BULGARIAN IMPLEMENTATION PLAN

This document should be considered as an implementation plan of Bulgaria in accordance with Article 20 of Regulation 2019/943 in the context of the ongoing process of approving State Aid for the introduction of a Capacity mechanism in Bulgaria.

Contents

Introduction

In accordance with art. 20, para. 3 of Regulation 2019/943 (“the Regulation”), Member States with identified resource adequacy concerns shall develop and publish an implementation plan with a timetable for the adoption of measures to eliminate identified regulatory distortions or market failures as part of the state aid procedure.

When developing the plan, Member States shall take into account the principles set out in para. 3 of the Regulation and consider application of the following measures:

(a) removing regulatory distortions;

(b) removing price caps in accordance with Article 10;

(c) introducing a shortage pricing function for balancing energy as referred to in Article 44(3) of Regulation (EU) 2017/2195;

(d) increasing interconnection and internal grid capacity with a view to reaching at least their interconnection targets as referred in point (d)(1) of Article 4 of Regulation (EU) 2018/1999;

(e) enabling self-generation, energy storage, demand side measures and energy efficiency by adopting measures to eliminate any identified regulatory distortions;

(f) ensuring cost-efficient and market-based procurement of balancing and ancillary services;

(g) removing regulated prices where required by Article 5 of Directive (EU) 2019/944.

Implementation plans shall be submitted to the Commission. Within four months of receipt of the implementation plan, the Commission shall issue an opinion on whether the measures are sufficient to eliminate the regulatory distortions or market failures and may invite the Member States to amend their implementation plans accordingly.

The Member States concerned shall monitor the application of their implementation plans and shall publish the results of the monitoring in an annual report and shall submit that report to the Commission. The Commission shall issue an opinion on whether the implementation plans have been sufficiently implemented and whether the resource adequacy concern has been resolved.

This implementation plan has been prepared for the electricity market in Bulgaria and is structured as follows:

- **Part I**: Analysis of regulatory and market failures associated with adequancy in Bulgaria;
- **Part II:** Analysis of the necessary market reforms;
- **Part III:** Implementation plan reflecting the required market reforms and deadlines for implementing them in connection with the capacity mechanism implementation.

Part I: ANALYSIS OF REGULATORY AND MARKET FAILURES ASSOCIATED WITH FUNCTIONING OF THE BULGARIAN MARKET

This Part has been prepared by Frontier Economics and identifies various market failures which are likely to prevent the efficient functioning of the Bulgarian electricity market and the bringing forward of such investment. A number of market reforms have been identified that can be applied to solve problems common to all energy markets, as well as those specific to the situation in Bulgaria. Beyond the classically-quoted market failures (reliability as a public good and missing money), the key concern for Bulgaria relates to the exposure of investors to policy risk. In particular, returns on long-term capital investment projects will depend upon the extent of impact of policy in relation to environmental constraints and regional solidarity.

This section is structured as folows:

- Description of the EU requirements for demonstrating the necessity of a CRM[1];
- Setting out the regulatory barriers and market failures associated with adequacy, and assessing to what extent they may be addressable through market reform; and
- Assessing the case for the introduction of a CRM in Bulgaria based on the residual market failures.

1. Legislative context

The first step required in justifying the need for a CRM is the identification of an adequacy problem. However, this is a necessary, but not sufficient step[2]. Both the EEAG 2014[3]and Regulation 2019/943[4] state that a Capacity Remuneration Mechanism (CRM) can only be introduced if:

- market or regulatory failures can be identified that would be expected to result in the market delivering less than adequate capacity; and
- that these market failures cannot otherwise be solved by market reforms i.e. CRMs should only be introduced on a temporary basis to solve the 'residual' market failure.

This is consistent with the Commission's State aid case practice, and the conclusions of the Commission's State aid sector inquiry into CRMs contains similar wording:

"Member States proposing capacity mechanisms should make appropriate efforts to address their resource adequacy concerns through market reforms. In other words, no capacity mechanism should be a substitute for market reforms."[5]

The Regulation further states that Member States should be required to adopt measures to eliminate any identified distortions and make a timeline for their implementation

1 *Capacity Remuneration Mechanism*
2 *Art. 21(4) EU 2019/943*
3 *EEAG 2014, paragraph 223.*
4 *Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity, OJ L 158, 14.6.2019, p. 54–124.*
5 *COM(2016) 752 final, 'Report from the: Commission: Final Report of the Sector Inquiry on Capacity Mechanisms {SWD(2016) 385 final}', p.7.*

('Implementation Plan'). Member States cannot introduce a CRM until the Commission has given an opinion on their Implementation Plan.[6]

2. Regulatory and market failures in Bulgaria

The carried out review of the Bulgarian market idetified:

- potential market failures and regulatory barriers inconsistent with the requirements of the Regulation 2019/943 and which therefore need to be addressed through market reform and included in Bulgaria's implementation plan; and
- 'residual' market failures that would exist irrespective of the delivery of the implementation plan, and hence could form the justification for a CRM.

In the following section, each of these are considered in turn.

2.1.Identification of market failures to be adressed via market reform

The results of the revision of the model on the Bulgarian electricity market and its comparison with the requirements of the EU legislation for an efficient energy market, in accordance with Regulation 2019/943, can be summarized as follows:

- limitation of the role of regulated retail prices and the facilitation of consumers' active participation in the electricity market (whether directly or indirectly through aggregation);
- absence of distortions to the 'merit order' of generation (including ending sales at regulated prices at wholesale level and ensuring that environmental and other wider impacts are taken into account in market participants' decisions);
- balancing and ancillary services procured in a competitive and market-based manner, open to all resources technically able to participate, and without restrictions on price formation;
- imbalance prices that reflect the marginal cost of actions taken by the system operator to resolve energy imbalances and that include a scarcity pricing function;
- liquid intraday and day-ahead markets that are coupled with neighbouring markets;
- liquid market in forward and other hedging products;
- efficient locational signals (i.e. dealing with possible network congestion issues);
- the absence of restrictions on cross-border trade in electricity and in ancillary services, and sufficient interconnection capacity (including reaching interconnection targets referred to in EU legislation); and
- ability of demand-side response, storage and autogeneration to participate effectively and the enabling of energy efficiency.

For each feature above, has been identified whether reforms may be necessary in Bulgaria to remove identified regulatory barriers.

Figure 1 below summarises the reforms Bulgaria will need to take forward to ensure compliance with the Regulation 2019/943. Those reforms already planned by Bulgarian steakholders have

[6] *Regulation 2019/943, Article 21(5).*

been indicated below. Such reforms are the basis on which is developped the market reform Implementation Plan submitted under Part III.

Figure 1[7]

Feature of efficient market	Reform required in Bulgaria
Limiting role of regulated retail prices	▪ Phase out of regulated retail pricing (already planned) ▪ Or move to setting regulated prices above cost – at a level allowing competition (already planned) ▪ As part of this process, a package of measures to facilitate competition should be developed and customers on regulated prices should be offered smart meters at no additional upfront cost ▪ Regulated prices could continue for vulnerable and energy poor consumers (no such concept is envisaged for now)
Absence of distortions to the (generation) merit order	▪ The Government intends to terminate the existing Power Purchase Agreement (PPA) (already planned) ▪ Regulated prices for all producers should be phased out (already planned)
Complete balancing markets	▪ Competitive tenders should be used for FCR and FRR capacity, open to all providers including DSR (already planned) ▪ Producers should be able to freely set bids/offers for activated energy in terms of BGN/MWh (including for RR capacity) ▪ Activation payments for reserve services should be set on a 'pay-as-clear' basis (already intraduced)
Impbalance prices reflecting scarcity	▪ A shortage pricing function should be introduced ▪ Bulgaria should consider setting imbalance prices on a more marginal basis (although this is not an explicit requirement of the legislation). ▪ The imbalance pricing rule for periods of zero/minimum system imbalance should be revised (already planned)
Liquid intraday and day-ahead markets	▪ Implement day-ahead and intraday market coupling with neighbouring markets (already planned) ▪ Reforms to imbalance pricing and ending regulated prices for producers (see above) should contribute to increased liquidity (already planned)
Liquid forward markets	▪ Improvements to intraday and day-ahead liquidity and the ending of regulated prices (see above) should eventually drive improvements in forward liquidity (already planned)

