Energy price ceilings with partial cover: A Dutch master?

By Professor Marco Haan, University of Groningen, and Professor Maarten Pieter Schinkel, University of Amsterdam[1]

Source: Marco Haan

Men constructing a ceiling, in the style of van Gogh. Generated using artificial intelligence, with the assistance of DALL·E 2.

Following the surge in energy prices and the financial stress this created for many households, several EU member states reacted with price-capping measures to protect their citizens. The Netherlands designed a price ceiling on the fly, in which households pay lower prices on limited amounts of gas and electricity. Marco Haan, Professor of Industrial Organisation at the University of Groningen, and Maarten Pieter Schinkel, Professor of Economics at the University of Amsterdam, analysed the system and gave an early warning that it would reduce competition on retail markets, driving up prices, profits, and subsidies. Their analyses have just become all the more relevant, considering that the proposal for the EU's electricity market design, which was presented by the European Commission on 14 March 2023, is closely modelled on the Dutch price ceiling system. The authors present alternative designs that deliver the same values of income support to households, while maintaining competition and incentives to conserve energy.

Misdiagnosed market failure

When energy prices skyrocketed end of summer 2022 to levels that households could no longer afford, governments throughout Europe rushed to implement energy-bill aid measures. Support was delivered through reduced energy taxes, transfers, wholesale and retail price regulation, and various combinations of these[2]. The surging retail prices for energy originated in an artificial scarcity of the natural gas supply, created for geopolitical reasons by the dominant supplier, Russia. Household electricity is a homogenous good produced from various sources with different efficiencies that are engaged in order of their increasing marginal cost of production. Wholesale gas is late in that merit order, but a necessary input at the margin for meeting electricity demand

1 This article is based in part on joint work with Simon van Tartwijk and Jan Tuinstra, both University of Amsterdam, and Bert Tieben, SEO Amsterdam Economics.

2 Hirth, L. The Merit Order Model and Marginal Pricing in Electricity Markets, neon.energy/marginal-pricing, 2 September 2022; Sgaravatti, G., S. Tagliapietra, C. Trasi, and G. Zachmann, National fiscal policy responses to the energy crisis, Dataset, Bruegel, 13 February 2023.

in most member states. Gas for domestic consumption in heating and cooking is straightforwardly refined from crude gas.

Accordingly, when the steep increase in the marginal cost of input gas shifted retail energy supply curves drastically downwards, consumer market prices rose. European energy markets functioned remarkably well, quickly translating the sudden shortage of natural gas into higher energy prices, bringing demand and supply back in line. This induced users to reduce their energy consumption down to the available supply, signalled to producers the need for an urgent transition to other energy sources, and generated the incentives necessary to invest in them[3].

Marginal cost pricing is a well-established and efficiency-enhancing economic principle. However, in leading policy circles, the steep consumer price rises were rashly diagnosed as a system failure of the free energy markets. France's President Macron found it 'absurd' that electricity prices followed gas prices upwards.[4] UK Prime Minister Boris Johnson called pricing on the basis of 'the top marginal gas price', now that it was high, 'frankly ludicrous'.[5] The President of the European Commission, Ursula von der Leyen, believed that renewables like solar and wind had made the market system 'outdated'[6]. Most dramatically, Vice-President Frans Timmermans stated at a press conference on 14 September 2022 marking the introduction of a Council regulation on emergency interventions to address high energy prices that: 'What was once a free and functioning market has been sabotaged'.

Russia always had been dominant in crude gas, and now abused its position by excessive pricing[7]. However, while the resulting unprecedentedly high consumer prices certainly had huge negative income effects on households, a failure of the European energy markets they were not.

ECA Journal Short Read

The **Dutch energy ceiling** system design, while capping the tariffs paid for gas and electricity on household consumption up to set ceiling volumes, also created upward pricing pressures on Dutch retail prices, by reducing competition and by basing compensation for suppliers on their market prices. The European Commission proposed **reforms of the EU's electricity market design**, published on 14 March 2023. They include **an 'electricity price crisis' regulation** to assure households of access to affordable energy while maintaining incentives to reduce energy use that is **closely modelled on the Dutch price ceiling system.**

The **ceiling prices apply to high consumption volumes** that cover total demand from the majority of households, disengaging them from the energy market and reducing their incentive to save energy. This softens price competition between energy suppliers. In addition, a particularly strong price-increasing effect is introduced if suppliers are given **lost revenue compensation** on the basis of market prices.

