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FEBRUARY 2023

REGULATORY ASSISTANCE PROJECT

Better, faster, stronger: A look into further electricity market reforms

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Introduction

The European energy crisis was not caused by the electricity market. But it sure made people pay closer-than-usual attention to its design. That is not a bad thing. The electricity market becomes ever more important as large swaths of the economy further electrify. The electricity market therefore needs to be fit for purpose. In this briefing, RAP lays out how it can deliver better, faster and stronger for the energy transition and the people living it.

Any follow-up to the crisis should aim to speed up the replacement of fossil fuels with **renewables, demand-side flexibility, storage and energy efficiency**. The focus of market reform induced by this crisis should be to elevate the demand side on par with supply-side resources and improve hedging in the market to alleviate the remainder of the ongoing crisis and prepare for the next. This requires boosting a new portfolio of longer-term market features to share risks and benefit consumers.

Short and long-term electricity markets are inextricably linked. Ultimately all price formations in the many different markets link back to the expectations of the imbalance price in the day-ahead and intraday markets. Most of the trading by volume happens in long-term markets products — over the counter or via trading platforms. But they use short-term markets as a price reference. The end result of improving long-term markets should be to trade away any sustained decoupling of short- from long-term markets. There's no point in trying to treat short- and long-term markets as separate. In what follows we will discuss integrated solutions.

Short-term markets see location and scarcity

Short-term market fundamentals are sound. Add better locational and reserve scarcity price signals to give the correct investments, and tap into the full potential of demand-side flexibility.

Surging electricity prices have stimulated calls to "fix Europe's broken electricity market." Attempts to blame market design, however, miss the mark. The problem is the cost of fossil fuel, upon which the system remains critically reliant. The wholesale power market in Europe uses pay-as-cleared marginal pricing to set the *wholesale* price for electricity.[1] All wholesale market participants get the same price for the electricity they produce.

Marginal pricing incentivises the party with the cheapest additional capacity to balance supply and demand for electricity.[2] A clearing price that is linked to marginal costs thus drives minimisation of total long-run cost and maximises societal welfare.

European markets lack locational granularity though, which obscures congestion costs. This could be resolved by the introduction of **locational marginal pricing** (LMP). This would, in turn, make it possible to reduce gate closure times, which significantly mitigates the need for the system operator to redispatch. Global best practice for **gate closure time** is five minutes, as implemented across North America.

- We move to more capital-intensive, decentralised and variable resource portfolios and a significant scale-up of related investment in networks. Global experience suggests that the benefits of LMP make nodal pricing now a compelling proposition.
- Gate closure closer to real-time. This should be assisted by reform to introduce LMP, by establishing **nodal pricing**, at least for generation (with at least better zonal price resolution for wholesale buyers), explicitly as the end state of market design. Its implementation would require proper consultation on policy design to address considerations, such as treatment of existing and under-construction renewable generation and facilitating best outcomes for retail customers.

Some advocate for **mandating participation in the day-ahead market**, but potential benefits of such a move are not straightforward. That said, a resource awarded a commitment in a forward capacity remuneration mechanism should have an obligation to offer into the day-ahead market. That might also apply to state-backed Contracts for Differences (CfDs), depending on how they are implemented. It need not apply to resources under market-based Power Purchase Agreements (PPAs) unless they are also receiving capacity market payments.

[1] The wholesale price of energy is a wholesale market price, not the retail market price that end-consumers pay. How one flows to impact the other is a separate topic. The pay-as-cleared wholesale price is the only reliable indicator of the incremental cost to consumers — there's no way around that with a different market design.

[2] More accurately: in the short run it incentivises the party with the lowest short-run marginal cost and, as slack in the supply of production capacity is taken up, it incentivises entry by parties with the lowest long-run marginal cost.

Forward markets allocate risks

Improve forward markets liquidity through better cross-border integration and enable long-term contracts (PPA/2CfD).

Forward markets are a means whereby market participants (buyers and sellers) seek to cost-effectively manage and mitigate the risks they face in short-term markets. Forward undertakings, whether market-driven or public, don't eliminate risks. They transfer them from one stakeholder to others. Allocating the various risks to parties best placed to understand and manage them is the key to whether final costs for a reliable supply of electricity will be low or high.

