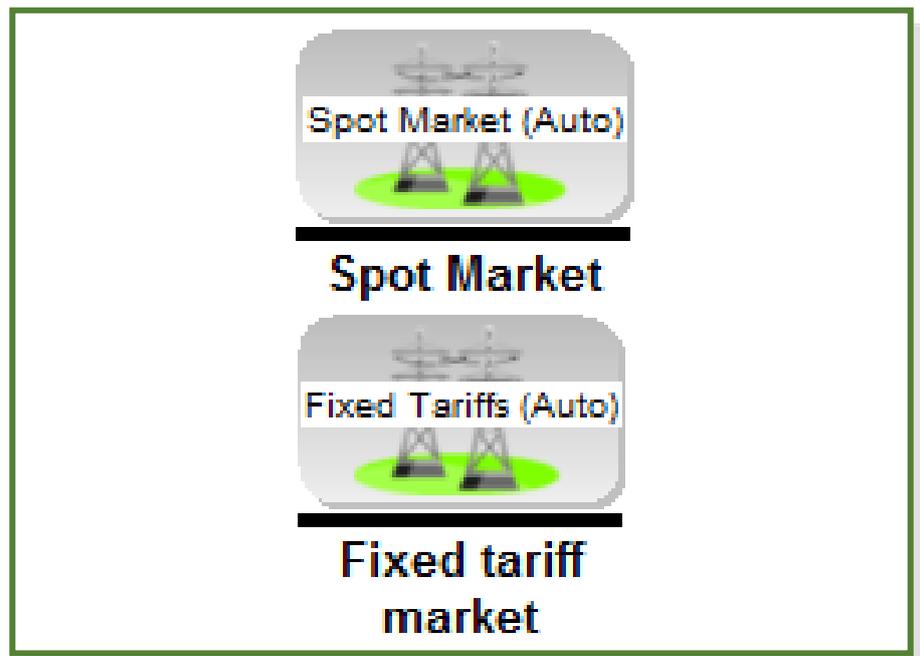




HOW TO GUIDE

***More wholesale markets
in energyPRO***



Preface

energyPRO is a Windows-based modeling software package for combined techno-economic analysis and optimisation of complex energy projects with a combined supply of electricity and thermal energy from multiple different energy producing units.

The unique programming in energyPRO optimises the operations of the plant including energy storage (heat, fuel, cold and electrical storages) against technical and financial parameters to provide a detailed specification for the provision of the defined energy demands, including heating, cooling and electricity use.

energyPRO also provides the user with a detailed financial plan in a standard format accepted by international banks and funding institutions. The software enables the user to calculate and produce a report for the emissions by the proposed project.

energyPRO is very user-friendly and is the most advanced and flexible software package for making a combined technical and economic analysis of multi-dimensional energy projects.

For further information concerning the applications of energyPRO please visit www.emd.dk.

Terms of application

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1. Introduction

With the application of the MARKETS module in energyPRO it is possible to add one or more markets contingent of access to the MARKETS module. This 'How to Guide' details how to get the MARKETS module, examples of how to apply the module including examples of graphical outcome.

2. License to MARKETS

To check if you have a license to MARKETS see "Help" and go to the submenu "About" and a picture similar to that on Figure 1 appears.

