ENERGY & COMMODITIES

Digital Innovation in European Power Trading

Like many other commodity markets, the European power and gas markets are changing rapidly with significant impact on those engaged in producing, consuming and trading European power and gas. The rise of renewables, impact of regulations, EU legislation and policy around energy, among other factors, have resulted in significant and ongoing disruptive changes that are markedly altering the entire market dynamic and placing challenges before all players in the market. This white paper examines some of these changes and their impacts.

As the EU pushes toward a low carbon future, renewables have rapidly taken on a large proportion of power generation in certain parts of Europe. At the same time, in some countries, there has been a switch from coal and/or nuclear generation toward renewables and natural gas. This rapid, and sometimes abrupt, change in the generation side of European power, along with market coupling and a general move from over-the-counter (OTC) bilateral transactions to more exchange-based trading, have all combined to create a myriad of inter-related issues. These include:

1. Reduced profitability from trades as basis and price differentials have eroded with decreasing market imperfections and costs have increased (largely regulatory compliance), making profitable trades harder to find.
2. An increased and uncertain burden on utilities and generators that have seen traditional business models shift significantly, with issues such as negative power prices, virtual power plants, increased costs (not just financial) associated with fossil fuel or nuclear generation assets, uncertainty around where cash can be found for necessary investments in infrastructure as profits erode and costs increase, and the rise of "prosumers," necessitates changes in infrastructure and business models.
3. The move from longer-term trades to real-time intraday trading, which often involves trade automation, real-time optimization of assets, forecasting and scheduling.
4. Increased stakeholder pressures, particularly from financing banks, who are now much more intrusive over validating risk management and business processes prior to agreeing to finance operations.
5. A massive rise in the volume of data relevant to trading from weather forecasting to asset availability, as regulation has mandated increased transparency, and the move toward real-time trading on a 24/7 basis has demanded it.
6. The development of distributed production and consumption within the context of a smart grid and Internet of Things (IoT). There are a growing number of small producers, who at the same time are also consumers (solar production of residential areas, small wind farm, industrials and commercials with own production) – so-called prosumers. These groups need to have some trading capabilities, but direct access to markets is too expensive for them.

Of course, this is all taking place at a time when technology innovation is also occurring at a rapid clip. "Digitalization" encompasses a number of potentially disruptive technologies like distributed ledger technology (blockchain), artificial intelligence (AI) and machine learning (ML); "big data" that can encompass everything from typical trade data (prices, events, weather, demand, production, etc.) to mining of massive amounts of social media for sentiment analysis or event identification; a migration toward the cloud and software as a service; and visualization. While these technological factors potentially help to alleviate some of the issues cited above, they also add a further burden of business process and industry structural change.

The structural changes taking place in the European power and gas markets are fundamental as traditional roles are progressively eroded – like those of brokers and asset owners, for example. Brokering business models are being challenged by the move to automated, high-speed trading on exchanges and the move, in some quarters, toward the use of real-time portals as internal market places for third-party and direct market access across Europe. The historical role of the asset holder is being changed by the increasing securitization of assets, the use of virtual assets and aggregation or disaggregation of assets. New market entrants in the form of hedge funds and others that can offer services like data provision, analytics, financing and algo-trading are also challenging the traditional merchant model.

European power and gas is undergoing a quantum shift and all players in those markets are being impacted. It is difficult to foresee what the end game might look like, but certainly, there are a number of initiatives and trends that are readily apparent.

Disruptive Technologies

There has been a great deal of interest and considerable hype around blockchain and distributed ledger technology, in part because it is seen as guaranteeing transaction security and verifiability. As such, it aids in terms of building trust between parties. One major European initiative is Enerchain, the Ponton-led consortium involving a large number of European traders, producers and consumers. The potential benefits of Enerchain are touted as lower transaction costs, peer-to-peer (P2P) integration directly between market participants, reduced entry barriers for smaller market participants, and a seamless process, including not only trade execution, but instantaneous settlement of transactions as well. The project is in a proof of concept stage with a view to providing "an operating system for wholesale energy trading, where multiple vendors can plug in their apps and services." Ponton is also working on blockchain applications in two other key areas: a local smart energy exchange allowing prosumers, distribution system operators (DSOs), and aggregators to exchange locally-produced energy and in optimizing grid management processes.

