

Power price crisis in the EU 2.0+

Desperate times call for
desperate measures

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0. INTRODUCTION AND ROADMAP³

A well-known compatriot of the man behind the current crisis in Europe, unfortunately going way beyond energy, once said, “there are decades when nothing happens; and there are weeks when decades happen”. This quote applies to the weeks that passed since we published our working paper a few weeks ago, which we refer to as Batlle et al. (2022) in this paper. Regulatory design needs to permanently adapt to the changing context, so what has happened and might happen cannot be ignored.

Measures that are deemed not to be worth the cost in one context might be unavoidable in another; sometimes, it might be worth catching your breath for a good while, but doing it for too long would cause irreversible damages. Therefore, in this new working paper, we briefly describe how the situation has evolved and how it impacts the issues at stake. We also aim to clarify our proposals in response to some of the many thoughtful observations we have received.

This paper consists of five parts: two first sections in which we review the latest news, an intermezzo to develop our broad view about what we miss in the current policy developments, and the last two sections in which we first analyze the measures that are proposed to deal with the current high electricity prices, and then we elaborate upon future market design improvements.

Roadmap

First, we briefly recap what has happened since the onset of the energy crisis up to the current state of an “invasion economy”. In this recap, we are guided by futures prices for natural gas in the EU (the Dutch Title Transfer Facility (TTF) hub prices). Using gas prices instead of electricity prices is no coincidence as we cannot underscore enough that this is a natural gas crisis and not an electricity market crisis (or more precisely, not a short-term electricity market design issue).

Second, we introduce the important communications of March 8 and March 23 by the European Commission (European Commission, 2022a; 2022b). The March 8 communication clearly indicates that the Commission’s position with regards to interventions in the power markets has significantly changed compared to their communication including the toolbox to deal with high prices from October 2021 (European Commission, 2021). In the March 8 communication, price regulation and rent transfer mechanisms are argued to be compliant measures to deal with the high electricity prices. The communication of March 23 further specified potential interventions such as a price cap in electricity wholesale market and financially compensating fossil-based fuel generators to limit their impact on the market-clearing price.

Then, we include an intermezzo that slightly digresses from the core discussion on power market design. The main aim of our work, responding to our (better or worse) expertise in economic regulation of the electricity business, is to evaluate the specific interventions in the EU electricity

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market under consideration. But we cannot avoid putting forward several questions about the overall energy policy discussion. In our humble point of view, we have all tired ourselves looking for magical solutions to control electricity market prices when the actual problem (and why not the solution?) should be searched in the gas market. Beyond any consideration that could be made regarding the latter, we wonder how at this stage the policy mainly focuses on storing gas at astronomic prices and mitigating the impact of these prices on end users. Who will be paying when consuming gas next winter which was bought at prices sometimes largely above 100 €/MWh? On top, subsidizing end users will necessarily lead to consumption levels well above what actual efficient opportunity costs signal⁴.

In contrast, not a single rationing policy has been urgently implemented at any level, not even proposed. End users are worried about the current price increases, but they expect that their governments will manage to intervene to reduce costs (indeed, this is what has happened), while not necessarily perceiving the need for a significant modification of their consumption patterns, particularly among residential customers. We are going through a grave situation, and we have the impression that the population is far from being fully aware of it. We do not want to blame the population, but we are of the opinion that it is up to the policymakers to convey this message more clearly. And we think that the same people who have been confined for weeks and still wearing masks, would understand that the current situation also requires sacrifices.

In the third section, we come back to our core discussion. We revisit the review of the regulatory alternatives to deal with the current energy situation, which is, as mentioned, radically different from the one in which the first version of our working paper was written. From the Commission's communication of March 23, we understand that there are currently four measures on the table: a single buyer passing-through electricity below market prices to consumers, financially compensating fossil-based fuel generators, a price cap in the wholesale electricity market, and a windfall profit tax. All four of these interventions in the power market have unavoidable dynamic implications, as we discussed in Battle et al. (2022). In this paper, since some Member States already consider implementing any of these measures unavoidable, we further discuss their static or short-term implications, going deeper into discussing the unavoidable inefficiencies that would be linked to the implementation of each of them. We particularly focus on analyzing the Iberian proposal sent to the European Commission, aimed at decoupling the electricity price in the Peninsula from the rest of the continent. We close this section arguing that if an intervention is deemed necessary, we consider that the least harmful measure would be a carefully implemented windfall profit tax (actually, an "income tax" fixing ex ante the quantities affected, among other details). Not only because it can reduce the interference with the short-term economic dispatch, but also because it would allow to later make a better allocation of the savings among the different categories of consumers, since not all of them need the support in the same way.

Finally, in the fourth section, we propose regulatory mechanisms, not thought to be a direct solution to solve the current crisis but to improve the market design and mitigate the impact of similar events in the future. We emphasize the role of centralized auctions for renewables as a tool to maximize competition and minimize costs for consumers, taking advantage of the steep learning curves. Further, we recall the beneficial impact that other interventions could have on the perennial market incompleteness of future markets, such as implementing a market-making obligation on large, often

⁴ Let us recall a sharp and clever comment made by a good colleague of us when he learnt that the intention in Spain is to heavily subsidize the electricity price: "once implemented, we will turn off our gas heating, we will better heat our home turning on the kitchen oven 24/7."

vertically-integrated, utilities, particularly for financial products whose liquidity has always been nil, as evidenced in Batlle et al. (2022). Finally, we provide some clarifications around our proposal of introducing what we originally called “stability options”, but we now rename them as “affordability options.” The renaming is needed since the objective is not to turn future prices for end users into a stable signal which a contract-for-difference would do. Instead, the objective of this financial product is to guarantee that the monthly bill remains under a certain threshold, to avoid affordability issues, while keeping end users exposed to hour-to-hour and even monthly price fluctuations (as soon as these latter are below “affordable” levels). We also want to precise that the affordability options should not be understood as a scion of reliability options, since the objective is not to enhance the security of supply, as these latter aim at serving. The current situation involves an energy-constraint power market, not a capacity-constraint system; that is the key difference.

In the short horizon, our future work is centered around assessing the power market interventions currently on the table in more detail. In the longer horizon, we intend to work out the procurement and design details of the proposed affordability options, as well as reflect on the actual role that retail liberalization has played and could play in the future, as the current crisis has in our view confirmed a good number of fears that we have worried about since a long while.

1. A STORY OF TWO PHASES ENDING UP IN AN “INVASION ECONOMY”

Up to this date, the evolution of the EU energy crises can be split into different phases. This differentiation is relevant as it explains how the radical change in the market conditions necessitates considering different regulatory solutions. We distinguish between two main phases and a brief transition period between them.

1.1. Phase 1.0 (09-12/'21): “high gas prices are transitory and should fall significantly in April 2022”

We consider the period from September until early December '21 the first phase of the energy crisis. In September '21, a first call advocating for interventions in the power market design was launched by the Spanish and French governments as described in Annex A of Batlle et al. (2022).⁵ In that month, TTF spot prices doubled from 50 €/MWh at the beginning of the month to 100 €/MWh by the end of that same month. Even though TTF spot prices continued to rise until early December, what was important is that during those months the surge in natural gas prices was expected to be over by April '22. This phase 1 is illustrated in Figure 1 below, in which the monthly gas forward curves for different trading dates during that period are shown. We can see that during all that period, after April '22 futures prices turned back to still relatively high but more acceptable price levels.