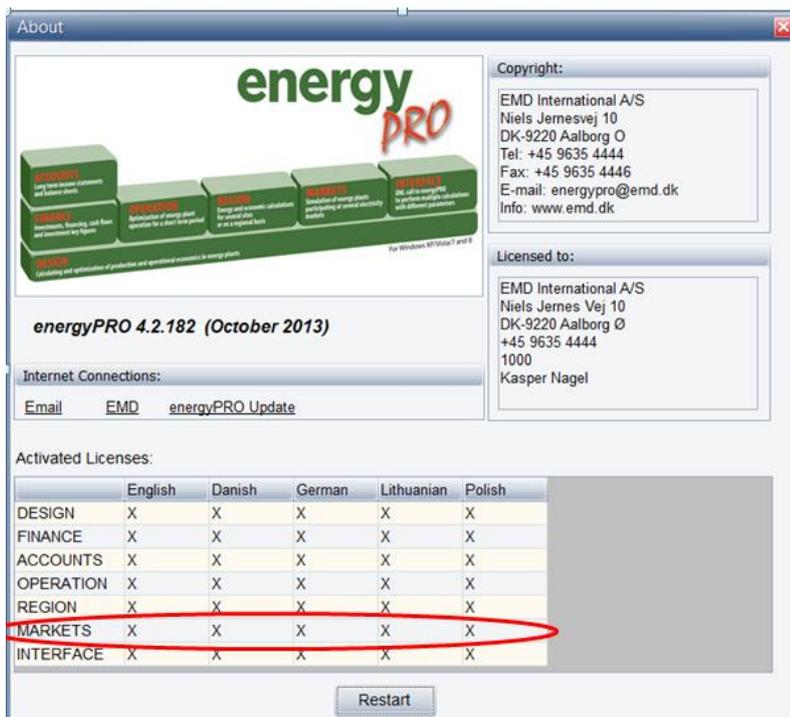


Figure 1. "About" showing access to the MARKETS module

If you do not have a license to the MARKETS module, this can be purchased by contacting the sales department at EMD International: sales@emd.dk

3. Adding a market in energyPRO

To add a market you do this by clicking on the blue cross as shown on Figure 2 or by right-clicking on the "Electricity markets"-folder.

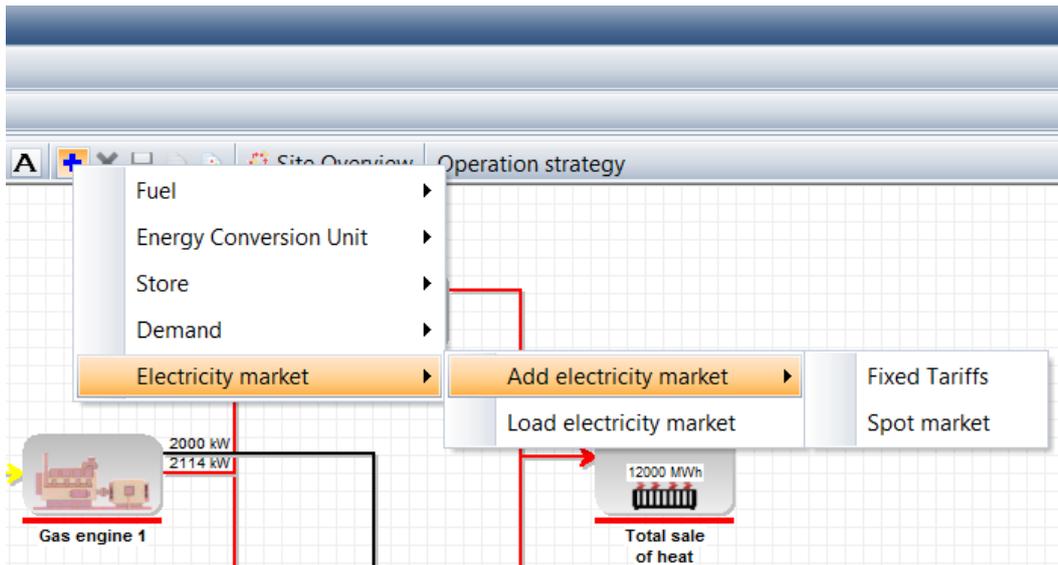


Figure 2. Adding an electricity market

4. More markets in the Operation strategy

With the MARKETS module it is possible to e.g. sell electricity production on spot market or through fixed tariffs and purchase of electricity to cover the electricity demand on a flat rate. Figure 3 shows gas engine 1 selling electricity on the Spot market and gas engine 2 selling electricity on fixed tariffs.