A system of providing similar household support through **an indexed lump sum fosters competition**, as well as the incentives for all households to consume less energy. **Retail market competition can be preserved** also within a price ceiling system, by giving indexed government discounts. Current market developments suggest that the **Dutch energy price ceiling system** has **kept energy prices up**, despite the recently sharp fall in the purchasing cost of input gas.

The **Dutch experience** can serve as an **educational example** for the EU to properly address the **challenge to provide energy price support while ensuring incentives to reduce energy demand**.

Price caps on limited volumes: The Dutch energy ceiling system

Nevertheless, the concern that citizens could no longer pay their energy-bills led many member state governments to intervene hastily and deeply in the retail energy markets. In his glowing speech, Timmermans suggested that in particular 'setting a lower price for limited volumes' would be 'a good way to offer specific support to low- and middle-

3 See Heussaff, C., S. Tagliapietra, G. Zachmann and J. Zettelmeyer, *An assessment of Europe's options to reduce energy prices*, Policy Contribution 17/2022, Bruegel; or listen to *The Sound of Economics, Europe's energy crisis: Is Europe's energy price surge here to stay?*, Bruegel podcast, 16 February 2022.

4 24 News Recorder, Emmanuel Macron castigates the "absurd" fixing of the price of electricity and the "unreasonable superprofits", 29 June 2022.

5 Bloomberg, Boris Johnson Hints at UK Energy Market Reform Amid Inflation Surge, 25 June 2022.

6 Von der Leyen addressing the European Parliament, 8 June 2022.

7 In fact, the European Commission had opened proceedings against Gazprom abusing its dominance in Central and Eastern European gas markets that in 2018 led to commitments to enable the free flow of gas at competitive prices; see Case AT.39816 – Upstream gas supplies in Central and Eastern Europe, 24 May 2018.

income households'[8]. Within a week, on 'Prinsjesdag', the start of the parliamentary year in the Netherlands, the Dutch government implemented such a system of retail price caps on limited gas and electricity volumes[9]. In 2023, Dutch households pay fixed, relatively low prices of €1.45 for their first 1,200 cubic meters of gas consumption, and €0.40 for their first 2,900 kilowatt-hours of electricity consumption. Only for consumption beyond those ceiling volumes do retail market prices apply. The energy companies are compensated for the revenue they lose from supplying energy below cost. The Dutch government essentially pays them the difference between the retail prices and the fixed ceiling prices on the actual amount of energy consumed below the ceiling volumes, provided these do not exceed a maximum gross profit margin, which is set rather generously[10].

Other member states imposed retail energy-market interventions too, ranging from full price control, such as in France, to more sophisticated individualised price ceilings, as in Germany. But the Dutch energy ceiling system is remarkable for its combination of two elements that conspired to raise energy prices even further than they had already been by the high cost of input gas. On the one hand, the Netherlands set rather high uniform ceiling volumes, namely at about (and later adjusted a little upwards from) the average household consumption levels of electricity and gas in 2021. As a result, based on 2021 consumption, at least some 70% of households was projected to stay fully below the threshold with their energy use. The actual share of households that was fully covered by the ceiling volumes was even higher, as ceiling prices were higher than 2021 average retail prices and the winter turned out to be unusually mild. This generous full demand cover essentially disengages the majority of Dutch households from the energy market, thus reducing competition between energy suppliers for them[11]. On the other hand, however, the Dutch system continued to rely on market forces – now hampered by the ceiling system itself – to determine the prices that high-volume users pay for consumption above the ceiling volumes, and, moreover, the compensation that the Dutch government pays the energy companies.

Preliminary lessons from an experiment in progress

In this article, we set out how the design of this Dutch energy ceiling system created strong net upward pricing pressure on Dutch retail rates, thus increasing the cost of energy consumption for users not entirely covered by the energy ceiling system, as well as the compensation cost for the government. In essence, the Dutch ceiling system stalls competition between suppliers in the retail market for household energy. The high volumes to which the price ceilings apply have made the majority of Dutch households insensitive to market prices[12]. We set out several price effects from the system, including also potential downward pricing pressures, the net effect of which is probably to increase prices, profit margins, and government cost. A particularly strong price-increasing effect is added by compensating the energy suppliers for lost revenue on the basis of their own market prices for gas and electricity, as the Dutch did – albeit constraint. Alternative, better ways of giving energy-bill support were proposed, but not implemented. We also present some preliminary indications of elevated price and profit margins in the first quarter of 2023 that the Dutch energy ceiling has been operational, despite the recently sharp fall in the purchasing cost of input gas. Competition seems at least to have been impeded by the ceiling system.

