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EPEX SPOT'S RECOMMENDATIONS FOR A DECARBONISED ELECTRICITY SYSTEM

June 2022 **Paris**





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RECOMMENDATION 1: PROTECT THE SIGNIFICANCE OF MARKETS & PRICE SIGNALS FOR DECARBONISATION

PRICE FORMATION IN EUROPEAN SPOT MARKETS

- Meaningful price signals set the incentives for secure, clean, and affordable electricity supply. Therefore, distortions of the wholesale electricity market price shall be avoided.
- Keep relying on price formation based on marginal costs which leads to the most efficient dispatch, lowers costs for consumers and sets the right incentives to invest in clean technologies.

EUROPEAN MARKET COUPLING

- Build on the existing market coupling architecture to reduce time-to-market of new products and features. The current market coupling architecture has delivered important projects and contributes to system security and security of supply.
- Enable competition between power exchanges across all EU Member States to provide market participants with additional trading opportunities and enlarge the benefits of the internal electricity market to all European consumers.



RECOMMENDATION 2: BOOST RENEWABLES THROUGH MARKETS



MARKET INTEGRATION OF RENEWABLES

- Renewable energy support schemes, even market-based feed-in premiums, distort the market price and should be stepwise replaced by all possible market remunerations (power exchange, Guarantees of Origins (GO), Power Purchase Agreements (PPA), etc.).
- In the transition phase, certain support mechanisms are likely to be still needed. Those support schemes shall be justified by a demonstrated market failure not addressed otherwise, clearly limited in time, market-based, and harmonised at European level, to minimise distortive effects of such measures and ensure a levelplaying field across the EU.

GUARANTEES OF ORIGIN FOR RENEWABLE ELECTRICITY

- Enshrine the use of GOs all across the European Union and facilitate standards to ensure transfer of GOs between registries. Reduce time granularity of GOs of currently one year to one month or smaller. Shorter time granularity enables the matching of GOs with closer to real time electricity production and consumption.
- Issue GOs to both non-subsidised and subsidised renewables, to allow all renewable electricity generators to benefit from additional market-based revenue streams, support the use of PPAs and eliminate the need of subsidies for mature renewable technologies.

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RECOMMENDATION 3: VALUE FLEXIBILITY TO TRANSFORM POWER SYSTEMS



GRID CONGESTION AND DEMAND-SIDE FLEXIBILITY

- Incentives for system operators to engage in flexibility procurement processes, complementary to an appropriate grid expansion.
- Avoid barriers for small-scale and demand-side flexibilities to participate in market processes.

LOCAL FLEXIBILITY MARKETS

- Arbitrate grid investments with other "soft" solutions, notably making use of local flexibility markets, to foster cost efficiency of energy transition.
- Rely on neutral platforms and operators for a transparent matching of orders and emergence of meaningful price signals. The distribution of roles and tasks between flexibility providers (i.e. aggregators), system operators and platform operators has to be clear.

Ralph Danielski

CEO of EPEX SPOT



he current situation of persistently high electricity prices is unprecedented. We have witnessed an increase of electricity prices by over 200% within less than a year, starting in autumn 2021. But as well in these turbulent times, the power market works perfectly reliable and accurate. The wholesale electricity market provides strong and meaningful price signals every day. It keeps reflecting the fundamentals of demand and supply precisely and makes the current situation transparent, as ACER rightly points out in its April 2022 Assessment of the EU Wholesale Electricity Market Design.

Solutions lie in a massive expansion of renewable energies combined with more flexibility in the system, e.g., through demand side management, storage capacities, local flexibility and close to real-time trading. Decarbonisation makes Europe independent from energy imports, which is powered by the May 2022 REPowerEU Plan of the European Commission. But what concrete measures should be considered to achieve a decarbonised electricity system?

As European Power Exchange operating physical short-term electricity markets, EPEX SPOT drives the decarbonisation of the energy sector with innovative products and services. Meaningful price signals are the basis for efficient market participants' investment decisions and set the right incentives for secure, clean, and affordable electricity supply. The coupling of European electricity markets facilitates the integration of renewables and contributes greatly to security of supply. Electricity markets with free price formation thus directly contribute to achieving the energy transition in the most efficient way. New price signals for local flexibility can solve grid congestion and unlock the potential of demand-side flexibility. This is why EPEX SPOT keeps working on the development of new flexibility trading platforms and thus further contributes to the decarbonisation of the electricity sector. This paper sets out our policy

"Solutions lie in a massive expansion of renewable energies combined with more flexibility in the system."

recommendations for a decarbonised electricity system, based on our longstanding expertise and experiences as largest power exchange in Europe. The paper focusses on the significance of markets and price signals for decarbonisation (chapter 1), boosting renewables through markets (chapter 2) and valuing flexibility to transform power systems (chapter 3).

We warmly invite European policy makers to take our considerations into account while discussing the REPowerEU Plan of the European Commission and fostering an integrated and competitive European electricity market.

PROTECT THE SIGNIFICANCE **OF MARKETS & PRICE SIGNALS FOR DECARBONISATION**



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MEANINGFUL PRICE SIGNALS AS BASIS FOR EFFICIENT ELECTRICITY MARKET DECISIONS



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- Meaningful price signals set the incentives for secure, clean, and affordable electricity supply. Therefore, distortions of the wholesale electricity market price, such as price caps, shall be avoided.
- Keep relying on price formation based on marginal costs which leads to the most efficient dispatch, lowers costs for consumers and sets the right incentives to invest in clean technologies.