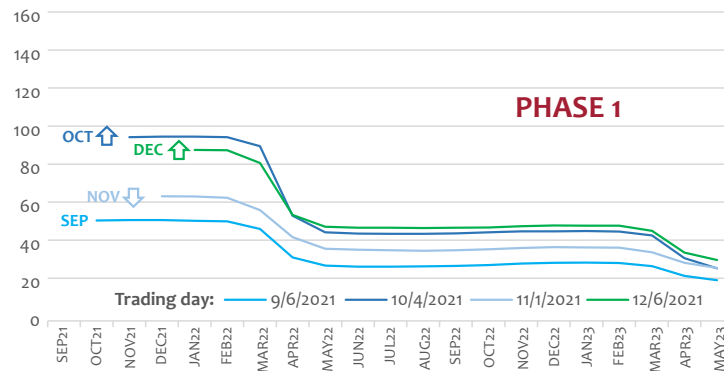


Figure 1: Monthly TTF gas forward curves [€/MWh] for different trading days between September and early December '21. Own elaboration with data from theice.com

1.2. Phase 1.5 (12/'21-middle 01/'22): “high gas prices might not be transitory”

The transition phase of the crisis that we distinguish starts in early December and ends by the middle of January '22. This phase can be split up into two periods that evidence the lack of certainty at the time of what the future might bring: a heating up and a cooling-off period. First, spot and futures TTF gas prices continued to rise until the 21st of December. The main reason for this price rally was a strong winter demand for gas and electricity due to low temperatures, worries about the low levels of gas storage, and gas supply limitation among which the most important the limited volumes of gas sales from Russia. By that time, future prices indicated for the first time sustained high price levels (gas prices above 90 €/MWh) until March '23 as shown in Figure 2 (left). This was the first indication of a prolonged crisis. However, the market quickly cooled off again as supply worries reduced. As shown in Figure 2 (right), by the middle of January, prices for gas were projected to still be very high for the entire year (with 60 €/MWh being about three times the normal price level) but not necessarily above to be widely considered as “unbearable limits”.

⁵ Higher-than-normal natural gas prices started to gain attention with TTF spot prices rising above 25-30 €/MWh from around late spring '21.

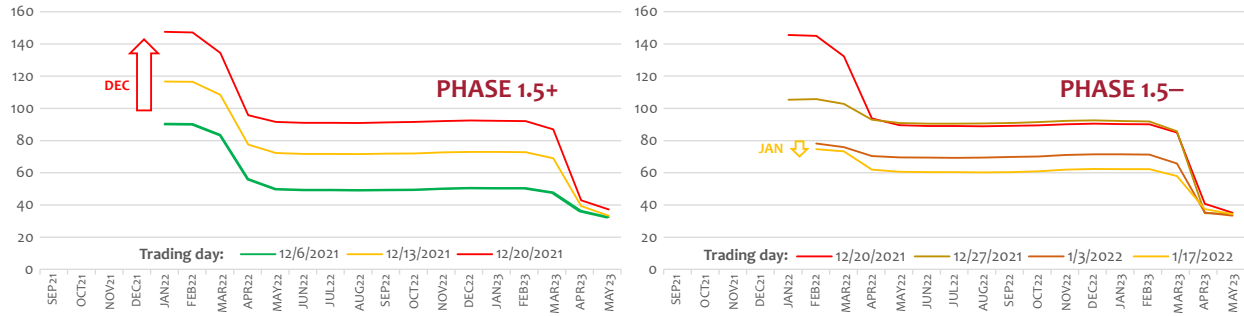


Figure 2: Monthly TTF gas forward curves [€/MWh] for different trading days between early December and middle January '21. Own elaboration with data from theice.com

1.3. Phase 2.0 (middle 01/'22-now): “high gas prices are not going to be as transitory as initially expected”

We consider the period between the middle of January and today to be a totally different phase of the energy crisis. From the middle of January onwards, future gas prices started rising again as the prospects of a Russian invasion of Ukraine become more likely. We published our first version of the working paper one day after the official start of the invasion on February 24, 2022. It can be seen in Figure 3 (left) that as the aggression against Ukraine gradually increased, future gas prices also followed an increasing trend. We show in Figure 3 (right) the futures gas prices as traded on March the 7th, 2022. Gas prices were expected to remain at extremely high levels until May '23. It can be argued that phase 2 gradually evolved into an “invasion economy”. Bearing with such high price levels for over a year can be infeasible by the governments in the several EU Member States, making measures that we deemed not worth the cost in one context (Phase 1) possibly unavoidable in another (Phase 2+).

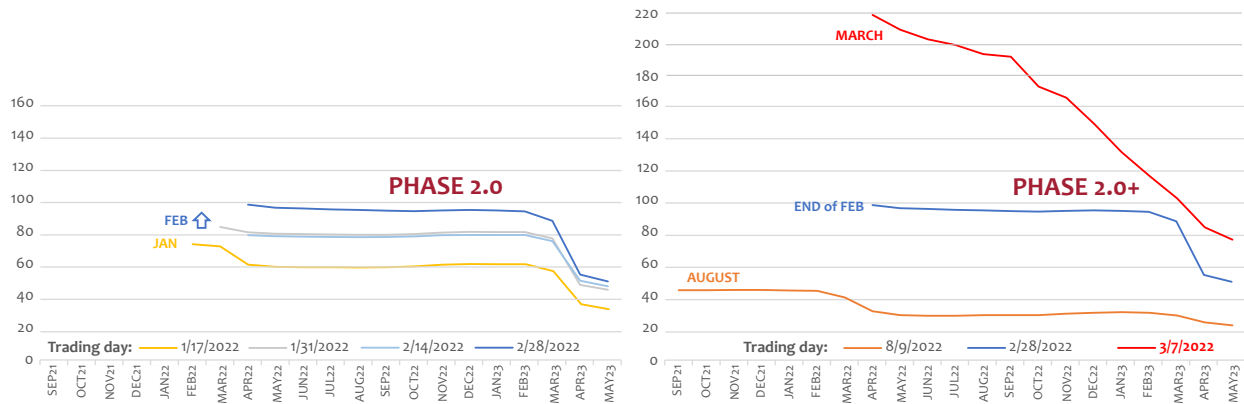


Figure 3: Monthly TTF gas forward curves [€/MWh] for different trading days between the middle of January and the end of February '21 (left). Idem including prices as traded on March the 7th of 2022 (right). Own elaboration with data from theice.com

2. THE COMMISSION'S MARCH COMMUNICATIONS: DESPERATE TIMES CALL FOR DESPERATE MEASURES

We describe here how what we call “phase 2.0+” of the energy crisis has led the European Commission to allow for interventions in the power market. We describe two crucial communications from the Commission and briefly discuss the conclusions of the European Council meeting on March 24-25, 2022.

2.1. The REPower Europe communication from March 8, 2022

The expectation of sustained high natural gas prices since we entered into what we call “phase 2(+)” of the energy crisis has led the European Commission to change its original position and to consider the arguments raised by governments who asked for a severe intervention in the power market. This change of position was reflected in the communication published on March 8, 2022, entitled “REPowerEU: Joint European Action for more affordable, secure and sustainable energy.” In that communication the Commission states that *“To address the current emergency, the Commission will look into all possible options for emergency measures to limit the contagion effect of gas prices in electricity prices, such as temporary price limits.”* Concretely, it is stated that for the time being *“price regulation and transfer mechanisms to help protect consumers and our economy are possible”*.