8 Timmermans, F., Opening remarks by Executive Vice-President Timmermans and Commissioner Simson at the press conference on an emergency intervention to address high energy prices, 14 September 2022; European Commission, Proposal for a Council Regulation on an emergency intervention to address high energy prices, 14 September 2022. Such price ceilings had been advocated by the Netherlands socialist party PvdA since the summer.

9 Reuters, *Dutch government to impose price cap on energy* - NOS, 19 September 2022.

10 The definitive Dutch energy ceiling system was published on 9 December 2022 as EZK (2022) *Subsidieregeling bekostiging plafond energietarieven kleinverbruikers 2023*. Kabinetsbrief, DGKE-DE / 22564387. Suggestions for last-minute improvements we gave in Haan, M., en M.P. Schinkel, *Drie uitvoerbare voorstellen om het energieplafond te verbeteren*, Blog on esb.nu, 14 December 2022.

11 In the German ceiling system, each household received support on a percentage (80%) of *its own* 2021 consumption, keeping all households in the market. However, the support increased in the market price, so that households that consumed below their ceiling volume had an incentive to contract for high tariffs. See Ralph Bollmann, *Das grosse Geldverbrennen*, Frankfurter Allgemeine Zeitung, 11 December 2022. This again shows how, in market interventions, the devil is in the detail.

12 We originally gave this warning in Schinkel, M.P., M. Haan, S. van Tartwijk, B. Tieben, and J. Tuinstra, *Energie-plafondsysteem heeft prijsopdrijvend effect*, in: Economisch Statistische Berichten, 108 (4817), 26 January 2023, 16-19 (online publication 19 October 2022).

These unintended consequences of the Dutch energy ceiling have become all the more relevant with the Commission's proposed reforms of the EU's electricity market design, published on 14 March 2023[13]. These include an 'electricity price crisis' regulation that is to assure that households have access to affordable energy, which is closely modelled on the Dutch price ceiling system[14]. If the Commission would declare a crisis of sustained sharp increases in electricity retail prices, member states may set a ceiling price for the supply of electricity that is below cost, provided it applies to no more than 80% of median household consumption and energy suppliers are compensated for their supply below cost.[15] The lessons learnt already in the Dutch experiment with price ceilings on limited volumes of energy consumption, although that experiment is still ongoing and to be studied more, should be valuable for assessing this part of the proposed reform of the EU electricity market design.

Capped volume limits competition

An important aspect of retail energy markets is that competition between energy providers is *for* households; to attract and contract them for their entire use against specific gas and electricity tariffs for a certain period of time – including flexible periods against variable rates. By offering consumers competitive tariffs, providers try to lure households away from their competitors and induce them to switch supplier[16]. A lower retail price means higher demand for a given supplier, and a lower likelihood that its customers will switch away to another. These competitive forces to undercut rivals keep retail prices low at close to production costs.

The first effect of the Dutch energy price ceiling is that all Dutch households pay the same fixed below market prices for their energy use up to the ceiling volumes of 1,200 cubic meters of gas and 2,900 kilowatt-hours of electricity – regardless of their supplier. Households whose consumption is covered by these ceiling volumes – that is in 2023 some 70-90% of Dutch consumers – are entirely disengaged from shopping for a better energy contract deal[17]. They have been made perfectly price-inelastic by the fixed low prices, and so lost their incentive to shop around. Suppliers can no longer induce them to switch by making low price offers. The reduced competition lowers competitive pricing pressure, increasing market prices for energy above the ceiling volumes.

However, households that consume more than the ceiling volumes – while a small minority – do maintain some competitive pressure on prices. These households do have an incentive to switch, with their entire consumption, to an energy supplier that offers lower market rates. In fact, suppliers now have to compete more fiercely to attract these households, as they benefit from lower prices only for their consumption above the ceiling volumes, which can be small for many. After all, these households too pay the fixed ceiling prices for all of their consumption below the ceiling volumes. The higher the ceiling volumes, and thus the lower the demand above those volumes, the less large-consumption households can gain from switching suppliers at given prices.

Further price effects depend on the compensation received by suppliers for implementing the ceiling system. If that compensation is higher than the cost, which is what the supplier will try to assure and therefore arguably is the likely scenario, providers have more of an incentive to try to attract those households with total consumption above the ceiling price, because they come with a lucrative subsidy on their consumption below. Hence, while it

13 European Commission, *Proposal for a Regulation of the European Parliament and of the Council amending Regulations (EU) 2019/943 and (EU) 2019/942 as well as Directives (EU) 2018/2001 and (EU) 2019/944 to improve the Union's electricity market design*, 14 March 2023.

