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ANALYSIS OF METHODS FOR FORECASTING ELECTRICITY CONSUMPTION OF THE COMPANY MERGANTEX

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Abstract: Predicting the electricity consumption of industrial enterprises is a complex and very important task. Approximate forecasting of electricity consumption by enterprises allows taking appropriate measures for its generation for several seasons ahead. Usually predictability in practice is implemented by expert opinion without any in-depth calculation of all kinds of indicators. Automated calculation allows for more accurate forecasting. The paper proposes a forecasting method using the Excel program.

Keywords: Forecast, electricity consumption, function, seasonality ratio, least square method, forecasting, correlation analysis, generalized indicator, power supply system, industrial enterprises, energy efficiency, energy saving.

Introduction

To predict today there are many different models. But if we need to get the result with a small amount of data for a limited amount of time, is it really possible? Of course, really! When you need to quickly and simply estimate the perspective value, you can use the favorite Excel functional, which will automatically generate values on the basis of existing data. In Excel, we will mainly use tools to evaluate the expected data "Trend", "Growth", "Prediction", "Linear" and Setting up "Package of Analysis / Regression. It should be noted that such a type of forecast does not take into account the influence of internal and external factors, but this method is perfect for what to get an exemplary result on the inertial scenario, so let's say to the ambulance hand. Consider this for examples of the annual generation of electricity of the Mergantex enterprise in the Bukhara region (Fig. 1).

Fig.1. Consumption of electricity enterprise (kW * h) Mergantex for the period 2015-2020.

The first will use the function growth and trend. These functions are designed to extrapolate future values. Since the growth function is based on exponential dependencies, the value is growing more rapidly than when the function used is used, which returns values from linear desigitation by the least squares method. Despite the formulas look equally using various algorithms. In connection with which it allows to use various forecast options. A more realistic and accurate forecast in this case gives the Trend function. Therefore, it would be appropriate to use it in further work. Yes, and in general, the function growth is rather an exception for those who fulfill the forecast, since exponential growth is a rather rare phenomenon. But besides these two functions, there is another one - the prediction. It is similar to the function of the tendency except that it returns one point on the regression line, and not an array that defines its line (Fig. 2).

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
ПОТРЕБЛЕНИЕ ЭЛЕКТРОЭНЕРГИИ КВТЧ	9 443 000	9 569 000	9 118 132	8 722 141	15 622 879	18 129 344				
ТЕНДЕНЦИЯ	9 443 000	9 569 000	9 118 132	8 722 141	15 622 879	18 129 344	17 887 153	19 635 649	21 384 145	23 132 641
РОСТ	9 443 000	9 569 000	9 118 132	8 722 141	15 622 879	18 129 344	17 989 437	20 567 532	23 515 098	26 885 084
ПРЕДСКАЗ	9 443 000	9 569 000	9 118 132	8 722 141	15 622 879	18 129 344	17 887 153	19 635 649	21 384 145	23 132 641
ЛИНЕЙН	9 443 000	9 569 000	9 118 132	8 722 141	15 622 879	18 129 344	17 887 153	19 635 649	21 384 145	23 132 641
ПАКЕТ АНАЛИЗА	9 443 000	9 569 000	9 118 132	8 722 141	15 622 879	18 129 344	17 887 153	19 635 649	21 384 145	23 132 641
ПРЕДСКАЗ (по месяцам)	9 443 000	9 569 000	9 118 132	8 722 141	15 622 879	18 129 344	17 251 460	18 876 728	20 501 997	22 131 058
ПРЕДСКАЗ (по месяцам - оптим)	9 443 000	9 569 000	9 118 132	8 722 141	15 622 879	18 129 344	18 116 515	19 741 783	21 367 052	22 996 113
ПРЕДСКАЗ (по месяцам - пессим)	9 443 000	9 569 000	9 118 132	8 722 141	15 622 879	18 129 344	16 386 405	18 011 674	19 636 942	21 266 003

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
ПОТРЕБЛЕНИЕ ЭЛЕКТРОЭНЕРГИИ КВТЧ	9 443 000	9 569 000	9 118 132	8 722 141	15 622 879	18 129 344				
ТЕНДЕНЦИЯ	9 443 000	9 569 000	9 118 132	8 722 141	15 622 879	18 129 344	17 887 153	19 635 649	21 384 145	23 132 641
РОСТ	9 443 000	9 569 000	9 118 132	8 722 141	15 622 879	18 129 344	17 989 437	20 567 532	23 515 098	26 885 084
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Fig.2. Forecast using functions Growth, trend and prediction

As can be seen from Fig. 2. The results will be such as when using, the function is a tendency. For a small dataset, probably, the predicted function is better. Same time an array of function trend works faster when you have a job with large data sets. Another useful function is Linene. It returns the parameters of linear advancement according to the least squares method.

