Empirical Analysis of the Iberian Electricity Price Cap (Version II/II)

Lessons Learned from the Price Reduction Mechanism in Spain and Portugal and Implications for an EU-wide Application

EXECUTIVE SUMMARY

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Executive Summary

Since summer 2021, European energy markets have been experiencing an unprecedented price rally, which has intensified further since February 2022 due to the Russian war of aggression on Ukraine and the resulting concerns about security of supply, especially with regard to natural gas. The recent development of wholesale prices in the electricity market can essentially be attributed to the strong rise in prices for natural gas (and also price increases for substitute fuels such as coal).

During recent months various ideas regarding the limitation of price increases have been developed and proposed. One of the mechanisms that have recently been discussed for adoption on an European level is the so-called Iberian Price Cap, or Iberian Model, which was first implemented in Spain and Portugal in June 2022. The Iberian Price Cap follows the idea of decoupling electricity and gas prices consistently. The aim of the Iberian Price Cap is to lower the bids of fossil power plants in the national electricity supply curves of the electricity auctions. To ensure that the order of deployment of power plants of the so-called "merit order" (MO) does not change, all fossil power plants (in particular natural gas, coal and oil-fired power plants) are obliged to include a fixed price discount in their bid that is the same for all these power plants. The subsidy costs are covered by electricity consumers, not the public budget.

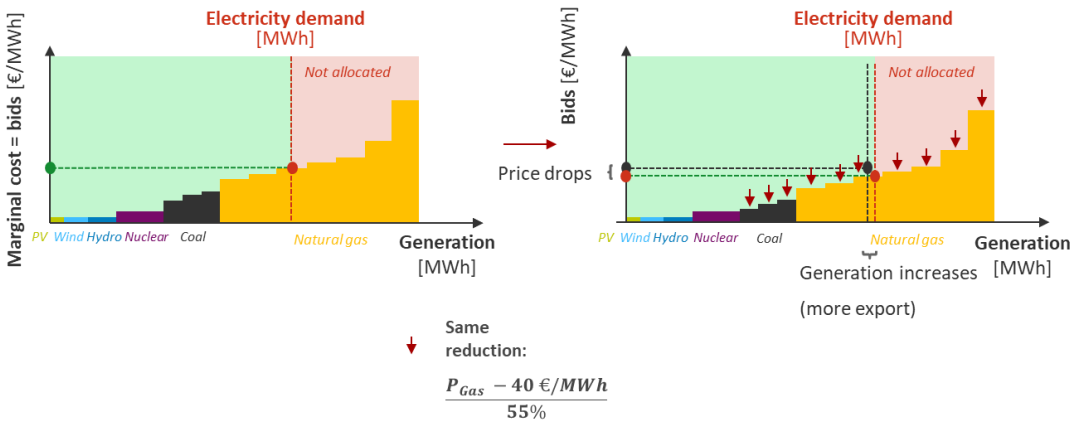

Figure 1: Visualisation of the effect of the Iberian price cap on the merit order curve (own depiction)

The Austrian Federal Chamber of Labour (AK) has commissioned the Austrian Energy Agency to analyse and monitor the first months of market results under the Iberian Price Cap, with a dedicated focus on electricity price and gas consumption effects. This Executive Summary summarises the resulting working paper. The first part of the paper was published on 30 November, presenting the results of said investigation, covering the timeframe since the mechanism's inception until 30 September 2022. The second part will be published around 21 December and additionally contains an extension focusing on EU electricity interconnections to non-EU neighbours.