The electricity sector carries unprecedented uncertainty about both technology and demand. The adaptability of forward markets becomes more valuable. While public forward undertakings can reduce the costs of individual investments, care must be taken to seek a fair balance between reducing risks for individual project investors, and the public accumulation of long-term risks to the consumers who will ultimately bear them.

While these are all valid considerations, liquidity in forward markets is currently seen as insufficient.[3] Possible solutions include:

- Reflect the true marginal cost of energy in short-term energy market prices (including both direct costs, such as fuel, and indirect costs, such as carbon pricing), the **locational cost** of grid congestion, and the opportunity cost of running short of the various reserves needed to comply with reliability standards. Establish tradeable **financial transmission rights** to enable management of physical grid congestion risks.
- Remove out-of-market support for **generation that is not needed** to comply with economic resource adequacy standards and actively facilitate the exit of non-economic resources.
- Devolve **responsibility to suppliers** for maintaining adequate resource access to spur needed counterparty liquidity in forward markets.
    - Reinforce supplier incentives to trade in forward (financial) markets, if deemed necessary, by establishing a backstop mechanism for intervention by the system operator, as in Australia.
    - Facilitate market development, for instance by creating a portfolio of standard products and standard forms of contract and supporting the establishment of trading platforms. In particular, pooling of demand to give access to smaller final customers, supporting the standardisation of contracts, and facilitating cross-border PPAs.

We note that the Renewable Energy Directive[4] already requires Member States to analyse and remove barriers to renewable PPAs.

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[3] ACER. (2022, April). *Final Assessment of the EU Wholesale Electricity Market Design*. https://www.acer.europa.eu/events-and-engagement/news/press-release-acer-publishes-its-final-assessment-eu-wholesale

[4] Article 15 (8) of the Renewable Energy Directive: European Commission. (2018, December). *Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast).* https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001

Contracts for Difference are carefully designed and procured

Long-term contracts (PPAs, 2CfDs, options) help hedge against price shocks. Design and procure them carefully to minimise interference with price formation and optimal dispatch.

In the current price environment, investments are forthcoming on a market basis. There's no reason to believe this will change significantly in the near future. Where investments are not forthcoming this is most likely due to non-market barriers or regulatory uncertainty. Accelerating renewable energy deployment will be a matter of accelerated permitting, improved public support and sufficient grid capacity.

The energy crisis did, however, raise concerns about excessive profits for low-marginal cost generators. Crisis measures, on the other hand, increased the regulatory risk for investors. Well-designed and procured two-sided Contracts for Difference (CfD) can help address both issues. The two-sided CfD can mitigate price peaks by ensuring revenues in times of sustained high prices are channeled back to consumers. Two-sided CfDs are a good option to ensure the social welfare resulting from cheap renewables in a marginal pricing system is shared with consumers and does not accrue only to investors. The investors for their part get better visibility on returns for the duration of the contract.

Well-designed and procured CfDs should interfere very little with price formation on the short-term market. **Financial CfDs**[5] may help address price and dispatch distortions. Equally important is how much capacity is procured via CfDs and other public undertakings relative to the total available or needed capacity in the market. It could be useful to produce templates and guidelines to fast-track or automate **state aid approval** for schemes that follow the guidelines. Main design points:

- Auction-based **procurement** of renewables. Carefully assess project pipeline, PPA-market and demand forecast (taking into account the potential for demand-side flexibility and efficiency) to determine CfD **auction volume**, and prudent assessment of technology cost in order to set the reserve prices at an optimum level. Auction participation should be **voluntary**, not mandatory.
- Payout design must support **efficient behaviour** of market actors. Design features may include a lump sum payment per period determined in the original auction, with a dynamic top up/penalty at the margin determined by volume performance compared with a reference,[6] priced at spot prices. Investors will want very long-term (10-20 year) contracts, while consumer interests may be best served by shorter terms that trade somewhat higher investment costs for increased adaptability.
- The way **proceeds are shared with, or funds recouped from,** consumers should not mute demand response incentives or dry out forward markets.

[5] As outlined here: Schlecht, I., Hirth, L., & Maurer, C. (2022). *Financial Wind CfDs*. http://hdl.handle.net/10419/267597

[6] Kitzing L. (2023, February). Are contracts-for-differences here to stay? [Webinar]. Florence School of Regulation. https://fsr.eui.eu/event/are-contracts-for-differences-here-to-stay/

Infrastructure planning and operation integrates sectors

Integrated cross-sectoral infrastructure planning is needed, along with the right mandates and total expenditure (TOTEX)-based cost recovery for system operators.

