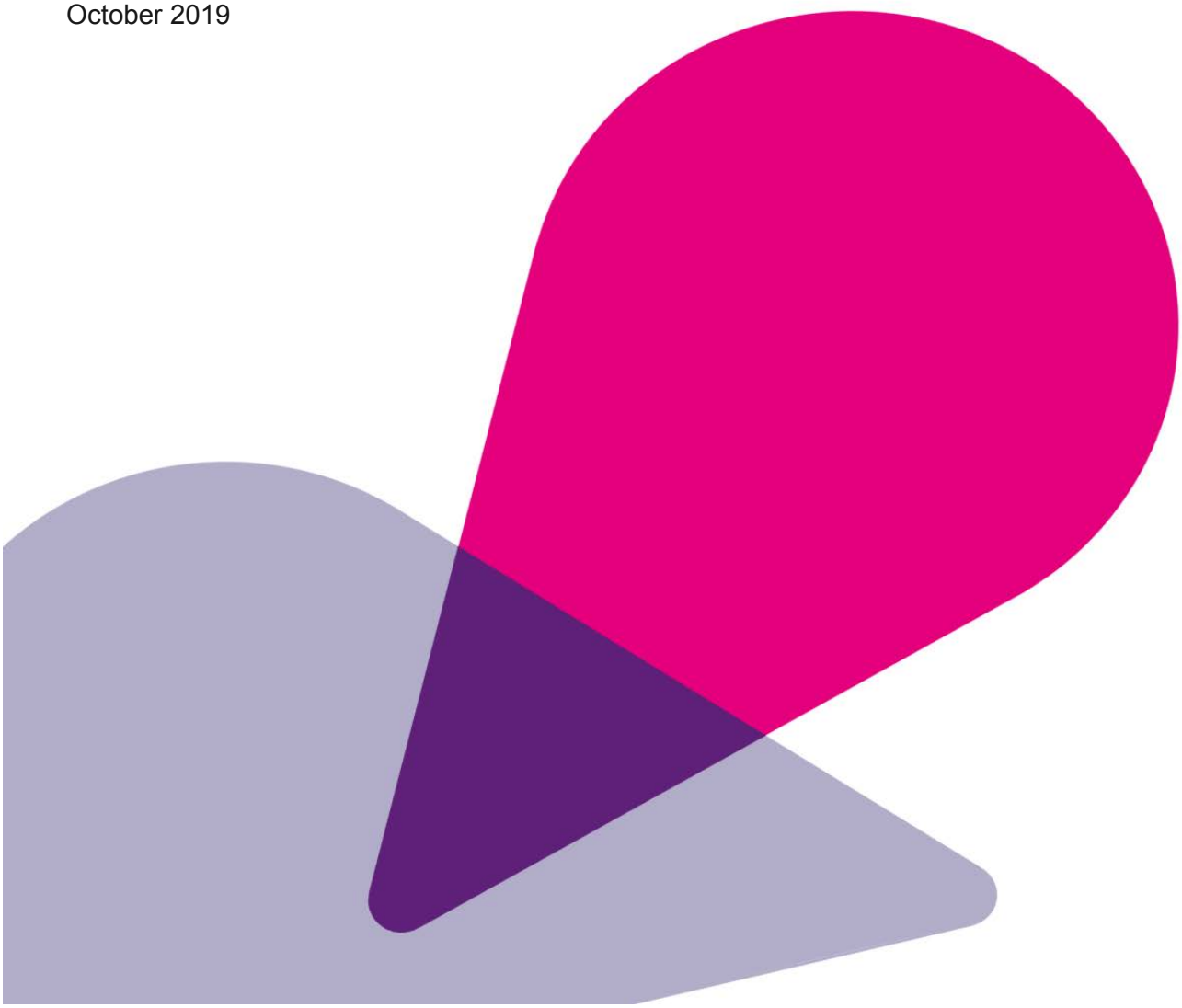
Authority for
Consumers & Markets

Summary of ACM's REMIT Interviews

about the value of information on production unit availability for trading decisions

October 2019



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Management Summary

ACM interviewed electricity trading professionals to gain a better understanding of what information market participants use as part of the basis of their trading decisions. In the interviews, ACM talked about this question in general, and ACM specifically discussed information on production unit unavailability. By gathering information on the way trading professionals value and use information about unavailability of a production unit, ACM aims to be able to interpret the scope of inside information under REMIT better. This report contains a summary of what the interviewed electricity trading professionals told ACM about their trading decisions, and the relevance of information for these decisions.

Trading professionals use a lot of information for their trading decisions. It depends on the activities of the companies and the traders, what specific information they use. Generally speaking, all traders want information on prices, liquidity and on the market fundamentals. They use this information to form an opinion on electricity prices and liquidity now and in the future. Several trading professionals use models to forecast electricity prices, and use information on market fundamentals as input for these models. The value that trading professionals give to a new piece of information on a new event or development strongly depends on the other market circumstances or the information they have thereon. Only against the backdrop of a complete “picture”, can they assess if a new piece of information gives them a new opportunity or reason to trade. Any new piece of information (a ‘delta’) could change the ‘picture’, and, therefore, could impact the trading decisions.

