KOPERNIKUS PROJEKTE SynErgie
Die Zukunft unserer Energie

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Term	Definition	References
Congestion Management	**Congestion management** is used to prevent or remove bottlenecks in the grid and to enable the efficient allocation of transmission capacity.	Neuhoff, K., Hobbs, B., Newbery, D., 2011, Congestion management in European power networks: Criteria to assess the available options, DIW Berlin Discussion Paper 1161
	In the German zonal pricing system, costs of congestion management arise due to redispatch and amount to over one billion Euros every year.	BNetzA, 2020, Quartalsbericht Netz- und Systemsicherheit – Gesamtes Jahr 2020 https://www.bundesnetzagentur.de/SharedDocs/Mediathek/Berichte/2020/Quartalszahlen_Gesamtjahr_2020.html.
Demand-Side Management	**Demand-side management** describes the effort to make electricity demand more flexible so that electricity consumers can flexibly react to, e.g., price signals. While demand for electricity has been relatively inelastic in the past, demand-side flexibility now is becoming one promising solution for dealing with imbalances in the electricity grid.	Ashour Novirdoust, A., Bichler, M., Bojung, C., Buhl, H. U., Fridgen, G., Gretschko, V., Hanny, L., Knörr, J., Maldonado, F., Neuhoff, K., Neumann, C., Ott, M., Richstein, J. C., Rinck, M., Schöpf, M., Schott, P., Sitzmann, A., Wagner, J., Wagner, J., Weibelzahl, M., 2021a, Electricity Spot Market Design 2030-2050, https://doi.org/10.24406/fit-n-621457.
Feed-in Management	Until October 2021, Distribution System Operators (DSOs) could use **feed-in management,** if there were still remaining congested transmission lines after **redispatch.** This included the reduction of in-feed of electricity generated by Renewable Energy Sources (RES) and combined heat power generators. As RES feed into the grid with priority, feed-in management was used as one of the last measures to manage congestion. Since October 2021, feed-in management for RES with an installed capacity of more than 100 kW has been replaced by **Redispatch 2.0.**	Ashour Novirdoust, A., Bichler, M., Bojung, C., Buhl, H. U., Fridgen, G., Gretschko, V., Hanny, L., Knörr, J., Maldonado, F., Neuhoff, K., Neumann, C., Ott, M., Richstein, J. C., Rinck, M., Schöpf, M., Schott, P., Sitzmann, A., Wagner, J., Wagner, J., Weibelzahl, M., 2021a, Electricity Spot Market Design 2030-2050, https://doi.org/10.24406/fit-n-621457.

Financial Transmission Rights (FTRs)	**FTRs** are financial hedge products that can help market participants manage risks from local market price differences. They can be used to mitigate distributional effects that might arise during the transition to a nodal pricing system. FTRs can cover price differences between different nodes. FTRs are issued by the system operator and allocated to consumers and producers.	Ashour Novirdoust, A., Bhuiyan, R., Bichler, M., Buhl, H. U., Fridgen, G., Fugger, C., Gretschko, V., Hanny, L., Knörr, J., Neuhoff, K., Neumann, C., Ott, M., Richstein, J. C., Rinck, M., Röhrich, F., Schöpf, M., Sitzmann, A., Wagner, J., Weibelzahl, M., 2021b, Electricity Market Design 2030-2050: Moving Towards Implementation, https://doi.org/10.24406/fit-n-640928.
Inverse Demand Function	The **inverse demand function** describes the electricity price as a function of the quantity demanded.	Mas-Colell, A., Whinston, M.D., Green, J.R., 1995, Microeconomic Theory, New York: Oxford University Press, ISBN: 978-0-1950-7340-9.
Market Clearing	The process that leads to the balancing of the buyers' total electricity demand and the sellers' total electricity supply is called **market clearing**.	Khorasany, M., Mishra, Y., Ledwich, G., 2018, Market framework for local energy trading: a review of potential designs and market clearing approaches, IET Generation, Transmission & Distribution, Vol 12, Iss.22, pp.5899-5908, https://doi.org/10.1049/iet-gtd.2018.5309.
Market Design	**Electricity Market Design** refers both to the rules governing the (electricity) market and to the deliberate design of these rules so that behavioral incentives are set for individuals in a desirable manner.	Ashour Novirdoust, A., Bichler, M., Bojung, C., Buhl, H. U., Fridgen, G., Gretschko, V., Hanny, L., Knörr, J., Maldonado, F., Neuhoff, K., Neumann, C., Ott, M., Richstein, J. C., Rinck, M., Schöpf, M., Schott, P., Sitzmann, A., Wagner, J., Wagner, J., Weibelzahl, M., 2021a, Electricity Spot Market Design 2030-2050, https://doi.org/10.24406/fit-n-621457.
	An appropriate market design is needed to enable efficient production and distribution of electricity taking transmission capacity into account. In electricity markets, it is of particular importance that their design ensures that demand and supply of electricity are balanced at all times and at every node of the grid.	Sauer, A., Abele, E. Buhl, H.U., Hg., 2019, Energieflexibilität in der deutschen Industrie. Ergebnisse aus dem Kopernikus-Projekt – Synchronisierte und energieadaptive Produktionstechnik zur flexiblen Ausrichtung von Industrieprozessen auf eine fluktuierende Energieversorgung (SynErgie). Stuttgart: Fraunhofer Verlag. ISBN 978-3-8396-1479-2.
Merit Order	The **"Merit Oder"** determines the order in which electricity from all available plants is used: generation plants are sorted in ascending order according to their price offer. Due to their	Haucap, J., Kühling, J., Amin, M., Brunekreeft, G., Fouquet, D., Grimm, V., Gundel, J., Kment, M., Ketter, W., Kreusel, J., Kreuter-Kirchhof, C., Liebensteiner, M., Moser, A., Ott, M., Rehtanz C., Wetzel, H., Meinhof, J., Wagner, M., Borgmann, M., Stephanos, C., 2022, Strommarktdesign 2030: Förderung der erneuerbaren Energien wirksam und effizient gestalten.