Pricing power

The key to the energy transition is to achieve an energy mix that meets the requirements of carbon-neutrality, security of supply and cost-efficiency. Wholesale markets for power can continue to contribute to each of these goals has they have done so over the last two decades. The claim to fully integrate renewable energy sources in the wholesale markets is an essential instrument in this regard. In the first place, the market provides market players with incentives to bid at their real marginal costs in the power derivative and spot market, meaning dispatch based on the merit order.

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PRICE FORMATION IN EUROPEAN SPOT MARKETS

The marginal pricing principle



e <u>Marginal pricing bases on</u> pav-as-clear:

- Enables all generators
- Encures security of supply
- Incontivisor gonorators
- to bid at their true costs
- Sets investment incentives in new clean technologies

The market price signal is decisive:

- Short-term: for generation & consumption decisions
- Long term: to provide investment signals for new energy assets

Dispatch based on marginal pricing serves various purposes

It shall guarantee the lowest prices for the European end-consumers and industry as the generation with the lowest costs (or the willingness to sell at the lowest price, to be more precise) is dispatched first. When complaining about low costs, one should be aware of the fact that low prices are welcome signal as regards energy-poverty or global competition.

The actual market price is where the supply of power matches demand. In the day-ahead market, which also produces the settlement price for the derivatives markets, a uniform price is determined at a total volume that is derived from the optimisation of overall welfare. Among the successful orders, this price represents the highest price that a buyer is willing to pay and the lowest price a seller is willing to accept. This shall allow generators that are able to produce at lower prices to recover their investment costs. When criticising high costs, one should also consider that they deliver investment signals, promote energy efficiency, and that they make additional public support unnecessary.

The energy transition aims at replacing conventional power sources by low-carbon or carbon neutral ones. There is a wide range of commonly accepted political tools that are designed to steer this development, for instance market-premium models for renewables, EU Emission Trading System (ETS) or other means to price carbon. The fully integrated wholesale markets offer the best link for these instruments at optimal costs as all sources and technologies are enabled to enter competition. While policymakers are enabled to steer this competition to a certain extent, the outcome remains the same: the allocated energy mix is cost-efficient – especially in comparison with a completely regulated and/or steered allocation.

Source : ACER 2021 ; RTE 2020.



This means that as every player has its preferred price range, there are consequently also prices that it dislikes. In any case, the price signal has its value and can carry precious information for market participants, system operators, consumers, authorities, or any other stakeholder as long as the price signal remains unbiased. It then provides valuable feedback to identify oversupply, excessive demand, insufficient information, defective regulation etc. The spot market price is also used in national regulations as basis for the calculation of the feed-in premium for renewables or for the definition of the imbalance settlement price.

At EPEX SPOT, we operate the physical short-term markets for power trading for today (Intraday) and tomorrow (Day-Ahead). By matching supply and demand, we create these fair, transparent, and orderly price signals that trigger the above-mentioned decisions on all levels of the power system.

Focus on negative prices and price hikes

Negative wholesale market prices: In the recent past, negative prices have caused severe concerns over the well-functioning of the wholesale power markets. Indeed, having to pay in order to sell a good that usually has an intrinsic value appears odd and might cause the reflex to assume market failure. In fact, negative prices never represented a long-term equilibrium. On the contrary, they need to be understood as adverse effects resulting from insufficient flexibility in the generation mix and obsolete support regimes. In other words, they were created when market participants were too inflexible to adjust their generation; or they simply did not face any incentive to avoid negative prices. While renewable sources were privileged by priority dispatch and feed-in tariffs, which rather intend to support them to remain out of the market and not to be required to react to price signals, old coal fired power plants as well as nuclear assets lacked the possibility to adjust their output quickly.



Not being able to react on decreasing prices and/or not being required to react, this could result in negative prices. However, this should not be interpreted as a failure of the market but rather a signal to revise public support regimes and to invest in the development of more flexible means of production. In addition, the relevance of must-run facilities can be reappraised. The signal of the market for the latter, however, is certainly a demotivating one: Those who cannot adapt quickly, have to accept negative prices and therefore are disincentivised to operate.

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Price hikes in 2021 - 2022: The steep increase in power prices in 2021 and 2022 was also interpreted as market failure by some parties. In fact, looking at the fundamentals, they can be explained by the interplay of (a) a global gas shortage, (b) increasing prices for carbon emissions, and (c) relatively low generation from renewable sources. In fact, it is encouraging to see that wind production can be interpreted as an enabler to have rather low prices. Yet, stakeholders need to be aware of the volatile nature of this source. If renewables generation is low, a properly functioning market ensures that more expensive sources will replace the resulting gap. The rising price of carbon emissions has been requested for several years. Rising prices of CO2 emissions increase the incentives to avoid carbon emissions through energy efficiency measures or investments in renewable energies. The rise of carbon prices can be explained by looking at market players expectations. By politically advocating for more disruptive and quicker transition to a greater share of renewables, scarcity of emission certificates is to be expected. At the same time, when renewable generation is low, and considerable volumes need to be replaced by conventional plants, the need for certificates is simply increasing – and increasing demand results in higher prices. As the price for coal and natural gas are concerned, we need to be aware of the increasingly global nature of these markets.

