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APPLIED IMPLEMENTATION OF GROUP METHOD OF DATA HANDLING FOR MODELING THE PETROLEUM CONSUMPTION IN UKRAINE

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ПРИКЛАДНА РЕАЛІЗАЦІЯ МЕТОДУ ГРУПОВОГО УРАХУВАННЯ АРГУМЕНТІВ ДЛЯ МОДЕЛЮВАННЯ СПОЖИВАННЯ НАФТИ В УКРАЇНІ

Considered issues of petroleum consumption in Ukraine. The dynamics of petroleum consumption and the proposed guidelines gait efficient use of petroleum. Researched and projected scenarios projected of petroleum consumption in general throughout Ukraine.
Keywords: energy balance; energy conservation; energy efficiency; energy statistics.

Розглянуті проблемні питання споживання нафти по Україні. Проаналізовано динаміку споживання нафти та запропоновані методичні рекомендації ходо ефективного використання нафти. Досліджені та зпрогнозовані прогнозні сценарії споживання нафти загалом по всій Україні.
Ключові слова: енергетичний баланс; енергозбереження; енергоефективність; енергетична статистика.

Рассмотрены проблемные вопросы потребления нефти по Украине. Проанализирована динамика потребления нефти и предложены методические рекомендации путем эффективного использования нефти и нефтересурсов. Исследованы и спрогнозированные прогнозные сценарии потребления нефти в целом по всей Украине.
Ключевые слова: энергетический баланс; энергосбережение; энергоэффективность; энергетическая статистика.

Introduction. The basic foundation of the formation of the Ukraine grid construction is forecasting scenarios for different types of energy and the various criteria for effective use of energy resources. The problem of efficient use of energy resources raises crucial for sustainable economic development against the backdrop of energy saving national economy depends on energy imports, on the one hand, and rising prices for these resources. The solution to this problem is not only with

ensuring energy security, but also with the level of development of regions and the quality of life of its population. [1]

Forecasting of petroleum consumption in Ukraine today is an extremely important issue of strategic importance since conducted through analysis and building predictive models will be possible to develop guidelines for the efficient production and consumption across Ukraine as a whole.

Aim of the work is to develop methodical recomendations on predicting of petroleum consumption in Ukraine through the use of the group method of data handling..

Statement of material and research results. The level of energy has a decisive impact on the economy of the state, resolving social problems and living standards of citizens. Changes in energy prices immediately reflected in all industries, and the rest, the price of the final product. Therefore, instead of quantitative objectives of energy development, which was followed by Ukraine's economy in recent decades, energy has to go to power sustainable economic development, focused on that now developed countries. The said research leads scientists to balance the energy balance of Ukraine, which determined the relevance of the work. In the traditional understanding of energy balance is the ratio between the extraction (production) and consumption of different types of energy resources. [2]

At the heart of the development of fuel and energy balance is a set of strategic statements of economic development, the definition of forecast volumes of energy consumption, based on adopted policies to increase energy efficiency, the development of fuel and energy complex and evaluating opportunities extraction and production of fuel and energy, as well as the formation of areas of import- exporting policy and determine the volume of purchase and sale of energy. [3]

One of the mathematical methods of forecasting is group method of data handling, which allows you to build adequate predictive models of energy consumption in the system of Ukraine's energy balance. [4]

By the use of a group method of data handling and by using modern software were built predictive models of petroleum consumption in the system of Ukraine's energy balance:

1. Predictive system model, 2 lags:

$$Y(1) = 2.2580 + 0,7135*Y1(-1) - 0,0.3915*Y1(-2) + 0,1544*Y3(-1)$$
$$Y(2) = 11.0662 + 0,6253*Y2(-1) + 0,8652*Y2(-2) - 1.0759*Y3(-2) \qquad (1)$$
$$Y(3) = 6.2975 - 0.8208*Y3(-1) - 0.0460*Y3(-2)$$

