

Box 1.2: An update on energy price developments: pass-through from wholesale to retail

Increasing wholesale energy prices are the main driver of the recent pick-up in consumer and producer price inflation throughout the EU. The pace and extent to which these pressures are passed on to household consumer prices remain highly differentiated across EU Member States. Understanding the transmission of the hikes in energy commodity prices, both in terms of amplitude and timing, is crucial for the outlook for households' real disposable income and, consequently, for their consumption and saving decisions. This Box reviews recent energy price developments as well as the factors driving the price pressure transmission and gauges the speed and extent of this pass-through.

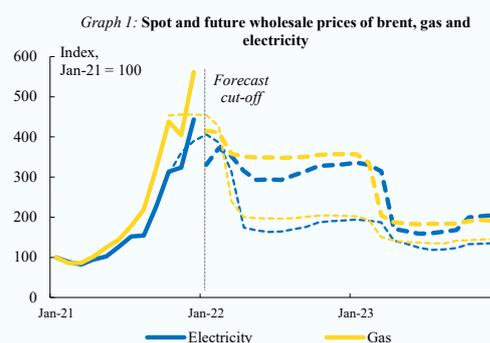
Energy prices are fluctuating at a high level but futures signal the peak is close

After strong increases during the summer and fall, the Dutch TTF Gas – which acts as the European benchmark for wholesale gas prices – increased again, doubling during December to a level of 180 €/MWh, but has since retreated. This increase was accompanied by heightened volatility. As gas storage levels continued to decline,⁽¹⁾ prices reacted sharply to swings in supply or demand, as well as to market sentiment. Wholesale electricity prices have continued to broadly move in lockstep with gas prices. Average EU wholesale electricity prices jumped significantly to about 250 €/MWh in the early days of December, and have since remained at elevated levels. The surge in carbon permit prices in the EU Emissions Trading System added pressure on electricity prices, though this is estimated to have played a more limited role.⁽²⁾ Oil prices fell temporarily with the emergence of the Omicron variant, as concerns on renewed obstacles to the global recovery increased, but they have since recovered and hit a seven-year peak of around 90\$/barrel at the end of January.

⁽¹⁾ European gas storage was down to 47.6 % of capacity on 15 January (54 billion cubic meters, or BCMs) compared to 62.5 % a year earlier.

⁽²⁾ According to recent estimates between December 2020 and June 2021, wholesale electricity market prices almost doubled in Spain, with around 20% of the increase due to the rise in CO₂ prices in the European ETS. Pacce, M., Sánchez, I., and Suárez-Varela M. (2021), 'Recent Developments in Spanish Retail Electricity Prices: the role played by CO₂ emission and higher gas prices'. Banco de España Occasional Paper No. 2020.

Compared to the Autumn Forecast, there has been a significant upward shift in gas and electricity futures from the first quarter of 2022 onwards. Futures' prices for Brent oil also increased, but to a much lesser extent. Future contracts still point to a retreat from high levels after this winter, though prices are set to remain higher than expected in autumn throughout 2022, before abating more substantially in the spring of 2023 (see Graph 1).



Consumer energy prices have yet to fully adjust

Energy inflation in the EU increased from about 14% in July to 26% in December, partly due to base effects stemming from the low energy prices the year before. Energy components account for around 10% of the HICP basket in the EU. Of this share, the largest part comes from fuels (45%) followed by electricity (30%) and gas (20%). Overall, the rise in energy prices directly explains around half of the increase in inflation since the summer.

Developments in HICP energy continued to vary within the EU. Cumulated over the 24 months from January 2020 to December 2021, consumer-level price changes ranged from -12.9% (CZ) to 130.2% (EE) for electricity and from -11.4% (CZ) to 118.2% (EE) for gas (see Graph 2).

Even in the absence of further increases in energy commodities prices, the past increases are yet to be fully reflected in retail energy prices. The extent to which this will happen depends on a broad variety of factors that ultimately shape consumer price developments in individual Member States.

