

HOW TO GUIDE

# Loading wholesale electricity prices into energyPRO



**energy**PRO



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## **About energyPRO**

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 approved by international banks and funding institutions. The software enables the user to calculate and produce a report of 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](http://www.emd.dk).

## **Terms of application**

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# Contents

When modelling electricity producing units in energyPRO, it is relevant to know how to download and incorporate electricity market prices into energyPRO. This guide will provide a detailed step-by-step manual on how to download market data from either Nord Pool's or ELEXON's homepage and how to use these data in energyPRO.

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# Download wholesale prices from Nord Pool

Nord Pool is Europe's leading power market and offers a long range of market prices in both day-ahead and intraday markets across nine European countries. This guide will go through the steps in downloading data from Nord Pool's homepage and how to copy the data to a time series in energyPRO.

The first step is to open the website: [www.nordpoolspot.com](http://www.nordpoolspot.com). Next, click "Market data" in the menu, as shown in Figure 1.

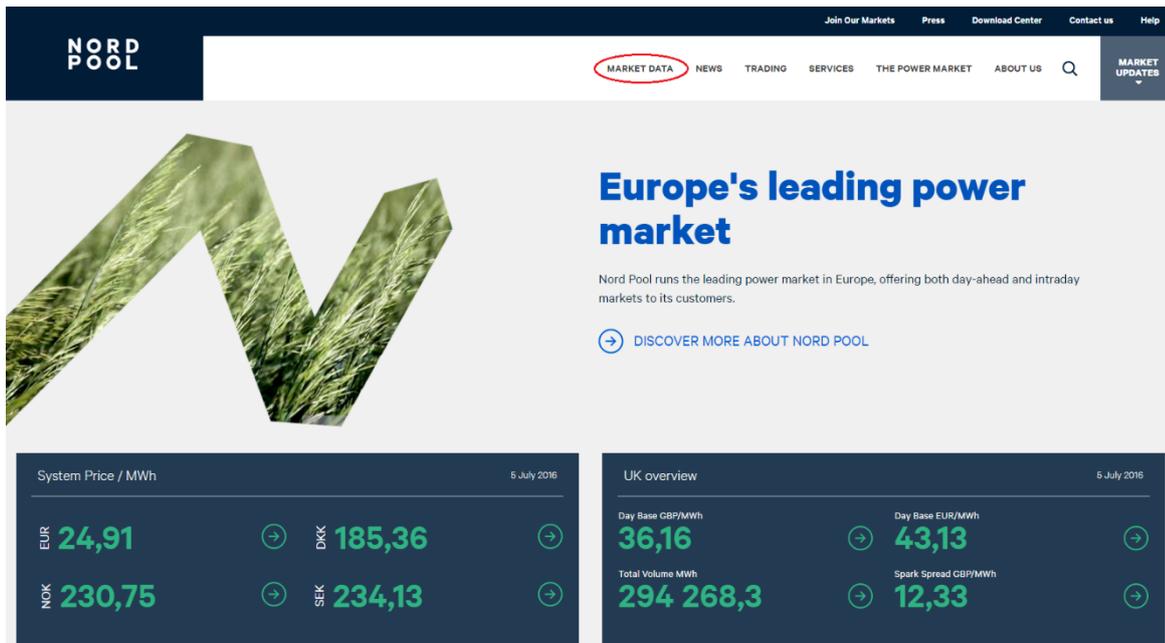


Figure 1. Nord Pool's homepage

In the left-hand side, click "Data Downloads" and the page shown in Figure 2 will appear.

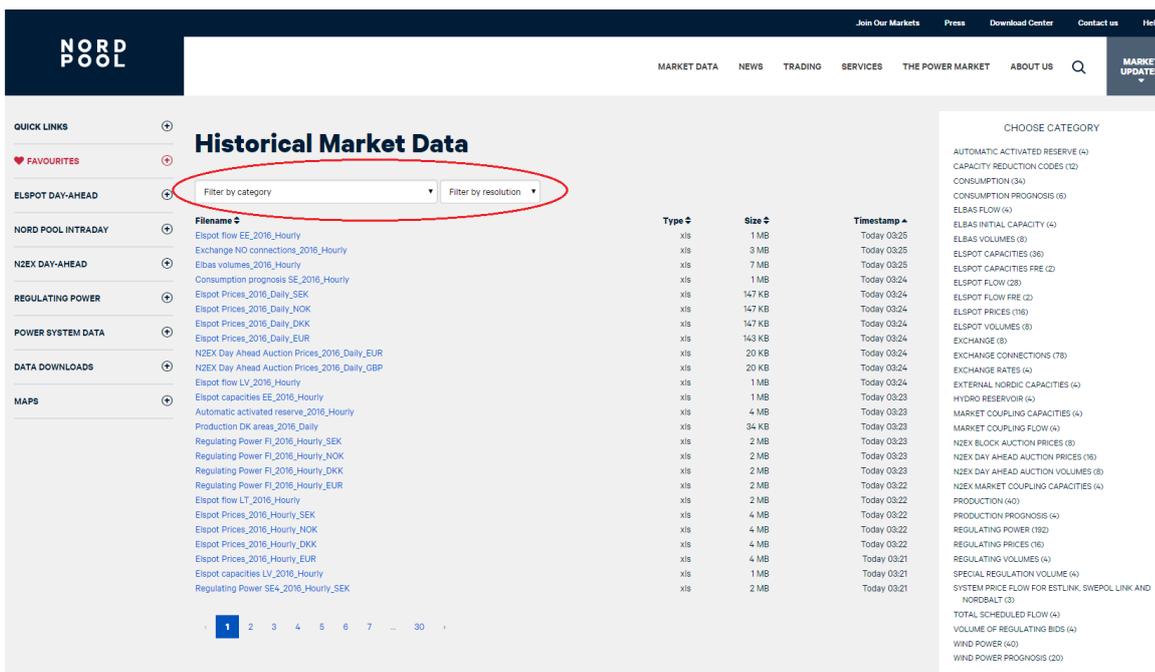


Figure 2. Select from the dropdown menu the type of data you wish to download

Select "Elspot Prices" and "Hourly" in the two drop-down menus and the available data will be filtered, showing only hourly spot prices.