However, such P2P, blockchain-based, proof of concepts still faces significant technical, legal and other challenges. Phillippe Vassilopoulos, director of product development of EPEX SPOT, sees these as potentially including the performance to match and settle trade transactions in volume; difficulties around the legal definition of what is the venue (a de-centralized, P2P structure makes it difficult to define a centralized venue operator and some level of governance is still required); cost considerations, as blockchain has not reached an optimal price/performance level; and a host of other critical concerns around regulatory reporting, and membership processes, for example. "Often cited as a threat to exchanges, replacing existing trading arrangements is problematic in areas such as matching and clearing." Yet, EPEX SPOT is also looking at blockchain and sees a number of potential use cases in other areas, including within the back office.

In December last year, EPEX SPOT also announced an initiative aimed at connecting microgrids to the wholesale market using blockchain, in partnership with LO3 Energy. According to the announcement, the first realization of this partnership will involve pilot projects in Europe and the LO3 technology will be deployed in community microgrids where the two partners will connect these local P2P markets to the EPEX SPOT wholesale markets.[1] "This is potentially a game changer, where smaller prosumers can react to prices through the IoT or the meter, resulting in more reactiveness and transactions based on wholesale prices as opposed to retail tariffs or services," Vassilopoulos says.

Additionally, BTL also completed a pilot project in June 2017 with the participation of European energy majors BP and Italy's Eni, which involved the building out of an energy trading confirmation solution on its platform. It is now moving into phase 2 of the project to enable gas trading reconciliation through to the settlement and delivery of trades. Many other initiatives are also in play in commodity trading in general, in areas within the supply chain and settlement. However, it remains early days as these technologies are provided by smaller vendors, and the regulators have yet to have their say. As stated above, there also remains a lack of clarity in a number of areas. Who will oversee a centralized market based on blockchain? Where will E/CTRM software sit in relation to these initiatives? How will the current centralized energy marketplace providers actually respond?

Meanwhile, real-time intraday trading is an area where considerable technical innovation is taking place. Many smaller traders are now using automated trading to ensure that they can manage their positions 24/7 and some larger traders are deploying algo-trading using AI and ML in the process. However, the true innovation lies in the added abilities to optimize generation and automate scheduling and other related business processes alongside an extended value chain. In this area, Hitachi, for example, has claimed AI can optimize trading and scheduling operations for a utility by up to 20 percent.[2] As massive amounts of available data have the ability to dictate trading patterns, an ability to visualize and extract meaningful information is another area of innovation. Vassilopoulos of EPEX SPOT sees many use cases for AI, including error recognition and looking for trading patterns. "Trading and connection with the assets directly using AI will be the game changer," he says.

AI is computationally intensive and may require parallel processing or, in the future, quantum computers. Cloud computing is facilitating the deployment of AI, however, by offering the computational flexibility that is required. In order to really benefit and leverage cloud computing technology, applications and programs must become "cloud native."

AI and ML can completely transform the business. Pricing is one area in which there are vast amounts of different variables to be considered and where having AI software is immensely valuable. Other applications possible include trading in continuous intraday markets across Europe, paper trading to reduce risk and optimize portfolios, and forecasting demand and FX trading.

[1] https://www.epexspot.com/en/press-media/press/details/press/LO3_Energy_and_EPEX_SPOT_join_forces_to_connect_local_microgrids_to_the_wholesale_market

[2] http://www.hitachi.eu/en/social-innovation-stories/energy/does-future-energy-lie-artificial-intelligence

AI is being deployed in many areas. National Grid, a British multinational electricity and gas utility company, is making progress in integrating AI technology from Google-owned AI company, DeepMind, which is set to improve the power network's transmission efficiency by as much as 10 percent. It is tasked with maintaining the frequency of the grid within a relatively tight band of values. Too high a frequency damages electrical equipment and too low a frequency can result in blackouts. Electricity supply and demand must be carefully balanced across the grid, but intermittent renewables – such as wind and solar – make this increasingly hard. Being able to process massive amounts of data and create predictive models means AI can pre-empt surges in demand or instances of oversupply and help National Grid do its job more effectively.