First, differences in the dynamics of wholesale gas prices faced by individual Member States rose sharply in the course of 2021. As a result of lags in

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adjustments of pipeline import contracts - to the TTF benchmark - among different gas providers, the range of wholesale gas prices across the EU rose to a multi-year high in September 2021. ⁽³⁾

Second, the structure of retail energy prices differs significantly across Member States. For example, the share of energy and supply costs (including the price of the raw material) in the consumer gas price varied in 2020 between some 21% (DK) to 73% (CZ), while that of taxes ranges from 9% (EE) to 62% (SE). Additionally, network costs differ markedly across the EU, both in terms of levels and shares in the final price. Adjustments in all these price components will lead to changes at the consumer level. Nevertheless, these vast differences in price structures appear to shed little light on the heterogeneity in actual energy price developments in 2020 and 2021.

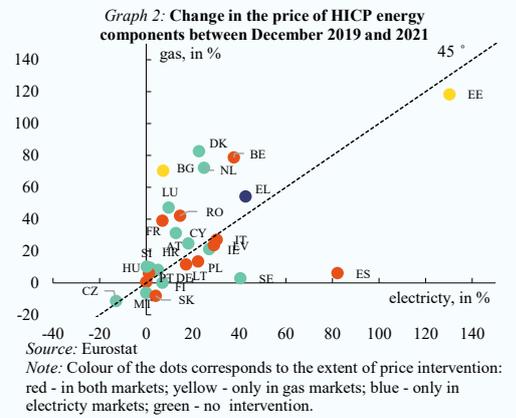
Third, regulatory frameworks and government interventions differ significantly across countries. Roughly half of Member States actively intervene in retail markets for electricity and gas ⁽⁴⁾. Regulators may impede or constrain upward adjustments, with the ensuing cost either directly absorbed by the government (or state-owned energy companies), or shared between the government and energy companies. However, the link between the extent of regulation and the size of retail price adjustment over the past two years is not obvious, with regulated markets present in both high (EE, ES, BE) and low (SK, HU, PT) tails of the price change distribution (see Graph 2).

Fourth, many Member States, including those that do not normally regulate energy prices, introduced in 2021 and early 2022 extraordinary measures to shield consumers from soaring energy prices. Some of these (e.g. temporary cuts in energy taxes or network fees) have had a direct impact on retail prices of gas and electricity.

Finally, it should be recalled, that even within Member States, multiple contracting practices may coexist, with some households opting for longer term contracts that lock in retail price for several years.

⁽³⁾ European Commission (2021). ‘Quarterly report on European gas markets Q3 2021’. Issue 3, section 2.3.3.
⁽⁴⁾ ACER Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2020 - Energy Retail Markets and Consumer Protection Volume, November 2021.

To shed light on the speed and intensity of the transmission mechanism, a simple pass-through model is estimated, relating commodity price changes to consumer price changes, allowing for transmission delays up to one year. ⁽⁵⁾ Estimates show that, on average, almost 40% of the change in Brent oil prices is passed onto liquid fuel consumer prices within 12 months (see Graph 3). The transmission is relatively swift, with 80% of the price increase occurring within one month. While the high degree and speed of the transmission is a characteristic that generally holds across countries, the estimated range may be explained by differences in the total tax shares between Member States.



The picture looks different in the case of natural gas. Generally, the effect is found to be both smaller and to feed through at a much slower pace. On average, about 13% of the increase in natural gas prices is passed on to consumer gas prices 12 months later, with only about 20% of this effect occurring within the first month. This feature implies that the rise in wholesale gas prices observed until the end of 2021 is set to exert significant upward pressure on retail gas prices throughout this year. Furthermore, cross-country heterogeneity is strong, which can be explained by the differences in national market structures noted above.