Click on the data you are interested in and begin to download the data. Once downloaded, open the xls.file in a spreadsheet application. You will now see the following data.

1	Elspot Prices in EUR/MWh																		
2	Data was last updated 12-01-2016																		
3	Hours	SYS	SE1	SE2	SE3	SE4	FI	DK1	DK2	Oslo	Kr.sand	Bergen	Molde	Tr.heim	Tromsø	EE	LV	LT	FRE
4	01-01-2015 00-01	27,48	27,38	27,38	27,38	27,38	27,38	25,02	27,38	27,4	27,4	27,4	28,16	28,16	28,16	27,38	30,03	30,03	
5	01-01-2015 01-02	26,68	23,37	23,37	23,37	23,37	23,37	18,29	18,29	27,07	27,07	27,07	28,05	28,05	28,05	23,37	29,59	29,59	
6	01-01-2015 02-03	26,23	19,33	19,33	19,33	19,33	19,33	16,04	16,04	26,93	26,93	27,98	27,98	27,98	27,98	19,33	29,56	29,56	
7	01-01-2015 03-04	25,95	17,66	17,66	17,66	17,66	14,6	14,6	26,83	26,83	26,83	27,94	27,94	27,94	17,66	29,5	29,5		
8	01-01-2015 04-05	25,91	17,53	17,53	17,53	17,53	14,95	14,95	26,81	26,81	26,81	27,95	27,95	27,95	17,53	17,53	17,53		
9	01-01-2015 05-06	26,24	18,07	18,07	18,07	18,07	14,5	14,5	26,97	26,97	26,97	28,07	28,07	28,07	18,07	30,52	30,52		
10	01-01-2015 06-07	26,81	25,23	25,23	25,23	25,23	10,76	10,76	27,07	27,07	27,07	28,39	28,39	28,39	25,23	30,51	30,51		
11	01-01-2015 07-08	26,82	26,8	26,8	26,8	26,8	12,01	12,01	26,8	26,8	26,8	28,48	28,48	28,48	26,8	30,52	30,52		
12	01-01-2015 08-09	26,96	26,97	26,97	26,97	26,97	12,39	12,39	26,97	26,97	26,97	28,47	28,47	28,47	26,97	30,53	30,53		
13	01-01-2015 09-10	26,74	26,29	26,29	26,29	26,29	14,04	14,04	26,98	26,98	26,98	28,49	28,49	28,49	26,29	26,29	26,29		
14	01-01-2015 10-11	26,75	26,06	26,06	26,06	26,06	14,68	14,68	27,06	27,06	27,06	28,5	28,5	28,5	26,06	26,06	26,06		
15	01-01-2015 11-12	26,77	25,56	25,56	25,56	25,56	16,08	16,08	27,13	27,13	27,13	28,53	28,53	28,53	25,56	25,56	25,56		
16	01-01-2015 12-13	26,79	25,91	25,91	25,91	25,91	16,08	16,08	27,09	27,09	27,09	28,57	28,57	28,57	25,91	25,91	25,91		
17	01-01-2015 13-14	26,59	25,42	25,42	25,42	25,42	16,05	16,05	25,42	27,01	27,01	28,6	28,6	28,6	25,42	25,42	25,42		
18	01-01-2015 14-15	27,01	26,78	26,78	26,78	26,78	16,04	16,04	26,78	26,98	26,98	28,65	28,65	28,65	26,78	45,01	45,01		
19	01-01-2015 15-16	27,62	27,51	27,51	27,51	27,51	16,1	16,1	27,51	27,51	27,51	28,7	28,7	28,7	27,51	45,08	45,08		
20	01-01-2015 16-17	28,29	28,32	28,32	28,32	28,32	23,93	28,32	28,32	28,32	28,32	28,58	28,58	28,58	28,32	46	46		
21	01-01-2015 17-18	28,34	28,36	28,36	28,36	28,36	26,9	28,36	28,36	28,36	28,36	28,55	28,55	28,55	28,36	46	46		
22	01-01-2015 18-19	28,22	28,18	28,18	28,18	28,18	26,36	28,18	28,18	28,18	28,18	28,52	28,52	28,52	28,18	46,01	46,01		
23	01-01-2015 19-20	27,91	27,81	27,81	27,81	27,81	27,81	23,98	27,81	27,81	27,81	28,51	28,51	28,51	27,81	46,02	46,02		
24	01-01-2015 20-21	27,54	27,46	27,46	27,46	27,46	16,09	16,09	27,46	27,46	27,46	28,63	28,63	28,63	27,46	45,08	45,08		
25	01-01-2015 21-22	27,13	27,06	27,06	27,06	27,06	14,08	14,08	27,06	27,06	27,06	28,78	28,78	28,78	27,06	31,57	31,57		
26	01-01-2015 22-23	26,92	26,4	26,4	26,4	26,4	12,44	12,44	27	27	27	28,66	28,66	28,66	26,4	28,05	28,05		
27	01-01-2015 23-00	25,96	18,36	18,36	18,36	18,36	0,04	0,04	26,83	26,83	26,83	28,49	28,49	28,49	18,36	28,07	28,07		
28	02-01-2015 00-01	24,79	17,78	17,78	17,78	17,78	17,78	-12,11	-12,11	26,71	26,71	28,16	28,16	28,16	17,78	28,1	28,1		
29	02-01-2015 01-02	22,23	9,62	9,62	9,62	9,62	9,62	-19,63	-19,63	26,41	26,41	28,22	28,22	28,22	9,62	9,62	9,62		

Figure 3. Hourly Elspot prices from Nord Pool.

The data consists of hourly spot prices in different areas, indicated with an area code. Hourly prices for the West Denmark price area can be found under "DK1".

Depending on the settings in your Window's Regional and Language Options in Control Panel, this format is probably not readable by energyPRO. If Windows uses the following date and time format: (dd-mm-yyyy) and (hh:mm), then the data should be divided into three columns: Date (dd-mm-yyyy), Time (hh:mm) and Value, as shown in in Figure 4.

If you are unsure how to change the data format in Excel to the needed data format, please refer to "Annex: How to change the comma-separated CSV-file to energyPRO format" on page 12.