Information on production unit unavailability is fundamental information that trading professionals need for their trading decisions. In case of an unavailability, trading professionals want to know what the ‘delta’ is. To assess this, they want to know about the characteristics of the unit, whether it was planned to be running, and whether network capacity restrictions impact production unit availability. Generally speaking, most trading professionals want to know about unavailabilities of production units in the Netherlands of 50-100 MW and more. In addition, they find it hard to make general statements about starting from what size of unit unavailability they would include a piece of information in their models and/or whether they would trade on the back of this new information. It really depends on the other pieces of fundamental information. To assess what markets and products are affected by an unavailability, and for how long, trading professionals generally want to know the exact starting time of the unavailability, the best expectation of the end time of the unavailability, a rough ramp-up schedule, and the reason of the unavailability. Several trading professionals indicated that, currently, they see no consistency in publishing UMMs in the Netherlands, which makes it harder for them to gather all relevant information, and to interpret this correctly for their trading decisions. In addition, they often miss a clear history of publications, which is important for assessing previous events, and for calibrating their trading models.

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1 About the interviews and this report

Why did ACM interview electricity trading professionals?

ACM is the competent regulatory authority for oversight of the Regulation on Wholesale Energy Market Integrity and Transparency (REMIT) in the Netherlands. REMIT aims to ensure that consumers and other market participants can have confidence in the integrity of electricity and natural gas markets, that prices set on wholesale energy markets reflect a fair and competitive interplay between supply and demand, and that no profits can be reaped from market abuse. To that end, REMIT prescribes that inside information needs to be published, and it prohibits trading with inside information.

ACM interviewed electricity trading professionals to gain a better understanding of what information market participants use as part of the basis of their trading decisions. In the interviews, we talked about this question in general, and we specifically discussed information on production unit unavailability. By gathering information on the way trading professionals value and use information about unavailability of a production unit, ACM aims to be able to interpret the scope of inside information under REMIT better.

Whom did the ACM interview?

To get a broader picture of what information market participants use as part of their trading decisions, ACM interviewed over twenty electricity trading professionals from eight companies that are all active on the Dutch electricity markets.[1] We approached companies with different profiles and, therefore, with different perspectives on the value of information for electricity trading in the Netherlands. In our interview series, we included:

- both larger and smaller companies;
- both with and without production capacity;
- both with and without a responsibility for physical supply to end-users;
- both with and without speculative trading activities;
- both based in the Netherlands, and based in other countries.

We also interviewed an information service provider, to hear from them about the value of information for their electricity trading clients.

As we specifically wanted to learn about the relevance of information (and the different types thereof) on production unit availability and unavailability in the Netherlands for trading decisions, we approached companies that are based in the Netherlands, have production units in the Netherlands, and/or trade Dutch electricity products.

[1] These companies are: De Vrije Energie Producent, EnAppSys, Engie, Mercuria Energy Trading, Nuts Groep, Priogen, Statkraft, and Vattenfall.

We interviewed electricity trading professionals responsible for:

- Electricity trade: Most of the traders we spoke with focus on trading either long-term products or short-term products. The traders we interviewed that trade intraday do this because their company has production units and/or has a responsibility for physical delivery. The traders we spoke with have different mandates for trading. For example: some are allowed to speculate on price differences, others are not. Another example: some traders get internal and/or external orders to buy or sell a specific volume of electricity within a specified period of time. This order could, for instance, be to buy electricity that the company or its clients need for their end-users. Some of the traders told us they use trading algorithms that trade for them. They told us the trading decisions of these algorithms are defined in advance by trading professionals, and use information that is comparable to (or the same as) the information used by traders.
- Analysis: In several of the companies we visited, the analyst role is separated from that of a trader. Analysts collect, process, and analyse information to inform traders regarding their trading decisions.
- Dispatch and portfolio-optimisation: People involved in these activities decide on the production plan of production units a company owns. They gather information on market prices and/or use information from analysts, to try and decide whether each of their units is (or is expected to be) in-the-money. This could lead to a decision to trade electricity.

On several occasions, a compliance officer, a risk manager, and/or a legal counsel was present, and participated in the interview.
The information service provider we interviewed analyses and visualizes information that its clients mostly use for short-term electricity trading.

The interviews took place between August 2018 and February 2019.

What is in this report and how to read this report?

This report contains a summary of what the electricity trading professionals we interviewed told us about their trading decisions and the relevance of information for these decisions. For the sake of completeness, it should be noted that related topics were brought up and discussed during the interviews. These are not included in this summary.

In the report, when we refer to ‘the professionals (trading or otherwise)’, we refer to the electricity trading professionals we interviewed, and to what they told us during the interviews. Likewise, if we refer to ‘the traders’, or ‘the analysts’, we refer to the traders and analysts we interviewed. We included some quotes from the trading professionals in this report. Some of these are translated from Dutch.

2 Information as part of the basis of trading decisions

The work of the trading professionals we interviewed is very data-intensive. The traders, and/or their fellow analysts, spend many hours on collecting, updating, valuing and assessing information as a basis for their trading decisions. When trading, the traders we interviewed generally have six to sixteen screens simultaneously at their disposal, displaying different kinds of information that they use for their trading decisions.

What specific information the trading professionals we interviewed use, differs between them. They explained that companies and their traders trade for different purposes, have different company targets and/or personal targets, different trading horizons, different trading strategies, styles or methods and different appetites or mandates for risk-taking. As a result, they face different trading decisions, and information needs.

2.1 Trading activities, trading decisions, and information needs

When discussing trading decisions in the interviews, there were basically three main types of activities that the trading professionals told us about. Each of these types of activities have their own reasons to trade and their own triggers for trading decisions. Below, we give a short summary of what the professionals told us about each of these three types of activities, and what this means for their information needs.