Part A: Findings on the effects of the cap in Spain and Portugal

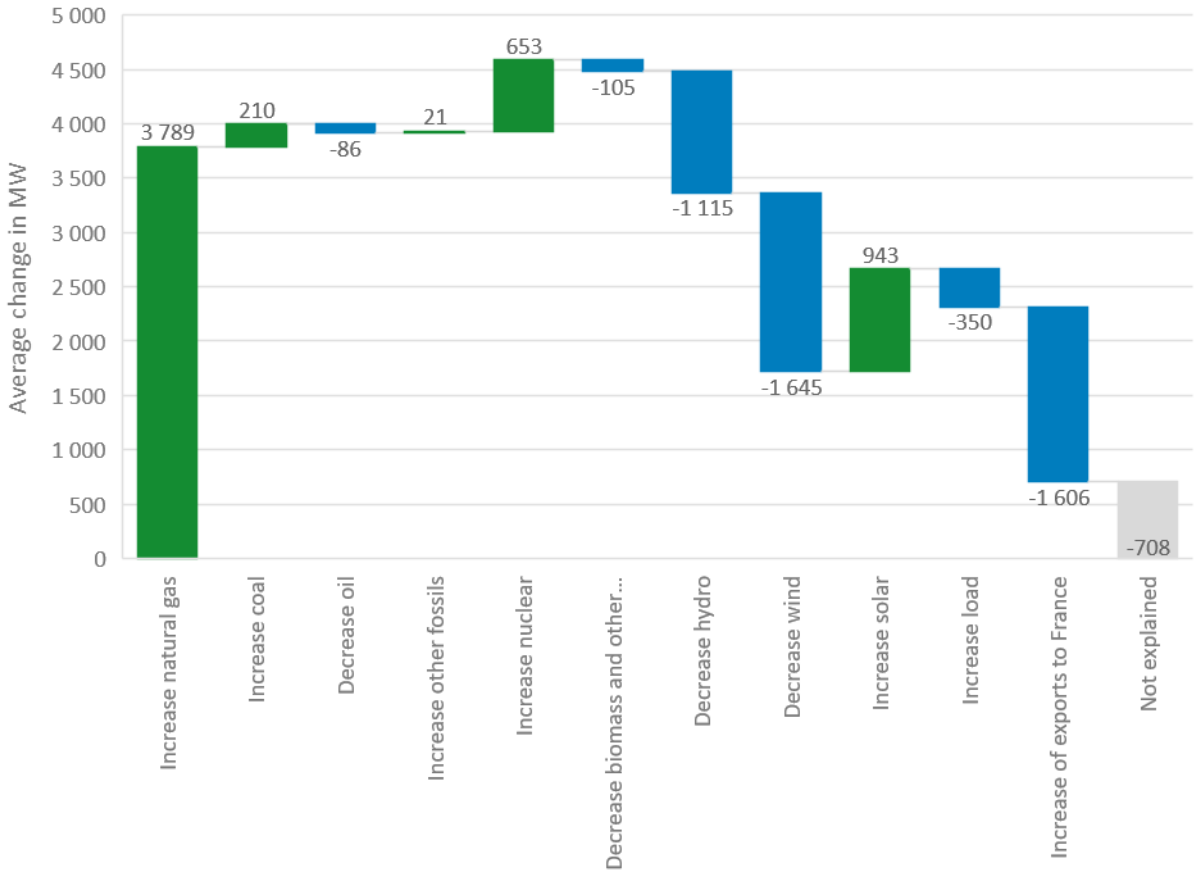

Figure 2: Average energy volume changes on the Iberian Peninsula since 15 June 2022 (until 30 September 2022, own calculations based on data from (European Network of Transmission System Operators for Electricity (Entso-E) 2022)), colour code: green: generation increase, blue: generation decrease or demand increase, grey: not accounted for

The results obtained in this paper regarding the historical results of the Iberian Price Cap show some clear tendencies:

- Under the premise of high natural gas prices, the Iberian Model reduces electricity spot price levels significantly.
- On the Iberian Peninsula, the price cap has been accompanied by a significant increase of electricity production from natural gas. However, a more detailed analysis of this effect is necessary.
- About one third of this increase needs to be counted towards generation unavailabilities during the 2022 summer period.
- About half of this increase can be attributed to a surge in electricity exports to France and Morocco. However, it is not definitive that all these additional exports can be solely linked to

the Iberian Price Cap, as electricity prices might have been higher in Central Europe even without the Cap.

- About one tenth of this increase can be attributed to a higher electricity demand, which at least partly could be linked to high temperatures during the investigated time period.
- Electricity price drops only partly materialise for electricity customers, as the subsidy costs need to be paid by means of a levy by market participants. The relative impact of said levy was increased by a low renewable generation output and a higher electricity export during the investigated time period.

Despite ocurring under local market circumstances, the historical observations in Spain and Portugal may still give an indication of what might happen in other market areas if the Iberian Cap were applied across Europe. Still, observed effects do not have to occur in the same manner everywhere. Thus, the Iberian example should be observed with caution and without overinterpreting every effect of the Iberian Cap. This requires a more profound analysis across Europe.