Regarding the regulated prices, it is said that *“the legal framework of the electricity market, and in particular Article (5) of the electricity Directive, allows Member States, in the current exceptional circumstances, to set retail prices for households and micro-enterprises”*. Annex 1 provides detailed guidance for Member States to devise schemes for regulated prices, which should be temporary. Annex 1 describes that *“Regulated prices should be cost-reflective, at a level where effective price competition can occur.”* Further, it is written that *“the most appropriate measures will depend on the specific situation in each Member State and the specific challenges they face, and could include the following: measures to ensure suppliers are able to make offers on the market that meet consumer needs [including] ... measures on dominant producers to make forward contracts available on a fair basis (e.g. on same terms as to their supply arm). If generators have already sold forward energy through long-term power purchase agreements or bilateral contracts, this energy should be excluded⁶.”*

Regarding the windfall profit taxes, the Commission states that *“to finance such emergency measures, Member States can consider temporary tax measures on windfall profits.”* The Commission cites a report of the International Energy Agency (2022) estimating that such fiscal measures on high rents could make up to EUR 200 billion available in 2022. Further it is described that *“such measures [windfall profit taxes] should not be retroactive, but should be technologically neutral and allow electricity producers to cover their costs and protect long-term market and carbon price signals.”* Annex 2 briefly touches on some conditions those instruments should meet. In Annex 2 it is clarified that *“the duration of the tax should be also clearly limited in time, not going beyond 30 June 2022.”*

In contrast with the communication that was published in March, in the Commission's communication of October 13, entitled “Tackling rising energy prices: A toolbox for action and support” no mention was made of windfall profit taxes or alike (European Commission, 2021). It was emphasized that all introduced measures shall *“avoid interfering with market dynamics or dampening incentives for the transition to a decarbonised economy.”* Further, on November 25, 2021, in a confidential letter responding to the note from September '21 of the Spanish economy and energy ministers, Ms. Nadia Calviño and Ms. Teresa Ribera (Calviño and Ribera, 2021), the Commission criticized the Spanish measures which were then introduced by stating that *“the two measures [reduction of excess gains non-CO₂ emitting power plants (gas charge and ETS charge measures)] may undermine investment incentives for decarbonised forms of electricity generation, whilst bringing relatively limited price relief*

⁶ This exclusion does not appear to be obvious to implement/justify, particularly considering the large vertical integration (generation/retail) that characterizes EU power markets.

for consumers ... national regulation should not hamper such investments.” Lastly, about the mandated auctions for bilateral contracts as they were proposed in Spain, it was written that “the proposed measure restricts the freedom of companies in question to sell their electricity to who they choose. Whilst there may be scope for justifying such restrictions where they are imposed on dominant players, this prima facie does not seem to be the situation of any of the electricity generators operating in the Spanish market.” However, these earlier communications of the Commission were published in Phase 1 of the energy crisis. The context in Phase 2+ is substantially different.

2.2. The security of supply and affordable energy prices communication from March 23, 2022

While the REPower Europe communication indicated a significant change of position of the Commission with regards to interventions in the electricity market, it was not very concrete on how to implement such measures. The communication from March 23 goes a step further in this regard. Four possible concrete interventions which directly or indirectly impact the functioning of the wholesale electricity market are described in the communication: a single buyer passing-through electricity below market prices to consumers, financially compensating fossil-based fuel generators, a price cap in wholesale electricity markets, and a windfall profit tax. The Annex of the communication develops a preliminary analysis of the different options' potential benefits, drawbacks, and costs. Capping or modulating the gas price and the negotiated volumes and prices with international gas suppliers are also discussed options. However, it is stated that “such intervention should only be envisaged as last resort, as it entails some drawbacks in terms of security of supply of gas flows.”

2.3. European Council meeting of March 24-25, 2022

In the conclusions of the meeting of the European Council (2022) on March 24-25, it is stated that the European Council “tasks the Council and the Commission, as a matter of urgency, to reach out to the energy stakeholders, and to discuss, if and how, the short-term options as presented by the Commission (direct support to consumers through vouchers, tax rebates or through an “aggregator model/single buyer”, State aid, taxation (excises and VAT), price caps, regulatory measures such as contracts for differences) would contribute to reducing the gas price and addressing its contagion effect on electricity markets, taking into account national circumstances;” Further, the European Council also “calls on the Commission to submit proposals that effectively address the problem of excessive electricity prices while preserving the integrity of the Single Market, maintaining incentives for the green transition, preserving the security of supply and avoiding disproportionate budgetary costs.”

These statements seem to imply that the interventions in the electricity market as described in the communication of March 23, most importantly financially compensating fossil-based fuel generators to induce them to submit lower bids and the introduction of a price cap, are not envisioned to be directly implementable. In that regard, it is added that “In the present context of very high electricity prices, the Commission stands ready to urgently assess the compatibility of emergency temporary measures in the electricity market notified by Member States, including to mitigate the impact of fossil fuel prices in electricity production, with the provisions of the Treaties and Regulation 2019/943. In assessing such compatibility, the Commission will also ensure, through an accelerated procedure, that the following conditions are met: the measures reduce spot electricity market prices for companies and consumers and they do not affect trading conditions to an extent contrary to the common interest. In making this assessment, the temporary nature of the measures and the level of electricity interconnectivity with the single market for electricity will be taken into account.”

Reading these lines, we understand that at least an assessment by the Commission (following an accelerated procedure) stands in between interventions in the electricity market proposed by a

Member State and their introduction A key but vague principle of such assessment is whether “they [the proposed interventions] do not affect trading conditions to an extent contrary to the common interest.”

3. INTERMEZZO: NOT SEEING THE FOREST FOR THE TREES

Although Europe is currently dealing with a broad energy crisis (certainly involving electricity as a byproduct but also oil), we are facing, first and foremost, a serious gas emergency. After the summer, electricity prices spiked intensively, and the focus was immediately put on the electricity market design (guilty without the presumption of innocence). The electricity market price formation was initially blamed, with the bone of contention being the inframarginal rents of certain technologies considered excessive. This ignited an intense discussion that we narrate in Annex A of Batlle et al. (2022), and in which many of us enthusiastically participated.

But even if it is considered needed and possible to find a magical solution to mitigate power producers' rents without harming economic efficiency, just a part of the problem is tackled, not the most relevant one, namely the high gas prices. In that regard, please note that the average household consumption across the EU MSs in 2019 was 3,579 kWh for electricity and 4,662 kWh for gas (ACER/CEER, 2021). These are average numbers. In some Member States, the balance towards more gas kWh's than electricity kWh's is a lot more significant due to most household being dependent on gas boilers for heating. For example, in Flanders, an average family heating their house with a gas boiler consumes 23,260 kWh of gas per year. In comparison, the average electricity consumption of such households is estimated to be 3,500 kWh per year (VREG, 2022). Based on prices from February 2022, the annual gas bill for such a family is estimated to be €3,380,90 and the annual electricity bill €1,705,67 (De Morgen, 2022).

Although it was in front of our eyes, we did not sufficiently become aware of the fact that the actual problem was, is, and will be gas prices. And not only that, but we were also not aware that spot and future gas prices, from the very beginning, were closely revealing that gas was an invasion weapon.

By no means do we argue that there has not been any initiative focused on the gas side. For instance, in their Common Statement, Calviño et al. (2021) asked to build common gas storage guidelines and better coordinate our gas purchases. Later, in the draft communication by the European Commission leaked in mid-February (Taylor, 2022), a legal requirement for Member States to ensure a minimum level of storage by 30 September was mentioned. When the final version of the communication was published on March 8, the Commission announced a legislative proposal by April requiring the existing storage infrastructures in the EU territory to fill up to at least 90% of their capacity by 1 October each year (European Commission, 2022a). As can be observed in the forward curves shown in Figure 3 in the previous section, gas prices skyrocketed since the communication was leaked, particularly when it was finally published. Maybe the strong requirement for storing could be behind the significant price surge? We cannot assure it, but some gas experts consulted argue that this is at least partially the case. Anyhow, irrespective of the actual reasons behind that surge, two fundamental sets of questions come to our minds. The first set has to do with gas supply, the second set with gas consumption, even though both are deeply intertwined.

i) The significant uncertainty linked with the gas supply coming from Russia makes it perfectly understandable to implement measures to enhance gas storage levels. But does it make sense to store gas at price levels that are very likely well above the actual utility for some EU customers (the so-called cost of non-served energy, talking in energy planning terms)? Can the EU economy and its end users (or at least some of them) reasonably afford to pay gas prices above, for instance 100 €/MWh for months in a row? Does it even make sense to pay these prices, particularly knowing that a significant part of the funds will indeed be used to support military aggression? To what extent do these prices

reflect the supply chain cost fundamentals, or, on the contrary, are they symptomizing a market out of control? Are there not sufficient arguments for intervening a market under these circumstances? Would a price cap on gas in the EU, as some are proposing, make sense? Would it not be possible for the EU to reach a tacit agreement with the key aligned countries (suppliers and consumers) to avoid a fratricide competition for energy supplies that does nothing but feed certain military assaults?

ii) What in our opinion is even more shocking is whether it makes sense that, in the current context, a good portion of end users in the EU (certainly residential users) keep on consuming business as usual? If storing gas is considered to make sense to be ready for a potential scenario of scarcity next winter, how is it possible that no severe immediately implementable rationing measures are not even discussed? Moreover, considering the odds, is it not paradoxical that the policies leading to somehow subsidized consumption (well below the acquisition costs, so leading to consumption levels above what cost efficiency recommends) are not accompanied by coordinated (hopefully EU-wide) plans to reduce consumption? Is it assumed that under the current frightening geopolitical scenario, with a military invasion happening next door, EU citizens would not understand and would not be ready to assume that they cannot keep consuming as they are used to?