[7] *Changes in electricity market organization made after the preparation of the analysis are reflected.*

Feature of efficient market	Reform required in Bulgaria
Locational signals	▪ No structural congestion currently, although Bulgaria could state that it will monitor the situation and take appropriate action (whether investments in network capacity or definition of bidding zones) if required ▪ The cost of congestion management actions taken by ESO should not enter the imbalance price calculation
Efficient cross-border trade	▪ Bulgaria plans to reach its EU interconnection targets (already implemented) ▪ 5% of revenue contribution currently levied on domestic generators should be phased out
Demand response, storage and autogeneration	▪ Technology-neutrality in reserve procurement should be ensured (see above – already planned) ▪ Framework for allowing participation of aggregation (already planned), including DSR aggregation ▪ A cost-benefit analysis of smart meter roll-out should be carried out ▪ Other commonly-identified barriers including ending "double taxation" of electricity storage, should be addressed

Source: Frontier Economics

A cornerstone of any reform plan will be the phasing out of regulated prices at both wholesale and retail level.

- At retail level, Bulgaria should either end regulated retail pricing or change from the current arrangement for regulated prices (whereby EWRC[8] sets retail tariffs to cover costs) to one in which regulated retail tariffs are set above cost (i.e. are a "backstop" against excessively high tariffs), allowing room for competition to occur below the retail tariff. To do this, Bulgaria would also need to notify a package of measures to improve retail market competition (such as facilitating price comparisons and reducing barriers to switching retailers). In addition, any consumers on such retail tariffs should be offered smart-meters at no additional upfront cost.

- Vulnerable and energy poor customers could continue on regulated prices. However, Bulgaria would first need to define the concepts of energy poverty and vulnerability and would also need to ensure the costs of providing regulated prices (compared to the market-based retail price) are recovered in a non-discriminatory way (for example through the State budget or via the Energy Security of Supply Fund (ESSF)).

- Bulgaria should phase-out regulated prices for producers, with retailers purchasing from the free market. A gradual phase out (and corresponding increase in market purchases by retailers) may be feasible, although the extent to which EU legislation allows for a transition period in this regard is unclear.

8 *Energy and Water Regulatory Commission (Bulgarian National Regulatory Authority)*

Moving generators from the regulated system into the 'free' market should improve competition and facilitate the process of opening up markets for reserve services.

- Bulgaria should implement competitive tenders for FCR[9] and FRR[10] reserve capacity open to all providers able to meet the technical requirements (including producers and demand-side response). Such competitive tenders are implemented at the end of 2020. The reserve prices would need to be set at a level that allow for the possibility of competition and new entry (while preventing excessively high prices).

- For all reserve services, producers should be able to freely set bids/offers for activated energy in terms of BGN/MWh and be able to set their bids closer to the time of delivery (as opposed to a month in advance as is currently the case).

- Bulgaria should move towards setting activation payments for reserve services on a 'pay-as-clear' basis (introduced).

Bulgaria's participation in the PICASSO, MARI and TERRE projects will also support increasing competition in ancillary services and balancing markets. These projects will lead to the implementation of European platforms for the exchange of balancing energy from aFRR, mFRR and RR (further detail is provided under Part II). Bulgaria expects that the implementation of these platforms will include provisions for producers to freely participate in ancillary and balancing services, as well as freely set their bids and offers for activated energy. However, new systems in place in Bulgaria mean that there is no technical barrier to allowing bids for activation payments to be freely set and for payments themselves to be set on a pay-as-clear basis (introduced). This could therefore be done in advance of the introduction of European balancing platforms.

The reforms to reserve markets mentioned above will in turn help to sharpen imbalance prices. However, additional changes to imbalance pricing could further improve cost-reflectivity and incentives to be available during peak periods, which could be implemented before the full implementation of the European platforms, which Bulgaria expects to be at the end of 2023.

- Bulgaria should consider introducing a shortage pricing function in the imbalance price, which would sharpen incentives to be available at peak times. This could also help to recover ESO's administrative costs and availability costs associated with reserve services, with any remaining shortfall or surplus being socialised across consumers (for example via grid tariffs). This would also result in imbalance prices being set to the value of lost load in periods when customers are involuntarily disconnected to manage energy balance across the system.

- More generally, although it is not an explicit requirement of the legislation, Bulgaria should consider adjusting the calculation of its imbalance prices to be set on a more marginal basis, thereby removing implicit caps on the wholesale prices.

- In periods when ESO does not incur any costs associated with upward or downward regulation, the imbalance price should be set equal to the avoided cost of activating balancing energy (i.e. the lowest cost offer for activating balancing energy submitted to ESO in the relevant settlement period).

---

[9] *Frequency Containment Reserve*

[10] *Frequency Restoration Reserve*

The combination of reforms above is likely also to lead to an increase in market liquidity, initially in short-term markets and eventually also in forward products.

EU legislation also requires Member States seeking to introduce CRMs to enable self-generation, energy storage, demand side measures and energy efficiency by adopting measures to eliminate any identified regulatory distortions.

- Bulgaria plans to introduce technology neutrality in the procurement of reserve services.
- Bulgaria should elaborate a methodology for the allocation of imbalances from demand-side response aggregation.
- Bulgaria should commit to undertake a cost-benefit analysis to identify if deployment of smart meters would be cost-effective for all or a subset of consumers.
- Bulgaria should also address other potential issues, such as potential "double taxation" of electricity storage.
- To the extent there is a lack of evidence on the barriers affecting such players/technologies in Bulgaria, Bulgaria might also consider committing issue a call for evidence or consultation on the issues thatmarket participants face and bring forward additional measures, if needed, to address the issues identified.

2.2.Other concerns about adequancy

Although reforms are indispensable in addressing capacity shortages, they may only be effective in the long run or might not be sufficient to address fully the underlying problems of adequate capacity.

Therefore, with a clear implementation plan which is accepted by the Commission, we expect:

- Identified regulatory barriers to persist in the short-term, given the time it will take Bulgaria to deliver its implementation plan especially given its relatively early stages of market liberalisation.
- Market failures to exist, which will limit the market's ability to bring forward new investment.

In this section market failures are considered in more detail especially those which are expected to persist in Bulgaria even following successful implementation of an Energy Only Market (EOM).

These include commonly held market failures which also apply to Bulgaria.

- The fact that reliability is a public good and customers cannot choose their desired level of reliability, which in turn, can result in the market under-delivering capacity.
- Despite reforms to ensure prices reflect scarcity, investors may still perceive "missing money" in making their business cases.

In addition, investors face a number of other uncertainties in the Bulgarian market, including those related to politically driven environmental and self-sufficiency decisions by countries in the region. These issues may be exacerbated by the difficulty in understanding the implications of any given environmental policy on closure given the nature of the power station assets in the country, and positioning of the Bulgarian market compared to the overall market for international power sector investment.

These issues are discuss below.

Reliability as a public good

This argument implies that the market fails to deliver optimal levels of capacity as individual customers cannot typically choose their desired level of reliability.

The system operator cannot selectively disconnect the majority of smaller customers, and these customers do not respond to real-time changes in the wholesale price (the ability to actively manage demand is typically confined to larger industrial customers). Therefore, customers are unable to express what they would have been willing to pay to avoid being individually disconnected (i.e. their individual VoLL), and hence the same level of reliability must be provided to all of these consumers. As a result, improvements in reliability are to the benefit of all consumers, even those who have not directly paid for the improvement.