14 In footnote 139 of the *Commission Staff working document, reform of Electricity Market Design*, published 14 March 2023, The Netherlands, together with Austria, Hungary, Germany and Rumania are named as member states that already implemented the approach.

15 European Commission, Proposal for a Regulation of the European Parliament and of the Council amending Regulations (EU) 2019/943 and (EU) 2019/942 as well as Directives (EU) 2018/2001 and (EU) 2019/944 to improve the Union's electricity market design, 14 March 2023, Article 66a proposed for implementation in Directive (EU) 2019/944 of the European Parliament and the Council of 5 June 2019 on common rules for the internal market for electricity.

16 In addition to the tariffs, energy providers also compete on contract terms, as well as on lump sum discounts or presents to win customers over. In the following, we abstract from such other dimensions of competition as unit prices. We note that, in particular, non-linear pricing can significantly affect the price effects of the ceiling system – essentially reducing some of the price-decreasing effects of the ceiling system. Out of total residential consumption in 2022, roughly 90% is below the quantity ceilings.

17 Out of total residential consumption in 2022, roughly 90% is below the quantity ceilings. See Ministerie van Financiën, *Budgettaire verwerking APB*. Kamerstuk, 4 October 2022.

becomes harder for suppliers to attract consumers, it also becomes more attractive for them to do so. The net effect of these two factors on prices is ambiguous. If, on the other hand, the government would only pay a compensation that is lower than cost, suppliers would have an incentive to try to shed high-volume consumers by raising prices.

Most markets are in some form of imperfect competition, and the Dutch retail energy market is no exception. In fact, the market is essentially a triopoly of Eneco, Essent and Vattenfall, which together serve some 80% of demand[18]. They are disciplined somewhat by a competitive fringe, consisting of quite a few small providers. Still Dutch retail energy market competition is oligopolistic, which implies strategic price setting and positive profit margins – even if only small. This presents an additional mechanism by which the ceiling system design can actually reduce prices. Consider a company that is contemplating lowering its price, weighing up the pros and cons. The advantage is that sales increase. The downside is that revenue per product decreases – also for the products the company sells anyway. However, with a ceiling price, this disadvantage does not apply to sales below the ceiling volumes, because the price for that part is fixed. This makes it more attractive to choose a lower price, giving a downward effect on the imperfectly competitive prices for low enough ceiling quotas[19].

With these various possible price effects of a price ceiling, some upwards others downwards, the net effect is an empirical question for the retail energy market at hand. A preliminary assessment of the Dutch retail energy markets suggests that upward pricing pressures are probably the stronger ones.

Lost revenue compensation drives up prices further

An additional, and particularly strong upward price effect occurs if energy providers are compensated on the basis of the unregulated retail market prices. Such 'lost revenue' compensation was what the Dutch government originally intended to give[20]. This may sound reasonable, since suppliers forgo selling against the market price on the below-ceiling volumes on which they can only charge the lower ceiling prices. The problem is, however, that those market prices are not exogenously given: in imperfect competition, they are set by the energy suppliers themselves. Lost revenue compensation then provides all of them with an additional incentive to raise prices. After all, increasing one's retail price now means receiving a higher government compensation on all the energy provided below the ceiling volumes. Doing so will not drive away those households whose demand is fully covered by the ceiling volumes. On the other hand is market price-based compensation lucratively above cost, which induces suppliers to attract high-volume households by lowering prices. The net price effect of lost revenue compensation is typically upwards, certainly at higher ceiling volumes that leave fewer households with consumption beyond to attract.

In a last minute reconsideration of the original design of the ceiling system, the Dutch government constrained the lost revenue compensation it gives[21]. In the implemented version, energy companies receive a compensation advance, for energy provided below the ceiling levels, that is equal to the difference between their market price and the ceiling price, but with a cap on the maximum gross profit margin that the advance can contain. If it turns out that more compensation was given, the suppliers are to pay back the difference. In other words, a profit ceiling was added to the Dutch price ceiling mechanism. However, the maximum allowed gross margin is rather generously determined, and is based on the seller's own reported operation cost. Issues of cost accounting and control introduce complexities in determining actual gross margins in hindsight. There are no penalties on having to repay excessive advances. Moreover, the details of the gross profit margin test are still to be published, and so it remains unclear to what extent the test will constrain prices. Weak control of the true cost and the actual rate of return are likely to keep market prices and compensation costs higher than necessary.