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Bidding zones

- Market prices result from supply and demand in a specific geographical area, the bidding zone. Bidding zones are the geographical foundation of the price formation.
- The bidding zone review should be unbiased and open to both mergers and splits of bidding zones. Using member state borders as boundary condition for the clustering algorithm of market coupling means to ex ante exclude mergers of bidding zones of two or more countries. This limits the potential configurations of bidding zones and excludes configurations of two or more countries that could turn out efficient in the future. We therefore recommend to allow mergers between bidding zones.
- The German-Luxembourg bidding zone is a success story and enables the integration of large amounts of renewable generation. However, there is the urgent need to accelerate grid expansion and thus reduce high redispatch costs. A bidding zone split will not reduce physical congestion problems but reduce pressure for urgently needed grid expansion and make the integration of renewable energies even more expensive.

Capacity mechanisms only as measure of last resort

- The Energy Only Market is the preferred solution to address the flexibility challenge, with well-functioning short-term and balancing markets as part of it. Market-based reference price signals shall be the basis of decision-making for market participants.
- Yet, the missing money problem i.e., situations when electricity prices are too low to set incentives for the construction of new generation capacity - exacerbated by subsidised renewable energies means that price signals could be challenged to guide investments towards the optimal mix. There are EU member states where the further enhancement of the Energy Only Market proves inapplicable or insufficient to counter acute challenges to security of supply. In these cases, capacity mechanisms can be a reasonable complement to the Energy Only Market.
- In these cases, the following design criteria for capacity mechanisms shall be considered: Capacity mechanisms should be as technology neutral as possible and open to cross-border participation. The participation of renewable energies should be considered based on their capacity credit. Also demand-side resources and distributed flexibility assets should be treated equally to generation in the competitive bidding process. If possible, capacity mechanisms should be designed as temporary instruments and re-evaluated after some time.

Balancing markets

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- Balancing markets provide a real time equilibrium between supply and demand to keep the 50 Hertz frequency. The European Balancing Guideline sets out harmonised rules for the procurement, activation, and settlement of balancing services with the aim to improve the integration of renewables and development of flexibility also in balancing markets.
- Power exchanges with their expertise can contribute to balancing services. This is for instance the case for the Frequency Response Auction in Great Britain, operated jointly by EPEX SPOT and National Grid ESO. We also bring our expertise in market operations to the European Balancing Platform TERRE. TERRE shows how closer coordination at a European level optimises the exchange of balancing energy to eventually achieve lower overall system costs, to the benefit of the European end-consumer.
- For the well-functioning of the whole energy market, it is key that market participants have strong economic incentives to get balanced until delivery at the spot market instead of relying on costly balancing energy.
- More generally, the design of allocation schemes for balancing shall be chosen in a way that does not impair trading on wholesale markets.



FOSTER COMPETITION AND INNOVATION THROUGH THE EUROPEAN ELECTRICITY MARKET COUPLING



EPEX SPOT POLICY RECOMMENDATIONS

- Build on the existing market coupling architecture to increase organisational efficiency and decision-making processes to reduce time-to-market of new products and features. The current market coupling architecture has delivered important projects and contributes to system security and security of supply.
- Enable competition between power exchanges across all EU Member States to provide market participants with additional trading opportunities and enlarge the benefits of the internal electricity market to all European consumers.

European Market Coupling has been a reality for more than 15 years and brings considerable daily benefits for Europe's industry and end consumers.

The Single Day-Ahead Coupling (SDAC) couples the day-ahead markets of 27 countries (see map next page). In June 2021, the 4M Market Coupling (Czech Republic, Hungary, Romania, and Slovakia) have been integrated into the European Market Coupling. SDAC includes 61 bidding zones, 35 Transmission System Operators (TSOs) and 16 Nominated Electricity Market Operators (NEMOs). The European Market Coupling covers countries representing 98.6% of the EU consumption with 1,530 TWh of traded volumes coupled in one market solution in 2020, despite the COVID-19 pandemic.



The Single Intraday Coupling (SIDC) currently couples the continuous intraday markets of 23 countries (on the left). The integration of Greece and Slovakia is planned during 2022. SIDC includes 31 bidding zones, 32 TSOs and 10 NEMOs. 82 TWh of coupled intraday volumes have been traded in more than 40 million trades in 2020.

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Market coupling means that prices and power flows between countries when cross-border capacity is made available are calculated across different power exchanges at the same time in the most efficient way. Thanks to a coordinated calculation of prices and flows, available cross-border capacity is used more efficiently and the price difference between two or more market areas is reduced, as shown in the following graph.

As of January 2022



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Welfare = Seller surplus + Buyer surplus + Congestion rent

Welfare (Decoupled) ≤ Welfare (Congestion) ≤ Welfare (Full coupling)



Price convergence as a result of European Market Coupling

In the example above, in Market A, demand and supply meet at a lower price. In Market B, demand and supply meet at a higher price. With market coupling, in Market A, demand increases due to exports to Market B. In Market B, supply increases due to imports from Market A. The new equilibrium prices of the two markets converge: Prices increase in Market A and prices decrease in Market B. The remaining difference is the congestion rent which means the price difference between two markets linked by market coupling arising when there is congestion on the border.