Since the majority of customers cannot signal their willingness to pay for improvements in reliability, capacity providers are unable to capture this value from customers to support new investments i.e. customers are effectively able to 'free ride' on the improvement in reliability paid for by others. As a result, if left to the market, this would result in less capacity relative to the level needed to achieve the socially optimal level of reliability, thereby justifying intervention.

In time, the deployment of smart technology and time of use tariffs e.g. facilitated by smart meters or smart phone technology, may allow consumers to respond to real-time market signals and adapt their consumption accordingly i.e. signal their willingness to be disconnected, such that the market could deliver the socially optimal level of reliability.

That said, in Bulgaria the place of smart meter roll-out and introduction of time of use tariffs is unclear. For the moment, Bulgaria only plans to roll-out smart meters to industrial consumers. Even implementing the reforms suggested in section 2.1, there is no certainty that smart meters will be rolled out to all consumers, and even less certainty on the timescales for any roll-out or the type of tariffs that the market may offer.

Missing money

In principle, a well-designed energy only market can result in an optimal level of investment in new capacity.

- For the majority of time periods in a competitive wholesale electricity market, there will be more generating capacity available than required to meet demand. In such conditions, the competitive market price will typically reflect the short-run marginal cost (SRMC) of the most expensive generator (the "marginal" plant) required to balance the system.
- While all generators with lower operating costs than the SRMC of the marginal plants will receive an "infra-marginal rent" making some contribution to the recovery of fixed costs

(including a return on and return of the original investment), prices would need to rise above this level to support investment in sufficient capacity to prevent shortages.

- Therefore, at times of peak load when the margin between available capacity and demand tightens, prices should in theory exceed the marginal costs of the most expensive plant on the system, leading to a "scarcity rent" or "mark-up" (with prices potentially approaching VoLL).
- These mark-ups (which occur over a relatively small number of hours) provide an essential signal to investors in new capacity, and a strong incentive to be reliable for all plants so that they are available to generate when these mark-ups occur.

However, there are concerns that this theoretical description of the operation of the energy only market may not work in practice. There is significant uncertainty for investors when choosing to make large lumpy investments based on high but infrequent price spikes which can be subject to political influence.

Even if investors were able to predict potential price spikes adequately, they may still be concerned that prices would not be allowed to rise sufficiently in peak hours due to regulatory intervention. For example, regulators may view high price spikes incorrectly as evidence of market abuse and introduce price caps. As a result, there may be **"missing money"** in investment cases which ultimately can reduce the amount of investment coming forward.

Over time, implementing the reforms discussed in Part II should address these issues in part. In addition, a benefit of these reforms stemming from the requirements of EU legislation is that the discretion of individual Member States' to intervene to limit wholesale prices is restricted, potentially making scarcity prices more credible for investors. However, these reforms may not eliminate the concern completely.

Politically driven uncertainty

In any electricity market, volatility and uncertainty in relation to market prices create significant risks for investors. However, investors should be willing and able to take on and manage these risks when markets are allowed to operate free of political intervention.

Investors are less able to manage risks associated with politically driven policies, in particular related to the environment:

- *Risks associated with renewables policy*: The incentive to invest in conventional thermal generation is being undermined by uncertainty related to the pace of renewables deployment, in particular intermittent technologies such as wind and solar which have a very low SRMC. Increasing renewables penetration is likely, other things being equal, to reduce the profitability of new baseload thermal plant. Investors in potential new capacity are unable to hedge or diversify what is fundamentally a policy driven risk, and this will (other things being equal) lead to investors seeking a higher return before investing. In the limit, it could dissuade investors from making any investment.
- *Risks associated with technology compliance* - There is uncertainty regarding whether lignite and coal plants will be able to obtain an exemption from 'BREF' limits or whether they will need to decide between incurring additional investment and/or operating costs or early closure. If existing plants become exempt or make investments, this will impact on the

profitability of new thermal plants. Again, this is a policy-driven risk which investors in potential new capacity are unable to hedge or diversify.

- *Risks associated with broader environmental policy:* Beyond this, further environmental constraints may be anticipated. In the context of President von der Leyen's priorities for the incoming European Commission, which include increasing Europe's emission reduction target for 2030 from 40% to 50%, these could include:

  - potential for significant increase in the price of carbon; and
  - potential for limitations or planned phase out of coal and/or lignite stations.

Such further policy risk will again impact on the perception of investors in new plants, both in relation to the likelihood of closure of existing plants, but also in relation to the expected lifetime of new unabated thermal plant. Encouraging new entry by investors will clearly be harder if there is a perception that the useful lifetime of assets may increasingly be limited.

Policy-driven risks for investors in new capacity are not restricted to environment and climate policy. Given the interconnected nature of the Bulgarian market, investors in capacity in Bulgaria will also be concerned about the efficient operation of markets in the wider region. Whereas the Bulgarian government may have concerns about the certainty with which reliance can be placed on imports from non-EU neighbours, this does not mean that investors in potential new capacity in Bulgaria will either (a) form the same view, or (b) be sufficiently certain in relation to this policy-driven risk and its implications for price spikes in scarce periods that they would be willing to commit to major long-lived investments.

The nature of the Bulgarian plant park may worsen the uncertainty

As mentioned above, the uncertainty around the impact of environmental policies may leave investors with perceived risks that would prevent them from investing in new capacity. This perceived risk may be magnified by the nature of the plant park in Bulgaria.

In our adequacy assessment, we identify that given current capacity the vast majority of thermal plant is expected to be loss-making today and in the future, and hence we would expect some level of closure across the region for economic reasons. However, we note that in Bulgaria market participants will find it hard to take a consistent view in evaluating the least economic plants, and hence which plants should close first.

Key reasons for this uncertainty stem from the cost structure of thermal capacity in Bulgaria:

- The three large lignite plants (ME1, ME2, and ME3) collectively account for nearly 70% of Bulgarian thermal capacity. These plants are all relatively similar and use the same fuel (lignite from the Maritsa East basin). As a result, they have very similar costs.

- As ME1 and ME3 are currently subject to Power Purchase Agreements, it is not possible to use market outcomes as a guide to the underlying economics of the plants. The impending termination of these agreements leads to further uncertainties around future market conditions.

- Even with detailed information available from these plants, it is difficult to assess the economic order in which they would close. Plant investors, with access only to statutory accounts (from which it is not possible to obtain figures consistent with the detailed data provided to us by companies), would be subject to even greater uncertainty.

- This uncertainty in the underlying economics of the plants is compounded by several factors. First, the lignite and coal plants are made up of multiple individual units, and each unit may have a different variable cost (depending on its efficiency as well as other variable O&M costs). It is also not clear to what extent forward looking fixed operating costs could be avoided by partial closure of different plants. There is also uncertainty over the future fuel costs for these plants (and others that consume lignite from the same mines).[11] There are a number of possibilities for lignite pricing which could be adopted in future, with one possibility being that the mine could adopt different prices for different plants because the various plants are served by different sections of the mine, with each section facing different marginal costs.

- This situation will be even more difficult to assess by market participants, because some plants have higher efficiency, but also a higher fixed price. For example, although ME1 is the most modern of the lignite power plants in Maritza complex, fixed costs remain well above those of its older neighbors. This situation is complicated by volatility in the carbon price.

These uncertainties not only make it difficult for existing plant owners to make efficient closure decisions, which could result in uncoordinated and excessive closure, but they also make it hard for new investors to determine the timing of when new capacity will be required. This adds to the risk brought forward by environmental regulation and may therefore further reduce the willingness for investors to develop projects.

The attractiveness of Bulgaria to International investors

Investors face choices regarding where to invest. Across all sectors of the economy, not just energy, Bulgaria is in competition for investment with other European and global economies. In making these choices, investors will assess the risks and benefits of each location.