Trading because the company or its clients own production units

Generally, production units are expected to produce electricity if the company expects a positive revenue when producing. This is the case when current or expected electricity prices are higher than the unit's variable costs to produce electricity. This situation is often referred to as the production unit being 'in the money', whereas the opposite is referred to as being 'out of the money'.

Companies tend to trade with the purpose of selling electricity from production units that are or are expected to be in the money. Changes in current or expected prices or current or expected marginal costs can cause a production unit to shift from 'in the money' to 'out of the money', or vice versa. Both are possible triggers to change the intention to produce, and to trade accordingly.

Companies also trade to hedge and/or mitigate the risks that are associated with the production units. For example: a company could sell their expected future production (or part thereof) to hedge against price fluctuations. In case of an outage of one of their own production units that was expected and/or planned to be running, the company could want to buy (or buy back) the electricity that it already sold but now cannot produce.

When deciding on the moment when to sell, hedge or buy back the electricity from production units, the trading professionals we interviewed not only look at current and expected prices, and marginal costs, but also take into account the market liquidity (actual or expected) at each point in time. For example: a trader told us that, sometimes, he wants to sell part of his future production, but he cannot immediately find a buyer. This situation could call for an alternative hedging strategy.

Trading because the company or its clients are responsible for delivery to end-users

In this case, trades are normally triggered by an expectation to sell electricity to end-users. This expectation leads to an estimated volume of electricity that the company is responsible to deliver, and therefore has to purchase or produce itself. The trading decisions then often come down to when to buy what products to cover the expected electricity consumption. The traders told us that they try to close their positions at the lowest price possible, within their mandates.

There are many reasons why the expectation of the volume of electricity that the company needs for their end-users could change. These changes occur often. A company could get new customers or lose customers, or the projected electricity consumption changes, for example, because of changes in the weather. All of these changes could be a trigger to buy or sell electricity to match the new expectation for consumption by their end-users.

Companies also trade to hedge and/or mitigate the risks that are associated with their end-user portfolio. For example: they can buy electricity at different points in time, to hedge against higher prices.

When deciding when to buy the electricity they need for end-users, the trading professionals we interviewed not only look at current and expected prices, but also take into account the market liquidity (actual or expected) at each point in time. For example: a trader told us he aims to have his consumption portfolio balanced at day-ahead, because the intraday market is not very liquid.

Trading the electricity to profit from price differences

Traders could trade purely to profit from price differences, with no intention or responsibility to physically deliver or use the traded electricity. This is often referred to as ‘proprietary trading’, ‘speculative trading’ or ‘pure trading’. In this case, trades are normally triggered by a difference between a companies’ or traders’ price expectation and the current market price. If a trader expects prices to go up, he could buy electricity now, speculating to sell it later for a higher price. If he expects prices to go down, he could sell electricity now, speculating to buy it back later at a lower price.

When deciding when to trade, the trading professionals we interviewed not only look at current and expected prices, but also take into account the market liquidity (actual or expected) at each point in time. For example: the speculative traders we interviewed told us that they are all active in the Day-Ahead auction, because it has a high liquidity.

Some of the professionals we interviewed are active in only one of these types of activities, some in several simultaneously. The professionals of the companies that have more than one type of these activities explained that these activities can impact each other, and therefore the trading decisions. For example: a company with both production units and end-users could choose to either use their own available production units to produce electricity for new customers, or to buy that electricity on the market.

2.2 General information need of trading professionals

For all the trading professionals we spoke to, the current and expected electricity prices and the market liquidity play a role in their trading decisions. Some of the information on these issues is directly available, such as the current bids and offers for different contracts. For a large part, the trading decisions are based on assumptions and expectations about electricity prices and liquidity. The trading professionals we interviewed make their own assessments of these, based on additional information.

Both electricity prices and liquidity are the result of supply and demand on electricity markets. When making their own assessments of prices and liquidity, the professionals we interviewed all look at information about factors that influence supply and demand. They often refer to this as information on market fundamentals (or just: 'the fundamentals'). All of the traders we spoke to use information on market fundamentals in one way or the other for their trading decisions.
The trading professionals mentioned the following factors as market fundamentals that impact market prices of electricity:

- consumption
- production, both renewable and other
- weather conditions (or forecasts thereof)
- production unit availability
- available network capacity
- CO2 prices and fuel prices, and relation between these and the electricity prices (like the so-called 'spark spread' and 'dark spread')
- availability of cross zonal capacity for all timeframes (year, month, day-ahead, intraday); more specifically the available cross zonal capacity on the high-voltage, direct current (HVDC) connections with Norway (NorNed) and the UK (BritNed) and possible constraints coming from the Flow-Based Capacity Calculation for the Day-Ahead Market Coupling (FBMC) region.

> A trader explained :
> "*In the end, all factors play a role in trading. 500 MW is 500 MW, whether it is wind forecasts, availability of a plant, something coming from the border, something on the consumption side, or uncertainty about temperature.*"

The trading professionals also tend to follow the news for political (and geopolitical) developments. They explained that such developments could have an impact on electricity prices. Several traders mentioned as an example the current developments regarding the reduction of gas production in the Netherlands. Another example that was given is a decision of a new government to have a 'green' agenda and a policy to reduce coal-fired production units.

Several traders indicated that fundamental information has the biggest impact on short-term trading.

> One trader explained that the short-term market is effectively about supply and demand. This is also true for the long-term, but other factors play a role there as well. As an example,

he mentioned that long-term trading influenced by utilities wanting to hedge their exposure. But for short-term trading, his day as a trader is decided purely by market fundamentals.