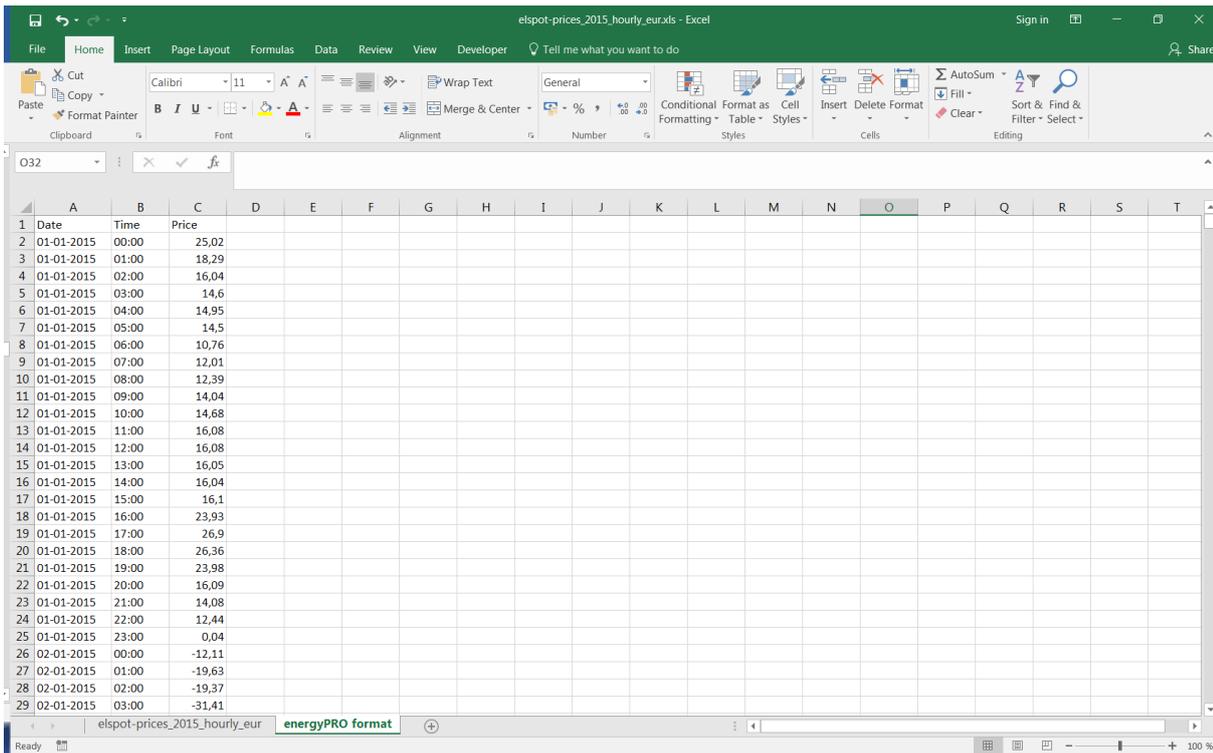


Figure 4. Data in a readable format

Once the data is in the correct format, mark the date, time and price columns and copy the data. The data can be pasted into a "Time series" in energyPRO, and you now have the DK1 electricity prices to be used in your model as seen in Figure 5.

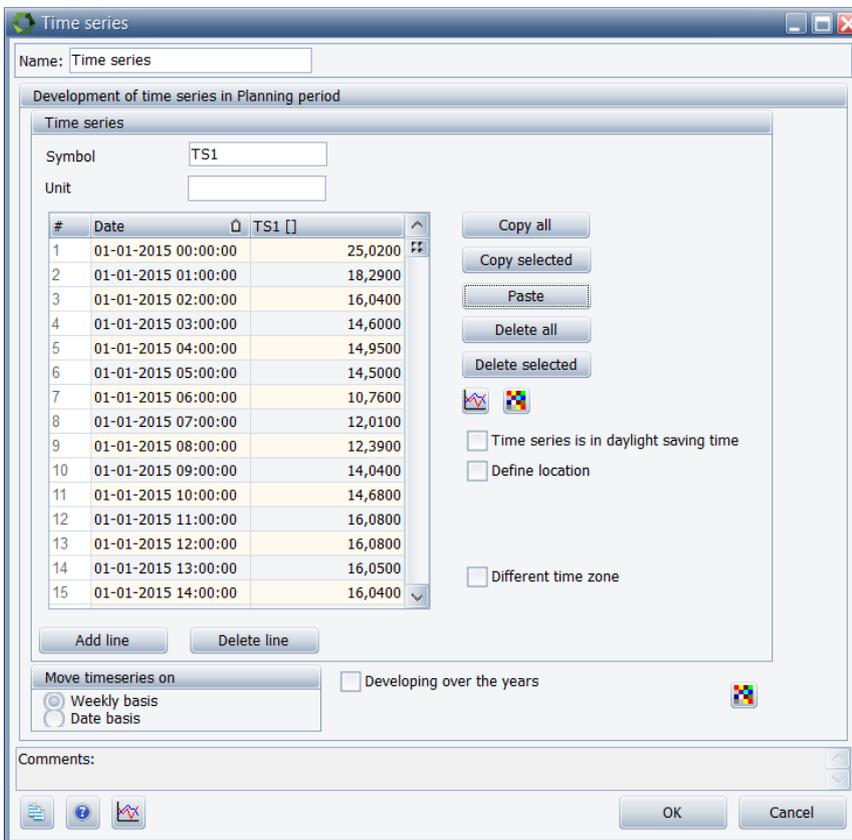


Figure 5. Data from Nord Pool inserted into a time series in energyPRO

# Download wholesale prices from ELEXON

Several types of pricing data for the UK electricity market are centrally available on the website [www.elexonportal.co.uk](http://www.elexonportal.co.uk). In order to get access to the market data, one first has to register on the homepage. The link for registering can be found in the right side of the website as shown in Figure 6.