18 See the pie chart in Financieel Dagblad, *Vrije energiemarkt leidt tot meer keuze maar niet tot lagere prijzen*, 27 November 2019; and GfK Energie Monitor, *Cijfers over het derde kwartaal van 2019*, published in 2020. See Schinkel, M.P., en J. Tuinstra, *Forced freebies: a note on partial deregulation with pro bono supply requirements*, in: Journal of Regulatory Economics, 26(2), 2004, 177–187.

19 See Schinkel, M.P., en J. Tuinstra, *Forced freebies: a note on partial deregulation with pro bono supply requirements*, in: Journal of Regulatory Economics, 26(2), 2004, 177–187.

20 Minister Jetten's letter to Parliament, EZK, *Nadere uitwerking tijdelijk prijsplafond energie,* Ministerie van EZK, Kabinetsbrief, 4 October 2022.

21 EZK, *Subsidieregeling bekostiging plafond energietarieven kleinverbruikers 2023*, Kabinetsbrief, DGKE-DE / 22564387, 12 December 2022.

Indexed lump sum support

There are better ways than a price cap to shield consumers from high energy prices; ways that do not interfere with market processes and that are also easier to implement. An obvious one is a lump sum payment to households of roughly the size of the income effects. Lump sums were already given in the Netherlands, as an intermediate measure in the months of November and December 2022, when the ceiling system described above was still under construction. Each household twice received a fixed amount of €190 per month. A major advantage of such a lump sum is that it delivers income support while preserving in full households' incentives to switch supplier for lower contract prices on all of their demand. It therefore does not affect the market for energy at all. If it is so desired that the total value of income support for households remains that of the price ceiling system, the size of the lump sum can be adjusted to move in tandem with changing energy prices. For example, if energy prices double from one month to the next, the lump sum could also double. That way, subtracting the fixed amount from each household's energy-bill leads to the same net bill total as under the energy ceiling system.

It should also be noted that lump sum compensation maintains the incentives of all households to save on energy and reduce demand in full, unlike the ceiling system. After all, each unit of energy saved under lump sum compensation would save a household the full market price, rather than just the lower capped price. Indeed, in the ceiling system with artificially low prices, governments essentially subsidize fossil fuel consumption. The much higher retail prices for household gas and electricity without such subsidies provide a strong incentive for reducing energy use. That force for the environment coming from the competitive pricing system is *preserved* when lump sum income support is given. By reducing that force, providing energy-bill support through price ceilings fundamentally runs counter to the Green Deal objectives. It is quite ironic therefore that it is Frans Timmermans who encourages the member states to waste a good energy crisis as an opportunity for the Green Deal to gain momentum.

Indexed discounts

A drawback of the lump sum approach is that each household receives the same amount of support, regardless of their need and actual energy consumption; indeed, the latter is what maintains their incentives to economise. A political concern with this alternative is that lump sum aid would not be 'targeted', as required by the European Commission[22]. Also, the compensation costs to the government do not decrease with households consuming less energy, as compensation costs do under the ceiling system. Moreover, the Dutch cabinet and Parliament considered it a desirable feature of the price ceiling system that households have certainty about the price that they pay, and the energy-bill that they will face – even though, as explained above, properly indexed lump sum support would give that same certainty regarding the energy-bill[23]. For these reasons, lump sum compensation, despite being much easier to implement and much less disruptive of competition in the energy markets, was rejected.

It is, however, not difficult to design an adequate alternative energy-bill support system that provides price certainty for households and is targeted in the sense that it does not give more support than necessary. Such a system implements the income support through discounts given on retail prices that are indexed to those retail prices[24]. It has the large advantage that it preserves competition, so that market prices, profit margins and government costs do not increase unnecessarily. This indexed discounts systems works as follows. The existing ceiling volumes of 2,900 kilowatt-hours of electricity and 1,200 cubic meters of gas remain in place. Households pay market prices, but receive substantial discounts for all usage up to the ceiling volumes, which is subtracted from their energy-bills. For electricity, this discount is equal to the average electricity retail price, minus the current ceiling price of €0.40. For natural gas, it equals the average retail price of natural gas, minus €1.45.

22 European Commission *Proposal for a Council Regulation on an emergency intervention to address high energy prices*, 14 September 2022, recital 14.

23 Ministerie van EZK, *Beantwoording vragen over tijdelijk prijsplafond*, Kabinetsbrief, DGKE-DE / 22526088, 7 October 2022.

24 We originally suggested this alternative in Haan, M., and M.P. Schinkel, *Alternatief energieplafond verenigt prijszekerheid met marktwerking*, in: Economisch Statistische Berichten, 108 (4817), 26 January 2023, 20-23 (online publication 30 November 2022).