In the following, we will revolve to develop discussions framed within the boundaries of what we deem our expertise, i.e., the economic regulation of the electricity market, in which gas supplies are just a given input. As any intervention or agreement leading to lower gas prices would automatically resolve the perceived issues in the electricity market design, we cannot avoid expressing our feeling that we are just discussing how a cast should be put on to heal a leg fracture when an internal hemorrhage is affecting the lungs.

4. THE QUEST FOR THE LEAST HARMFUL INTERVENTION IN THE WHOLESALE ELECTRICITY MARKET

We take the position of the European Commission as a given. In that regard, our main question of interest is shifted from “Should the power market be intervened?” to “Which is the least harmful measure?”. From the Commission’s communication of March 23, 2022, we understand that there are currently four measures on the table: a single buyer passing-through electricity below market prices to consumers, financially compensating fossil-based fuel generators, a price cap in wholesale electricity markets, and a windfall profit tax. All four of these interventions in the power market have unavoidable dynamic implications, as we discussed in Batlle et al. (2022). Here we focus on the static implications.

In Batlle et al. (2022), we already briefly discussed the static implications of two or related measures: a variant of the single buyer idea (which we label mandated auctions for bilateral contracts) and windfall profit taxes. Regarding the former, the single buyer idea can be related to the ARENH mechanism implemented in France since 2011. In Annex B of the same paper, we also discussed the short-term implications of this solution. Even though implementation details can be different, we assume that the impact of such a solution would be similar.

It is important to note that (honestly, contrary to what we assumed before published) mandated bilateral auctions and windfall profit taxes seem to be compliant with the relevant EU Directives as indicated by the Commission in their communication of March 8, 2022. Regarding the mandated bilateral auctions, it is stated that it is allowed to introduce “... measures on dominant producers to make forward contracts available on a fair basis (e.g. on same terms as to their supply arm). If generators have already sold forward energy through long-term power purchase agreements or bilateral contracts, this energy should be excluded.” Regarding the windfall profit tax, in Annex 2 in the communication of the Commission from March 8, it is stated that: “The measure [windfall profit tax] should not be retroactive and should only claw back a share of profits that were actually made. Thus, it needs to take into account that generators may have sold part of their production forward at a lower price before the crisis began. Energy which has not profited from higher electricity market prices because it was already sold forward should be exempted from claw back measures.” In our reading this implies that these measures apply to production that is currently sold on the spot market or production of which long-term contracts end within the period of the implementation of either of these measures. However, we are no energy lawyers and look forward to reading clarifications about whether this is the correct interpretation.

Before coming back to these two measures, we focus our attention on the other candidate interventions in electricity: financially compensating fossil-based fuel generators and a price cap in the wholesale electricity market. These two measures directly interfere with the price setting of the wholesale market and are, again in our reading and somehow confirmed by the conclusions of the European Council meeting of March 24-25, not considered as interventions that are in line with the relevant EU Directives. We start by assessing the impact of financially compensating fossil-based fuel generators as we have picked up from conversations in the last weeks that this intervention is currently the closest to be adopted in some jurisdictions, e.g., the Iberian Peninsula, see La Moncloa (2022a). After, we compare the implications of the other interventions with this intervention. We end with a brief summary.

4.1. Assessment of financially compensating fossil-based fuel generators

This intervention consists of subsidizing fossil-based fuel generators, most notably gas-fired generation. In principle, roughly speaking, the idea is to calculate final day-ahead market prices considering artificially reduced bids from fossil-fuel plants (gas and if necessary, also coal and even cogeneration). The pursued objective, as bids from gas-fired generators are often at the margin, is that market-clearing prices, received/ paid by all market participants, will (artificially) decrease.

At the time of this writing, it is far from being clear how this can actually be implemented. In Box 1 below, we report the best information we could gather on the issue.

Box 1: The Iberian proposal to “substantially lower power prices”

On March 25, 2022, the Spanish government announced an agreement with the Portuguese government to “temporarily establish a benchmark price for gas used to produce electricity that will be substantially lower than the current one [gas price]” (La Moncloa, 2022a). Four days later, the Spanish government announced a “national plan to respond to the economic and social consequences of the war in Ukraine”, to be formalized in a new Royal Decree-Law. In the press release (La Moncloa, 2022b), no further details were given, beyond the notion for the need of an “exceptional and temporary measure setting a reference price for the gas for electricity production, in Spain and Portugal”. However, in the Royal-Decree-Law, published the day after, no mentioning was found to this mechanism.

On March 31, a Portuguese newspaper (Publico, 2022) leaked that “Portugal and Spain delivered a proposal to Brussels to lower electricity prices. The measure, which should be in force until December, sets a maximum fuel cost of 30 euros per megawatt hour for gas, coal, and cogeneration plants, so that they will reduce selling prices.” On that very same day, the Spanish Minister, Teresa Ribera, declared that “we have a joint proposal with Portugal, and we are working with the Commission. It is a preliminary document that responds to the guidelines that we had worked on in advance, such as introducing a double matching system, one at the border so that electricity exports are remunerated at the price that would correspond in the absence of an adjustment mechanism, and a second matching, where the adjustment is introduced (...) We have proposed the cheapest gas price at which we understand that adjustment should take place, 30 €/MWh, but it is one of the technical elements of the proposal that we have to discuss with the European Commission.”

From what we were told by different sources who claimed to have had access to the letter and the draft of Royal Decree submitted to the EU Commission, the main elements of the proposal are:

- A two-step market clearing:

- i) First, EUPHEMIA will be run “business as usual”. Fossil based-fuel plants in the Iberian Peninsula are supposed to bid considering the actual gas market price in the pan-European day-ahead auction. The objective of this first clearing is to obtain the flow (and the price) through the Spain-France border.
- ii) Then, a second market clearing will be organized (most likely by OMIE, the Iberian Power Exchange, although it is not explicitly specified). In this second auction, the flow through the interconnection is fixed to the previously calculated value and the Iberian market price is calculated in isolation. All the plants in the system will be asked to bid again, and specifically the fossil-fuel plants will be asked to bid considering that any cost they might incur over a cost of fuel above 30 €/MWh⁷ will be later compensated. The intended consequence is that lower prices would result in this second auctioning round.⁸

⁷ MWh_{eq} means megawatt-hour equivalent electrical energy of useful thermal energy output. 1 MWh_{eq} = 3.413 million Btu of thermal energy.

⁸ The draft does not specify the 30 €/MWh. This number was first announced days before by the Minister of Social Rights; then, as previously mentioned, the competent Minister confirmed it had to be agreed with the EU Commission.