If there were unlimited cross-border capacities and no congestions, prices between all bidding zones participating in the market coupling would converge 100% of the time. Yet, due to limited cross-border capacities, prices still differbut converged in 48% of the time in 2021 on EPEX SPOT's markets. This corresponds to an increase compared to 43% in 2020.

Increase of economic efficiency and welfare due to market coupling:

In the example above, the seller in Market A can sell at a higher price (seller surplus) and the buyer in Market B can buy at a lower price (buyer surplus). A higher total volume can be traded as competitive sellers get access to additional markets and price-sensitive buyers have more options to choose. Cross-border capacities are used in an optimal way. A congestion rent is generated which can be used by TSOs to reduce network tariffs or cover costs for grid investments to increase cross-border capacities. ACER estimates the welfare gains created through market coupling at more than 1 bn \notin /year. Additional welfare benefits of more than 1.5 bn \notin /year are estimated in the future through the further accomplishment of market coupling in all timeframes across the EU, in particular coming from balancing markets.



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European Market Coupling brings numerous benefits for Europe's industry and consumers:

- Optimal use of interconnectors facilitating congestion management
- Smoothing effect on negative or positive price spikes
- Attenuation of extreme weather conditions (i.e., cold wave, storm front) on other market areas
- Higher security of supply through market integration and no longer depending on the individual country
- Optimisation of use of resources (e.g., less curtailment of renewables)

The revision of the CACM Regulation: possible effects for the market

Market coupling started already in 2006 as initiative of power exchanges. The Regulation 2015/1222 on Capacity Allocation and Congestion Management (CACM Regulation) set the existing market coupling into European legislation. It also provided a framework to power exchanges for the extension of services to other European markets. Since then, the current setup of market coupling has proven its resilience, from the increased competition between power exchanges to several geographical and technical extensions as well as to the COVID-19 crisis.

With its markets at the heart of Europe, EPEX SPOT plays an active role in the operation of the European schemes for Single Day-Ahead and Intraday coupling. EPEX SPOT is a key contributor to the successful Single Day-Ahead Coupling (SDAC) and Single Intraday Coupling (SIDC) solution.

The CACM Regulation is currently under review. The current proposals may put at risk the completion of the European single power market and associated projects for several reasons:

• Effectiveness, efficiency, and transparency of the overall system might be endangered by the creation of additional governance layers and intermediaries;



• Safety of operations might be less resilient, as the governance options lead to the creation of a potential "single point of failure" which could increase the risks and the impacts of an incident and in the end endanger energy security;

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- Significant transition costs of a new setup may divert resources away from critical projects aimed at expanding the geographical scope of market coupling and making new trading products supporting the EU Green Deal and 2030 Climate Target Plan;
- Longer time-to-market for innovations may result from the proposed market design changes and new restrictions placed on power exchanges.

Therefore, the following aspects shall be taken into consideration for the revision of the CACM Regulation:

- Ensure stability. Market coupling is already a reality, and a number of critical projects are underway. A coherent and stable framework is essential to pursue the implementation of a resilient market coupling system and ensure safe operations at all times.
- Further develop the current architecture. To speed up market integration while allowing competition and innovation to thrive, EPEX SPOT sees the urgent need to build on the current architecture and further develop it. The goal is to improve efficiency, reduce time-to-market for projects, avoid escalations to regulatory authorities and provide more transparency on the functioning and evolution of market coupling.
- Ensure the transition of monopoly NEMOs to the competitive model. To foster fair competition between Nominated Electricity Market Operators (NEMOs), the most efficient approach is to ensure the transition of monopoly NEMOs to the competitive model. More than six years after the entry into force of the CACM Regulation, one third of EU Member States still allow monopoly NEMOs, meaning that in one third of EU Member States no competition at all between power exchanges is possible. The benefits of opening a country to competition between power exchanges are numerous, in particular in terms of trading opportunities for market participants, access to product innovation, reduced administrative and financial burden and cost-effectiveness.



BOOST RENEWABLES THROUGH MARKETS





TOWARDS FULL MARKET INTEGRATION OF RENEWABLES



- Renewable support schemes, even market-based feed-in premiums, distort the market price and should be stepwise replaced by all possible market remunerations (power exchange, GOs, PPAs, etc.). This leads to more efficient market price formation and saves tax payers'/ electricity consumers' money.
- In the transition phase, certain support mechanisms are likely to be still needed. Those support schemes shall be justified by a demonstrated market failure not addressed otherwise, as least distortive as possible, clearly limited in time, market-based, and harmonised at European level, to minimise distortive effects of such measures and ensure a level-playing field across the EU.

Price formation in the transition phase to a decarbonised energy sector

We face a **transition phase** on the path to decarbonisation with the goal to fully integrate renewable sources in the market. Certain support mechanisms are likely to be still needed during this phase.