With respect to its electricity sector, the wholesale market in Bulgaria is still in the relatively early phases of liberalisation and significant reforms are being implemented or are planned. A track record of regulation within the emerging market set-up has yet to be established. There is also no history of fully liberalised prices helping participants to make judgements. In power sectors in other jurisdictions, the process of liberalisation has been largely completed some time ago, and regulatory arrangements and practice are more established.

This increases the existing risk around the politically driven uncertainty which may lead to an energy only market not delivering the appropriate level of investment.

3. Assesement of case for a CRM

There have been identified various market failures which are likely to prevent the efficient functioning of the Bulgarian electricity market. Some of these can be addressed by market reforms and have been highlighted under section 2.1. Even following reforms, market failures

[11] *Currently, a set of Lignite Supply Agreements guarantee the supply of lignite to Bulgaria's plants at a fixed price. Following the termination of the PPAs, these agreements will expire, and the future lignite price is uncertain.*

issues may remain. These include issues common to all energy markets as well as issues specific to Bulgaria.

Also there have been identified material concerns related to capacity adequacy in Bulgaria due to thermal plant closure and the fact that Bulgaria considers that there are additional risks associated with relying on imports from its non-EU neighbours when assessing adequacy. The capacity adequacy assessment has identified a need, under credible scenarios, for the market to bring forward new capacity to replace exiting thermal capacity.

The identified market failures cast doubt on the ability of an energy only market, even with the proposed reforms implemented, to deliver the required investment. Beyond the classically-quoted market failures (reliability as a public good and missing money), the key concern for Bulgaria relates to the exposure of investors to policy risk, both in relation to environmental constraints and regional solidarity. Returns on long-term capital investment projects will depend upon the extent of impact of policy in relation to environmental constraints and regional solidarity. Investors also run the risk of their projects having a limited lifetime as a result of environmental policies.

It may therefore not be credible to expect investors to make investment decisions in such an environment, as they may wait until regulations are in place.

This fundamental policy risk is likely to be compounded by other specificities of the Bulgarian energy sector, notably:

- difficulty in understanding the implications of any given environmental policy on closure given the nature of the power station assets in the country; and
- positioning of the Bulgarian market, which a relatively short-lived track record in wholesale market liberalisation in the overall market for international power sector investment.

As a result, the findings of the adequacy assessment, together with the market failures identified, provide a justification for introducing a CRM (in conjunction with wider market reforms set out in the implementation plan).

Part II: ANALYSIS OF REQUIRED MARKET REFORMS

This Part has been prepared by Frontier Economics and inludes analysis of possible market reforms. Changes in electricity market organization made after the preparation of the analysis are reflected.

The analysis of the necessary reforms contains:

- set out the key features of an efficient electricity market, consistent with the requirements of Regulation 2019/943;
- analyses of the extent to which the Bulgarian electricity market currently meets, or is expected to meet the requirements of Regulation 2019/943; and
- set out possible additional reforms that could be implemented to address any gaps.

1. Requirements of Regulation 2019/943

Article 20(3) of Regulation 2019/943 sets out a list of issues to be addressed by Member States when introducing a CRM.

a. Removing regulatory distortions;

b. Removing price caps in accordance with Article 10;

c. Introducing a shortage pricing function for balancing energy as referred to in Article 44(3) of Regulation (EU) 2017/2195;

d. Increasing interconnection and internal grid capacity with a view to reaching at least their interconnection targets as referred in point (d)(1) of Article 4 of Regulation (EU) 2018/1999;

e. Enabling self-generation, energy storage, demand side measures and energy efficiency by adopting measures to eliminate any identified regulatory distortions;

f. Ensuring cost-efficient and market-based procurement of balancing and ancillary services; and

g. Removing regulated prices where required by Article 5 of Directive (EU) 2019/944.

Therefore also are considered the 17 “principles regarding the operation of electricity markets” listed in Article 3 of Regulation 2019/943:

a. Prices shall be formed on the basis of demand and supply;

b. Market rules shall encourage free price formation and shall avoid actions which prevent price formation on the basis of demand and supply;

c. Market rules shall facilitate the development of more flexible generation, sustainable low carbon generation, and more flexible demand;

d. Customers shall be enabled to benefit from market opportunities and increased competition on retail markets and shall be empowered to act as market participants in the energy market and the energy transition;

e. Market participants of final customers and small enterprises shall be enabled by aggregation of generation from multiple power-generating facilities or load from multiple demand response facilities to provide joint offers on the electricity market and be jointly operated in the electricity system, in accordance with Union competition law;

f. Market rules shall enable the decarbonisation of the electricity system and thus the economy, including by enabling the integration of electricity from renewable energy sources and by providing incentives for energy efficiency;

g. Market rules shall deliver appropriate investment incentives for generation, in particular for long-term investments in a decarbonised and sustainable electricity system, energy storage, energy efficiency and demand response to meet market needs, and shall facilitate fair competition thus ensuring security of supply;

h. Barriers to cross-border electricity flows between bidding zones or Member States and cross-border transactions on electricity market and related services markets shall be progressively removed;

i. Market rules shall provide for regional cooperation where effective;

j. Safe and sustainable generation, energy storage and demand response shall participate on equal footing in the market, under the requirements provided for in the Union law;

k. All producers shall be directly or indirectly responsible for selling the electricity they generate;

l. Market rules shall allow for the development of demonstration projects into sustainable, secure and low-carbon energy sources, technologies or systems which are to be realised and used to the benefit of society;

m. Market rules shall enable the efficient dispatch of generation assets, energy storage and demand response;

n. Market rules shall allow for entry and exit of electricity generation, energy storage, and electricity supply undertakings based on those undertakings' assessment of the economic and financial viability of their operations;

o. In order to allow market participants to be protected against price volatility risks on a market basis, and mitigate uncertainty on future returns on investment, long-term hedging products shall be tradable on exchanges in a transparent manner and long-term electricity supply contracts shall be negotiable over the counter, subject to compliance with Union competition law;

p. Market rules shall facilitate trade of products across the Union and regulatory changes shall take in to account effects on both short-term and long-term forward and futures market and products;

q. Market participants shall have a right to obtain access to the transmission networks and distribution networks on objective, transparent and non-discriminatory terms.

Based on Article 3 and Article 20(3) of Regulation 2019/943, the key features of an efficient market, consistent with Regulation 2019/943 are summarised, as including:

- limitation of the role of regulated retail prices and the facilitation of consumers' active participation in the electricity market (whether directly or indirectly through aggregation);
- the absence of distortions to the 'merit order' of generation (including ending sales at regulated prices at wholesale level and ensuring that environmental and other wider impacts are taken into account in market participants' decisions);
- balancing and ancillary services procured in a competitive and market-based manner, open to all resources technically able to participate, and without restrictions on price formation;
- imbalance prices that reflect the marginal cost of actions taken by the system operator to resolve energy imbalances and that include a scarcity pricing function;
- liquid intraday and day-ahead markets that are coupled with neighbouring markets;
- a liquid market in forward and other hedging products;
- efficient locational signals (i.e. dealing with possible network congestion issues);
- the absence of restrictions on cross-border trade in electricity and in ancillary services, and sufficient interconnection capacity (including reaching interconnection targets referred to in EU legislation); and
- the ability of demand-side response, storage and autogeneration to participate effectively and the enabling of energy efficiency.

This is summarized in Figure 2 below.

Figure 2 Key features of an efficient electricity market

Sorce: Frontier Economics.

An efficient market would ideally also:

- Include effective prevention of market (power) abuse; and
- Be underpinned by strong and independent regulatory and governance institutions with a track record of rational, measured and transparent exercise of judgement.

However, these additional criteria do not appear to be required explicitly by Regulation 2019/943. Therefore, they are not considered further in this note.