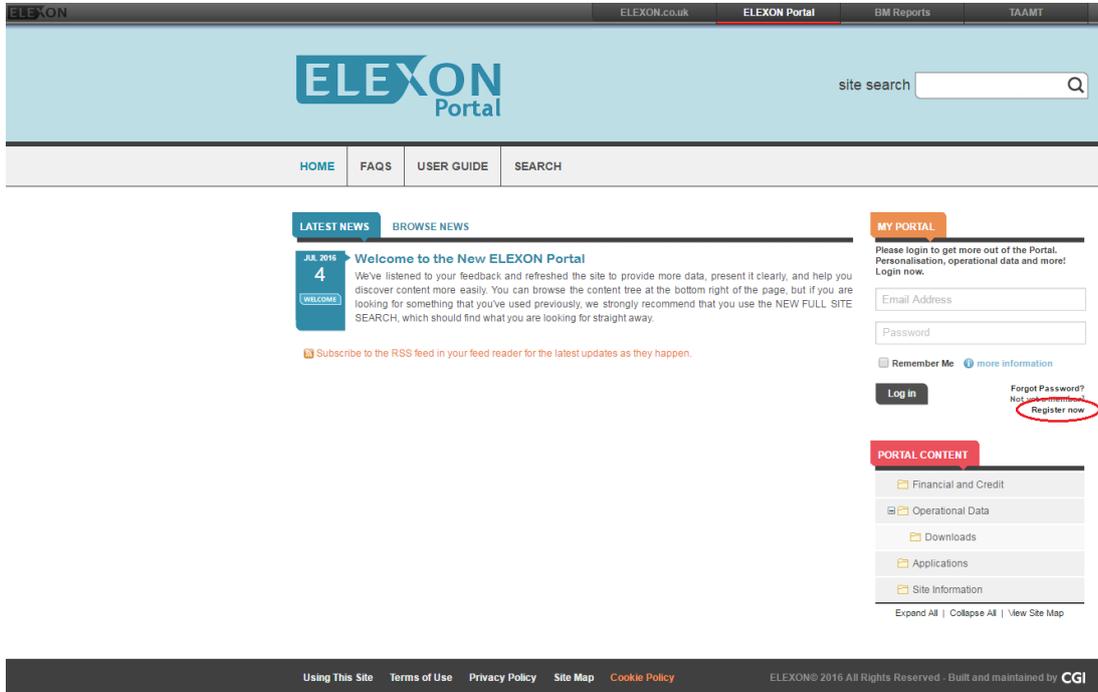


Figure 6. Main page of ELEXON Portal

This opens the following page, where name, phone number, email, etc. have to be entered.

	ELEXON.co.uk	<b>ELEXON Portal</b>	BM Reports	TAAMT
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site search

HOME	FAQS	USER GUIDE	SEARCH
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NEW USER REGISTRATION

### New User Registration

Thank you for deciding to create an account. Please enter your details below.

Please be aware that once you have registered your account, an activation email will be sent to you, and you will need to follow the instructions in order to activate your account (we need to confirm that you are the owner of the email address that you provide). Your account will expire in one week if it is not activated.

By registering your account, you acknowledge that you accept the website's [terms of use](#).

If you do not receive your activation email (it may be incorrectly be seen as "spam" and quarantined by your email provider), you can contact the BSC Service Desk on 0870 010 6950 to arrange a manual activation.

**Your Email Address (This Will Be Your Username)**  
 Your username for the site will be your email address. Enter it here. Please ensure that this is a valid email address - we will be sending an email to you in order to confirm your registration and unlock your account once it is created.

**Your First And Last Names**  
 Please enter your first and last names.

**Your Chosen Password**  
 Please enter and confirm your chosen password. Your password must be at least 6 characters long, and must contain at least one UPPERCASE character, one lower case character, and one number.

**Your Telephone Contact Number**  
 Please provide your telephone number. Like all information provided here, your number will not be passed on to any third parties.

**Your "Secret Question"**  
 If you ever forget your password or accidentally lock your account, you will be able to unlock it again by providing the answer to your secret question. Enter a question that only you would know the answer to.



MY PORTAL

Please login to get more out of the Portal. Personalisation, operational data and more! Login now.



Remember Me [more information](#)

[Forgot Password?](#)  
 Not yet a member?  
[Register now](#)

PORTAL CONTENT

- Financial and Credit
- Operational Data
- Downloads
- Applications
- Site Information

[Expand All](#) | [Collapse All](#) | [View Site Map](#)

<a href="#">Using This Site</a>   <a href="#">Terms of Use</a>   <a href="#">Privacy Policy</a>   <a href="#">Site Map</a>   <a href="#">Cookie Policy</a>	ELEXON® 2016 All Rights Reserved - Built and maintained by <b>CGI</b>
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Figure 7. Fill out the required information to register.

You will now have to follow the instructions for registering, and after having successfully registered you should be able to login in the right side of the website in the section "My portal".

After logging in, new submenus will be available in the menu "Portal content" on the right side of the website. There are two price data on this site that could be relevant for an energyPRO model. These are the "System Prices", which covers prices on the balancing market and the other is "Market Index Price", which is calculated by ELEXON and reflects the price of the wholesale electricity in the short-term market. The approach for retrieving these data is the same, and in this document retrieving "Market Index Data" is shown as an example.

In order to download the "Market Index Price" data you will need to open the menu "Financial and credit" and then choose "Market Index Price and Volume" as seen on Figure 8.

The screenshot shows the ELEXON Portal website. At the top, there is a navigation bar with links for ELEXON.co.uk, ELEXON Portal (highlighted), BM Reports, and TAAMT. Below this is the ELEXON Portal logo and a site search box. A secondary navigation bar contains links for HOME, FAQs, USER GUIDE, SEARCH, and FEEDBACK. A breadcrumb trail indicates the current location: YOU ARE HERE > Content > Financial and Credit.

The main content area is titled "Financial and Credit" and includes a description: "This section provides information on previous Trading Charges calculated for your BSC Party, Advice Notices issued and Credit Cover lodged/used." Below this is a table with the following data:

Title	Last Modified
Credit / Credit Alerting	-
System Prices	-
FAA Forms	28/11/2011
FAA Payment Calendars	19/02/2016
Funding Shares	25/01/2012
Market Financial Information	25/01/2012
<b>Market Index Price and Volume</b>	03/07/2016
Residual Cashflow Reallocation Cashflow	03/07/2016

On the right side, there is a "MY PORTAL" section with user information for Christian Frandsen and a list of bookmarks, including "Market Index Price and Volume". Below this is a "PORTAL CONTENT" sidebar with a list of categories, where "Financial and Credit" is circled in red. A "log out" button is also visible.