2.3 Using information for trading decisions

Most of the trading professionals we interviewed use the information on market fundamentals to form their opinions on what they expect the electricity prices to be in the future. Based on this expectation – in combination with their companies' activities (see above) – they decide whether to enter into a transaction relating to, or to issue an order to trade in an electricity product.

Many of the professionals we interviewed construct and use price models to forecast the electricity prices in the future.

> One trader explained that their trading team wants to build a picture, through various models, of the fair value of electricity in every country at every point in time along the forward curve. They also want to run scenarios based on variables, like the weather forecast and the unavailability of electricity production units. The trading team wants to have an idea of what these variables mean and what kind of price impact they would have.

Different types of models are used by the professionals we interviewed. What most of the models have in common is that they use information on market fundamentals as input. Some models forecast prices with a technical analysis, like analysis of historical price trends with adjustments for the current market situation. Some models forecast prices with a fundamental analysis, like forecasting supply and demand based on the market fundamentals.

Some of the professionals mentioned they do not (or not always) use a model. They explained they could observe market prices and/or fundamental information and make a trading decision based on knowledge and expertise, feeling for the market and/or market instinct.

> A trader who buys electricity for end-users explained that a message about a new production unit unavailability in a month could temporarily lead to volatility in market prices. This volatility could be a reason for a decision to postpone buying electricity for future consumption by a month.

> A long-term trader said:
> *"If you look at your screen in the morning and you see prices opening a lot higher than they were at the end of the day before, apart from market information, that is a sign not to start buying right away."*

Several professionals mentioned they want as much fundamental information as possible to make their forecasts or decisions.

One trader said:
"In the Netherlands, all information could be relevant, under specific circumstances, for making a decision to trade or not. Therefore, you would like the model to be as complete as possible with as much correct information as possible."

Another trader said:
"*Traders always need all the pieces (of information) of the puzzle. The challenge is then to figure out which piece of information is the most important. All the information is regarded to form an opinion.*"

Although some would like to have and use all available information on market fundamentals, all the professionals acknowledge that their "picture" is never complete and that there is a limit to the amount of new pieces of information they can gather and take into consideration. The time that the trading professionals have for gathering information and analysis is always limited. This is even more so just before trading deadlines ('gate closures'). So it is noted that, in practice, it is not always feasible for a trader to be on top of each piece of new information at once. In addition, some professionals indicated that an overload of information is not desirable either. Most of the traders work in a team in which they share information and appreciations of what they see is happening. Furthermore, many of the traders use information processed by their analysts or by external data providers that offer as much information as possible "at a glance".

One analyst explained that the period between 11:00 AM and 12:00 AM is a critical timeframe for trading day-ahead, as this is the hour before the Day-Ahead auction (EPEX Spot). After his final price forecast, his colleagues have to decide on their own how to deal with new information during that time period.

It is also noted by several trading professionals that, when having a new piece of information, they still have to make their own judgement on whether they should actually take this new piece of information into account for making their trading decisions, for instance, by including that new piece of information in their model. For various reasons information might be considered too marginal to have a significant impact on the model outcomes.

A trader, when talking about plant availability, explained:
"The question is: how detailed and time consuming do you want to make your analysis? It could be that there is very little benefit of adding one new bit of information on a unit level given the extra amount of noise that goes with it. Sometimes, the extra effort of doing the analysis on a unit-to-unit level might be valuable. However, for 'time reasons', you might want to simplify things."

Another trader explained he weighs his expectation of the price effect against the error margin of his model. He would not trade on an expected price difference within that range. But if he expects price changes well above the error margin, he would like to take a position on that.

2.4 The value of a piece of information for trading decisions

Relevance of market circumstances

All trading professionals we interviewed emphasized that the value they give to a new piece of information on a new event or development strongly depends on the other market circumstances or the information they have thereon. These market circumstances can be seen as the sum or the result of all market fundamentals at a given moment in time. The trading professionals explain that, only against the backdrop of a complete "picture", can they assess if a new piece of information gives them a new opportunity or reason to trade.

For these market circumstances, traders refer to many different aspects, for example weather conditions affecting the electricity demand and the production of renewable energy (where is the wind blowing, is the sun shining?), availability of plants (are there any planned maintenances?), the size of the market (is there price convergence with neighbouring countries?). So, given certain market circumstances, the professionals might consider a new piece of information to be relevant whereas given other market circumstances they might consider it to be less important. In any case, they need to know the new information in order to be able to make this assessment. This can be illustrated by the following examples trading professionals gave during the interviews.

A trader, talking about the relevance of new information about the gas price, said:
"*This* [whether or not to include an update of the gas prices in the model] *also depends on where in the stack the market is, for example, is it at the more efficient gas-fired plants, and also in which season we are, e.g. winter. In addition, the weather also matters. If there is much wind and a lot of production from renewables, and the borders are open and a lot of coal-fired plants are available, then the gas price is less relevant for the forecast and the gas price is not included in the model. Another example, when forecasting a weekend day in the summer and there are two gas-fired plants unavailable, then changes in gas prices will not be included in the model, because the gas-fired plants will not be running and are out of the stack. Therefore, the update of the gas prices will not be relevant for the bid-offer curves".*

A trader, referring to an outage of a nuclear production unit, that happened a few weeks before the interview, told us:
"If the borders are open and there is more wind production than foreseen the day before, the price impact might be zero. On the other hand, if borders are closed (no market coupling) and there is less wind, there could be a significant price impact. So there is no general answer to what this outage might mean for the market. It really depends on the situation on the market".