	very low marginal costs, RES typically constitute the "beginning" of the merit order, while expensive gas-fired power plants are typically at the "end" of the merit order. The price offer of the last power plant needed to cover total demand, e.g., gas-fired power plants, determine the electricity price in a certain time period.	Impuls des Akademienprojekts „Energiesysteme der Zukunft", https://doi.org/10.48669/ESYS_2022-1
Nodal Pricing System	A **nodal pricing system** leads to regionally differentiated electricity prices in the case of congestion between regions. This is because all physical transport restrictions are already considered during market clearing and regions that are separated by congested lines have different market clearing prices. Thus, as all relevant economic and technical constraints are considered, nodal pricing systems lead to efficient grid congestion management: High prices signal local import bottlenecks and thus provide incentives for (1) efficient dispatch (2) long-term investments. This reduces the need for ex-post grid interventions and expensive **redispatch.**	Sauer, A., Abele, E. Buhl, H.U., Hg., 2019, Energieflexibilität in der deutschen Industrie. Ergebnisse aus dem Kopernikus-Projekt - Synchronisierte und energieadaptive Produktionstechnik zur flexiblen Ausrichtung von Industrieprozessen auf eine fluktuierende Energieversorgung (SynErgie). Stuttgart: Fraunhofer Verlag. ISBN 978-3-8396-1479-2.
Redispatch	**Redispatch** describes the daily process of readjusting market outcomes in zonal markets after trading in order to prevent bottlenecks in the grid and achieve a feasible allocation. Until October 2021, transmission system operators (TSOs) asked conventional power plants with an installed capacity of >10 MW to reduce or increase electricity feed-in. Since October 2021, there have been various legal changes for	Ashour Novirdoust, A., Bichler, M., Bojung, C., Buhl, H. U., Fridgen, G., Gretschko, V., Hanny, L., Knörr, J., Maldonado, F., Neuhoff, K., Neumann, C., Ott, M., Richstein, J. C., Rinck, M., Schöpf, M., Schott, P., Sitzmann, A., Wagner, J., Wagner, J., Weibelzahl, M., 2021a, Electricity Spot Market Design 2030-2050, https://doi.org/10.24406/fit-n-621457. Neuhoff, K., Hobbs, B., Newbery, D., 2011, Congestion management in European power networks: Criteria to assess the available options, DIW Berlin Discussion Paper 1161

	redispatch as part of the Grid Expansion Acceleration Act (NABEG) (→ see **Redispatch 2.0**). Overall, redispatch measures are balancing-neutral in terms of the traded quantities as well as profit-neutral for individual players. The need for redispatch stems from the fact that internal capacity constraints are neglected in a uniform or zonal pricing system.	
Redispatch 2.0	The Grid Expansion Acceleration Act (NABEG), which came into force in 2019, has allowed TSOs to adjust RES since October 2021 to avoid or eliminate grid congestion, provided that the installed capacity of the power plant exceeds 100 kW (the new size requirement also applies to conventional power plants). This new rule implies that the former feed-in management for RES (with an installed capacity of more than 100 kW) has been replaced by Redispatch 2.0 The new regulation does not change the fact that redispatch of conventional power plants takes place first, as the feed-in priority for RES continues to apply.	Ashour Novirdoust, A., Bichler, M., Bojung, C., Buhl, H. U., Fridgen, G., Gretschko, V., Hanny, L., Knörr, J., Maldonado, F., Neuhoff, K., Neumann, C., Ott, M., Richstein, J. C., Rinck, M., Schöpf, M., Schott, P., Sitzmann, A., Wagner, J., Wagner, J., Weibelzahl, M., 2021a, Electricity Spot Market Design 2030-2050, https://doi.org/10.24406/fit-n-621457. BDEW, 2022, Allgemeine Hintergrundinformationen. Retrieved July 27, 2022, from https://www.bdew.de/energie/redispatch-20/
Social Welfare	**Social welfare** can generally be measured by the sum of consumer surplus and producer surplus, which is realized in a market equilibrium, i.e., at the price-quantity-pair where markets clear (→ see **market clearing**). A special feature of electricity markets is that the congestion rent for the grid operator - as an additional player - must also be taken into account when assessing social welfare.	Khorasany, M., Mishra, Y., Ledwich, G., 2018, Market framework for local energy trading: a review of potential designs and market clearing approaches, IET Generation, Transmission & Distribution, Vol 12, Iss.22, pp.5899-5908, https://doi.org/10.1049/iet-gtd.2018.5309.

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Uniform Pricing System	In a **uniform pricing system**, there is no regional price differentiation within a pricing zone. Against this background, a single market price, a so-called uniform price, is formed in each trading period for the entire zone. This implies that all transport restrictions are neglected.	Sauer, A., Abele, E. Buhl, H.U., Hg., 2019, Energieflexibilität in der deutschen Industrie. Ergebnisse aus dem Kopernikus-Projekt - Synchronisierte und energieadaptive Produktionstechnik zur flexiblen Ausrichtung von Industrieprozessen auf eine fluktuierende Energieversorgung (SynErgie). Stuttgart: Fraunhofer Verlag. ISBN 978-3-8396-1479-2.