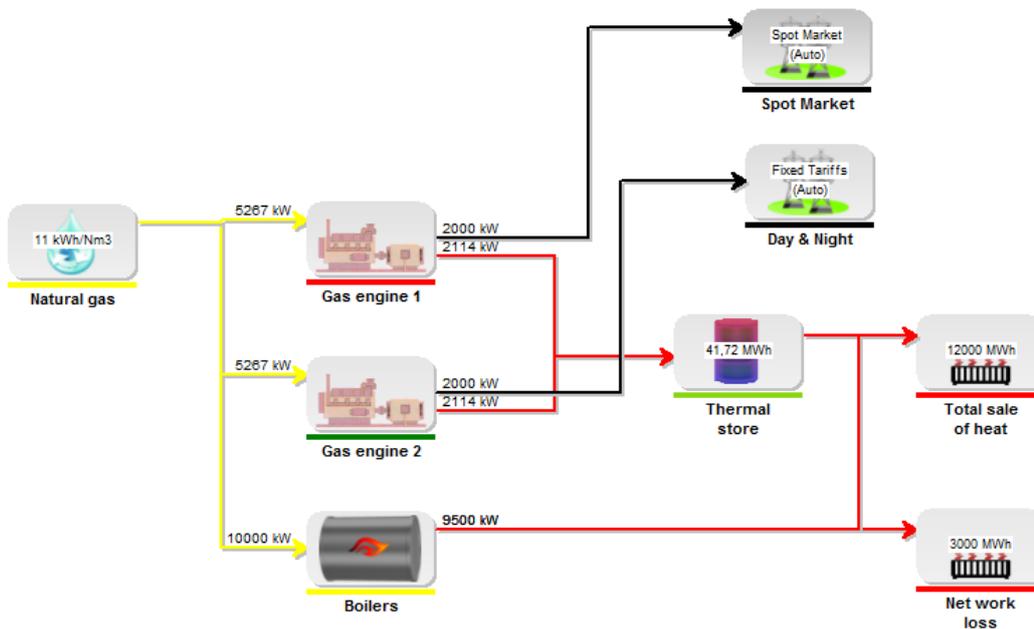


Figure 3. Two gas engines selling electricity at different terms

In the operation strategy you select the electricity market you want to show the Net Heat Production Cost for and a graphical illustration as the one on Figure 4 appears.



Figure 4. "Operation Strategy" lets you choose electricity market

In the "Operation Strategy" you can furthermore see the Net Heat Production Cost for each of the individual production units and thus also at what production unit that has the lowest production cost at either Day or Night as shown on Figure 5.

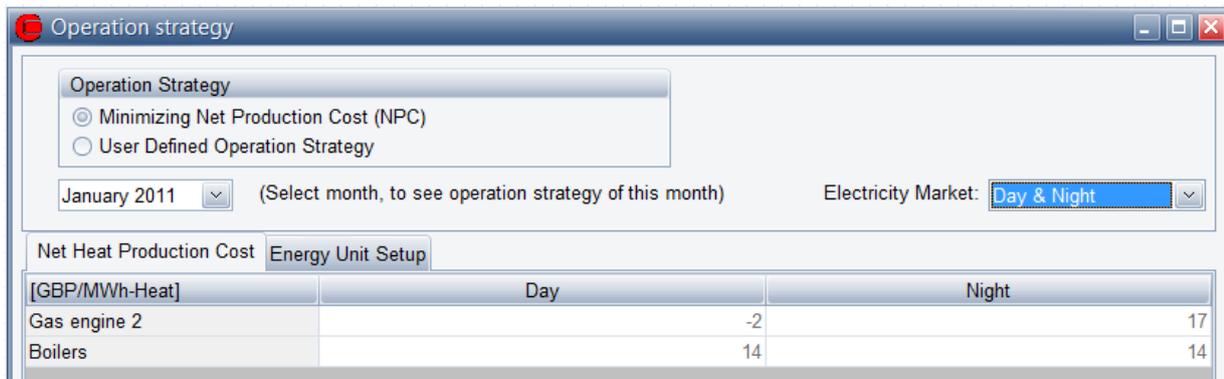


Figure 5. Net Heat Production Cost for gas engine 2 and boilers

5. Time series in the Operation strategy

It is also possible to include time series in the payments which naturally affects the operation strategy as shown on Figure 6.