2. Bulgarian electricity market

For each feature of an efficient market listed in the section above, it is set out below, in turn:

- Frontier Economics understanding of how the Bulgarian market works;
- The areas that may not be compliant with Regulation (EU) 2019/943; and
- Bulgaria's options to resolve these issues.

Article 20(3) of Regulation 2019/943 also requires that a market reform implementation plan contains clear timescales for implementing any reforms identified. In Part III the deadlines for the implementation of the envisaged market reforms are indicated.

2.1. Limiting the role of regulated retail prices and facilitating consumers' active participation in the wholesale electricity market

Functioning of the Bulgarian market

In this section consultant:

- Set out the types of retail supplier;
- Set out the size of the regulated segment in Bulgaria;
- Describe how regulated retail prices are set; and
- Summarise recent and future planned amendments to retail market functioning in Bulgaria.

Types of retail suppliers

Three types of retail suppliers operate in the Bulgarian retail electricity market:

- **Free market supplier:** a trader who supplies electricity to household and non-household customers at prices based on demand and supply.

- **End supplier (ES) of electricity:** supplies electricity to objects of household consumers connected to the electricity distribution network at a low level at regulated prices determined by EWRC. ES purchase their electricity supplies from NEK, which is sometimes referred to as "the public supplier". NEK in turn, in its role as public supplier, purchases electricity from generators on long-term PPAs or at prices determined by EWRC (see next section). End suppliers are regional monopolies licensed by EWRC.

- **Supplier of last resort (SLR):** a supplier that guarantees the universal service provision as a last resort in accordance with a license obtained from EWRC. It has the obligation to supply electricity to customers who are connected to the distribution network and have not chosen a free market supplier or when the free market supplier they had chosen fails to provide the supply. The SLR final selling prices are determined by EWRC.

Size of the regulated segment

As the table below shows, regulated customers account for around half of Bulgarian electricity consumption till the end of 2018.

Figure 3 Size of the regulated and non-regulated segments of the retail energy market in BG

	2015	2016	2017	2018
Market with freely negotiated prices(TWh)	13.2	15.2	16.7	16.5
Regulated market (End suppliers and SLR) (TWh)	16.2	14.9	14.2	14.5
Total (TWh)	29.4	30.0	31.0	31.0
Share of end consumption in the market with freely negotiated prices	45%	51%	54%	53%
Share of end consumption in the regulated market (End Supplier and SLR)	55%	49%	46%	47%

Source: ESO

According to the EWRC's 2017 report to the European Commission, the number of independent suppliers exiting the market[12] may contribute to a perception of instability in the unregulated part of the retail market. As a result, regulated customers may not move to the free market and some customers may even return from the free to the regulated market (either due to active decisions to switch back[13]or to free market customers being switched to the supplier of last resort when their supplier fails). This possibility was reflected by an increase in the free market share of final electricity consumption between March and September 2017 to 60%, followed by a decrease to 50% in December 2017.[14]

Till 01.10.2020 most consumers in the regulated market were household consumers and business customers, as shown below. Due to legislative changes that came into force in mid-2020, after this date only households have the opportunity to buy electricity at regulated prices.

[12] In 2017, five new suppliers entered the household consumer markets and another five exited the market. Six suppliers entered the non-household customers market, while 11 exited the market.

[13] According to the website of the Association of Traders of Electricity in Bulgaria, customers on the low voltage network have a free choice between market and regulated tariffs (https://ateb.bg/en/%D0%BF%D0%B0%D0%B7%D0%B0%D1%80/).

[14] EWRC Bulgaria Annual Report for the European Commission July 2018, p. 33 ff.

Figure4 Percentage of consumers in the regulated market, by consumer type

	2016	2017	2018
Households	99.9%	99.5%	99%
Business customers	83%	78%	76%
Industrial users	0%	0%	0%

Source: EWRC

Methodology for setting regulated retail prices

Regulated prices are set by the regulator, EWRC, and are calculated using a methodology set according to Ordinance № 1 of 14 March 2017 on regulating prices of electricity (ORPE). The prices faced by consumers in the regulated market are made up of the following components:

- The cost at which power is purchased from the public supplier, NEK;
- Transmission grid tariffs;
- Distribution grid tariffs;
- The public service obligation fee, which contributes to the recovery of RES and CHP support costs, as well as costs incurred by NEK in purchasing power at regulated prices in excess of the price at which it sells to end suppliers; and
- A reasonable profit for the end supplier.

Regulated and free market consumers pay the same grid tariffs and face the same public service obligation fee. Differences between retail regulated and free market retail tariffs will depend therefore on:

- The difference between the cost at which power is purchased from NEK by end suppliers and the wholesale price of power faced by free market suppliers; and
- Differences in the allowed profit for end suppliers compared to required profits for free market suppliers.

Regarding profits, the allowed profit for end suppliers is equivalent to roughly 2% of revenues. There is no information on free market suppliers' profit margins.

The cost at which end suppliers purchase their power from NEK bears some relation to the market price of the output of the plant in question, since it is related to the "baseload price" projected by EWRC[15]. However, EWRC makes certain adjustments to the prices passed onto end suppliers, depending on the plant in question and the price that NEK pays for the plant's output:

- The output of plants that supply NEK with power at a price below EWRC's baseload price (such as Kozluduy NPP) is charged to end suppliers at the price paid by NEK.

[15] *The projected baseload price is calculated by EWRC based on an analysis of forward transactions on national and regional power exchanges.*

- The output of RES and CHP plants is charged to end suppliers at a price that reflects that the fact their output profile is not baseload and so, had they sold their output on the free market, they would not have achieved the baseload price. Their output is charged to end suppliers at a price equal to EWRC's projected baseload price, plus an adjustment reflecting the difference between the average (baseload) price during the previous year and the average price they would have captured on the day-ahead market in the previous year.
- In 2018, the output of ME1 and ME3 was charged to end suppliers at EWRC's projected baseload price. However, in 2019, their output was charged to end suppliers at a price higher than the projected baseload price. This adjustment was intended to reflect that, had they wold their output during 2018 on the free market, they would have achieved a price higher than the baseload price (i.e. a similar adjustment as carried out for RES and CHP plant).

While the price paid by end suppliers for power might in some ways be considered to be reflective of the market price for power, there are some important differences:

- In practice, free market retailers' costs would be based on a mix of forward purchases and purchases on the spot market to cover unexpected changes in customer demand. The cost for end suppliers similarly will be based on forward prices but will also depend (given the adjustments applied by EWRC in respect of ME1, ME3 and RES and CHP plants) on historical (as opposed to current) spot prices. These timing differences will clearly result in differences in costs, although not systematic differences.

The Table 5 below shows the regulated prices for electricity between 2016 and 2019.

Figure 5 Electricity prices for the regulated market in BGN/kWh, for customers connected to low voltage level

	2016	2017	2018	2019
		Non-household		
Three scales, including				
Peak	0,1000	0,1002	0,1028	0,1046
Day	0,0640	0,0642	0,0659	0,0671
Night	0,0411	0,0399	0,0409	0,0445
Two scales, including				
Day	0,0899	0,0807	0,0821	0,0849
Night	0,0437	0,0399	0,0409	0,0445
One scale	0,0803	0,0807	0,0821	0,0849
		Household		
Two scales, including				
Day	0,0735	0,0750	0,0755	0,0769
Night	0,0320	0,0324	0,0321	0,0323
One scale	0,0735	0,0750	0,0755	0,0769

Source: Data provided by EWRC

Note: Peak = 8:00 – 11:00 ; 18:00 – 21:00.