This set-up means that the net prices households end up paying on average exactly equal the desired certain ceiling prices of €0.40 and €1.45. The discounts can be determined regularly with changes in market prices, for example every month, based on the then-current retail prices. The discounts are administered by the energy suppliers, but they will be regularly compensated for the total amount of discounts that they will have to pay or have paid out. Determining the proper compensation is straightforward, as it requires no in-depth insight into the costs and operations of energy suppliers. This makes the government's involvement fully transparent[25].

One important feature of this indexed discounts system is that for households it works out almost the same as the current price ceiling, insofar as it provides near price certainty. In other words, a household that pays a retail price equal to the market average receives exactly the same compensation as in the current system. For example, if the average retail price for electricity is €1.00 (or 100 cents) per kilowatt-hour, the discount is 100 (the average price) – 40 = 60 cents. A household that faces a retail price equal to the average therefore pays 100 (its retail price) – 60 = 40 cents, i.e. the fixed ceiling price. If the average market price rises to 150 cents, the price discount also increases by 50 cents to 110 cents, so the average household still pays 40 cents per kilowatt-hour. For natural gas, an indexed discount per cubic meter works exactly the same. As intended, consumers thus no longer face the uncertainty of strong price fluctuations.

The main benefit of this system is that competition in the energy market remains fully effective. Households receive the same discount from each provider, but these discounts are based on the actual retail price they pay. Consumers thus retain the incentive and ability to switch to the provider with the lowest prices. The following example clarifies this. Suppose there are four suppliers, each charging an electricity price of €1.00. The discount is then 100 – 40 = 60 cents. If one of them lowers its price to 92 cents, the average market price becomes 98 cents, and the discount 98 – 40 = 58 cents. Its customers then pay 92 cents (the price of this supplier), minus 58 cents (the new discount), hence 34 cents, for their consumption under the quantity ceiling. A customer of some other supplier pays 100 – 58 = 42 cents. Switching to the price-buster thus implies a saving of 8 cents – exactly the 8 cents by which it lowered its price. Similarly, no supplier can raise its price without losing a significant portion of the households it serves. This keeps suppliers sharp and prices competitive, even for consumption below the quantity ceilings. It prevents excess profits and keeps compensation costs for the government low.

The only real disadvantage of this indexed discounts system is that is does not give *perfect* price certainty. Some price variation remains, as only households facing a retail price exactly equal to the market average will actually end up paying exactly 40 cents per kilowatt-hour and €1.45 per cubic meter. Households in a contract with above-average prices are slightly worse off, as they pay the above-average price but are reimbursed based on the average price. However, customers paying a price below the market average are somewhat better off. It should be noted that it is precisely this feature of the indexed discounts system that ensures that competition remains unaffected. It keeps it attractive for households to shop around for the lowest prices – to which their discounts apply. As a result, the different suppliers' retail prices will be driven down by that competition to the same, relatively low, levels. With all contract prices converging towards the average, all households ultimately end up paying the desired €1.45 per cubic meter of gas and €0.40 per kilowatt-hour of electricity. Hence, while some price uncertainty remains around the level of the ceiling prices, it is driven down towards zero by the system itself.

Chilled competition in the Dutch energy market

The Dutch energy ceiling system is an educational example of how intervening in an otherwise well-functioning market can easily backfire. It shows how the devil is in the detail. This is especially the case if the design of that regulation gives firms the scope to obtain and use market power to their advantage. The Dutch price ceiling system, despite good advice and extensive debate in Parliament, came into effect on 1 January 2023 in a form that still contained the main design flaws that give concern for stifled competition and raised prices, profit margins and government compensation costs. Of course, it is too early to tell what the effects of the Dutch energy price ceiling eventually will have been. Various things relevant to the operation of the energy market have changed at the same time, and are changing still, so