At the bottom of the page, there is a footer with links for "Using This Site", "Terms of Use", "Privacy Policy", "Site Map", and "Cookie Policy", along with the copyright notice "ELEXON© 2016 All Rights Reserved - Built and maintained by CGI".

Figure 8. Price data relevant for energyPRO

This brings out the website shown below.

ELEXON.co.uk **ELEXON Portal** BIM Reports TAAMT

**ELEXON Portal** site search

HOME FAQs USER GUIDE SEARCH FEEDBACK

YOU ARE HERE > Content > Financial and Credit > Market Index Price and Volume

**VIEW ARTICLE**

**Market Index Price and Volume** Add Subscription Add Bookmark

Last modified by Automatic System Update - 03/07/2016 15:00:06  
 Permalink: www.elexonportal.co.uk/marketindexpricedata

Market Index Data (MID) is used in the calculation of the Reverse Price for each Settlement Period, and reflects the price of wholesale electricity in the short-term market. You can find an explanation of how it is calculated and used in the Market Index Definition Statement (MIDS).

You can view Market Index Data by year since 2003 in the spreadsheets below. The file for the current year is updated automatically every day. The modification time on this article is the last time that the file was updated.

File	Size	Date	Basket
mid_2003.csv	984 KB	01/09/2010	Add
mid_2004.csv	940 KB	01/09/2010	Add
mid_2005.csv	664 KB	01/09/2010	Add
mid_2006.csv	665 KB	01/09/2010	Add
mid_2007.csv	665 KB	01/09/2010	Add
mid_2008.csv	669 KB	01/09/2010	Add
mid_2009.csv	666 KB	01/09/2010	Add
mid_2010.csv	561 KB	08/01/2011	Add
mid_2011.csv	933 KB	02/12/2011	Add
mid_2012.csv	1 MB	22/01/2013	Add
mid_2013.csv	1 MB	26/03/2014	Add
mid_2014.csv	1 MB	21/04/2015	Add
mid_2015.csv	1 MB	04/02/2016	Add
mid_2016.csv	543 KB	03/07/2016	Add

**MY PORTAL**

Christian Frandsen  
 My Profile  
 My Download Basket (empty)  
 Bookmarks (manage)  
 Market Index Price and Volume  
 Market Financial Information  
 ELEXON Portal User Guide  
 Residual Cashflow Realloca...  
 SSP/SBP/NIV

log out

**PORTAL CONTENT**

- BMRS API & Data Push
- Financial and Credit**
  - Credit / Credit Alerting
  - System Prices
- LDSO Data
  - National Grid Data
  - Operational Data
  - Applications
  - Site Information

Expand All | Collapse All | View Site Map

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Figure 9. Market index Price and Volume

Find the year of data you are interested in and press on the corresponding file. You will now have a comma-separated CSV-file, which you can open with a spreadsheet application e.g. Microsoft Excel. If your spreadsheet application does not separate the data into columns automatically, the format will have a similar format to that shown on the below figure.

Settlement Date	Settlement Period	Market Index Data Provider Id	Market Index Volume(MWh)	Market Index Price(€/MWh)
01-Jan-10,1		APXMIDP	680	32.91
01-Jan-10,2		APXMIDP	734.5	33.25
01-Jan-10,3		APXMIDP	682.5	32.07
01-Jan-10,4		APXMIDP	555.5	31.99
01-Jan-10,5		APXMIDP	520.5	31.47
01-Jan-10,6		APXMIDP	750	30.8
01-Jan-10,7		APXMIDP	532	29.2
01-Jan-10,8		APXMIDP	267	28.65
01-Jan-10,9		APXMIDP	261	27.53
01-Jan-10,10		APXMIDP	187.5	27.45
01-Jan-10,11		APXMIDP	189.5	27.38
01-Jan-10,12		APXMIDP	174.5	27.04
01-Jan-10,13		APXMIDP	200.5	27.59
01-Jan-10,14		APXMIDP	337.5	27.68
01-Jan-10,15		APXMIDP	1186	26.27
01-Jan-10,16		APXMIDP	868.5	26.33
01-Jan-10,17		APXMIDP	838.5	26.26
01-Jan-10,18		APXMIDP	1277	26.12
01-Jan-10,19		APXMIDP	636	26.59
01-Jan-10,20		APXMIDP	563.5	26.68
01-Jan-10,21		APXMIDP	559.5	26.67
01-Jan-10,22		APXMIDP	555	26.44
01-Jan-10,23		APXMIDP	663	28.94
01-Jan-10,24		APXMIDP	635.5	29

Figure 10. Non-separated data from Elexon Portal in Excel

This format is however not readable by energyPRO, so it will have to be changed in order for it to be similar to that shown on Figure 10. If you are unsure how to change the data format in Excel to the needed data format, please refer to Annex: How to change the comma-separated CSV-file to energyPRO format on page 12.

The data must be in the following format.

Settlement Date	Settlement Period	Market Index Data Provider Id	Market Index Volume(MWh)	Market Index Price(€/MWh)
01/01/2010	00:00	APXMIDP	680	32.91
01/01/2010	00:30	APXMIDP	734.5	33.25
01/01/2010	01:00	APXMIDP	682.5	32.07
01/01/2010	01:30	APXMIDP	555.5	31.99
01/01/2010	02:00	APXMIDP	520.5	31.47
01/01/2010	02:30	APXMIDP	750	30.8
01/01/2010	03:00	APXMIDP	532	29.2
01/01/2010	03:30	APXMIDP	267	28.65
01/01/2010	04:00	APXMIDP	261	27.53
01/01/2010	04:30	APXMIDP	187.5	27.45
01/01/2010	05:00	APXMIDP	189.5	27.38
01/01/2010	05:30	APXMIDP	174.5	27.04
01/01/2010	06:00	APXMIDP	200.5	27.59
01/01/2010	06:30	APXMIDP	337.5	27.68
01/01/2010	07:00	APXMIDP	1186	26.27
01/01/2010	07:30	APXMIDP	868.5	26.33
01/01/2010	08:00	APXMIDP	838.5	26.26
01/01/2010	08:30	APXMIDP	1277	26.12
01/01/2010	09:00	APXMIDP	636	26.59
01/01/2010	09:30	APXMIDP	563.5	26.68
01/01/2010	10:00	APXMIDP	559.5	26.67
01/01/2010	10:30	APXMIDP	555	26.44
01/01/2010	11:00	APXMIDP	663	28.94
01/01/2010	11:30	APXMIDP	635.5	29

Figure 11. Data format applicable in energyPRO

Once the format is correct, mark the date, time and price column and copy it. The prices can now be pasted into a "Time series" in energyPRO. You now have the UK electricity price data in your energyPRO model as can be seen in .