Part B: Transmission capacities at the EU border – a volume assessment of possible effects of an EU-wide application

The identified effect of the historical analysis of the Iberian Price Cap with regard to the increase in electricity generation from natural gas, linked to higher exports from subsidised electricity, raises the question how this effect would play out in the rest of Europe, if the EU as a whole decided to adopt this measure as well.

The available transmission exchange between EU and non-EU countries is therefore investigated by looking at additional export potential if the Iberian Price Cap was applied across Europe. To do so, installed transmission potential[1] is deducted from historical import data of the year 2021 and compared to actual electricity generation data from 2021 in neighbouring non-EU countries from hard coal and natural gas plants that would potentially be substituted due to a cross-border merit-order change. Electricity generation from cogeneration is hereby conservatively included into substitution potential, despite being quite unlikely to be fully replaced by other heat sources. The assumption of a full exploitation of the transmission potential at all times also is conservative, as price fluctuations and occasional import direction reversions are likely, e.g. depending on hourly available renewable generation.

All borders between EU and non-EU counties are evaluated under the assumption of two different scenarios:

1. Introduction of an Iberian Price Cap as in Spain and Portugal, with a target energy price of about 40 €/MWh; and a joint subsidisation of all fossil fuels (i.e. hard coal, oil and natural gas) within the subsidy.

2. Introduction of an Iberian Price Cap-like intervention that focuses solely on subsidisation of natural gas power plants and sets a much higher, automatically adjusted target energy price depending on current coal and CO_2 price levels. This ensures that EU-internal merit orders are not distorted. Under the current market situation as of early December 2022, this would be the case with a target energy price of about 125 €/MWh.

The comparison of transmission potentials and existing national electricity system cost structures imply that the UK and Türkiye are the neighbouring countries to the EU most likely to benefit from the import of subsidised electricity, as domestic fossil electricity production can be substituted. Similar conditions apply to Morocco, which is however already affected by the existing Iberian Price Cap.

Despite having substantial transmission capacities towards the EU, Switzerland, Norway and the Southeast Central European neighbour countries (Albania, Bosnia & Herzegowina, Montenegro, North Macedonia and Serbia) do not have a large potential for additional import from subsidised electricity from natural gas due to the availability of own lower-cost generation capacity.

[1] Due to data availability, available transmission capacity was proxied by using hourly maximum values of physical flows in 2021 as reported on the ENTSO-E Transparency Plattform.

However, a temporal small additional demand effect by Switzerland at the time of cap introduction appears likely, as there is an incentive to sell electricity stored in pumped hydro water storages before Cap introduction and refill storages with subsidised electricity afterwards.

Table 1: Iberian Price Cap as in Spain and Portugal
Overview of transmission potentials and additional exports in case of a 40 €/MWh EU target price for fossil fuels

Import border	Estimated transmission potential [MW]	Additional annual export potential [TWh]	Generation switch potential from non-EU fossil fuel to EU natural gas [TWh]	Additional annual export [TWh]
EU-> UK	5.688	22.9	133.3	22.9
EU -> Norway	7 467	57.6	0.6	0.6
EU -> Switzerland	13 569	96.0	0.6	0.6
EU -> Ukraine	1 963	14.8	38.6	14.8
EU -> Moldova	-	-	44.5	0.0
EU -> Türkiye	1 017	7.8	179.8	7.8
EU -> Morocco	1 400	11.6	30.7	11.6
EU -> South-East Central Europe	6 931	51.0	1.7	1.7
Total (without Ukraine)				**45.2**

Table 2: Iberian Price Cap-like intervention
Overview of transmission potentials additional exports in case of an adjusted target price for natural gas set based on hard coal electricity generation costs

Import border	Estimated transmission potential [MW]	Additional annual export potential [TWh]	Generation switch potential from non-EU natural gas to EU natural gas [TWh]	Additional annual export [TWh]
EU -> UK	5.688	22.9	121.6	22.9
EU -> Norway	7 467	57.6	0.5	0.5
EU -> Switzerland	13 569	96.0	0.6	0.6
EU -> Ukraine	1 963	14.8	14.2	14.2
EU -> Moldova	-	-	5.8	0.0
EU -> Türkiye	1 017	7.8	122.1	7.8
EU -> Morocco	1 400	11.6	4.0	4.0
EU -> South-East Central Europe	6 931	51.0	1.7	1.7
Total (without Ukraine)				**37.1**

Export effects in (North-)Eastern Europe due to the Iberian Cap are assumed to be limited (due to sanctions and other existing export limits to Russia and Belarus) or subordinated (for Ukraine and Moldova), as EU electricity exports to these countries have already been rising due to the destruction of energy infrastructure in Ukraine. Therefore, additional electricity exports to Ukraine and Moldova are hardly attributable to market mechanisms and hence, the effects of the Iberian Price Cap.