- The compensation: combined-cycle gas plants will be compensated considering a reference thermal efficiency of 55% for each plant and the difference between the reference price (30 €/MWh) and the Iberian gas market daily price.⁹ The draft states that coal plants will be treated equally. We assume coal plants to be compensated following the same methodology and thus these plants are also expected to bid in the second iteration accordingly. As such, coal plants would not be outbid by the subsidized gas-fired plants and fall out of the economic dispatch. Similarly, for cogeneration plants, although we must confess that we have not been able to guess how this will be done for the latter.

- Subsequent intraday auctions: trading once the day-ahead market is cleared is obviously an issue. From what we were told, the intention is to ban any change in the cross-border flow and, in an attempt to minimize arbitrage opportunities, also to limit in some way the maximum amount market agents are allowed to trade. It is unclear how this can be finally implemented. The negative consequences of such rules would be that market agents cannot adjust their positions near real-time, which would result in higher balancing needs. In that respect, we were not able to learn how the balancing market is envisioned to work and under which bidding regime. Note that hard-to-regulate hydro plants are a key component in the balancing market.

Although as far as we could know, it is not clarified in the letter submitted to the Commission, the subsidy (compensation) for the fossil-based fuel generators is supposed to be recuperated via a levy on end users. This levy will not necessarily be evenly allocated among all grid users. For instance, the Spanish Government announced an 80% discount on network and system charges for electricity-intensive industry. The idea is that the magnitude of the total compensations to the fossil-fuel plants is smaller than the total reduction in inframarginal rents for the non-subsidized generators (which can represent about 60% of the total energy supplied¹⁰).

Many questions remain still open on how this intervention is supposed to be finally implemented. Without knowing the details and assuming that the exact design will very likely change on a day-by-day basis, we can make a guess about how this could be expected to be managed:

Let us consider four plants:

- a) a CCGT "A" (thermal efficiency coinciding with the reference, 55%);
- b) a CCGT "B" (lower thermal efficiency, 45 %);
- c) a coal plant "C" whose variable cost is 100 €/MWh (assuming a value of the API2 of around 240 €/ton);
- d) a hydro plant H.

The contribution of gas and coal plants to CO₂ emissions considered¹¹ is 0.4 t CO₂ eq/MWh and 1 t CO₂ eq/MWh for coal-fired plants.

We assume that the MIBGAS price on a given day is 100 €/MWh. And we also consider a CO₂ price of 80 €/ton.

i) EUPHEMIA iteration. Assuming all the plants bid competitively, i.e., their marginal costs:

- a) A bids $B_a = 100/0.55 + 0.4 \cdot 80 = 214 \text{ €/MWh}$; b) B bids $B_b = 100/0.45 + 0.4 \cdot 80 = 254 \text{ €/MWh}$;
- c) C bids $B_c = 100 + 1 \cdot 80 = 180 \text{ €/MWh}$; d) in principle, H bids different amounts internalizing the expectation of the water value (?!).

⁹ These prices are quoted here: <https://www.mibgas.es/en>

¹⁰ In 2019, to take the closest full year not impacted by the pandemic, CCGTs supplied around 20% of the total electricity demand, while coal represented less than 5% and cogeneration 12% (REE, 2020).

¹¹ Based on RTE (2022).

We assume that the result of the EUPHEMIA clearing is that B sets the marginal price, so the market price resulting from the EUPHEMIA clearing is $SMP_1 = 254 \text{ €/MWh}$.

At this price the rents R of the different plants would be:

a) $R_a = SMP_1 - B_a = 40 \text{ €/MWh}$; b) $R_b = SMP_1 - B_b = 0 \text{ €/MWh}$;

c) $R_c = SMP_1 - B_c = 74 \text{ €/MWh}$; d) $R_h = 254 \text{ €/MWh}$.

ii) *Islanded clearing*: fossil-fuel plants are supposed to internalize that they will be compensated with the difference between the MIBGAS price and 30 €/MWh , considering a reference thermal efficiency of 55%. Thus, the compensation (subsidy) for the fossil-based fuel generators in our case is $S = (100-30)/0.55 = 127 \text{ €/MWh}$.

Thus, the bids would be:

a) $B_a^* = B_a - S = 87 \text{ €/MWh}$; b) $B_b^* = B_b - S = 127 \text{ €/MWh}$; c) $B_c^* = B_c - S = 53 \text{ €/MWh}$;

d) We discuss later the hydro plants case, but for these calculations we assume that hydro plants bid is zero.

The new market price, assuming the economic dispatch is not altered (?), is again set by B, so $SMP_2 = 127 \text{ €/MWh}$.

At this price the new rents R^* of the different plants would be:

a) $R_a^* = SMP_2 + S - B_a = 40 \text{ €/MWh}$; b) $R_b^* = SMP_2 + S - B_b = 0 \text{ €/MWh}$;

c) $R_c^* = SMP_2 + S - B_c = 74 \text{ €/MWh}$; d) $R_h = 127 \text{ €/MWh}$.

Next, we go a bit deeper into the discussion, addressing some of the open issues related to this measure and thus complicating the simple numerical example that we have provided. We consider three types of potential (interlinked) distortions that risk accompanying its introduction: dispatch, demand, and cross-border trade distortions.

Dispatch distortions

Unavoidably, this sort of intervention entails diverse risks of distorting the efficient economic dispatch. Some are specific to this intervention; others are more general for any temporary intervention in wholesale price or a tax on the income of a generator.

- *Fossil-fuel based generators*: a potential distortion of the dispatch relates to the calibration of the subsidy for each of these technologies. The stylized example developed above considers a simplified representation of the generation cost function of CCGTs, and similarly for the case of a hypothetical coal plant. Also, we wonder how the large diversity of cogeneration plants (in different sizes and fuels), which for instance in Spain are responsible for more than 10% of the energy supply can be managed.
- *Dispatchable non-fossil fuel-based technologies* (e.g., biomass and mainly storage): In a non-intervened context, and from the consumers' point of view, the cost of energy acquisition is only reduced in a relevant way when hydro is able to change the marginal technology (e.g., from a less efficient CCGT to a more efficient one, or even from gas-fired plants to coal, nuclear or renewables). This is something that unfortunately does not often happen in some EU power markets. Nevertheless, it is worth noting that in case the market is intervened as discussed above, the cost of energy acquisition is reduced whenever the production of higher cost technologies (gas-fired ones) is reduced (even if the marginal technology does not change). So, it would be all the more relevant at this time of desperate measures that water is optimally dispatched. Dispatchable generators, when bidding into the market, will necessarily consider the opportunity costs of producing one unit

more in the next hour or keeping it for the hours, days, weeks, or months after. Bidding is distorted in (at least) two ways.

First, hydro plants lose any opportunity-cost signal. Every day for them looks the same, since according to the current proposal, the underlying fuel cost that ends up determining the actual price at which non-fossil fuel plants are paid is supposed to remain unaltered. Gas market prices can and will change daily (and intra-daily as discussed later), but hydro plants will always “see” the same price. We guess that the expectation is that these generators will keep on considering the real gas price even if they are not going to be remunerated according to it. This is not obvious. We have no reason to doubt that hydro generators will keep on managing their hydro resources in a way aligned with the maximization of the efficiency of the economic dispatch in all time terms. Assuming the hydro dispatch from the EUPHEMIA iteration responds to this criterion, then we take for granted that the only way to avoid further inefficiencies would be that hydro plants in the islanded iteration would bid at zero price the same amounts cleared in each hour in the EUPHEMIA clearing. But if hydro plants would know this, they might change their bidding in EUPHEMIA and so on. In case doubts would arise, it would be needed to estimate how much and when a certain generator is expected to produce in an “optimal dispatch scenario” and somehow use it as a benchmark to set income, reducing the incentive for generators to deviate from the efficient schedule (on top of already receiving a lower price than when no intervention would be in place).¹² Obviously, this is very controversial since it is a very hard job to do these estimations, and such solution could lead to an overestimation or underestimation of production and (even more) pushback from utilities.