This includes that new plants shall be built where it is most efficient, irrespective of national borders and support schemes. To ensure sufficient new renewable installations during the transition phase to full market integration, one can also imagine support for renewables in form of upfront capacity payments (for each kW installed) instead of feedin premium payments (for each kWh produced). In terms of market integration, capacity payments would mean a further step towards full market integration as renewable generators would offer their electricity at marginal costs, as any other electricity source. The same holds true for conventional plants, which might still be needed in the transition phase.





Remuneration will be based on market-based revenues, coming from the remuneration of the commodity, i.e., the Power Exchange price for every MWh produced, as well as from the remuneration for the source of the electricity (guarantee of origin - GO) and other system services that can be provided (balancing, congestion management and ancillary services). Therefore, next to competitive and liquid wholesale markets, a well-functioning CO2 market and Guarantees of Origins (GO) market are also needed. This will contribute to renewables being able to refinance themselves on the market. Also, electricity consumers or taxpayers do not need to pay for subsidies anymore. Currently, GO prices are low (for standard Nordic hydro GOs mostly between 0.10 and 2.50 €/GO in the last years), but prices are expected to increase due to rising demand and political renewable expansion targets.

It will not be an easy path to attain full market integration of renewables, as this also includes the right regulatory decisions for a transitionary renewable support scheme, but many market players have already developed promising business models for market-based renewable remuneration schemes, such as new direct marketing models.

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With an increasing share of volatile renewables, prices will get more volatile as well. In hours of high renewables output, the prices will be close to zero, in hours with low generation from renewable sources, conventional power plants will set the price. With an increasing price tag of carbon emissions and global competition in demand for natural gas, these spikes will be considerable. However, the European market design for power already offers an antidote in the form of hedging on the derivatives markets. In addition, those spikes are needed to attract some instruments that will be crucial for a carbon free power market: demand side response and storage assets.

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PURE SYSTEM INTEGRATION

- Regulated remuneration (feed-in tariff)
- No reaction to market price signal
 No price risk
- No balancing responsibility ("produce & forget")
- TSOs in charge of commercialisation of renewables at the power exchange
 Offer at any price

2 TRANSITION PHASE

- Mixed remuneration: market revenues and support scheme (feed-in premium)
- Certain reaction to market price signal
- Certain price risk
- Full balancing responsibility
- New actors emerge: direct marketers/aggregators that commercialise the renewables at the power exchange
- Offer at opportunity costs, not at marginal costs

FULL MARKET

- No support scheme, but market-based remuneration (power exchange, GOs, PPAs, etc.)
- Full reaction to market price signal
- Full market price risk
- Full balancing responsibility
- All market actors including direct marketers/ aggregators, utilities, small market participants, etc.
 Offer at marginal costs

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Price formation in the enduring phase

In the **enduring phase,** with an even higher share of renewables, these developments will continue. Consequently, the market price signal also must remain undistorted to drive demand side response and to make full use of storage assets. The price signal must not be biased downwards, which is essential to stimulate investment in generation capacity. Renewables will be fully exposed to the market price signal and will fully react to it.

The main fear concerning the price signal in this enduring phase is that power will either be abundant or scarce, due to its generation from predominately volatile sources, resulting in low or negative prices if power is available and can be sold; and considerable price peaks if demand cannot be met by these volatile sources. Indeed, this outlook causes concern that the price signal would be insufficient.

Policy makers have already identified the need of demand side response and storage assets to complement volatile generation. In the enduring phase, they shall ensure to stabilise the market price and to add further contents to the price signal.

- A higher degree of flexibility of demand shall help to ensure a constant equilibrium of demand and supply more regularly. At the same point in time, the ability to control and shift demand (i.e., offer flexibility) shall be rewarded by the price spread between different market time units.
- **Storing electricity** can be interpreted in the same way as it allows for the capability to control the time when electricity is offered to the market. The losses in transformation or storage represent a price to achieve this, which works similarly to the marginal costs of today's merit order curve. In addition, if power is transformed to another good, its price can be interpreted as opportunity gains, which again can set the price in the bidding behaviour of the sellers.



The Power Exchange as enabler of efficient renewable market integration

EPEX SPOT has developed the power market by accompanying and enabling renewables integration through more performant systems and product innovation, in particular granular products traded automatically closer to real-time.

- Trading close to real-time/ Lead time reduction: With increasing renewables penetration, trading activity shifts closer to real-time when forecasts are most precise. EPEX SPOT continuously shortened the lead time on all its continuous Intraday markets. Already since 2015, trading is possible until 5 minutes before delivery in Belgium and the Netherlands, since 2017 in Germany (within a single control area), and since 2018 in France and Austria. In Finland trading is even possible until delivery. Yet, there are other countries where trading is not yet possible during the last hour before delivery, such as in Denmark, Sweden, and Norway.
- 15- and 30-minute products: Intraday products with smaller granularity, in particular 15- and 30-minute products, give market participants better possibilities to adjust hourly forecast deviations, fine-tune customer portfolios and manage production ramps. As the first Power Exchange in Europe, EPEX SPOT introduced in 2011 cross-border trading of quarter-hour products on the continuous intraday markets in Austria, Germany, and Switzerland and in 2018 in Belgium and the Netherlands. In 2020, 30 and 15 minute products became available on several borders in the Single Intraday Coupling (SIDC) solution.