Day = 6:00 – 8:00; 11:00 – 18:00; 21:00 – 22:00; When only day/night tariffs are applicable, Day = 06:00 – 22:00

Night = 22:00 – 6:00

A comparison between regulated and free market retail electricity prices have not been included largely because it is not a meaningful comparison for industrial customers (since all are on free market tariffs) or domestic customers (since the vast majority are on regulated tariffs). The comparison would only be possible for non-household commercial customers where there are a reasonable proportion of customers on free market tariffs. However, this data is not currently collected by EWRC. In addition, there is a relative lack of data on forward prices and information on typical hedging strategies adopted by free market retailers. This makes it challenging to construct a free market benchmark from available market data.

Recent amendments and future plans

Bulgaria has recently approved amendments to the Bulgarian Energy Act, which now requires electricity distribution companies to install smart meters for industrial clients if requested.[16]

Bulgaria adopted amendment with which from 01.10.2020 all non-household consumers are supplied from the free market.

Bulgaria also plans:[17]

- adequate protection to energy poor consumers by providing targeted heating allowances, and
- a mechanism for the protection of vulnerable consumers when the process of full liberalisation of electricity prices for end customers, including households, is launched.

Complience with Regulation

Regulation 2019/943 requires compliance with Article 5 of Directive 2019/944.[18] This in turn requires that:

- Retailers shall be able to determine prices freely for end-consumers (with some exceptions);
- Member States are to support vulnerable or energy poor customers (and are required to define the concepts of vulnerable customer and energy poverty)[19]through social policy or energy efficiency. Intervention in price-setting (i.e. use of regulated prices) is allowed provided certain conditions are met, including that the intervention should not result in additional costs for market participants in a discriminatory way.[20]The reference to 'non-discrimination' likely implies a need to ensure that the costs of providing regulated prices is socialised across consumers.

Member States may also establish retail price caps or regulated prices while competition is being established, though again subject to meeting certain conditions, including that any such intervention should:

- "be set at a price that is above cost, at a level where effective price competition can occur" (in other words, the regulated retail price should provide a "backstop" against excessively high retail prices for individual consumers, with competition being the main tool to ensure lower retail prices on average);
- not prevent consumers from switching to a market-based offer; and

---

[16] *https://www.cms-lawnow.com/ealerts/2019/05/changes-to-bulgarian-energy-act?cc_lang=en*

[17] *Draft integrated energy and climate plan of the Republic of Bulgaria, p. 38.*

[18] *Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU, OJ L 158, 14.6.2019, p. 125–199.*

[19] *Directive 2019/944, Articles 28(1) and Article 29. Regulation 2018/1999 (the 'Governance Regulation') also requires (Article 3(3) and Article 24) Member States to monitor and report on energy poverty indicators. The World Bank report includes some indicators of energy poverty and vulnerability in Bulgaria ("Bulgaria Power Sector: Making the Transition to Financial Recovery and Market Liberalization - Summary Report", November 2016).*

[20] *Directive 2019/944, Articles 5(3)-(5) and Articles 5(8)-(9).*

- be accompanied by a set of measures to achieve affective competition.[21]

Article 5 of Directive 2019/944 further specifies that consumers subject to regulated prices shall be offered to have smart meters installed at no additional upfront cost and should be directly informed of the possibility to install smart meters and provided with appropriate assistance to do so.[22]

For theBulgarian market arrangements, the following issues are likely to require addressing:

- There is not yet an official definition of energy poor or vulnerable customer in Bulgaria.
- The use of regulated prices for retail consumers remains widespread, is not obviously limited to vulnerable or energy poor consumers (given the lack of official definitions), and there is no clear pathway for the transition to market-based retail prices for other groups of customers.

Options for Bulgaria

To the extent Bulgaria wishes to continue with intervention in electricity prices (i.e. regulated prices) to support energy poor or vulnerable customers, Bulgaria would need to:

- define the concepts of vulnerable customer and energy poverty; and
- set out how the cost to retailers of providing regulated prices for vulnerable consumers (i.e. the difference between the regulated retail price and the market-based retail price[23]) will be met in a non-discriminatory way. Options for achieving this could include:
  - socialising the costs across all energy consumers, via, for example the ESSF or grid tariffs; or
  - covering the costs using the State budget.

For other groups of consumers (or for all consumers if Bulgaria's intention is not to support energy poor and vulnerable consumers exclusively through other means), Bulgaria will need either to:

- end regulated pricing immediately, or:
- change from the current arrangement for regulated prices, with EWRC setting tariffs to cover costs, to one in which regulated retail tariffs are set above cost (i.e. are a "backstop" against excessively high tariffs, as set out above), with a view to facilitating a transition towards greater uptake of market-based retail tariffs.

If using "backstop" regulated retail pricing on a transitional basis, Bulgaria will need to separately notify additional measures to achieve "effective competition". While a detailed

---

[21] *Directive 2019/944, Articles 5(6)-(9).*

[22] *Regulation (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast)*

[23] *A measure of the market-based price will be needed to work out the cost to individual retailers of serving customers at regulated prices. The measure should not be specific to individual suppliers, to avoid the risk of gaming. Possible options for a measure include any regulated "backstop" tariff available for customers that are not energy poor (see following paragraphs in this section) or the (weighted) average of any variable rate retail tariffs offered in the market.*

specification of potential reforms to enhance retail market competition is out of the scope of the current plans, potential measures to consider include:

- collection of data by EWRC on retail tariffs available in the free market, such that "backstop" regulated retail tariffs can be set at a level that incentivises switching to free market tariffs;
- provision of information to customers (for example, regarding information on alternative tariffs available); or
- measures to reduce barriers to switching suppliers, including the facilitating price comparison websites or mobile applications.

There are additional considerations for Bulgaria related to the speed of the transition to a more market-based retail pricing approach:

- Directive 2019/944 requires customers to have an incentive to switch away from the "backstop" regulated tariff to market-based tariffs. As noted above, this implies moving to a system in which EWRC effectively sets just the allowed profit margin (taking into account expected costs of purchasing energy from the wholesale market) at a level high enough to allow effective competition.
- The World Bank[24]has suggested a case for gradual liberalisation of retail prices, increasing the proportion of retailers' allowed wholesale energy cost indexed to market wholesale prices and reducing the proportion indexed to regulated wholesale prices.
- However, during a transition of the sort suggested by the World Bank, if retail regulated wholesale prices happen to be lower than market prices, the implied backstop retail tariff might in turn be lower than a 'purely' market-based retail tariff. Customers would not have an incentive to switch to a market-based tariff (as required by Directive 2019/944).
- There does not appear to be any explicit provision in Directive 2019/944 for a transition period from any existing system of regulated pricing towards a legally compliant system of market-based retail pricing combined with "backstop" regulated retail prices.

Finally, Bulgaria will try to ensure that any consumers on regulated prices are offered smart meters at no cost to them and should be directly informed of the possibility of installing smart meters and provided with appropriate assistance to do so.

In 2020 Bulgaria introduced Energy Act amendments which withdrew all non-household consumers from the regulated market and envisage an obligation for NRA to create and maintain a platform for comparing electricity supply offers.

---

[24] *World Bank (2016) "Bulgaria Power Sector: Making the Transition to Financial Recovery and Market Liberalization - Summary Report", November 2016, p.12.*

2.2. Distortions of supply and demand in the wholesale market

Functioning of the Bulgarian market

In Bulgaria, certain plants are required to sell their output at administrative prices (rather than prices determined freely on the market). These include:

- The ME1 and ME3 power plants, the output of which is covered by long-term PPAs including take-or-pay arrangements;
- RES and CHP installations below 1MW in size; [25]
- Certain other plants are obliged to sell quantities to NEK at prices set by EWRC, to cover the needs of end-consumers on regulated prices, which are supplied by NEK.

The prices and quantities at which NEK purchases electricity from generators in the third category above are determined by the regulator, EWRC. This is an annual process and is set out in the Energy Act. ESSF compensates NEK for the difference between its purchase costs and its revenues from sales to end suppliers. ESSF in turn raises revenues from sales of EU ETS allowances, a 5% contribution on domestic generators' revenues and the public service obligation fee.