Second, there is another dimension that can lead to additional distortions and this distortion is more general to any (temporary) intervention in the power market. As the end of the intervention approaches (in principle, as for now, announced until the end of 2022), the opportunity cost of dispatchable generators and thus their bidding behavior can also be impacted.¹³ The water in the reservoir will be more valuable when the intervention is removed and therefore the rational plan to manage the reservoir would be to store the resource, to generate electricity after that point in time. In that case, the dispatch would have been different without the introduction of an intervention, leading to more electricity production by more expensive generators during the period when the intervention is in place. This would mean in this situation that more gas is being burned and higher subsidy costs are incurred to generate electricity (and possibly the gas price is further driven up as well). Also, even in the short term, the implementation of the mechanism artificially reduces the price spreads at the margin, mitigating the adequate signals to properly manage the storage to produce in those hours where the savings for the system are larger.

- Intraday and balancing markets: Gas spot markets can be very volatile, even within a day. For example, on March 23, 2022, the TTF opened at 99 €/MWh, peaked around 2.30 pm at 132 €/MWh, and finally closed that day at 107 €/MWh.¹⁴ From what we learnt, the Iberian proposal considers

¹² This approach was put forward in the Portuguese context to evaluate the amount needed to compensate generation for the stranded costs related to the cancelation of the supply contracts signed prior to the start of the market. The mechanism, set forth in Decree Law No. 12/2005, proposed to calculate the gross amount for each facility as the difference between the value of the legacy contracts and the expected income under the market regime, based on the production resulting from the Valorágua model, the same planning and operation model of the generation mix on the basis of which the transmission system operator (Rede Eléctrica Nacional) managed the system until the introduction of the wholesale market.

¹³ Please note that this is not argument to put in place longer lasting interventions. The Commission is very clear in its communications that the duration of any intervention shall be as limited in time as possible.

¹⁴ Data from <https://tradingeconomics.com/commodity/eu-natural-gas> (consulted on 03/27/22).

taking as reference the MIBGAS price cleared in the daily market, but this intraday volatility would entail a certain risk of distortions. As far as we understood, to avoid potential arbitrage, no cross-border intraday trading will be allowed, and intraday trade within the bidding zones will be limited (with the corresponding loss of potential efficiency gains). But even if this is the case, without having had the change to carefully study it, we have (maybe more than) the intuition that the mechanism could open the floor to diverse arbitrage opportunities. In principle, we do not see clear risks in intraday sessions, since bids are submitted on a plant-by-plant basis, at least in the Iberian market. But in balancing markets this is no longer the case, since balancing responsibility is measured on a firm-by-firm bases. As stated, we are not able to evaluate all the potential risks, but we do have a recommendation to try to mitigate these arbitrage opportunities: to calculate the compensation for each plant on the basis of the final energy produced in each hour (in real time), not only on the quantity cleared in the day-ahead market clearing.

Demand distortions

We see two types of demand-side distortions, with the second being highly critical.

First, not only will average prices will be reduced by such an intervention but also the price spread between hours. Reducing price spreads interferes with the optimal dispatch of demand-side flexibility. This limits the positive effect these resources can have on mitigating the total cost of generation. However, we expect this is a minor impact since the actual role of flexible demand in electricity markets is still relatively small.

Second, this intervention artificially reduces wholesale and thus directly or indirectly also retail prices. Without any additional measure on the demand side, end users will maintain their consumption levels as if there is no ongoing energy crisis (at least not the full extent). This would mean higher volumes of consumption, leading to more burned fossil fuels and high subsidy costs for the fossil fuel-based generators compared to a situation where demand is exposed to the (marginal) price of electricity production.

Subsidies for electricity consumption have been present and widespread in the EU market since the very start. In some cases these subsidies have been largely explicit, as has been the case of the French nuclear energy, provided to local consumers at prices well below market levels; in other cases, via less visible mechanisms, such as the exemptions for the payment of the EEG surcharge¹⁵ “for reasons of competition” as declared by the German Federal Ministry for Economic Affairs and Climate Action (2022) or the Spanish Electro-intensive Statute (La Moncloa, 2021), including not only reduced network charges but also interruptible contracts (granted in auctions in which only these customers could participate)¹⁶. We note that these subsidies have been present during these two decades in which prices were even decreasing with time. But we should not forget that the current magnitude of the subsidy under consideration now is almost of an order of magnitude larger than a year ago.

In the current challenging context, considering that energy is to some extent an essential good, trying to guarantee a minimum volume for each citizen/business at an affordable price is perfectly

¹⁵ The EEG surcharge (renewables surcharge) finances the expansion of renewables. It provides the money to pay for the funding of electricity from wind, solar and biomass. These technologies enter the market at very low variable costs, reducing the market prices, while because of the exemption, their capital costs are mainly paid by non-industrial customers.

¹⁶ On March 29, 2022, La Moncloa (2022b) announced “a reduction of 80% of the network and system charges paid by the electricity-intensive industry, for an amount equivalent to 250 million euros. It also includes an increase in the allocation to compensate indirect CO₂ costs to the beneficiary industries.”

understandable. But at the same time, we deem it necessary to urgently accompany these mechanisms to make prices affordable with severe and coordinated rationing measures. EU citizens and businesses need to be conscious of the crucial need more than ever to save energy. While possibly perceived to be more acceptable than passing through (true) high prices to induce demand reductions, rationing policies are often very inefficient; see e.g., Mansur and Olmstead (2012) for the case of water management under periods of droughts. Inspired by water management, an example of how to implement such a rationing policy would be to charge residential consumers (or other end users if deemed needed) a subsidized price for a certain “reasonable consumption volume” per month.¹⁷ Any kWh consumed above the threshold would be charged the true marginal price of electricity plus an add-on to finance the compensations for the fossil fuel generators. Such measure or similar measure would need to accompany any policy that artificially reduces prices. It goes without saying that many controversial decisions need to be made when designing such rationing schemes. It is hard to minimize to limit the impact on existing retail arrangements.

Cross-border trade distortions

The two-step clearing mechanism somehow reduces the distortion of cross-border trade (again, only for the day-ahead market scope). Without arguing that it would allow to solve of the problems, we consider that a significantly better alternative to consider is the one developed by Alawad et al. (2022). To limit cross-border trade distortions, they propose original and simple bidding conditions and market clearing methods whereby one of two prices may be attributed to each generating unit depending on whether final delivery targets domestic or export demand. The proposal is illustrated with a full-scale case study, the Gulf Cooperation Council Interconnection, where the reluctance to comply with that limitation might be underlying governments’ unwillingness to commit to regional integration. This solution would be transferrable to the EU context if one country or more would be subsidizing one or more fossil fuels. However, its application would require (minor) adjustments to the EUPHEMIA algorithm and other cross-border trade platforms. In principle it might appear as a complex way to tackle the problem, since some few changes should be implemented in the current algorithm, but we do not think it should entail too much effort, and we do think it would avoid some of the problems that the two-step clearing method would bring.

4.2. Comparison with a price cap for wholesale electricity

The static distortions created by introducing a price cap in the electricity wholesale market would overall be similar, most probably even worse, compared to the introduction of financial compensations for fossil fuel-based generators.

With regards to the dispatch distortion, the difficulty of the price cap is in compensating any generator for which the (opportunity) cost of generating electricity during a particular hour is higher than the wholesale electricity price cap. There is an asymmetry of information between the operators of such power plants and the regulator. In case these power plants would not be adequately remunerated, scarcity in terms of production could result and compromise security of supply. An additional consequence of the price cap would be that electricity prices are the same for many hours when prices hit the cap, these prices would make generation technologies and demand indifferent about when to produce or consume, which creates additional costs and can create security of supply issues.

¹⁷ A certain “reasonable consumption volume” per hour would be even better, but we are aware that it would not be easy to implement.