Exploiting IoT is another area of interest for many firms in the industry. By deploying smart devices in – for example, power plants – a lot of data can be collected and analyzed. ML and AI can also be used here to assist with maintenance planning to help reduce the cost and improve efficiencies and reliability of the plants. However, the real future impact and benefit is the potential to move to a more event-driven operating model in real time.

One of the effects of the interest in AI and big data in the energy industry has been a surge in the number of M&A deals, where energy companies have acquired specialist AI firms.[3] According to a report from accounting firm, BDO, M&As involving energy companies and AI startups soared in average value from around $500 million in the first quarter of 2017 to $3.5 billion in the second quarter. In that report, BDO states that "AI will allow a transition to an energy portfolio with increased renewable resource production and minimal disruptions from the natural intermittency that comes with these sources due to variable sunlight and wind intensity."

Big data, AI and analytics are set to transform the industry. Creation of virtual power plants is another area of innovation in Europe where AI, automation, analytics and other technologies are being deployed. In one initiative, Next Kraftwerke, a Belgium-based virtual power plant operator and energy trader, combined small and medium-sized electricity producers with flexible electricity consumers in a single European-wide Virtual Power Plant (VPP). The VPP includes biogas and combined heat and power (CHP) plants owned by local farmers on the production side, and flexible pumps, ventilators and compressors on the consumption side. The whole VPP is monitored in real time and automatically controlled by algorithms. There are examples of German companies following the same path.

Other innovative technologies are also being closely watched and/or deployed in the industry. For example, the use of drones to collect information about distribution networks. The drones can collect images that help understand the state of the network, where there is an outage, and the state of damage. This helps reduce the cost and impact of outages.

[3] https://www.bdo.co.za/getmedia/9b39ded6-e999-434d-af9a-5e073db1285c/BDO-Renewables-and-artificial-intelligence.pdf.aspx

Business Model Innovation

Significant innovation is also taking place in terms of business models facilitated by technology. Many trading firms that have invested in a trading infrastructure over the years have seen a decline in profits from trading and profitable trades harder to find. They have sought ways to add services that leverage their infrastructure investment, add volume and additional revenues.

For example, RWE has introduced Easy Commodity Trader and other web portals for its customers and partners. ECT is a flexible platform for optimized online trading, targeting municipals and industrial customers. RWE offers the platform for bilateral trading and as a product that can be labelled by partner municipal utilities. "The advantage of these two apps for our customers is self-evident. They often focus on trading during traditional office hours, because running a unit that is active around the clock on their own would be far too expensive, due to shrinking margins and the market's pressure on prices," explains Robert Kronenberg, RWE's Head of Gas Portfolio Management.[4] "This is why our automated 24/7 trading helps customers to assert themselves on the current market. Labelling allows partner companies to remarket the platform to their customers and thus offer products and services that would usually be unprofitable in their own portfolios on a stand-alone basis. RWE attaches very high importance to neutrality, transparency and security in relation to customer portfolios." The portal is backed by a matching engine and features a highly usable user interface (UI).

Other large traders are also offering direct market access capabilities, allowing smaller traders to leverage their infrastructure, credit line, and other facilities for a fee. Trayport white labels its execution and matching platforms as well, offering customers the ability to launch their own OTC commodities market.

Many of the discussed technologies are allowing disruption of traditional business models across the commodities space, leading to creation of virtual assets, P2P markets, direct market access and so on. This disruption of traditional business models seems set to continue.

Conclusion

So-called disruptive technologies are set to change the face of the industry over the next decade. While some technologies like cloud computing are already a fact of life, much more is yet to be achieved as cloud native applications are developed and deployed. Additionally, the current focus appears to be in the areas of AI and ML, where many use cases are being identified and invested in by players in the industry. Other technologies like blockchain may remain a little further off in terms of commercial exploitation, but interest levels are very high.

However, the true potential of these technologies is still being actively explored. Their deployment will go hand in hand with continuous innovation of business models and structural changes across the industry. This in turn will require the attention of and investment by the regulators and stakeholders in the industry. It is the ability of these technologies to change business processes and create further structural change in the industry that will create true disruption.

FIS Can Help

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[4] https://news.rwe.com/rwe-offers-municipal-utilities-and-industrial-customers-flexible-platform-for-optimised-online-trading/

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