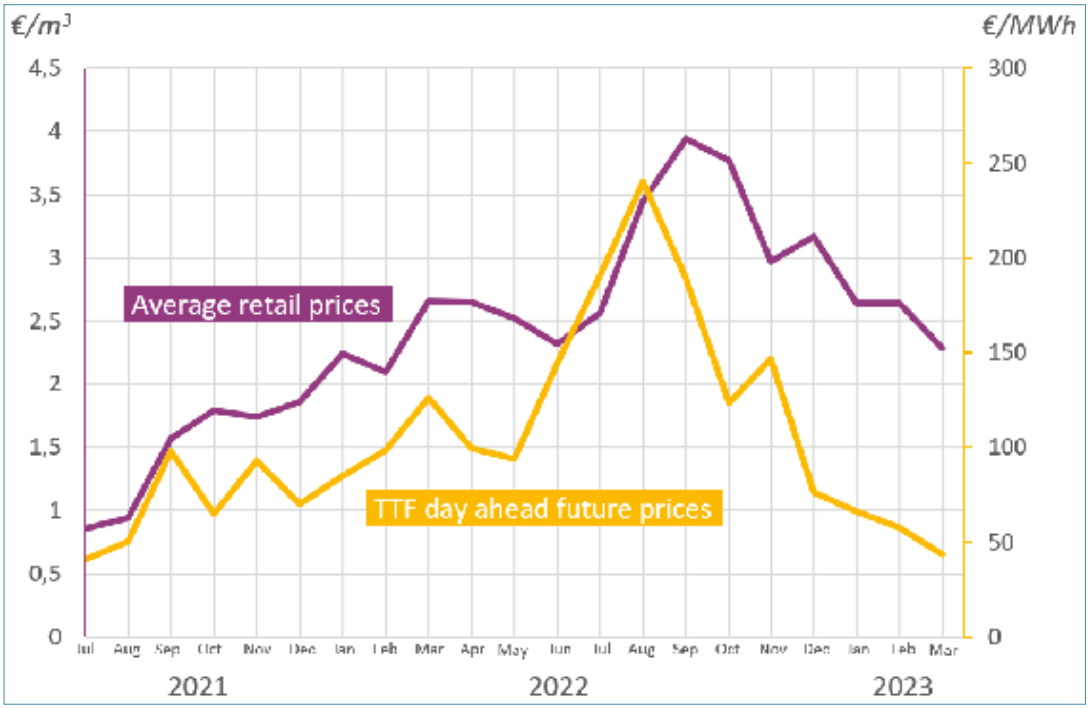
25 A spreadsheet that illustrates the core workings of the indexed discount system is available at www.marcohaan.nl/indexed-discounts

that it is hard to determine the proper counterfactual. Yet a shock to the mode of competition the introduction of the Dutch energy ceiling system certainly seems to have been, and there are some first signs that indicate higher prices and profit margins[26].

First, price dispersion in retail rates is remarkably high. For natural gas, retail prices among the 20 largest producers range from €1.77 to €3.22[27]. Such a wide price range for a homogeneous product is not something typical for a well-functioning competitive market. However, it would be consistent with the kind of distortions of competition that the Dutch price ceiling system would bring about, as explained above, in a tightly oligopolistic market with a competitive fringe trying to attract price-sensitive consumers with demand above the ceiling quantities. Indeed, the big three energy providers, Vattenfall, Essent, and Eneco, still set prices at the high end of the price range.

Second, although input gas prices on the world market have come down dramatically since August 2022, it seems that this decrease is still only partially reflected in Dutch retail prices. **Figure 1** shows gas prices on the TTF trading platform (yellow) and the unweighted average retail prices of the 20 largest producers (purple). Clearly, retail prices tracked TTF prices rather closely until the summer of 2022, but have so far failed to come down as strongly as the TTF prices. The pattern is consistent with prices falling like feathers, which can be a sign of limited competition[28].

Figure 1 - Average gas prices, wholesale and retail



Source: Energieprijzen, www.overstappen.nl (last consulted 23 March 2023); Dutch TTF gas futures, www.investing.com (last consulted 30 March 2023)

The fact that these market prices remain high suggests that the compensation cost to the Dutch government are unnecessarily high, as predicted. Nevertheless, when wholesale gas prices, spot and future, unexpectedly, sudden and steeply decreased from their peak at the end of August 2022 and into 2023, various media in the Netherlands cheerfully reported that the cost of implementing the Dutch ceiling system would be much lower than expected[29]. Certainly, with Europe the Netherland was lucky with a relatively warm winter. With hindsight, the peak in gas prices seems to have been a unique and temporary occurrence[30]. However, a hampered competitive retail market for energy makes that those decreases in cost are reflected only very partially in lower market prices, thus keeping the cost to government

26 Haan, M., and M.P. Schinkel, *Energieplafond houdt overheidskosten ver boven ramingen*, in: Economisch Statistische Berichten, 108(4819), 23 March 2023, 124-127 (online publication 7 February 2023).

27 Source: www.overstappen.nl (last consulted 30 March 2023).

28 See, for example, Tappata, M., *Rockets and feathers: Understanding asymmetric pricing*, in: The RAND Journal of Economics, 40(4), 673–687, 2009.