Similar to the financial compensation of fossil fuel-based generators, end users' prices are artificially reduced, requiring an accompanying rationing policy. With regards to the limitations of cross-border trade solutions, the same issue would occur. A variant of the solution proposed by Alawad et al. (2022) could mitigate the issue, but further research is required on how feasible this would be.

4.3. Comparison with windfall profit tax

A windfall profit tax, when implemented carefully, avoids many but not all of the static issues of the previously discussed interventions. Most importantly, as a windfall profit tax would not (at least not directly) impact the wholesale price, the demand and cross-border trade distortions would be a lot more limited. To mitigate the impact on end user bills, the revenues generated by windfall profit taxes can be used to finance lumpsum vouchers to end users deemed to need support. As such, these end users are still exposed directly or indirectly via a retail contract to the marginal price of electricity without being faced with affordability issues. From behavioral economics, we know that we cannot overestimate the reaction of a consumer to the marginal price compared to the average price (Ito, 2014). Yet, such a solution would be easier to implement compared to any rationing scheme as discussed before.

The implementation of windfall profit tax

An hourly settled call option contract with a strike and a reference spot market price would be a possible way of implementing the windfall profit tax. This strike would establish a cap on the price that plants subject to the windfall mechanism can receive. If the market price is below the strike, the plants would receive the market price; if the market price is above, the strike would be received. Next, we discuss the volumes to be committed and settled to each technology:

- For non-dispatchable technologies (such as renewables and to a certain extent nuclear), the settlement could be applied over the actual production profile. In that case, these technologies are expected to produce independent of a tax and thus no distortion is introduced.
- For dispatchable technologies (often coal, biomass, batteries, and, importantly, hydro with reservoirs), other than the marginal unit (often gas), any hourly settlement based on the actual production profile can cause distortions, as discussed before. This holds if the measure is short-lived; in this regard, it is relevant that the communication of March 8 mentions that “*the duration of the tax should be also clearly limited in time, not going beyond 30 June 2022.*” The most robust solution to avoid distortions of the dispatch incentives of such dispatchable generators is to impose settlements on fixed hourly volumes of production that are defined ex ante. As already mentioned when discussing this issue for a fossil fuel subsidy, this approach is controversial. It also implies the need to estimate when and how much a certain generator is expected to produce in an “optimal dispatch scenario”.
- Finally, gas-fired power plants are expected to be setting the marginal clearing price in many hours. Note that the average cost of producing electricity from a gas plant is not necessarily the marginal cost. However, in case gas plants would be taxed for sales the electricity because they would be making a profit in that market, e.g., their average costs for generating electricity are lower than the spot price of gas because they bought a certain volume of gas via long-term contracts at a lower price, they would sell that gas in the spot market for gas instead of using it to generate electricity. This implies that such tax might lead to security of supply issues in electricity. This does not mean gas-fired power plants should not be taxed for excess profits, which are probable in case they possess long-term gas contracts that were closed before the crisis (CREG, 2022). Instead, taxing

these power plants could be done via other routes than via an hourly settled call option contract with a strike and a reference electricity spot market price.

4.4. Comments on the single buyer solution

We discussed the static implications of a variant of the single buyer solution in Annex B of Batlle (2022). Such a solution would also create demand distortions and, consequently, dispatch and cross-border trade distortions. Yet, these can be expected to be less severe than under the introduction of compensation for fossil fuel-fired generators or a price cap in the electricity wholesale market.

In the communication of March 23, it is written that such an entity “*would buy electricity on favourable commercial terms*”. Obtaining such terms would be easier to implement in countries with (largely) publicly owned generators. It is not obvious why privately-owned generators would accept selling electricity under the market price to a third party other than being threatened that another more harmful intervention (at least for their business) would be introduced if they did not commit to doing so.

4.5. A brief summary

Based on our brief (and done under high time pressure) assessment of the four interventions in the power market that are currently on the table, we consider the implementation of a carefully implemented windfall profit tax (actually, an “income tax”) to be the least harmful measure. Please note that besides important static implications, any measure has unavoidable dynamic implications, as we discussed in Batlle et al. (2022). Further, we stress again that any intervention in the gas market would resolve the need to intervene in the electricity market.

5. REGULATORY MEASURES TO MITIGATE/PREVENT THE IMPACT ON THE END USER BILLS OF FUTURE SCENARIOS OF SUSTAINED HIGH PRICES

In Section 5 of Batlle et al. (2022), “A regulatory remedy to complete the market mechanism”, we started by discussing the enduring total lack of liquidity of the EU forward markets (for maturities beyond two or three years). This market failure has been largely discussed for years from the perspective of its negative impact on capacity expansion, see e.g., Joskow (2007) or Rodilla and Batlle (2012), but also Joskow (2021). Potential drivers behind this market failure are the lack of demand participation on one side, due to their trust in the regulator’s protection, and lack of supply participation on the other, due to the large vertical integration of the main market actors in most EU markets. Irrespective of the actual reasons behind it is an indisputable fact that these markets have not worked for two decades. It is not a question of designing new financial products (EU PXs have tried their best), regulated rates, or anything that could be expected to naturally arise after two decades. It is a structural flaw that, in our view, regulators cannot wait to act upon any longer.

Despite this evident malfunctioning of the forward markets, European regulatory institutions have been recurrently reluctant to permit the implementation of any sort of intervention aimed at promoting liquidity. Only in the last years, the door has been gradually opened to allow for the implementation of capacity remuneration mechanisms (CRMs) to stimulate investment in firm capacity, see European Commission (2022). These mechanisms aim at filling the existing gap in the very long term, but, as we discussed in Batlle et al. (2022) in Annex D “Short-term versus “long-term” volatility: different issues require different solutions”, the current crisis is completely different.

Therefore, we advocate for implementing a must-needed mechanism that enables hedges with maturities from 3 to 5 years or more. As we discussed in Batlle et al. (2022) in Section 3.2.2, “Negotiated long-term contracts on behalf of consumers”, we advise against forcing any sort of negotiation for long-term commitments now. The current context of abnormally and sustained high market prices would be the worst moment to enter into this sort of commitment, particularly if there is no way (time and manner) to open the negotiation to every potential fully (existing, i.e., already installed, or future) counterparty to maximize competition. Thus, in this context, if an intervention in the power market is deemed unavoidable, there is no other way to deal with the current situation than by introducing one of the measures discussed in the previous section.

This section briefly recalls three mechanisms to fix the gaps historically left by the market performance once this tough situation is finally (and hopefully) overcome. The objective of these mechanisms is to address certain structural barriers in the current market design (lack of willingness to participate in long-term markets of market agents and inefficient allocation of risks and uncertainties) while leaving as much room as possible for the exposure (of both supply and demand) to short-term market signals, leading to a minimization of the long-run average prices paid by all end users.

5.1. Centralized auctions for RES

Centralized auctions appear as an efficient tool to facilitate the entry of much-needed renewable sources. They offer several evident advantages, such as counterbalancing the large vertical integration of EU electricity markets, allowing new entrants to have access to long-term contracts minimizing project financing, which is a key factor, as well as even facilitating network planning, as it is possible to have a more accurate expectation on how RES deployment is expected to be.

Considering the extremely high amount of RES projects willing to enter the EU power systems, and thus the fierce competition, in Batlle et al. (2022), we also discussed the possibility of regulators restricting the access to the network (at least at the high-voltage level) to the winners of the auctions. We mentioned that we had the impression that this alternative would contravene the third-party access rules established by the EU Directives. But in the last communications of the European Commission, we have been able to witness interpretations of the EU Directives and Regulations that go beyond what we could ever imagine, so at this stage, it appears that implementing such a limitation is not inconceivable, under the argument that the transmission network needs to be appropriately planned to efficiently accommodate a large number of projects available.