M-slope and B-segment, these two numbers need to be put in the formula of the equation for a straight line

$$y = mx + b (1)$$

For reference, I would like to note that the linear function has separate functions. This is a slope and a segment function. Thus, Linene accelerates a significant calculation process (Fig.3)

Fig.3. Forecast using functions growth, trend and prediction and linear

We see that we got the same result as with the use of functions, trend and prediction. If we know how to change the values M and B, then it is convenient to do through the linear function, if not, the toprol use the function trend or prediction.

If necessary, you can perform a complex calculation with the help of the superstructure of the analysis / regression package. For convenience, make the calculation on another sheet (Fig. 4).

Fig.4. Forecast using Linene functions

We are looking for an analysis of the data-regression-input interval-recruited energy, a X-year. We will receive more detailed information of regressive analysis. Similarly, the function of Linene (1) is multiplied by the last year to the value of the variable x, and add the intersection of y. What are we looking for in the result? Functions The tendency, predict and analysis package / regression under the conditions of such a task gives the same result. The growth function seems to show the greatest value of the value. To work, we can choose any of these methods, and you can take the average between the data obtained. If you do not want to completely delve into the mathematical essence of this issue, we will advise the use of a tendency or prediction function. This is just an inertial forecast. No matter how does the result affect the factor besides the past amount of electricity consumption. Let's show you a small example of how to complicate the task and get a more accurate result. To do this, we will use these months, and not annual.Task: Use us known data by months, and calculate seasonal unevenness, take into account it in the calculation. As well as, with modeling a few scenario of the forecast of electricity consumption of the enterprise "EUROSNAR".

First of all, we need to calculate seasonal unevenness. To do this, it is necessary to fold the ranges in cells according to the periods known to us and divide us in the amount and multiplied by 12 months. Now, with the help of the Formula Predict, we do something that earlier only now we must multiply the result of prediction on the seasonality ratio that we calculated earlier. To do this, we need to use the function index.

Now we have forecasts for future periods, and the addition to the forecast itself is to calculate the permissible upper and lower bounds, which will allow us to evaluate the optimistic and pessimistic forecast. We need to calculate the permissible deviations of the forecast values. For this, you can confess the function, that is, the confidence interval. Now the principle is simple: what to count the pissimistic forecast then you need from our first results of the forecast to calculate the deviation ratio, if optimistic, then add to our result this deviation (Fig.5).

Fig.5. Forecast using seasonal coefficient

Thus, it was considered forecasts for months to 2028, taking into account seasonal unevenness and for three scenarios. It remains to fold the numbers and receive annual data and add to the table.

Before you 8 forecast options (Fig. 6).

Fig.6. Forecast using 8 functions

Now you can see all this on one schedule. The maximum consumption result will show the growth function, further the optimistic scenario of the forecast for months, then the function is a tendency, predict, linear, analysis package / regression, then the prediction feature for months and the last line on the chart is the pissing forecast scenario for months (Fig.7).
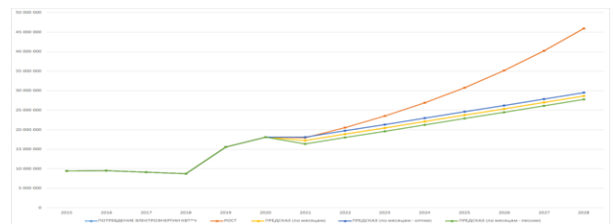

Fig.7. The schedule of the obtained forecast on 8 functions.

Conclusions

1. A simple forecast with the Excel functional is possible.

2. If you need to connect any factors, you can always come up with ways to enable them into account, as we, for example, have taken a monthly calculation of seasonality in three scenarios.

3. Which forecast scenario can be considered true solves a specific specialist in solving a specific task.

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