The volumes set by EWRC are based on forecasts provided by NEK regarding the quantities of electricity that will be required to serve the regulated market.[26]

EWRC selects generators to contract with for the supply for power to the regulated market, based on their ability to produce at a price no more than 10% above EWRC's projected baseload market price.

The generator-specific electricity price is calculated by EWRC based on remuneration that is made up of capacity and energy payments. These are set to cover, respectively, each plant's fixed costs (including capital costs, made up of equity and debt, plus a rate of return) and variable costs. Price and volumes are calculated each year within each regulatory period.

The generators with long-term PPAs ME1 and ME3 are not subject to this methodology and the prices and quantities of energy and capacity purchased from them by NEK is set according to the terms of their respective PPAs.

If the amount supplied to NEK exceeds demand in the regulated market, NEK has the right to sell the additional volumes on the free market and can choose the platforms which they use to sell the additional electricity.

[25] *As of 1 July 2019, all existing RES-E and CHP producers with a capacity 1MW or greater have been required to switch from previous feed-in-tariff arrangements to selling their output directly on the market (and receiving premium payments from ESSF). Since 2015, no new subsidies have been provided for RES-E and CHP installations, except for rooftop solar PV installations below 30kW in size.*

[26] *If NEK ends up with a surplus of energy, it can sell this on the free market. In the event of NEK needing to purchase additional volumes of electricity, it may make a request to EWRC or to the Ministry of Energy, who could then oblige the plants to supply more electricity to NEK at regulated prices. We understand that NEK is not currently permitted to make additional purchases from the wholesale market.*

Complience with Regulation

Articles 3(b), 3(m) and 3(n) of Regulation 2019/943 require respectively that:

- market rules shall encourage free price formation and shall avoid actions which prevent price formation on the basis of demand and supply;
- market rules shall enable the efficient dispatch of generation assets, energy storage and demand response;
- market rules shall allow for entry and exit of electricity generation, energy storage and electricity supply undertakings based on those undertakings' assessment of the economic and financial viability of their operations.

NEK's purchases of generation at administrative prices may result in a distortion to the electricity market, contrary to the requirements of these articles. In particular, NEK's purchases are not on a market basis but instead governed by:

- minimum purchase ("take-or-pay") obligations (in the case of ME1 and ME3, included in their respective PPAs with NEK)[27]; and
- decisions by EWRC.

This raises the risk that, in at least some periods, regulated demand is met through regulated purchases of generation when cheaper alternatives may have been available in the free market (e.g. on the IBEX[28] exchange).

As in the rest of the EU, generators are subject to the EU Emissions Trading Scheme as well as air quality legislation (for example, the Industrial Emissions Directive, including so-called 'BREF' limits). We assume these interventions are viewed by the European Commission as being sufficient to ensure there are no further distortions arising from environmental or climate-related impacts being insufficiently addressed in the market design.

Options for Bulgaria

Bulgaria has a plan to phase out regulated prices for producers.

The advantages of a faster opening of the wholesale market include that:

- it would make required reforms to balancing and reserve markets (see next section) easier to implement; and
- it would promote liquidity on the free market, which in turn would reduce barriers to entry to new free market suppliers.

---

[27] *ME1 and ME3 also have take-or-pay contracts for their lignite supplies. Arguably the lignite take-or-pay contracts could also result in distortions to the merit order (even without NEK's take or pay obligation to purchase from ME1 and ME3), by making the plants perceive a zero marginal cost of lignite supply (up to the take or pay amount). However, we assume that termination of the PPAs would result in the ending of the take or pay obligation, and that therefore this would cease to be an issue once the PPAs are terminated.*

[28] *Independent Bulgarian Energy Exchange EAD (Bulgarian NEMO)*

2.3. Balancing and reserve markets

Functioning of the Bulgarian markets

Consistent with the System Operation Guideline (Regulation 2017/1485)[29] and Electricity Balancing Guideline (Regulation 2017/2195)[30], ESO procures the following reserve services:

- Frequency Containment Reserves (FCR) – Primary Reserve. This typically includes operating reserves with automatic activation of maximum 30 seconds.[31]

- Frequency Restoration Reserve (FRR) – Secondary Reserve. In the EU Internal Electricity Balancing Market, FRR includes operating reserves with an activation time typically from 30 seconds up to 15 minutes. FRR replaces FCR if the frequency deviation lasts longer than 30 seconds.[32] FRR can be distinguished between:

- Automatic activation (aFRR): automatic activation of 30 seconds up to 15 minutes[33]
- Manual activation (mFRR): semi-automatic or manual activation of maximum 15 minutes[34]
- Replacement Reserve (RR) – Fast Tertiary Reserve. This includes reserves with a semi-automatic or manual activation of 15 minutes or less.
- Cold Reserve. Legislative amendments are under way that will eliminate the existence of a cold reserve

There are no specific rules that require the release of reserves to the market at certain market price thresholds. The FCR, FRR, RR and the Cold Reserve are describe below.

Frequency Containment Reserves

These are provided in the following way:

- Availability:

- On a yearly basis, ESO procures 45 MW for which an availability payment of 10 BGN/MW per hour is paid. This price is set by EWRC.
  - If HPPs/PHESs of National Electricity company EAD (NEK) produce electricity, they are allocated some of the obligation to provide capacity for FCR purposes. The rest of the capacity is allocated on a pro-rata basis between the thermal plants (ME1, ME2, ME3, Bobov dol and Varna) if they produce electricity within that time period, based on their installed capacity. In practice, the hydro plants are rarely used for FCR.
- Similarly, if peaking plants (such as OCGT) produce electricity for more than one day during the winter, ESO transfers part of the obligation to provide capacity for FCR

---

[29] *Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation, C/2017/5310, OJ L 220, 25.8.2017, p. 1–120.*

[30] *Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing, C/2017/7774, OJ L 312, 28.11.2017, p. 6–53.*

[31] *ENTSO-E, Electricity Balancing in Europe, Guideline November 2018*

[32] *https://www.emissions-euets.com/internal-electricity-market-glossary/794-frequency-restoration-reserve-frr*

[33] *ENTSO-E, Electricity Balancing in Europe, Guideline November 2018*

[34] *ENTSO-E, Electricity Balancing in Europe, Guideline November 2018*

purposes to peaking plants. This is intended to allow more capacity from coal-fired plants to be sold on the wholesale market. In practice however, this rarely happens.

- On a monthly basis prior to the 10th day of each month, ESO specifies the capacity ranges for each Balance Energy Provider (BEP) for the next month. This is done to adjust ESO's needs for reserves as they get updated information.
- The generators are obliged to allocate the capacity requested by ESO to the units in operation for the next day and inform ESO on D-1.
- The generators are obliged to retain the reserved capacity for ESO and not sell that electricity on the market.

- Activation:

- On a monthly basis, before the 15th of the month, providers must send ESO a bid in the form of an amount up to BGN 100, which is added to the received hourly price on day ahead market.
- The prices of balancing energy providers for upward regulation are then determined on a daily basis, as the hourly pricesof IBEX Day-ahead base load price, collected with the amount up to BGN 100 entered in the bid.
- The activated energy is then allocated to the cheapest provider first – i.e. the provider with the lowest amount up to BGN 100 – and so on until the required capacity is activated.
- For downward regulation, ESO accepts payments from balancing energy providers but does not make payments for curtailment.

Frequency Restoration Reserve

The FRR includes aFRR (automatic Frequency Restoration Reserve) and mFRR (manual Frequency Restoration Reserve). These are provided in the same way as the Frequency Capacity Reserve, both for the availability payment and the activation payment. 155 MW is procured yearly.

Replacement Reserve

The RR is open to all balancing energy providers that are registered for participation as energy suppliers for tertiary control. In principle, this is open to demand-side response providers. For the time being, most balancing energy providers are generators, the exception being a few larger industrial consumers.