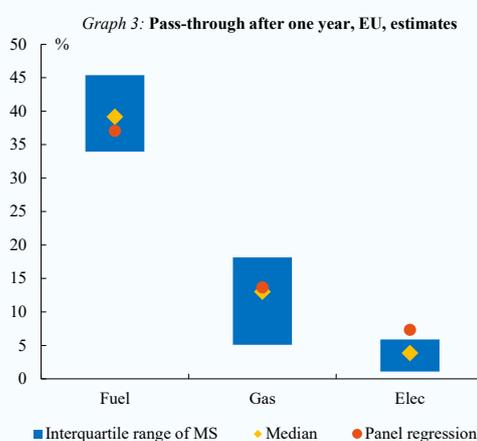
The transmission mechanism to electricity prices is more challenging to estimate. In the past, markets

⁽⁵⁾ The estimated model is an autoregressive distributed lag model: $dlog(P)_t = \beta_0 + \beta_1 dlog(P)_{t-1} + \sum_{j=0}^{12} \delta_j dlog(X)_{t-j}$ where P is the HICP energy component index and X the respective commodity price. The model is estimated for each EU Member State.

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were more segmented and differences in the energy production mix played a major role in determining price-setting mechanisms. This makes the choice of a driver of movements in electricity prices more challenging. In the EU, wholesale electricity prices have recently been more correlated with gas prices. For this reason estimates are performed using the European gas benchmark.⁽⁶⁾ On average, only about 4% of a change in wholesale gas prices is passed on to consumers' electricity prices within 12 months, which is a markedly lower share than for the other two commodities. About 25% of this effect happens within the first month. For a majority of Member States, however, no significant transmission is found.



These results are subject to important caveats in the current context. First, they assume that all countries face the same energy commodities price increases, which is not necessarily the case for natural gas due to differing supply and contract conditions. Second, changes in the functioning of markets, e.g. as a result of regulatory changes, may imply that past relationships no longer hold.

To crosscheck the robustness of the findings, alternative modelling strategies were employed. A panel regression accounting for country-fixed effects broadly corroborated the previous findings on the average magnitude and time lags of transmission. A principal component analysis shed further light on the differences between the three markets. The first factor explains about 70% of the total variation in consumer fuel prices across Member States, which suggests that there is a strong common determinant of monthly changes in

⁽⁶⁾ In the EU, wholesale electricity prices are based on the marginal pricing model, with gas power plants being often the marginal producer.

consumer prices for fuel. The same cannot be said for gas and even less so for electricity, where the first factor only explains 20% and 10% of the variation, respectively.⁽⁷⁾ This confirms the role of other important country-specific drivers.

Conclusion

Going forward, energy prices will remain a key driver of inflation dynamics in 2022. Despite the expected stabilisation of spot wholesale prices as from the second quarter, consumer gas price inflation is likely to peak on average only mid-year, as past increases will keep feeding through until then. While decelerating, prices of futures suggest that gas inflation is likely to still be positive up to mid-2023. Thereafter, a sharp downward correction could be in the cards. For electricity prices, inflation largely follows the same path. However, both swings to the upside and to the downside are set to be less pronounced.

By contrast, given the swift transmission of Brent oil prices to prices at the pump, fuel inflation (measured as year-on-year change) should gradually decline and fade over the next 12 months, assuming that the broad stabilisation implied by futures materialises.

This analysis concerns the direct impact of rising energy commodity prices on the corresponding consumer prices. Indirect effects are also affecting inflation developments, and they are likely to linger around for longer.⁽⁸⁾ As energy is a major input in the production of virtually all goods and services included in the HICP basket, to widely varying degrees, the extent of firms' profit margin compression may force them to pass the increase in production costs on to consumers.⁽⁹⁾

⁽⁷⁾ Assuming that the first component captures the effect of changes in commodity prices, a regression of wholesale gas prices on the first factor is performed. It points to a pass-through of about 12%. For electricity, the same exercise yields an estimate of 2%.

⁽⁸⁾ Alonso, I., Kataryniuk, I., & Martínez-Martín, J. (2021). 'The impact of supply and demand shocks on recent economic developments and prices'. Box 3, Economic Bulletin Banco de España, 2021(4).

⁽⁹⁾ See also Special Issue 2 "Energy prices" in European Commission (2021). 'Autumn 2021 Economic Forecast: From recovery to expansion, amid headwinds'. *Institutional Paper* 160, November 2021.