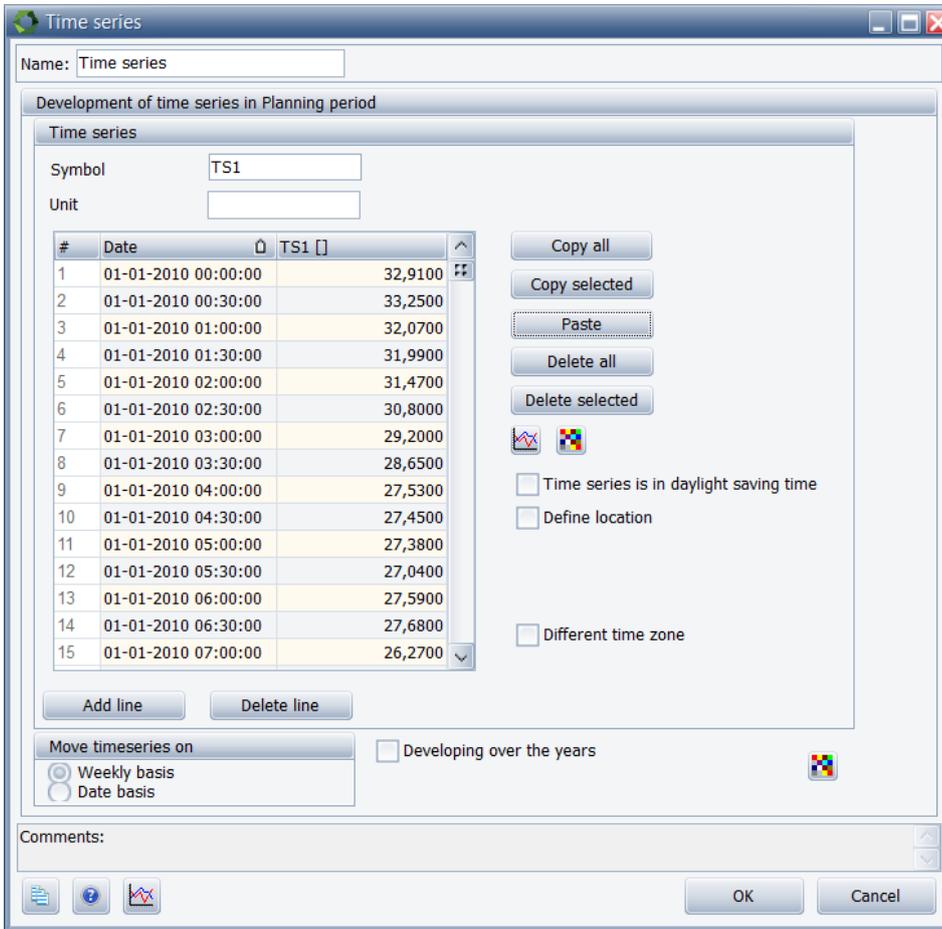


Figure 12. Data from ELEXON Portal inserted into a time series in energyPRO

## Annex: How to change the comma-separated CSV-file to energyPRO format

First mark the column with all the data (typical it will be column A). Then go to the menu "Data" and choose "Text to Columns", as shown on Figure 13.

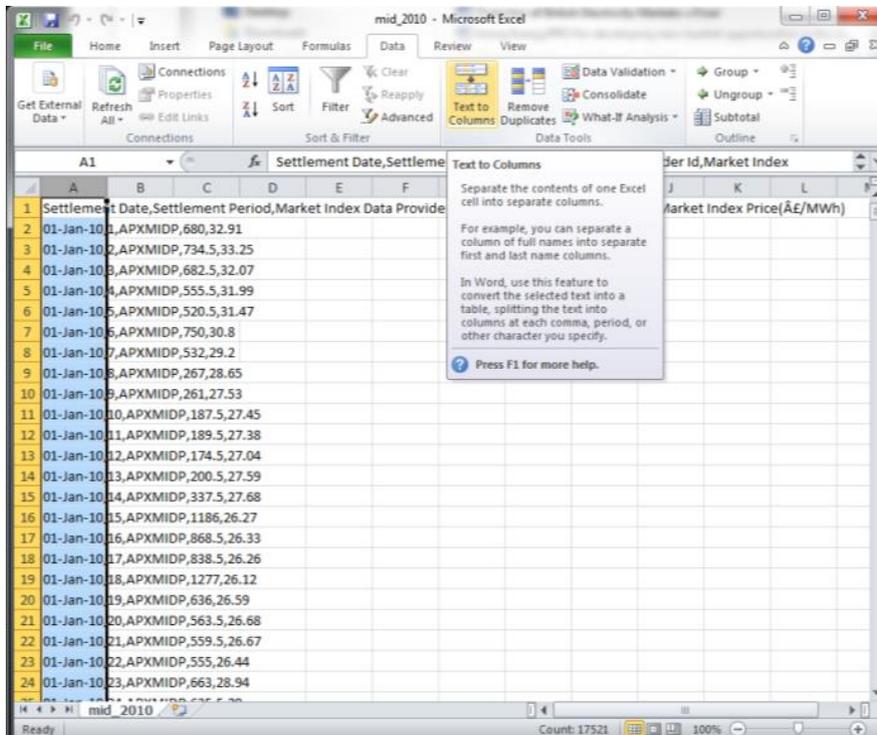


Figure 13. Choose column to be separated

This will bring up the "Convert Text to Columns Wizard" as shown below.