Thus, we do not advise against this alternative. In a context in which every Member State has had to issue their National Energy and Climate Plan, which entails an unprecedented level of central planning of the EU power systems¹⁸, centralizing the entry of renewables would not necessarily affect the efficiency of the expansion process. As stated, it would even facilitate the already difficult coordination between the generation and transmission expansion. But at the same time, it might not be necessary. Just the fact that these centralized auctions offer a minimization of the counterparty risk premia for investors (since they count on the State guarantee) should be, in principle, a sufficient advantage to turn the auction into the “de facto” main entry gate for renewables.

Only two additional remarks would be added:

- i) As already discussed by MITEI (2016), it is important to guarantee that the contracts granted in these auctions fully expose the winners to both short-term market signals (balancing responsibility) and the performance incentives that could be linked to the CRMs that could be in place.
- ii) Responding to the demand of the so-called “electro-intensive” industrial customers, some Member States are considering launching these auctions only on behalf of these customers, again “for reasons of competition”. In principle, this approach is just a direct way of cross-subsidization, but it does not necessarily have to lead to significant inefficiencies in the power system performance. As a result, this discussion goes beyond the limits of electric power systems regulation. However, we tend to think that electricity rates are not the most efficient way to implement general economic policy objectives.

5.2. Market making obligations

A “market maker” is a firm that stands ready to buy or sell a financial derivative at publicly quoted prices (U.S. Securities and Exchange Commission, 2022). Market Makers quote two prices, bid (buy) and ask (sell) prices, on a given pair, thus creating liquidity and speeding transactions in the market, when sellers cannot find buyers or vice versa. They commit to accepting trades at these prices within certain restrictions and obtain remuneration on the difference between these prices, the so-called spread. In some cases, the role of market maker can be granted in an auction, in which the potential candidates can ask for a fixed remuneration to develop the role.

Considering that market makers assume the risk of open positions, it is advisable to assign this role to market agents owning deep and balanced positions in the market, capable of assuming any trade or

¹⁸ See, for instance, the explanation of the European Commission (2022d) of the role of these plans on its webpage: “To meet the EU’s energy and climate targets for 2030, EU countries need to establish a 10-year integrated national energy and climate plan (NECP) for the period from 2021 to 2030. (...) The national plans outline how the EU countries intend to address: energy efficiency, renewables, greenhouse gas, emissions reductions, interconnections, research, and innovation. This approach requires coordination of purpose across all government departments. It also provides a level of planning that will ease public and private investment.”

quickly finding a counterparty willing to offset each operation for a fee below the predetermined spread.

Market makers are not new in electricity markets. For instance, in 2014 the Secure and Promote (S&P) Market Making Obligation (MMO) was introduced by Ofgem in the GB market, placing the obligation on the six largest vertically-integrated companies at its time of introduction. The mechanism was later suspended in 2019, among other alleged reasons because at least four of the six utilities under the original divested their generation assets (it is far from clear that the MMO had any impact on the decision made by the firms, but if it would have been the case, certainly it would not have been a bad outcome). As reflected in the responses to the open letter in which Ofgem discussed its decision (Ofgem, 2019), there was a consensus among all the large companies against the mechanism, but not surprisingly, a good number of small companies argued in favor of it.

This mechanism has even been proposed as a tool to improve the functioning of balancing markets in Europe, in which flexibility resources are traditionally largely concentrated, see Batlle et al. (2007). Certainly, as with any other solution, the design details make a key difference. Examples of choices that need to be made are how to assign the responsibility, how to determine the bid-offer spread, establishing maximum volumes that market makers should be obliged to cover, etc. Anyhow, we consider the introduction of a market maker for long-term electricity futures (>3 years) an option to carefully explore.

5.3. Some clarifications about “affordability options” (formerly called “stability options”)

In Batlle et al. (2022), we proposed a regulatory-driven centralized auction in which a central entity buys long-duration Asian call options from generators on behalf of (a subset of) consumers decided by the regulator. We have had the chance to largely discuss the proposal with a good number of experts, receiving extremely constructive feedback. While the objective of this working paper is not to go much deeper into the necessary analysis of the detailed design elements of the mechanism, we deem necessary to just outline a few concepts that we did not clearly expose in our previous work.

But before entering into it, allow us to remind, as explained in Annex D of Batlle et al. (2022), that the option contracts we propose are radically different from the reliability options, for instance, implemented in Italy, Ireland, New England, or Colombia. These latter aim to promote investment, providing the needed capacity with remuneration in exchange for a hedge against scarcity events for end users. With their particularities¹⁹, they are plain vanilla call options, settled hourly. Reliability options, therefore, aim at capturing abnormal price spikes. The affordability options are orthogonal since the aim is to hedge the electricity bill's average price level, which is why it is cleared according to monthly averaged values.

Affordability not stability: options not contracts for differences

We wrongly called the proposed hedge to be bought via a centralized tender “stability options”. We quickly realized the name was certainly misleading, as the objective of proposing an Asian option, contrary for instance a classic contract for differences (CfD), is precisely to maximize the exposure of end users to short- and mid-term market signals. The objective of the financial product is not to stabilize prices but just to guarantee a certain cap on the final monthly bill when prices skyrocket.

¹⁹ See, for example, in Mastropietro et al. (2017), the discussion on the different requirements and penalties (performance incentives) more recently linked to the reliability options implemented in certain jurisdictions.

Everything that takes place below these levels leaves end users exposed. So, we should have called them “affordability options” (AOs) from the start.

In recent years, and particularly so in these last weeks, there has been an increasing number of opinions in favor of redesigning electricity markets to be fundamentally based on centralized auctions for long-term contracts. This approach is everything but new. With different formats and particularities, it is common in a good number of jurisdictions, from the “Resource Adequacy Program” in force in California since 2004 (CPUC, 2022) to the mechanisms in force in the South American region (Mastropietro et al., 2014). Either the Investor-Owned Utilities (in the Californian case) or the distribution companies (via centralized auctions organized by the regulator) enter into long-term contracts on behalf of end users. These contracts are futures contracts that guarantee energy's future provision at a determined price. In the past, these commitments were often considered “physical”, even conditioning the economic dispatch as “must-run” contracts. But in the last years, these contracts are purely financial, a sort of CfD, as they are usually called in the European context. This financial nature of the contracts, assuming perfect rationality, leaves end users exposed to short-term prices. If the market price spikes in one hour, the efficient response from the users would be to reduce consumption as much as possible. But experience shows that end users are, in most cases, far from being so economically rational, and these apparently minor details really matter (see our discussion about energy vouchers in section 4.3). CfDs certainly largely stabilize electricity bills and thus narcotize the consumers’ response. This is the key reason why we advocate for the affordability options because unless something extraordinary takes place, consumers see their bills fluctuate according to the underlying fundamentals of electricity supply, and therefore the incentives to respond in the short and mid-term (energy efficiency measures) would remain alive.

Promising solutions not for the current crisis, but to be prepared for the next one

As we have already discussed previously, the current crisis can only be managed with surgical measures, such as the ones discussed in Section 4 of this paper. This moment of turmoil is not the right environment to rush to enter into any long-term commitment. This is why in our proposal, we defend a time lag of two or more years between the sale of the options and the start of the option contract, on the one hand, to give time to heal from the current condition, and on the other, to maximize competition levels, allowing to-be-built power plants to compete at equal footing with existing power plants (for instance, the mechanism could turn into an incentive for solar PV plants to invest in any sort of storage capacity that could allow aligning the price these installations perceive in the market with the average market price).

As stated, this working paper aims not to delve into the many AOs design details that need to be clarified. We expect to be able to find the time to delve into these matters soon. We close this section in a similar way which we did in the previous working paper: there are many design details of the affordability options that need to be properly discussed, for instance: credit risk (we got great comments and suggestions from Prof. William Hogan and a couple of other discussants), eligibility is another, how to allocate the cost of the premium in the tariffs, exit fees... many issues.

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