The energy transition comes with complex infrastructure challenges across energy carriers. To ensure the correct economically sound investments are made, integrated planning across sectors is paramount.

More intense coordination of the network development plans between ENTSO-E and ENTSO-G should be a priority. As the electricity grid is reinforced where needed and demand-side flexibility is deployed to mitigate investment needs in both generation and networks, the fossil gas grid will have to be actively scaled down. District heating and hydrogen networks need to be planned where they make most sense. A proactive approach by transmission and distribution system operators is important.

Expected growth of EV car and especially truck charging, as well as battery injection to the grid, will need to inform network planning. This includes matching the needs of hauliers in terms of charging demand and locations, with the grid's current and planned hosting capacity.

- For new investments, especially in the offshore grid, open the monopoly of transmission system operators (TSOs) to private parties to build and own transmission network assets and use tenders to discover competitive prices and provide incentives for timely build.
- Provide regulatory assurance for the parallel development of far-off generation and grid required to reach markets. Where appropriate, **non-firm** (interruptible) connections or co-location (cable pooling) can present a way forward for developers.
- Removing **CAPEX** bias in the system operator's remuneration will incentivise the use of demand response, energy storage and other flexibility assets. Distribution system operators (DSOs) and TSOs should be able to demonstrate how their business planning processes ensure that all alternatives to traditional investment in assets are considered in an objective fashion. To this end, a TOTEX approach should be considered.[7]

Offshore grids

To have a chance of exponentially increasing offshore wind capacity in time, we need to move beyond the current practice of coastal states linking wind parks to their onshore power system one by one and initiate more cooperative solutions. We should use the unique characteristics of the offshore energy resources as an ideal opportunity to implement the **regional independent system operator** (ISO) model. The development of an offshore bidding zone or zones (depending on offshore congestion) would provide for the efficient market integration of offshore wind generation.[8]

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[7] Pató, Z., Baker, P., & Rosenow, J. (2019, June). *Performance-based regulation: Aligning incentives with clean energy outcomes*. Regulatory Assistance Project. https://www.raponline.org/wp-content/uploads/2019/06/rap-zp-pb-jr-performance-based-regulation-2019-june2.pdf

[8] Regulatory Assistance Project. (2022). *Power System Blueprint — Coordinated Offshore Build*. https://blueprint.raponline.org/coordinated-offshore-build/

Windfall profit taxation as the exception

Inframarginal rent capture is not the first, best reaction to windfall profits. Better mechanisms include long-term contracts and options, possibly in combination with a **solidarity contribution** in defined exceptional circumstances.

The extreme price spikes in 2022 on fossil gas trading platforms, as well as in electricity wholesale markets, led to significant and unexpectedly high revenues among some market participants: fossil fuel companies, traders, transmission owners, certain generators, etc. As residential and industrial customers suffered on the receiving end of the price shocks, governments tried to alleviate impacts. This in turn put already strained government budgets under further pressure.

A question is whether the temporary profit claw-back mechanism introduced in 2022 should be made permanent. Any windfall profit measure should be harmonised across Member States to avoid market distortions, be transparent and predictable, not retroactive and only target exceptional profits. The mechanism shouldn't be limited to specific technologies. What is marginal generation shifts through the day, and marginal generators can also book windfall profits.

Distinguishing between windfall profits and legitimate capital cost recovery will always be problematic. Therefore, instead of continuing the current inframarginal rent capture mechanism, it is advisable to first help consumers during price spikes by means of CfDs, PPAs and affordability options. Windfall profit taxation could actually serve as a political backstop for generators to enter into CfDs.

If a windfall profit claw-back mechanism is deemed useful, it would be fairer and more feasible to implement a "solidarity contribution" type mechanism as was introduced for fossil fuel companies in the 2022 emergency regulation.[9] Redistribution of rents should go to protect vulnerable and low-income families — this may be a broad category in times of energy crises. Consumers who do not need help should not receive it.[10] In this respect a windfall tax approach is preferable to price caps set at below short-run marginal production cost.