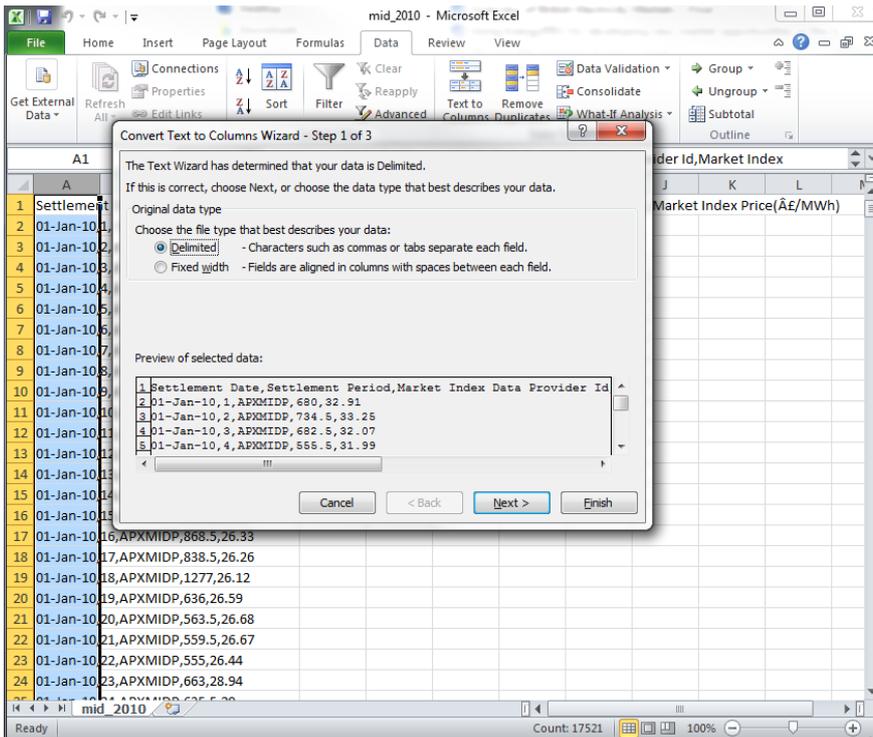


Figure 14. "Convert Text to Columns Wizard"

In step 1, choose "Delimited", if this option is not already chosen, and press "Next".

This will bring you to step 2, where it is possible to choose what kind of delimiter that are used in the cells. Here choose "Comma" under the "Delimiters" as shown below.

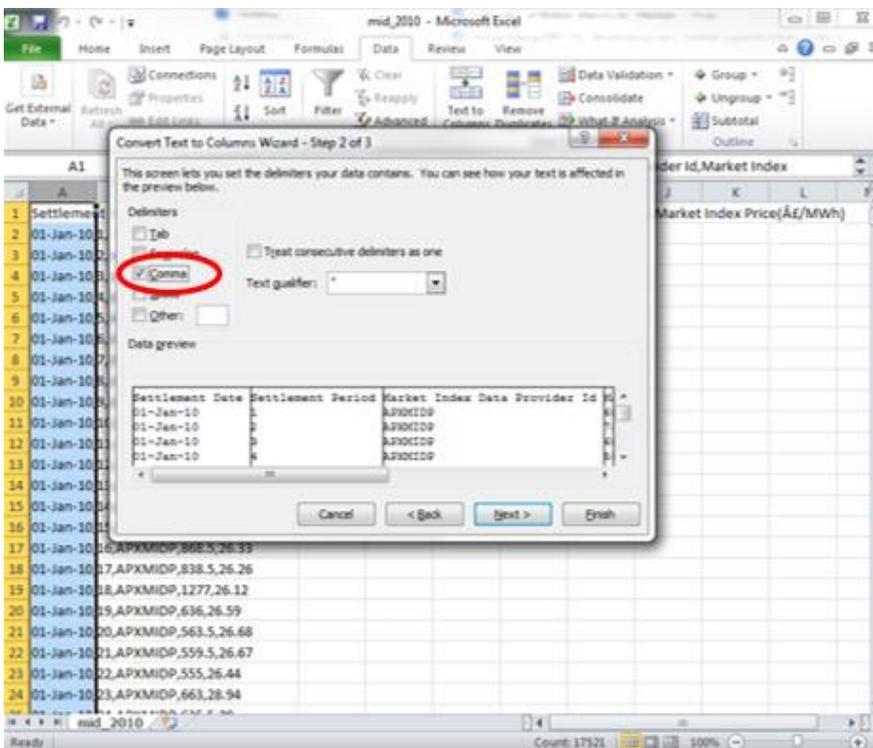


Figure 15. Choose 'Comma' as Delimiters

Now press "Finish" and the wizard will have separated the data into individual columns, as shown on Figure 16.

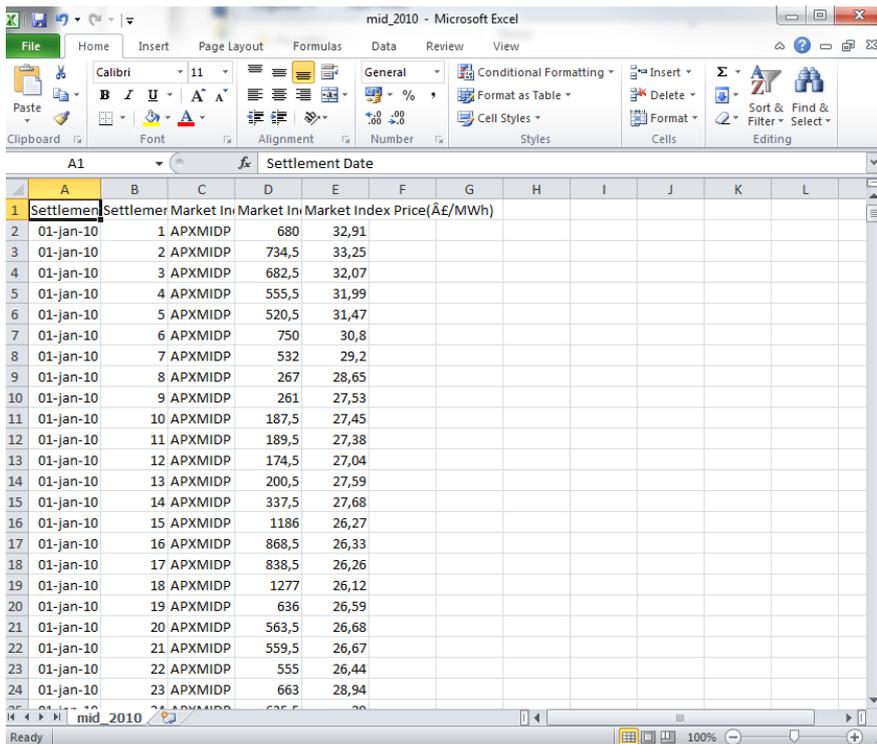


Figure 16. The column has now been separated

**Note:** If the "Region and Language" settings in Windows are using comma as the decimal symbol, then Excel will not recognize the UK prices as numbers. There are several ways to fix this. However, one of the easiest is to mark the cells with the prices. Then open "Replace" under "Find & Select". In this window write: "." in the "Find what" field, and in "Replace with" write: "," and then press "Replace all". Excel will then search for all the dots and replace them with commas in the selected cells, and Excel will now recognize the prices as numbers. Alternatively, you can change the decimal symbol to dot in the "Region and Language" settings in Windows "Control Panel".