The trading professionals explained that they base their decisions for electricity trading in the Netherlands on information concerning market conditions in other countries as well. They explained that, because of market coupling and the resulting possibility of price convergence, developments in other European countries influence electricity prices in the Netherlands.

> As one trader put it:
> "*You cannot look at one country without looking at all of them*."

> Another trader explained how a dry year in Norway can impact the situation on the electricity market in the Netherlands, and concluded:
> "*In fact, traders try to predict prices for all European countries. The Netherlands has a lot of cross- zonal capacity and can import and export a lot. Because of this, traders need a very good understanding of what happens in the countries surrounding the Netherlands.*"

> Talking about market coupling, one trader stated:
> "*If Belgium is tight, then often electricity flows from Germany to France to Belgium, and then no electricity flows from the Netherlands to Belgium. This could have a substantial impact on prices in the Netherlands as well as on Belgian prices."*

How does a single piece of information inform trading decisions?

Traders explained that it is the combination of information on all market fundamentals that is needed as a basis for a trading decision. They told us that it is all incremental. Pieces of information should always be considered in relation to all other information.

> A short-term trader explained that he needs all pieces of information together, when speculating on the day-ahead prices:
> "*There is not any one single piece of information that determines whether you start trading, but it is the sum of all pieces of information that contribute to a good estimation of the expected price.* "

> A trader, talking about the relevance of a single piece of information:
> "*It is all incremental. Every next change might have a price impact. A new piece of information on the future might lead to a new trade eventually*."

> A long-term trader, talking about a maintenance of a production unit, said:
> *"It depends on the situation on the market, what the traders will do with the information. It is always a puzzle, all the pieces of information together are needed."*

Information need on ‘deltas’

During the day, the traders and analysts continuously monitor information to see whether they see the need to update their expectations of electricity prices and opportunities to trade. Any new information on a change in a fundamental could lead to a decision to trade electricity. Several of the professionals refer to these changes in fundamental information as ‘deltas’. They want to know about these deltas and, therefore, are in a need for information on events and developments that cause the changes.

> One analyst explained:
> *“Information about unavailability is especially relevant for trade, if it leads to a difference with the situation like it is or was publicly known. Such differences, the ‘deltas’, could directly impact electricity prices. This is because market prices are based on the expectations from traders, which, in turn, are based on what is publicly known. If reality differs from what was publicly known, this could impact traders’ expectations, and therefore market prices.”*

> A trader told us:
> “*As an intraday trader, the day-ahead price cleared on the day before is a relevant starting point. This price reflects all the available fundamentals from the day before, which means all information on supply and demand. When you see that after the auction, at 12:00 AM the day before, there are changes, for example in the forecasts for the renewables production, it combines to a certain delta of power, that is either missing or additional production. More power will reduce prices, less power will increase prices. You make an estimate of what that factor’s relation with the day-ahead price will do to the prices intraday. So then you can take a position on that”.*

3 Availability of production units and trading decisions

In the previous chapter, we summarized that trading professionals told us that production unit availability is one of the fundamentals of the electricity market. Therefore, they use information on production unit availability as part of the basis for their trading decisions.

The trading professionals told us they are interested in the default production unit availability, and any changes (deltas) to that default. The default situation is that the production unit is available and there is no active REMIT-publication and/or publication following from the Transparency regulation about unavailability. Information about any unavailability, full or partial, right now or in the future, generally is a deviation from the default situation, and therefore a delta that the trading professionals would like to know about. They use this information for their trading decisions, either directly or as input for their price models.

The trading professionals we interviewed gather data on availability of production units in different ways. Most of the professionals monitor the REMIT-publications and Transparency publications, often referred to as urgent market messages (UMMs). They do this by monitoring transparency platforms (like EEX for the Netherlands) and the publication pages of the companies with production units, for example by showing it on their screens, by using web scrapers, and/or by using RSS-feeds. Several professionals use a paid data service that collects and presents this information to them.

As for all market fundamentals, the trading professionals use information on production unit availability to form an opinion on what the impact of an event or new situation could be on the prices and the opportunities to trade. The given market circumstances have a crucial part in this. How the information affects their trading decisions, also depends on the activities of their companies, and the strategies and mandates of the traders.

3.1 Information on availability of the production units

As mentioned before, trading professionals told us that for their trading decisions they are interested in knowing the changes compared with the situation just before the unavailability (the deltas). For production units, this means, first of all, knowing the general characteristics of the production unit and estimating whether the production unit was running or planned to be running. In this section, we give a summary of pieces of information the trading professionals told us they would like to have on these aspects.

Characteristics of the production unit

Trading professionals told us that, in case of an unavailability of a production unit, they look at the nameplate of the production unit. Based on the characteristics of this unit, they can make their estimates on the price effect of that plant's unavailability. Several trading professionals told us they know the general characteristics of existing production units, such as the maximum installed capacity, the fuel type, whether it concerns an old or new plant. Some professionals indicated they

would like to improve their assessment of the impact of an unavailability by having more specific information about production units, like the minimum stable capacity generation value (minimum level at which a plant can produce at a stable level), the ramp-up and ramp-down time of a unit, and the minimum running time (minimum period of time that a plant must run/produce once it is turned on).

Several trading professionals explained that knowing the type of a production unit is relevant to them, since the unavailability of a unit changes the structure of the supply side of the market at that moment, and this might affect prices.

> One trader gives an example:
> "*The type of plant that is unavailable is relevant for the structure in the market. If all the nuclear plants are unavailable and only old gas-fired plants are available, then there could be price jumps following news of a power plant being unavailable*".

Was the production unit running or planned to be running?