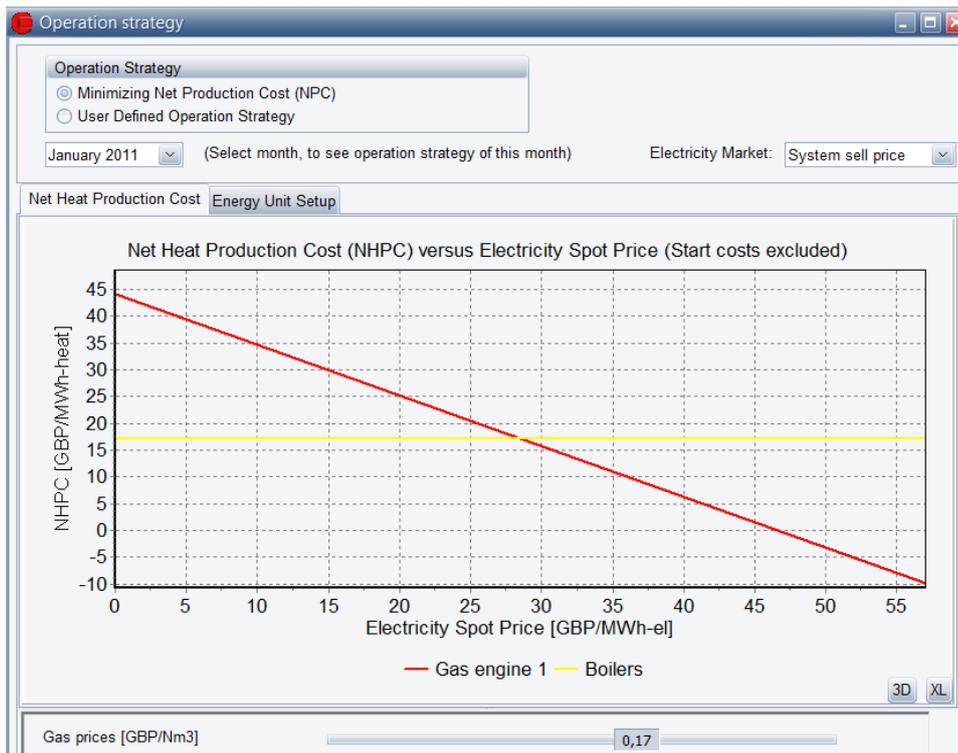


Figure 6. Including time series as a payment

By using the slider for Gas prices you can see the net heat production cost versus the spot prices at a given natural gas price. The range of the slider represents the range of the time series in the selected month.

6. Prognosis

By double-clicking on market in energyPRO a similar picture as the one on Figure 7 appears and lets the user choose the time series for both the spot market prices and the prognosis.

Each spot market in energyPRO is defined by two time series. The first is the actual spot price. The second one is a spot price prognosis. A special case is if the two time series are identical indicating full knowledge to future spot prices.

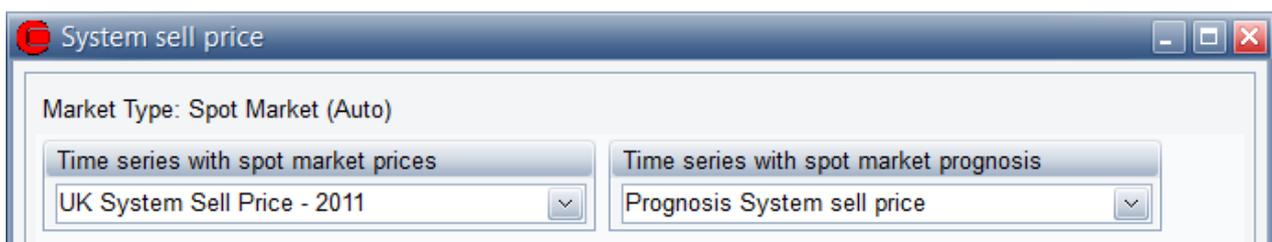


Figure 7. Select time series spot market prices and prognosis

When creating prognoses the user has two options. The first one is to create your own prognosis and import them into energyPRO. The second one is to create a new time series function in the time series function folder. Of special interest here is the "Interval"-function, this function creates a prognosis based upon an existing time series and information of how many intervals this times series should be divided into after subtraction of a percentage of extreme values (high prices) as shown below.