- Complementary intraday auctions: EPEX SPOT started introducing complementary local 15 minutes Intraday auctions in 2014, first in Germany. Complementary intraday auctions were a strong wish from market participants. To complement the local 15-minute Intraday auction in Germany, EPEX SPOT introduced coupled 30-minute Intraday auctions in Great Britain as well as the 60-minute Intraday auctions in Switzerland. In October 2020, EPEX SPOT successfully launched further new Intraday auctions in four countries: Austria, Belgium, France, and the Netherlands. These flexibility contracts facilitate the integration of intermittent electricity flows into the market, therefore playing a key role in the decarbonisation of the energy sector. In a market with an increasing number of renewable assets, they are essential in facilitating a cost-efficient energy transition, delivering a reliable reference price. Following a decision by ACER, the introduction of pan-European Intraday auctions is foreseen for 2023. We believe that the number of Intraday auctions should be limited and linked to new cross-border capacity recalculations.
- EPEX SPOT launched new **After-Market products** in January 2021 in Belgium and in the Netherlands. These products enable market participants to trade until one day after delivery. By balancing their positions even after delivery, when all the final information on production and consumption is available, our market participants are able to reduce their imbalance costs. These contracts were a strong wish from our members.







AN ORGANISED MARKET FOR GOS: A TRANSPARENT PRICE SIGNAL TO VALUE THE GREEN SOURCE OF ELECTRICITY



• Enshrine the use of GOs all across the European Union and facilitate standards to ensure transfer of GOs between registries.

- Reduce time granularity of GOs of currently one year to one month or smaller. Shorter time granularity enables the matching of GOs with closer to real time electricity production and consumption.
- Issue GOs to both non-subsidised and subsidised renewables, to allow all renewable electricity generators to benefit from additional market-based revenue streams, support the use of PPAs and eliminate the need of subsidies for mature renewable technologies.

Guarantees of origin (GOs) are an indispensable tool to trace the origin of the electricity

In a meshed grid with a multitude of producers and consumers, it is physically not possible to ensure that the electricity produced by one specific producer is transported to one specific consumer, as electrons cannot be tracked along the grid. This makes it necessary to establish a complementary system which traces the origin of the electricity and remunerates renewable production for its value.

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This is made possible with the GO mechanism, implemented with the European Directive on Renewable Energies 2009/28/EC. It allows to value the origin of the electricity and is mostly used to track renewable production. A GO is an electronic document that proves to the final customer that a quantified amount of electricity originates from a specific energy source, e.g., renewable or cogeneration. A GO tracks green energy from the producer to the final customer, ensuring full transparency for these consumers. It is recognised EU-wide. Every country has its own state-appointed registry holder, e.g., EEX in France and UBA in Germany. By ensuring the traceability of renewable electricity, GOs promote the production and consumption of green electricity and promote investments into renewables.

Full transparency for the consumer, additional market-based remuneration for the supplier

A megawatt hour produced from a renewable power plant has different values: the value of the commodity electricity (in \in /MWh), and the value of the origin (or greenness) of the electricity (in \in /guarantee of origin), if required by the end-consumer. More and more consumers do not only want to buy electricity but want to know the source of the electricity and buy electricity from renewable sources. For producers, the green part of their electricity has a value and can create additional marketbased remuneration for them. A supplier who buys GOs shows his/her appreciation of the corresponding technology and provides additional revenues for the original generator. This incentivises market participants to further invest in those technologies that yield the highest prices for GOs.

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Need for an organised market providing transparent and robust price signal

As any other commodity, GOs need a proper market to be traded. A full-functioning primary market exists and GOs can already be traded OTC today, thanks to key standards provided by the Association of Issuing Bodies (AIB) to ensure transfers of GOs not only within national registries but also between registries. The European GO market is expanding year after year with a GO supply close to 800 TWh and demand almost reaching 700 TWh in 2020. There is more and more interest from end-consumers to know the origin of the electricity coming from their plug, but also from Commercial and Industrial companies (C&Is). Electricity suppliers have been developing green offers to match the need of their customers and C&Is do procure themselves on the market. But the market is craving transparency and trading standards: there is a lack of a transparent and robust price reference today to show the value of all kinds of GOs. This is one of the main barriers for further development of the liquidity of the current GO market. A European market with additional trading standards - on top of the AIB ones - is required. There is the need for an organised market.

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EPEX SPOT'S RECOMMENDATIONS FOR A DECARBONISED ELECTRICITY SYSTEM © EPEX SPOT SE

First pan-European GO market to be launched in 2022

EPEX SPOT plans to launch a pan-European market for GOs in 2022, subject to successful testing and market readiness. The GOs spot auction will be held once a month and operated by EPEX SPOT. Clearing and settlement will happen through the Clearing house ECC, and EEX will ensure delivery through its GO registry. The market design of this new pan-European spot auction foresees a monthly multilateral auction for GOs from renewable production in selected countries that are part of the European Energy Certificate System (EECS). Buyers and sellers will access both specific and generic GOs within one pay-as-clear auction, optimising market liquidity. Several levels of specificity within three dimensions will be made available: country, technology, and subsidy regime. A specific GO can be for instance Dutch solar without subsidy regime. A generic GO means all countries, all technologies, and all subsidy regimes. Indices will be published following each auction, providing transparent price signals to the market. GOs over a specific production month, or over a longer production period will be both available for trading to cope with both general EU and specific French regulatory frameworks. Our flexible setup will be able to follow the development of the market and the evolution of the regulatory framework, for instance by modifying an existing dimension (new country, new technology), or by adding a new dimension.