In the event of an unplanned unavailability, like an outage, several trading professionals told us they ask themselves: was the capacity of this plant sold? They explained that, if the capacity was sold, the unavailability of the plant will probably have a bigger impact on prices, than if it was not sold. If the capacity of the production unit was sold, the market prices before the unavailability are partly based on the availability of the production unit. And it could be that the owner of the unit - now that the unit cannot produce - has to buy (or buy back) the capacity that it had already sold.

> One trader told us:
> *"As a trader, you want to know what was the day-ahead production plan of plants. This is because the production plans were baked into the day-ahead prices. So this information helps in understanding the formation of the day-ahead price."*

> One trading professional who works in portfolio optimization explained that an outage of a production unit with another owner might be a reason to offer the capacity of an own production unit that was not planned to produce yet. So, in the case of an outage, he updates his analysis, and checks whether it would be profitable to sell the capacity. This often depends on whether or not cross zonal capacity is available.

Several professionals told us that currently they do not know for sure whether a plant was producing when the unit fell off the grid. One trader told us he just assumes that the unit was running when there is a publication about an outage, because technical problems usually occur when a unit is running.

Some of the professionals make their own guesses on whether the capacity of the plant has been sold for the near future. They base this assessment on their estimate of whether the unit would be 'in the money' or 'out of the money'. Some professionals indicated that they use the information on the publication time (timestamp of the UMM) for this assessment, since it helps them estimate what capacity has been sold on the market and whether the impact of an unavailability is already included in the price formation.

> An analyst explained that if he sees an outage of a baseload nuclear production unit in the afternoon, he thinks that would mean that the power production of the particular plant is probably sold for the day-ahead. He then updates his model for this outage. Therefore, he sees the publication time as the most critical information, because based on that he can get a picture of what has been sold on the market.
>
> One analyst explained:
> "*The timestamp of publication gives an indication on whether a power plant is sold or not for the next day.*"

While knowing production plans could be very useful for traders, it was also mentioned by some trading professionals that they see this information as highly confidential.

Network capacity and availability of production units

Several trading professionals pointed out that restrictions on the network of the transmission system operator, in the Netherlands TenneT, could lead to unavailability (partial or full) of production units. Therefore, if there are market restrictions, these trading professionals want to know whether and which production units are unavailable (partially or fully) because of this.

> A trading professional explained that, in his opinion, information about market restrictions from TenneT is relevant for trading. Market restrictions can lead to high balancing prices. TenneT shares a lot of information about market restrictions, but, for a trader, it is hard to figure out what is going on. He thinks it would help if TenneT explained what the effects of the market restriction are.
>
> A trader told us he would like to see more specific information from the transmission system operator about how market restrictions impact the availability of production units, especially if the owner of the unit knows this months in advance. More detailed information on the network capacity would help him analyse the market better.

3.2 Size of the unavailability

The trading professionals we interviewed explained that the relevance of knowing an unavailability of a production unit might differ depending on the size of the unavailability. The professionals have different views on the sizes of the unavailabilities they would want to know about for their trading decisions. Most of the trading professionals consider information on the unavailability of 100 MW or even 50 MW as information that is generally relevant for the Netherlands. Many of them would consider unavailabilities of this size, for example by including these unavailabilities in their price models.

Some of the professionals said that ideally they would like to have all pieces of information, even the smallest changes in availability of a production unit, because it is all incremental. One trader explains that multiple outages with low capacity reductions could add up to a large amount of unavailability and therefore have a combined impact on price. Other professionals consider information on lower unavailability of capacity of less importance. For example, some said they don't want to be overloaded with information, even though the information might matter.

> One short-term trader explains that the relevance of an unavailability should be seen in relation to other forecasts that are part of his companies' price models. For example, forecasts of consumption and wind production have an error margin themselves, which makes small amounts of unavailability not really relevant.

In addition, most of the trading professionals mentioned that you cannot really make general statements about starting from what size of unit unavailability they would include a piece of information in their models and/or whether they would trade on the back of this new information. They explained it really depends on the other pieces of fundamental information.

> A trader stated that, not each day and each moment, a 100 MW unavailability of a production unit has an impact on the market, and therefore there is no clear MW threshold for price impact. Whether specific information is important, depends on the market as a whole at that moment.

> A trader explained that whether an outage of around 400 MW will have an impact on the price depends on the fundamental situation on the market. If it is a well-supplied day with no extreme unavailability of production capacity, then an outage might have no impact at all. If it is a cold winter day with no wind then it can have a much bigger impact. So, he concluded, it depends on the prevailing market conditions.

> A trader, when asked about the relevance of a planned maintenance of a 250 MW production unit, said that, at first glance, he would say it is significant information for the model, and the forecasted price should go up. But, at the same time, it must always be regarded in respect to all other information that comes out during the day or came out overnight.

Several trading professionals pointed out that the size of the market makes a difference in how they value a new piece of information on unavailability of a unit. For the Netherlands, market coupling and the possibility of price convergence are important factors in this.