Table 1

Initial data of petroleum consumption

Year	Petroleum production, total, mln t	Petroleum consumption, along with the processing of export, total, mln t	Petroleum imports, total, mln t
	Y1	Y2	Y3
2006	5,4	19,5	15,5
2007	6,1	23,4	16,8
2008	6,8	25,7	18,3
2009	7,9	29,5	21,9
2010	8,7	32,0	23,3
2011	8,8	33,6	24,6
2012	9,0	34,2	25,1
2013	9,1	34,9	25,7
2014	9,1	35,3	26,3
2015	9,3	36,0	26,7

Results of approximation and forecast for the next 5 years
The first indicator Y1 - Petroleum production, total, mln t is given in Table 2

Table 2

Petroleum production, total, mln t

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
Initial data	5,4	6,1	6,80	7,90	8,70	8,80	9,00	9,10	9,10
Forecast			7,09	7,92	8,44	8,73	8,92	9,08	9,22

Continuation of Table 2

Year	2015	2016	2017	2018	2019	2020
Initial data	9,30					
Forecast	9,35	9,45	13,17	12,35	10,30	9,14

The second indicator Y2 - Petroleum consumption, along with the processing of export, total, mln t is given in Table 3

Table 3

Petroleum consumption, along with the processing of export, total, mln t

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
Initial data	19,5	23,4	25,70	29,50	32,00	33,60	34,20	34,90	35,30
Forecast			25,89	29,43	31,02	32,87	33,72	34,57	34,86

Continuation of Table 3

Year	2015	2016	2017	2018	2019	2020
Initial data	36,00					
Forecast	35,03	35,82	33,47	33,93	30,61	28,99

The third indicator Y3 - Petroleum imports, total, mln t is given in Table 4

Table 4

Petroleum imports, total, mln t

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
Initial data	15,5	16,8	18,30	21,90	23,30	24,60	25,10	25,70	26,30
Forecast			19,34	21,53	23,17	24,42	25,32	25,93	26,29

Continuation of Table 4

Year	2015	2016	2017	2018	2019	2020
Initial data	26,70					
Forecast	26,68	26,68	24,05	24,0	23,14	22,51

Interconnection imports of oil and gas

$$Y1 = 0.9017*Y1(-1) + 0.0775*Y2(-2);$$
$$Y2 = 0.0369*Y1(-1) + 0.6177*Y2(-1) + 0.2820*Y2(-2);$$
(2)

The fourth indicator Y4 - Petroleum imports, total, mln t is given in Table 5

Table 5

Petroleum imports, total, mln t

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Initial data	54,1	52,8	47,5	45.4	42,1	40,3	39.6	37,3	33.6	31,3
Forecast			48,49	45,56	42,61	40,02	37,64	35,47	33,48	31,66

Continuation of Table 5

Year	2016	2017	2018	2019	2020
Initial data					
Forecast	29,79	19,39	21,27	19,49	18,89

Discussion. The basic method of building predictive models of petroleum consumption has been selected the group method of data handling, because through this unique method was possible to build a multidimensional multifactor forecasting model of petroleum consumption in the system of energy balance in Ukraine, which will take into account all the important energy performance in the petroleum industry in the complex. Using group method of data handling to build petroleum consumption forecasting scenarios enabled to view advanced options for the future

development of the sector of the petroleum industry in Ukraine for the next 5 years and made it possible to see clearly at that scenario can develop petroleum industry in Ukraine and were predicted important key indicators. [5]

Conclusion

Through analysis of the dynamics of petroleum consumption in Ukraine and analysis of important indicators such as: petroleum production, total, mln t; petroleum consumption, with export processing, total, mln t; petroleum imports, total, mln t - prediction models were built in the sphere of petroleum industry by using the group method of data handling for the above indicators and made the following conclusions and received such results:
- forecasted the growth of petroleum production from 5,4 mln t in 2006 to 9,14 mln t in 2020.
- forecasted the growth of petroleum consumption from 19.5 mln t in 2006 to 28,99 mln t in 2020.
- forecasted the growth of oil imports from 15,5 mln t in 2006 to 28.23 mln t in 2020.
- forecasted the decreasing of gas imports from 54,1 in 2006 to 18.89 in 2020.

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