Attention is required in the design of sharing proceeds with consumers in order to not mute welfare-enhancing demand response incentives and to not dry out forward markets. If the mechanism is perceived as a one-off, sharing proceeds with consumers (for instance, monthly, based on the previous month's electricity consumption) may not impede positive consumption efficiency incentives. If the mechanism becomes ingrained, however, there is a risk that consumers perceive a diminished need to adjust consumption. In that case, using proceeds to support energy efficiency upgrades might be preferable to returning funds to consumers.[11]

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[9] "The solidarity contribution would be calculated on taxable profits, as determined under national tax rules in the fiscal year starting in 2022 and/or in 2023, which are above a 20% increase of the average yearly taxable profits since 2018." Council of the EU. (2022, 30 September). *Council agrees on emergency measures to reduce energy prices* [Press release]. https://www.consilium.europa.eu/en/press/press-releases/2022/09/30/council-agrees-on-emergency-measures-to-reduce-energy-prices/

[10] Hogan, M., Claeys, B., Pató, Z., Scott, D., Yule-Bennett, S., & Morawiecka, M. (2022, April). *Price shock absorber: Temporary electricity price relief during times of gas market crisis*. Regulatory Assistance Project. https://www.raponline.org/knowledge-center/price-shock-absorber-temporary-electricity-price-relief-during-gas-market-crisis/

[11] Other solutions are explored by Schlecht, I. et al., 2022.

Capacity remuneration mechanisms fit for flexibility

Avoid capacity remuneration mechanisms (CRMs) by correcting market deficiencies. Where applied, capacity mechanisms should be improved to offer access to small-scale, demand-side resources.

The first and best solution is to remedy market deficiencies directly and thus preempt the need for further adoption of capacity markets. This can be served with cost-reflective prices that reflect scarcity that are accompanied by a real-time reserve market.

In many Member States, CRMs are in place. One of the first and most important implementation considerations is the determination of the CRM auction volume. This needs to take into account the full potential of efficiency measures and demand-side flexibility (DSF). Their potential is often underestimated, leading to capacity over-procurement and artificial price dampening. Collateral damage is done when such mechanisms have most often served to extend the economic lives of fossil generation that would otherwise be retired in favor of renewables, storage or demand response.

Improvements to capacity mechanism practice for consideration:

- Extend the remit of the DSF Network Code so that all-inclusive policy design requirements also apply to **new and existing CRMs** to facilitate market access and value-stacking for the explicit DSF that should be able to access these markets.
- CRMs have never been, in practice, a main driver of new long-term investment — they are a means to top up money missing from the energy and ancillary services market, something that can be practically assessed a few years in advance in the best case. There are better ways to ensure beneficial new entry, some of which are discussed above. Healthy new entry has been demonstrated in markets with rolling CRM commitment periods of **no more than one year**, and this should be considered best practice for facilitating *both* efficient entry *and* efficient exit.
- The Emission Trading System's declining allowance cap should bring power sector emissions to zero by 2035-40. Also, for this reason, it is advisable to **limit CRM auctions to 1-year contracts** to avoid lock-in of expensive and CO_2-emitting capacity. Contract length should at least be based on TOTEX (CAPEX-based contract length favours more expensive technologies).
- Reduce **minimum bid size to 100kW** or under, consistent with global best practice, for all markets (not only day-ahead and intraday but also balancing, ancillary services, forward and CRMs), as low bid sizes are key for third parties who build up their portfolios from scratch. Include energy efficiency among the eligible resources

As the ETS might not be a sufficient driver for timely power sector decarbonisation, it might be worthwhile to revisit the existing specific CO2 emission limit[12] to bring it in line with a trajectory to reach zero emissions in a 2035 to 2040 timeframe.

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[12] The design principles for CRM in Article 22 of Regulation (EU) 2019/943 include a 550 g CO2/kWh emission limit. European Commission. (2019, June). *Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast)*. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R0943&from=EN

Required demand side flexibility

Reducing peak load has many benefits: lower costs for all, fewer infrastructure needs and less gas in power generation. The closer the correlation between retail and wholesale price, the bigger the impact on peak as we move to a renewables-dominated system.

The introduction of a demand response requirement in the Electricity Regulation could apply in periods of crisis. The ideal situation is for automated, technical DSF to be fully integrated into markets during business-as-usual times, activated though implicit as well as explicit services.[13] This could double-up as emergency capacity as needed, reducing the work of system operators during an emergency. For this to function properly, adequate amounts of demand capacity should be available across all time frames and in all seasons. Energy efficiency deployment is also a win-win in this respect and should be recognised as a reliability resource.