We estimate an increase of annual electricity exports of about 45 TWh, respectively 37 TWh due to the introduction of an Iberian (-style) Price Cap across Europe, under the assumption that merit-order effects due to fuel switch between natural gas and hard coal power plants within the EU are omitted by an intelligent intervention design. This could be achieved either by subsidisation of all fossil fuels (as with the implemented Iberian Price Cap), or by establishing an adaptive target price, considering coal and CO_2 price levels. These numbers, that amount to in between 1.5% and 1.8% of annual electricity generation within the EU in the year 2021, lie well below the theoretical additional export potential of 261.7 TWh that would materialise if all export capacities were fully used at all times. In the case of production of this additional electricity by natural gas and an assumed mean gas plant effiency of 50%, this would result in an additional gas consumption of 90 TWh, and 74 TWh respectively.

The results of this volume assessment only represent a rough approximation of possible effects at the border of the European Union and not a holistic evaluation of a measure such as the Iberian Price Cap. Especially, demand side effects that might occur due to lower electricity prices within the EU are not taken into account. However, these are difficult to assess, as many EU member states have by now taken measures to subsidise or limit end user electricity prices by varying degrees.

Further research into this question should additionally focus on an accurate depiction of welfare effects of the Iberian Price Cap or similar measures. A decline of electricity prices would, among other effects, translate in lower production costs for goods and therefore likely contribute to a lowering of inflation rates within and outside the electricity sector. However, the price-lowering effect in the electricity sector under such a mechanism would not materialise in the same manner in different countries with diverse electricity generation mixes, leading to distribution effects across Europe that should be adressed before the introduction of a singular mechanism. Still, a jointly negotiated measure by EU countries would potentially enhance fair competition compared to the status quo of uncoordinated national subsidisation.

In return, the impact on gas prices resulting from subsidy leakage and electricity exports also affects other economic sectors. Therefore, these effects should additionally be taken into consideration when deciding on an impactful measure such as the Iberian Price Cap. Electricity demand effects by an increased export to non-EU countries and resulting gas consumption increases could be significantly reduced by targeted political measures on the EU borders (such as agreements or taxes), especially concerning the UK and Türkiye. All in all, the results of our analysis show that an EU-wide application of an intelligent Iberian(-style) Price Cap omitting merit order effects within the EU and limiting merit order effects at the borders of the union would not lead to the massive increase of gas consumption that is often feared. Nonetheless, any measure potentially increasing gas consumption should be considered with care in the current supply-constrained market situation.

ABOUT THE AUSTRIAN FEDERAL CHAMBER OF LABOUR (AK)

The Austrian Federal Chamber of Labour (AK) represents by law the interests of about 3.8 million employees and consumers in Austria. It acts on behalf of its members in fields of social-, educational-, economical-, and consumer issues both on the national and on the EU-level in Brussels. Furthermore, the Austrian Federal Chamber of Labour is a part of the Austrian social partnership. The Austrian Federal Chamber of Labour is registered at the EU Transparency Register under the number 23869471911-54.

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ABOUT THE AUSTRIAN ENERGY AGENCY (AEA)

The Austrian Energy Agency offers answers for a climate-neutral future. The aim is to organise our lives and economic activities in such a way as to no longer affect our climate. New technologies, efficiency and the use of natural resources, such as sun, water, wind and forests, lie at the heart of the solutions. This ensures that we and our children can live in an intact environment and that ecological diversity is preserved without being dependent on coal, oil, natural gas or nuclear power. This is the missionzero of the Austrian Energy Agency.

More than 80 employees from a wide range of disciplines advise decision-makers in politics, business, administration and international organisations on a scientific basis and provide support in reconstructing the energy system and implementing measures to tackle the climate crisis.

On behalf of the federal government, the Austrian Energy Agency manages and coordinates the climate protection initiative klima**aktiv**. The federal government, all federal states, leading companies in the energy and transport sectors, interest groups and scientific organisations are members of this Agency.

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