj} + \sum_{i,s} d^3_{is} y^3_{is} + \sum_{s,j} d^4_{sj} y^4_{sj} + \sum_{i,s} d^5_{s} y^5_{is} \to \min$$

$$\sum_{s,j} f^2_{sj} y^2_{sj} + \sum_{s,j} f^4_{sj} y^4_{sj} \to \max$$

$\sum_{s=1}^{l} y^1_{is} + \sum_{s=1}^{l} y^3_{is} = a_i$, i=1,..,m;
$\sum_{s=1}^{l} y^2_{sj} + \sum_{s=1}^{l} y^4_{sj} = b_j$, j=1,..,n;
$\sum_{i=1}^{m} y^3_{is} \le r_s$, s=1,..,l;
$\sum_{j=1}^{n} y^3_{is} = k_{пер} * \sum_{j=1}^{n} y^4_{sj}$, s=1,..,l;
$y^1_{ij},\ y^2_{sj},\ y^3_{is},\ y^4_{sj},\ y^5_{is} \ge 0.$

wherea_i - production volumes in i (i=1,..,m);
b_j- power delivery destinations in pointj (j=1,…,n);
r_s – power intermediate point processing s (s=1,…,l);
d^1_{ij} - the unit cost of transportation per unit of output from production point i (i=1,..,m) topoint of destination j (j=1,…,n);
d^2_{is} - the unit cost of transportation per unit of output from production point i (i=1,..,m)tointermediate point processing s (s=1,…,l);
d^3_{sj} - the unit cost of transportation per unit of output from intermediate point processings, (s=1,…,l) topoint of destination j (j=1,…,n);
d^4_{s} - the unit cost ofprocessing unionintermediate point s;
f^1_{ij} - income from sales fromi-point (i=1,..,m) production toj-point (j=1,…,n)of destination theproduct unit which has not passed the intermediate pre-processing step;
f^2_{sj} - income from sales froms- point(i=1,..,m) production toj- point(j=1,…,n)of destination theproduct unit which has not passed the intermediate pre-processing step on s-point (s=1,…,l);
y^1_{ij} - the volume of production, which transportation fromi- point(i=1,..,m) production toj-point (j=1,…,n)processing plant;
y^2_{is} - the volume of production, which transportation from i- point (i=1,..,m) production tos-point(s=1,…,l)intermediate processing forpretreatment;
y^3_{sj} - the volume of production, which transportation froms(s=1,…,l)intermediate pointon pretreatmenttoj (j=1,…,n)pointof destination.
Withoutlossofgeneralitybelieve that$\sum_{i=1}^{m} a_i = \sum_{j=1}^{n} b_j$.
Providesthat$f^1_{ij} \le f^2_{sj}$, $d^2_{is} + d^3_{sj} + d^4_{s} \ge d^1_{ij}$, i=1,..,m; j=1,…,n; s=1,…,l.

The practical realization of the economic and mathematical model has been implemented on the example of exports 80 million tons of rapeseed from 4 areas of the Ukraine after 3 intermediate points of processing and handling in the ports of Ukraine in the 4 ports of Europe.

The calculations we have obtained the following solution that:

Determine the amount and the departure point for the transportation of raw materials for export,

Determine the amount and terms for the administration of raw material for processing into biofuel

Determine the volume of the product after processing at intermediate points.

In solving the economic - mathematical model with the following results .At current prices of raw materials and transportation costs, as well as market prices for rapeseed and biodiesel exporter profits in the implementation of 80 tonnes rape will be 2,3 million dollars USA. The calculations took into account the cost of processing rapeseed, the percentage of the output of finished products, to determine the optimal ratio of the volumes of exported raw materials and finished products.

The economic effect of the proposed method for organizing effective export of biofuels in Ukraine is expressed as the maximum income on a limited budget.

The advantages of this economic - mathematical model are:

- Ability to fixed costs , which the company can invest in the process of organizing the transport of the consignment;
- The model does not require a large amount of input data, which facilitates its implementation , as well as the lack of sophistication in the collection of baseline data;
- The model can be applied not only to assess the effectiveness of transportation of rape, but also for any materials that may be subject to revision.

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