Notwithstanding the above, there may be a need for special emergency provisions, at least while we transition to smart energy systems. Demand response, properly compensated, is not evidence of a failure to ensure energy security — it's a cost-effective and consumer-centric alternative to over-investing in little-used supply-side resources. Demand response has positive spillovers: it reduces the overall cost of energy, reduces price at peaks and increases demand in times of oversupply of variable renewable energy, the benefit of which is shared across all consumers through lower bills. The many ways these benefits are currently suppressed in the compensation available to flexible consumers, and the market access barriers for demand-side resources suggest that Member States invest in less demand response than is optimal.

Introducing a requirement on DSF could trigger investment. The requirement could be defined per Member State (like the Emergency Regulation) or organised via EU-wide auctions to procure DSF. The optimal tool thus depends on the relative weight assigned to fairness and efficiency, which is ultimately a political matter, but should be informed by an estimate of potential efficiency gains from an auctioned approach. EU-wide auctions would be a new policy avenue whose efficiency merit is recognised but not put into practice yet (i.e., EU RES auctions).

One area in which EU coordination is clearly justified is the State aid rules, which should be reformed to create a general category of demand-side flexibility aid. It is already recognised in IEM legislation that the security, affordability and decarbonisation benefits of flexibility extend beyond the narrow focus of resource adequacy and capacity mechanisms. State aid rules lag behind, reducing "security of supply" to resource adequacy. Allowing aid to foster DSF in the absence of a generation adequacy concern would support true system resilience and reliability through proactive measures by Member States, rather than just emergency reactions.

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[13] For a more detailed discussion, refer to the November 2022 report *Options for the better integration of demand-side resources* by Zsuzsanna Pató of RAP for the Directorate-General for Energy, European Commission. This covers options to further mobilise energy efficiency and demand-side flexibility in European power markets. Pató, Z. (2022, November). *Options for the better integration of demand-side resources.* Regulatory Assistance Project, prepared for the European Commission. https://www.raponline.org/knowledge-center/options-better-integration-demand-side-resources/

Empowered and protected consumers

Stronger protection of vulnerable consumers should go far beyond the crisis scope. The goal should be to provide vulnerable consumers a runway to the upside of energy efficiency and flexibility, not just protection via exclusion.

Vulnerable consumer rights should be stronger. The group itself should be defined (if not by Member States) along with the procedures to protect them in a competitive market. Provisions on Suppliers and Tariffs of Last Resort should be clarified and made uniform across the EU.

Guaranteeing that defined essential needs can be met by vulnerable consumers will be a matter of deploying efficiency and flexible assets in homes, in addition to social protection measures, which may include social tariffs as necessary. Financial assistance should be targeted in the event of new crises instead of handing out money to wealthy consumers.

Provisions requiring suppliers to offer fixed price, fixed term contracts for households, an idea investigated by the European Commission, would not be ideal. In principle, a well-working, transparent competitive market will provide the contracts consumers want. If markets are shown to not be competitive, regulators should investigate why before reforms are implemented. But more importantly, it remains to be demonstrated that fixed price contracts are in the best interest of consumers.

There may be a case for ensuring **greater transparency in exit fees**. This may help regulators in scrutinising this ex-post. Any reform should first identify harm stemming from existing practice with termination fees.

Hedging replaces price risk with counterparty risk (in the case of other the counter forward contracts) or liquidity risk (in the case of futures contracts with margining).[14] The optimal management of these risks is **not best served by broad regulatory requirements on hedging**. Indeed, hedging requirements may serve to stimy retail offers and competition to the detriment of consumers. Implementing a requirement will engender arbitrariness, and be a regulatory burden, with uncertain benefit. Rather, retailers are best placed to manage these risks.

But arrangements must first ensure retailers internalise the true social cost of failure (have some skin in the game in the event of failure) to disincentivise excessive risk-taking. And they must be subject to prudent financial regulation of retailers — for instance to ensure they have sufficiently deep pockets to absorb material losses. ACER/CEER could be called on to provide guidance: best practice and transparency, standardisation via an accreditation scheme and comparison tools for consumers, etc.

[14] Hirth, L. (2022). *Electricity Market Design Session 4 - Forward Hedging and Long-Term Contracts* [Presentation]. https://vimeo.com/778465956/d79cd267c1

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This briefing is based on RAP's response to the EU Commission consultation on electricity market design reform that closed on 13 February, 2023.

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