> An analyst gave the following example. Say there is an outage of a very efficient gas-fired production unit with a capacity of 100 MW, then the analyst might include it in the forecast model. It depends on the situation. If there is no price convergence between the Netherlands and neighbouring countries, and there is a trip of a coal-fired plant of 800 MW capacity, then it will lead to a big shift in the merit order, since the merit order has a steep back-end. In such a situation, the outage of a 100 MW gas-fired plant will have an impact on the market (and the market price). In extreme cases, small changes in availability of production capacity matter. In such extreme cases, a production capacity reduction of 50 MW has an impact as well.
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> A trader explained that if the Netherlands is already importing electricity from Germany at maximum capacity, and a large production unit in the Netherlands falls away, this would have a very large price impact. In this case, electricity from the UK could be needed, and the electricity price in the UK is often a lot higher than in Germany.
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> A trader noted that, especially in markets such as Germany, he does not need information on changes in available capacity of a production unit less than 100 MW. However, he considers that changes in capacity of 50 MW in the Netherlands and Belgium could be important. He added *"but it depends on the market situation".*

The trading professionals explained that they try to predict the impact of the market coupling on the size of the market every day. They mentioned that this is quite hard to do as the market size could change on a daily basis, and the information needed to make a good estimate is, according to them, lacking.

> A trader noted:
> "*The impact of the flow-based market coupling is that there is a lot of volatility on day-to-day power flows between the countries. As a trader, you want to be able to predict that volatility. The problem regarding flow-based market coupling is that, for the trader, this is a black box. Critical branches have been anonymised. So as a trader, you cannot actually tell what caused the changes in power flows between countries. For predicting what the price will be, this means that you have a much wider uncertainty range than you could have had if this information were available*".
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> Another trader explained that, in his opinion, the flow-based market coupling model has become quite complex and hard to fathom. He gets the information for the day-ahead in the morning, which is fine. But the problem is that the matrix changes every day. So for trading a

week ahead, he would like to forecast how the matrix will change during the week. However, currently, this is a black box to him.

Some traders mentioned that they would like to know about smaller outages for short-term trading, like intraday and day-ahead, and that this type of information is less necessary for the longer-term trading.

A trader said:
"*On a very short-term, basically everything is important, and the trader prefers to have as much information as possible. If you look a bit more into the future, then really everything starting from 300 MW is relevant, because this has a direct impact on what the market will do.*"

3.3 Timing of the unavailability

The trading professionals explained to us that they want to assess what markets and products are affected by an unavailability, and for how long. To do so, they want to know the timing of the unavailability. What are the starting time and end time for the unavailability, and once the capacity becomes available again, does this happen at once or gradually? In addition, to make an estimate of the end time of the unavailability, most trading professionals want to know the reason of the unavailability including if it was a planned or an unplanned unavailability.

Starting time

The trading professionals told us that knowing the starting time of an unavailability helps them assess what markets and products could be affected. An immediate outage (e.g. starting time = half an hour ago) could impact intraday prices. A planned maintenance that starts in a month could impact month-ahead prices. So the relevance of specific information on unavailability also depends on the trading horizon of the trader.

A trader, talking about the relevance of information of planned maintenance:
"If you trade in long-term products of which the delivery period overlaps with that specific maintenance period, you as a trader need the information on that maintenance. Given that the market is trading three years ahead, this means that every maintenance in the period until three years ahead needs to be published."

The same trader, talking about the relative relevance of information of planned maintenance:
"*For instance, if you have a plant being unavailable in six months' time then a trader will look more at what gas and coal prices will be doing. The availability of plants is still relevant, but then there are other factors that tend to be bigger drivers for price movements. The availability of plants will be more in the background, but still in the picture*".

A long-term trader told us:

> "*A bit of a reaction is seen in the market from REMIT publications on unavailability of a power plant. Though it is more of a ripple effect: REMIT publications are of a more significant importance in the day-ahead market, but less relevant for week-ahead, even much less relevant for month-ahead. For quarter-ahead, the interviewee looks at other information: movements of the underlyings such as gas prices, coal prices, CO2-prices and spreads. Power-plant outages or outages in the gas market, e.g. a Norwegian pumping station going offline, move the market, but the interviewee does not trade on that information."*

Some trading professionals noted that, in case of an unplanned unavailability, it is important that the published starting time of the unavailability reflects the actual starting time, and is not for example the time of the publication. As was explained by a trading professional, if the published starting time is incorrect, it is harder for trading professionals to analyse what the price movements they observed are driven by.

End time

The trading professionals said that the expected end time helps them assess what markets and products could be affected as well. For example: in case of an immediate outage with an expected end time of two days later, a trading professional could conclude that the production unit will probably not be running day-ahead.

Most of the trading professionals mentioned that, for them, the end time of an unavailability of a production unit is hard to interpret, because of several reasons. They recognize that there is uncertainty in the expectation regarding the end time of an unavailability. When a plant will be back after an outage usually depends on various factors. Several traders told us they take this uncertainty into account when making their trading decisions. Some of the professionals see the indicated end time as the best estimate for when the capacity will be available again. Other professionals do not always believe that companies publish their best estimates. Some of these professionals often make their own assessments of how long it might take for the plant to be back up.

> A trading professional told us he thinks that different market participants deal with uncertainty in the expectation of the end time in different ways. Some market participants seem to take the approach of reporting a short duration and prolong it later. Others seem to be more on the safe side and report a longer estimated unavailability in the first place. For instance, if a plant trips, some producers always publish a message saying 'there will be an outage for a day', while, for a same event, others will publish 'the outage will last two hours' and after two hours there is an update 'the outage will last another two hours' and so on.

A speculative trader told us he wants to know about planned maintenance and its updates as soon as possible, especially if the maintenance is within the trading horizon. He reflected on a publication of an extension of a planned maintenance in Belgium by two months, where he saw prices for the quarter ahead product increasing immediately. He said that these kind of things have a direct impact on the market, and that also for the Netherlands a decrease of available capacity for a specific period will impact electricity prices for that period.