EXCHANGE-BASED TRADING OF GOS OFFERS MANYFOLD ADVANTAGES FOR MARKET PARTICIPANTS COMPARED TO BILATERAL TRADING

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- Access to an anonymous market
- Clear and transparent market rules
- Standardised products
- Level playing field between market participants
- Financial security of transactions through Clearing House
- Calculation and publication of fair and transparent price references

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An organised marketplace for GOs promotes the further development of renewables by publishing a fair and transparent price for the green quality of renewable electricity. Provided that GO prices are sufficiently high, GOs provide additional revenues for renewable plant operators. The remuneration for GOs sets additional incentives for the investment in new renewable plants. In addition, an organised GO market with transparent price signals contributes to build trust of consumers in electricity from renewable sources and can thus increase demand.

A reliable and harmonised regulatory framework is key

We welcome measures to enshrine the use of GOs all across the European Union and to facilitate standards to ensure the transfer of GOs between registries.

Remaining barriers to the exchangeability of GOs across EU countries shall be further reduced. Our upcoming GO auction will provide more trust, standardisation and transparency to the market and therefore support its development. In addition to that, a regulatory framework that further strengthens the role of GOs regarding the market integration of renewables is necessary as well as more harmonisation across the EU. Obstacles for trading GOs cross-border within the EU shall be removed. GO demand needs to be increased, e.g. by enlargening the applicability of GOs and for example allow system operators to use GOs for grid losses. In the future, the time granularity of GOs of currently one year shall be further reduced to one month or even smaller. Time granularity of a GO means the time between the production of the electricity and the expiration of the GO for the electricity produced, (electricity consumption date) i.e. the validity period. Shorter time granularity, e.g. one week, one day, or even one hour, enables the matching of GOs with short-term electricity production and consumption. This will further contribute to build trust in the GO market.

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GOs shall be issued to both non-subsidised and subsidised renewables,

as suggested by the European Commission in its draft revision of the Renewable Energy Directive (RED III). This will allow all renewable electricity generators to benefit from additional market-based revenue streams, support the use of PPAs and eliminate the need of subsidies for mature renewable technologies. Yet, if GOs will also be issued for subsidised renewables, one has to take into account that some buyers want to differentiate a GO from subsidised renewables from a GO from non-subsidised renewables. In the GO spot auction, we will therefore include the product specification of subsidy regime to correspond to market participants' needs and to provide full transparency to the consumers.



VALUE FLEXIBILITY TO TRANSFORM POWER SYSTEMS



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NEW COMPLEMENTARY PRICE SIGNALS TO SOLVE GRID CONGESTION AND TO UNLOCK THE POTENTIAL OF DEMAND-SIDE FLEXIBILITY

- Incentives for system operators to engage in market-based flexibility procurement processes, complementary to an appropriate grid expansion.
- Avoid barriers for small-scale and demand-side flexibilities to participate in market processes.



Tackling grid congestions and unlocking the potential of demand-side flexibility are key challenges of the energy transition

One particular growing concern of the electricity system is the congestion issue, or in other words how well the electricity grid is dimensioned to transport and distribute electrical energy from production to consumption centres, to avoid congestion situations where the grid is not developed in a manner to accommodate power flows where they occur. Rising intermittent renewables and the decentralisation of the electricity system led to increased congestions over the past years on the transmission level and will continue to grow both on the transmission and distribution level.

This trend will be reinforced by further renewable growth, new regulatory provisions, such as the EU 70% rule setting the target of 70% cross-border transmission capacity available for trading by 2025 and the advancing electrification of the heating and mobility sectors. Coping with such a challenge solely by relying on grid expansion would prove very costly for the European end-consumer and does not even appear as realistic in some EU countries very much advanced in the transition of their energy system. Making use of all flexibilities the system can offer will be of utmost importance to be able to support renewable energy development and future electrification prospects.



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Local flexibility markets for market-based congestion management represent a "soft" and cost-efficient solution to complement grid development for tackling the challenge of grid congestion through making best use of system flexibilities including demand-side flexibility. Flexibility markets implement a marketplace for congestion management that efficiently centralises local flexibility offerings. On the one side, network operators are enabled to resolve physical congestions reliably and economically. On the other side, flexibility providers benefit from an additional revenue opportunity for the flexibility they can provide. Thanks to an exchange-based platform, supply and demand are determined anonymously – enabling a transparent price signal to emerge. This price signal is also important for future investments.

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The increased use of demand side flexibility is currently limited by various factors. In order to create stronger incentives for consumers for demand side response in the future, the metering infrastructure would have to be further expanded. In addition, the share of taxes and levies in end consumers' electricity bills would have to be reduced so that the share of the electricity price takes on a more decisive role.

In recent years, a lot of research and development has been carried out throughout Europe to find practical solutions to this flexibility challenge, and several key initiatives have emerged.