The next step is to change the date and time formats to the format that energyPRO needs. One way of doing this is by first changing the format of the date. The date should be changed to what Excel refers to as Short Date. First mark the column with the "Settlement Date" then in the "Home" tab of Excel choose the number format dropdown menu and press "Short Date" as shown on Figure 17.

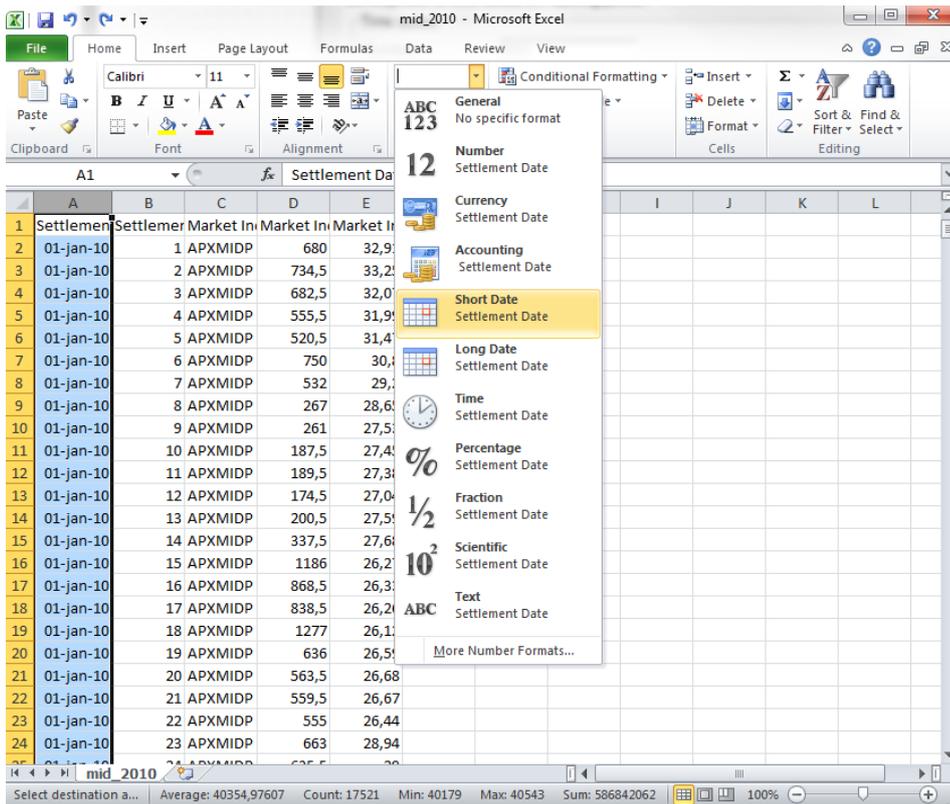


Figure 17. Date selection in Excel

Now the date is the right format, and now the time will have to be changed. The time column is the column called "Settlement Period". Here the daily settlement periods are referred to as numbers. Each settlement period is 30 minutes. energyPRO needs the start of each of these periods instead of the period number. Therefore write the starting time (as hh:mm) of the first two periods instead of their number, and then select both of them. Now double left click with the mouse on the small black square in the bottom right of the selection as shown below. This will copy the new format all the way down.

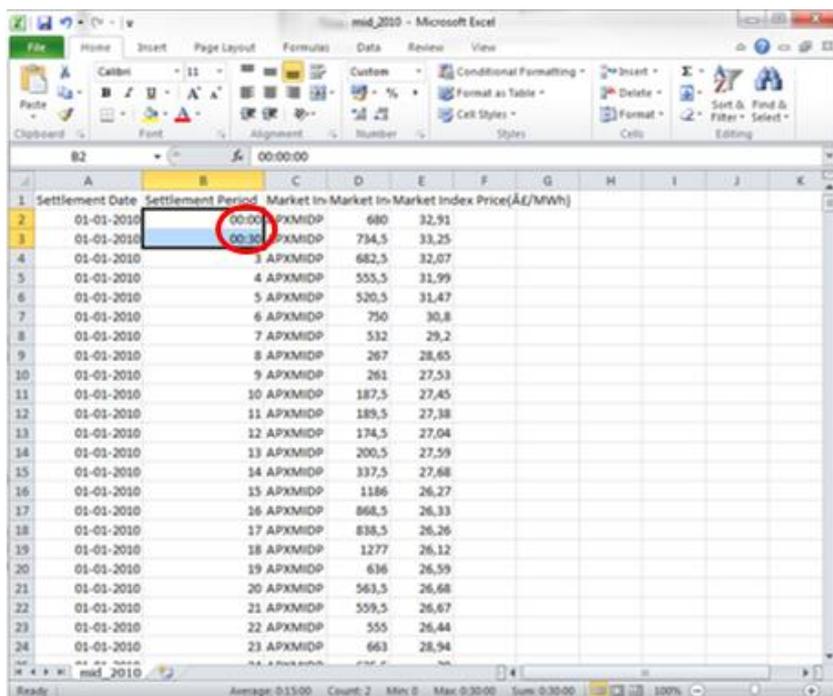


Figure 18. Double-click to copy the data all the way down

Now the date and time are in the right format for use in energyPRO, now the wanted price column will have to be moved to the right of the time as described earlier.

Please notice, that you can find more information on how to use energyPRO in the How to Guides, User's Guide and tutorials on EMD's website:

<http://www.emd.dk/energypro/>



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