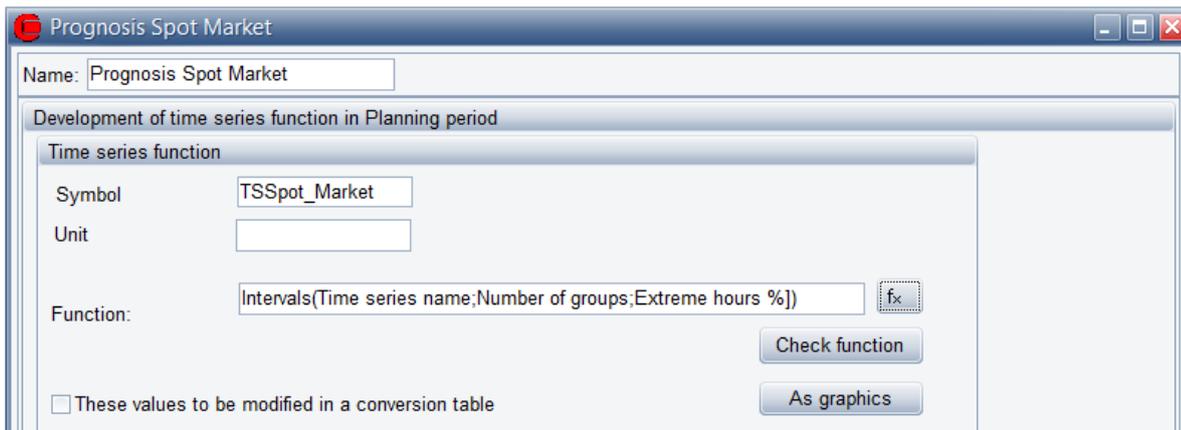


Figure 8. Intervals function and change of number of intervals

In Figure 9 is an example, where the original spot price time series (System sell price) has been used for generating a prognosis with 5 intervals and five 5 % extreme prices.

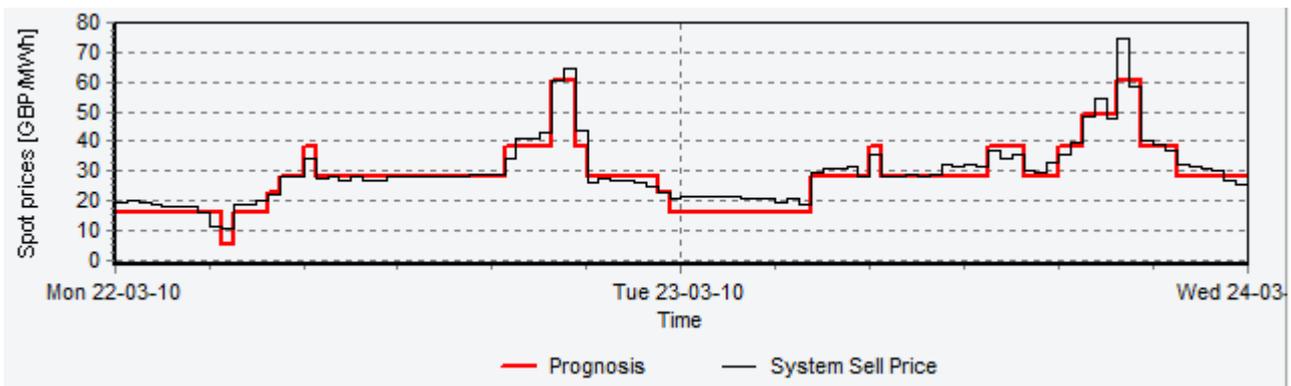


Figure 9. Graph for spot market prices and a spot market price prognosis

7. Production, graphic

To view a visualization of the results, open the “Production, graphic”-report as seen on Figure 10. The second graph from the top shows the priorities of all the production units. Have in mind, that the lower priority number, the better the priority.



Figure 10. "Production, graphic"-report

You can also choose to see any of the time series or time series functions. In the example on Figure 10, the spot price time series is shown. Notice that a high spot price result in a low net production cost for gas engine 1. Gas engine 2 is on a fixed tariff market and therefore unaffected.