With the energ project by the energy group EWE and EPEX SPOT, a showcase for a flexibility market was created in the period of 2017-2020. EPEX SPOT has designed, developed, implemented, and operated a short-term flexibility market for congestion management in the North-West of Germany. The project showed that a flexibility market is not only technically feasible, but also offers real added value by eliminating local physical congestions through use of a market. The curtailment of renewables could be avoided, and new flexibility potentials were opened up. New ways of remunerating flexibility were found and coordination between System Operators was enhanced. The enera project demonstrated that a key success criterion is a clear separation of roles between a) the system operators manging the grid, b) the power exchange handling neutral market operations, and c) the flexibility providers managing the optimisation of their assets.

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THE WAY FORWARD: WHAT BENEFITS A MARKET PLATFORM FOR FLEXIBILITY CAN BRING

PEX SPOT POLICY ECOMMENDATIONS

- Arbitrate grid investments with other "soft" solutions, notably making use of local flexibility markets, to foster cost efficiency of energy transition
- Rely on neutral platforms and operators for a transparent matching of orders and emergence of meaningful price signals. The distribution of roles and tasks between flexibility providers (i.e. aggregators), system operators and platform operators has to be clear.



System operators are responsible for the security of supply

In this role, System operators need to alleviate congestions before they occur. Next to grid investments, a complementary solution to solve congestions is the use of flexibility, i.e. the ability of assets connected to the grid to increase or decrease their consumption or production. The use of flexibility can also optimise grid costs and investments.

Traditionally, transmission system operators have used flexibility in regulated or semi-regulated processes (via redispatch procedures), whereas DSOs mostly focused on grid reinforcement. Bringing the energy transition to the next level will require a change of paradigm and a cultural shift to more "flexibilisation" of the grid and power system in Europe. The EU Clean Energy Package of 2019 sets the pace for a renewed approach to congestion management, favouring market-based solutions as well as market-based flexibility procurement and prompting system operators to better coordinate their operations; all for the sake of a cost-efficient energy transition:

- Congestion management has to be market-based (Regulation (EU) 2019/943 Art. 13);
- DSOs need to consider alternative options to grid investment such as market-based flexibility procurement (Directive (EU) 2019/944 Art. 32);
- TSOs and DSOs need to coordinate their operations (Regulation (EU) 2019/943 Art. 57).

The European Commission estimates that up to €5 billion per year of investment in the distribution network can be avoided by increasing flexibility capacities.

Yet, across Europe, there are miscellaneous national frameworks that are not always incentivising system operators to optimise grid investment costs with new emerging flexibility resources. Although local flexibility markets are a key enabler for the efficient use of flexibility resources, there must be compatible incentives for system operators to engage in flexibility procurement processes instead of further building the grid. EPEX SPOT has acquired the Local Energy Market (LEM) platform from Centrica end of 2021. The LEM auction platform provides a market-based solution for energy flexibility trading. It was developed and tested to allow system operators to use flexible assets to manage grid congestions. It offers an end-to-end process for system operators including pre-trading, flexibility registry and post-trading. Compared to continuous trading, offered on the platform previously used by EPEX SPOT for its local flexibility offer, the auction platform LEM allows for optimisation and more efficient DSO-TSO coordination. Local flexibility markets will become increasingly relevant, complementary to electricity wholesale markets, and will provide smart solutions for the energy transition.

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Flexibility market platforms are a market mechanism to:

- increase the efficiency of local flexibility markets over bilateral agreements by creating a shared explicit economic space,
- reduce entry barriers for smaller market participants,
- allow for standardisation of products and processes while keeping agility to adapt to local market or regulatory constraints, and not end up with a detrimental one-size-fits-all model,
- maximise the efficient use of the existing grid and therefore reducing costs in grid extension,
- while finding the most cost-efficient solution through competition of assets, and
- lead to a significant overall increase of social welfare.

REDISPATCH 2.0

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In Germany, the introduction of Redispatch 2.0 is a first and positive step towards the integration of smaller flexibilities. However, the reform alone is not sufficient. Redispatch 2.0 does not make it possible to integrate flexibility on the load side or to develop further flexible capacities, as the Federal Government rightfully recognises in their market reform plan. New rules must be found for the German market. One transitional solution acknowledging the challenges with current structural congestions would be a hybrid model in which the market-based redispatch is limited to small-scale flexibilities while existing, generation-based assets are kept in the cost-based redispatch. The small scale flexibilities include especially all the flexibilities which cannot be remunerated cost-based, such as load side flexibilities (electric vehicles, heat pumps,). That limits the extent to which Inc-Dec gaming could be harmful to the system and enables the development of new flexibilities to accompany the energy transition, ultimately enabling network operators to use the most favourable flexibility option for them. It would hence represent an efficient and forward-looking intermediary step on the way to a full market-based redispatch. This would also pave the way for greater harmonisation in the long run with neighbouring countries applying market-based approaches.



The European Power Exchange EPEX SPOT SE and its affiliates operate physical short-term electricity markets in 13 countries: in Central Western Europe, the United Kingdom, in Switzerland, the Nordics and in Poland. As part of EEX Group, a group of companies serving international commodity markets, EPEX SPOT is committed to the creation of a pan-European power market. Over 300 members trade electricity on EPEX SPOT. 49% of its equity is held by HGRT, a holding of transmission system operators. For more information, please visit www.epexspot.com.