29 Nieuwsuur, *Bij huidige gasprijzen kost het prijsplafond 'slechts' 4,7 miljard,* NOS Nieuws, 3 January 2023, a number based on the most optimistic of scenarios for TTF gas price development in CPB, *Scenario's energieprijzen*, 6 December 2022.istic of scenarios for TTF gas price development in CPB, Scenario's energieprijzen, 6 December 2022.

30 See The Economist, *The energy crisis and Europe's astonishing luck*, 11 January 2023.

high. The Dutch energy price ceiling system so far appears to have kept energy prices up, despite the recent sharp fall in the cost of purchasing of raw gas. Figure 1 illustrates with end of March purchase and sales prices. Only now, at the time of writing, with the winter officially over, are prices gradually starting to come down – in some instances even below the ceiling prices.

Providing energy-bill support while maintaining incentives to reduce demand

The Dutch energy price ceiling system illustrates some possible pitfalls in the design of price caps for limited consumption volumes with supplier compensation in an otherwise competitive market. This is how the European Commission intends to regulate that all member states should protect their vulnerable consumers in case of an electricity price crisis[31]. The Dutch system has two main design flaws: one is that it specifies rather high ceiling volumes, the other that it compensates energy producers essentially on the basis of their own market prices. We argued how the scheme is likely to keep retail prices and profit margins high, and hence the costs to government. The Commission's proposed regulation, in particular Article 66a proposed for implementation in Directive (EU) 2019/944 of the European Parliament and the Council of 5 June 2019 on common rules for the internal market for electricity, can be improved to avoid those pitfalls.

We discussed better alternative systems for implementing energy-bill support. An indexed lump sum energy-bill discount can give the same amount of support while preserving competition and the incentives for all households to reduce energy consumption. At least, rather than providing energy companies with compensation for lost revenue, consumers should be given an indexed discount equal to the difference between the average retail price and the target ceiling price. Such a system also maintains competition for all households, while only introducing a limited amount of price fluctuation around the desired ceiling-price levels. A downside compared to (indexed) lump sum compensation is that (indexed) discounts too only incentivise energy savings by large-consumption households.

We criticize the energy ceiling system for probably raising market prices. Of course, one could argue that higher retail prices for households that consume beyond the ceiling volumes are not a problem, as they would lower energy consumption in support of environmental objectives. In fact, the proposal to reform the EU electricity market design specifies that the aim is to administer energy-bill support but also 'not [to] create incentives to increase consumption'[32]. This reflects the Council's recommendation for crisis measures that apply 'cost-efficient two-tier energy pricing that ensures incentives to energy savings'[33]. Still, it is always preferable that money left on the table ends up with the European taxpayer rather than in the coffers of energy companies. A good energy-bill support design helps to assure that.

In theory, there may be optimal combinations of ceiling volumes and supplier compensation, depending on the policy objectives. In practice, however, it seems nearly impossible for a government tinkering with retail energy markets – which are complex and whose effects on prices and consumption are difficult to predict – to finetune a price ceiling system in exactly the desired way. High energy prices that restrict consumption and income support for European citizens can both be better reached by indexed lump sums, which on top of that are relatively easy to implement.

In closing we note that the proposed Article 66a does seem to leave room for cleverer designs, that can draw on the experiences of the Dutch and other member states with energy price ceilings. The article text says in 4(a) that member states may temporarily set lower prices on 'at most 80% of median household consumption'. At least this formulation appears to allow for lower, as well as individualised rather than fit-for-all ceiling volumes, and the support possibly also being given through discounts rather than fixed ceiling prices. Condition 4(c), 'suppliers are compensated', should allow for cost-based rather than lost revenue-based compensation. Clearly, there is an urgent need for more study, both theoretical research and empirical analysis, of the few experiments currently ongoing in a couple of member states, in order to obtain a better understanding of the various effects that two-tier pricing with price ceilings on limited volumes can have, and for developing workable energy crisis designs, before rolling out one policy across Europe.

31 European Commission, *Proposal for a Regulation of the European Parliament and of the Council amending Regulations (EU) 2019/943 and (EU) 2019/942 as well as Directives (EU) 2018/2001 and (EU) 2019/944 to improve the Union's electricity market design*, 14 March 2023.

32 European Commission, *Proposal for a Regulation of the European Parliament and of the Council amending Regulations (EU) 2019/943 and (EU) 2019/942 as well as Directives (EU) 2018/2001 and (EU) 2019/944 to improve the Union's electricity market design*, 14 March 2023, recital 53

33 European Commission, *Council Recommendation on the Economic Policy of the Euro Area*, 22 November, 2022, recital 8.