Ramp-up

Several professionals told us that to assess the impact of an unavailability (partial or full) and therefore the precise timing of the unavailability, they need to know about the time it takes for a production unit to get to the minimum generation level (to 'ramp-up') as this is not the same for each and every production unit.

A trader explained that the speed at which a unit can ramp-up depends on the type of the production unit. For example, nuclear plants in the Netherlands become available again in a day, or two days at most. Gas-fired plants come back online fairly fast after becoming available again. Sometimes, older coal-fired plants struggle when being brought online again.

Furthermore, they would like to know how the ramp-up of a production unit is related to the published end time of the unavailability. Some professionals indicated they think that, currently, information on a ramp-up is not published in the same way by all market participants.

Most of the professionals told us they want (at least) information on the time it takes for the plant to ramp-up and the time that it takes for the plant to reach its maximum production level. It differs between them, how detailed they would like to have this information. For some of these trading professionals, publications of 100 MW-steps of the ramp-up curve are sufficient, others would like to see steps of 25 MW or 50 MW for the Netherlands, and/or steps for every hour or fifteen minutes. Several professionals pointed out that they do not want to see the full ramp-up profiles right now, since this would create an overload of information. Several professionals mention that to them, the most relevant information is that a producer will *try* to ramp-up a production unit.

One trader mentioned that, in a more transparent market than the Netherlands, the error margins of price models are reduced, and, therefore, more precise information becomes more relevant. According to him, the full ramp-up profile should then be published.

An analyst told us that if a publication says a production unit should run at 200 MW in the morning, and there is no publication on an outage yet, then he looks at the steps of the ramp-up curve in the UMMs, and if, at the end of the day, the plant is expected to run at maximum capacity, then he includes the plant in the model for the following day.

Reason of unavailability

As mentioned before, several trading professionals told us that they make their own assessments of the expected end time of an unavailability of a production unit. For this assessment, these professionals look for information on nature and reason of the unavailability. Some professionals explained that, for such an assessment, they also use old publications on events in the past to see if they can discover a pattern that helps them estimate the end time. Several professionals mentioned that, currently, there does not seem to be a uniform way for publishing the end time for an unavailability.

> A trader said:
> *"The reason is important to make an assessment on how long the outage might take. Is the failure in the critical area of the plant, or in the non-critical area? There is a guess of the duration of the unavailability in the UMM, but this is tricky, and it is often updated. Some take the approach of reporting a short duration and prolong it later. Others are more on the safe side and report a longer estimated unavailability. Anyhow, as a trader you cannot really rely on these published expected durations. There is a certain experience, where if you see a publication, you clearly read the publication, and then you make your own assessment on whether you believe the plant will come back earlier or later than what has been published. Therefore the reason of the outage is of importance."*
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> A trader told us he regards the indicated reason of the unavailability as 'technical failure' in a UMM as too general for being useful information. This indication is often not sufficient for him to make an accurate judgement on the duration of the unavailability.
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> A trader told us he often would like to know more about the reason of an unavailability. With this information, he could look at the history and possibly know more on how long it will take for the plant to really be back.
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> A trader told us he often wonders whether companies publish the correct estimated end time. Sometimes there is a publication that a production unit will be online again at 2:00 PM, while you know that they rarely ever achieved this in the past. The production unit might be back at the end of the day or not at all, and he perceives it as too great a risk not to take a position on that.
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> A trader said that, at some point, you start to recognise certain patterns. If he sees that the availability of a plant is postponed every day at 11 o'clock, than he will start to take this into account.

In addition, some trading professionals mentioned that knowing whether an unavailability is planned or not helps them in valuing the information.

One intraday trader mentioned that he wants to be able to know whether a publication about an immediate unavailability concerns an unplanned outage, or an update of a planned maintenance. A planned unavailability has been foreseen, so he assumes that that capacity was not sold day-ahead, whereas, for an unplanned outage, you could assume that this unit was sold.

Several traders emphasized that any updates of maintenance plans to them are relevant deltas that should be published. These changes could be a delay of the maintenance or the expectation that the plant will be on grid earlier or later than expected.

3.4 Publication of information about unavailability

Many of the trading professionals mentioned that currently they see some inconsistencies in publishing UMMs in the Netherlands, both in where information is published and the way in which the messages are published. This makes it harder for them to gather all relevant information and to interpret it.

One professional mentioned that he sees inconsistencies in information when market participants run multiple platforms at the same time:
"*For example: you will find different numbers of installed capacity for the same unit, while that is actually static data*".

Many of the trading professionals told us they try to see or to have all unavailability publications. They look at the transparency platforms and producers' websites, use web scrapers and/or RSS-feeds, and/or or buy the information from a data service. They mentioned that this is quite costly and time-consuming, and quite a challenge to do this in a structural manner since transparency websites often change slightly, causing the need to update the automated reading of these pages. They also mention that automated reading of unavailability publications is complicated because publications are non-standardized. Several professionals indicated that, ideally, all information is published in one centralized place, in a uniform format, with uniform interpretation.

Several trading professionals pointed out that it is not always clear if a UMM is about a new event or if it is an update of a previous message. They often miss a hierarchy of publications, a chronological order of the messages and a linking publication ID. They think it is important that the history of the publications concerning a particular unavailability is provided, so they can assess what the delta is. A clear history of publications is also important for assessing previous events and for calibrating their trading models.

A trading professionals explained that he uses historical data which he uploads to their model: "*Based on this, traders can analyse what went right or wrong. Because the model can be wrong. So as a trader you try to figure out what went wrong, for example: was it an incorrect estimate on the consumption side or on the production side*."