The capacity from thermal generators and hydro that is not procured for FCR and FRR can offer tertiary reserve.

- Availability:
  - There is no availability payment for Replacement Reserve.

- Activation:
  - The selection process for activating energy and the pricing principles are the same as for FCR and FRR.
  - For upward regulation, participants are obliged to provide bids for the total gross capacity which they haven't contracted on the market through bilateral contracts and/or on the power exchange market. Bids and offers are sent each day between 3.30pm and 4pm
  - For downward regulation, all participants are obliged to provide bids for the total capacity until the technical minimum of the aggregates. Bids and offers are sent each day between 3.30pm and 4pm

Planned future developments in FCR, FRR and RR

Bulgaria's participation in the PICASSO, TERRE and MARI projects will support increasing competition in ancillary services and balancing markets:

- The Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation (PICASSO) is an implementation project endorsed by TSOs through the ENTSO-E Market Committee to establish a European platform for the exchange of balancing energy from frequency restoration reserves with automatic activation or aFRR-Platform. It is done pursuant to Article 21 of the Commission Regulation (EU) 2017/2195 which requires that TSOs develop a proposal for the implementation of such a platform and eventually, make it operational. A proposal has been submitted by the members of the PICASSO project in April 2018.[35]ESO is currently in the process of becoming an active member of the project.
- The Manually Activated Reserves Initiative (MARI) project is the European implementation project for the creation of the European platform for the exchange of balancing energy form frequency restoration reserves with manual activation. As per above, TSOs are required to develop a proposal for the implementation of such a platform. ESO is currently an observer of the MARI project.
- The Trans European Replacement Reserves Exchange (TERRE) project is the European implementation project for exchanging replacement reserves in line with the Electricity Balancing guideline. TSOs have submitted a proposal for the implementation framework of this platform in February 2018.[36]ESO has sent a request to become an observer of the TERRE project.

Bulgaria expects that the implementation of these platforms will include provisions for producers to freely participate in ancillary and balancing services markets, as well as freely set their bids and offers for activated energy.

---

35 *https://consultations.entsoe.eu/markets/afrr_implementation_framework/supporting_documents/20180426_aFRRIF_Implementation_framework.pdf*

36 *https://consultations.entsoe.eu/markets/implementation-framework-replacement-reserves/supporting_documents/2018%2002%2021_RR%20Implementation%20Framework_Public%20consultation.pdf*

Compliance with the Regulation

A number of requirements from the Regulation (EU) 2019/943 are relevant for the procurement of balancing and ancillary services:

- Article 20(3)(b) requires that Member States shall consider "removing price caps".
- Article 20(3)(e) requires that Member States shall consider "enabling self-generation, energy storage, demand side measures and energy efficiency by adopting measures to eliminate any identified regulatory distortions".
- Article 20(3)(f) specifies that Member States should ensure "cost-efficient and market-based procurements of balancing and ancillary service".

Options for Bulgaria

The following appear to be issues that would need to be resolved:

- FCR and FRR reserve capacity (which get an availability payment) is only provided by thermal and hydro plants. Whilst these services are technically open to generation from other sources or demand-side responses or storage who meet the technical requirements, there is no competitive tender that allows them to effectively participate, and the availability payment is regulated (as opposed to being determined through a competitive tender).
- Concerns regarding a lack of competition in providing these reserve services have prevented Bulgaria from implementing competitive tenders to date. However, rather than administratively determining the price for availability, another option would be to implement such a competitive tender but with safeguards (e.g. through the form of auction reserve prices) to avoid excessively high prices (but still allow the possibility of competition). These price caps could be phased out once the wholesale market is de-regulated (see previous section) and all large thermal plants are free to compete for reserve contracts. This would provide the Commission with evidence that a plan is put forward to remove regulatory barriers for ancillary and balancing services.
- Article 30(1)(a) of Regulation (EU) 2017/2195 requires that the methodology to determine prices for balancing energy is based on marginal pricing (pay-as-cleared), though this leaves open the possibility of different clearing prices for different products. While the Regulation leaves open the possibility of using a different pricing methodology if this can be shown to be efficient, the 'all TSOs' proposal published by ENTSO-E in December 2018 includes one clearing price each for RR, for FRR with scheduled activation type, for FRR with direct activation type and for aFRR. Only energy for congestion management appears to be paid according to its bid.[37]
- The activation payments for the reserve services are effectively subject to price caps (equal to BGN 100 collected with the IBEX hourly day-ahead baseload price). Participants can only change their allowance up to BGN 100 in a hourly based. The need to set a valuebefore knowing the day-ahead price introduces an element of risk which is likely to complicate bidding, which may in turn reduce the efficiency of the selection process. In the case of RR, when combined

[37] *All TSOs' proposal on methodologies for pricing balancing energy and cross-zonal capacity used for the exchange of balancing energy or operating the imbalance netting process pursuant to Article 30(1) and Article 30(3) of Commission Regulation (EC) 2017/2195 establishing a guideline on electricity balancing.*

with the fact that participants must offer all capacity not contracted either to the market or to ESO for providing FCR and FRR, this would imply a risk for plants of being obliged to run at a loss. This risk might grow with increased intermittent renewable electricity deployment on the system, putting downward pressure on wholesale prices.

- Similarly, participants cannot request to be paid for downward regulation (i.e. to be curtailed). However, some potential participants (e.g. nuclear, RES-E, which are not eligible for FCR and FRR today, but which are eligible for RR unless in receipt of a feed-in-tariff) may incur costs when curtailed (such as the loss of subsidy payments). Combined with the obligation to offer capacity, this could theoretically result in plants being forced to run at a loss in periods in which curtailment is required.

- The price for activating energy is set with reference to day-ahead hourly prices. However, the fact that the amount up to BGN100 still need to be set by BEPs a month ahead of delivery means that the risks highlighted above are still relevant. Bulgaria needs to consider setting a bidding process where BEPs can enter their bids for upward and downward regulation closer to the time of delivery, freely set in terms of BGN/MWh. There should be limited or no role for price restrictions for activating balancing energy.[38]

- From December 2020, monthly competitive tender for FCR and FRR are performed as from the middle of 2021, daily auctions for procurement of FCR and FRR are envisaged.

2.4.Imbalance prices

Functioning of the Bulgarian market

Imbalance prices provide incentives for balancing responsible parties to reduce their imbalances. With the exception of the following, all market participants are exposed to the same imbalance settlement rules:

- The ME1 and ME3 power plants are incentivised through their PPAs to maintain their availability and deliver output when requested;
- Certain RES and CHP plants receive fixed feed-in-tariffs for their output (those below 1MW in size and commissioned before 2015 and rooftop solar installations below 30kW in size).

ESO calculates two prices for each settlement period: a top up price in case of deficit and a spill price in case of surplus. The imbalance prices cover the costs for ESO of the activated balancing energy from the balancing energy providers (both generators and consumers).

The methodology describing how the imbalance prices are set implies that these are based on the average cost of balancing the system – i.e. broadly speaking, imbalance prices for each settlement period are set equal to the total costs incurred by the system operator in each settlement period, divided by the size of the system imbalance. To arrive at the final imbalance price, this ratio is multiplied by a coefficient reflecting the TSO’s cost for administrating the balancing energy market. This coefficient must be approved by the EWRC and has been set to 1 (one) since the start of the balancing market (01.06.2014) and as such does not affect

[38] *There may, however, be a justification for price restrictions to deal with certain specific market power issues, for example when managing network congestions arising from network outages.*

imbalance prices. The methodology to calculate the imbalance price does not differ for a balancing period in which the TSO has to disconnect one or more consumers involuntarily.

The availability costs associated with primary and secondary reserve are recovered through grid tariffs.

EWRC has further stated the following:

> *The costs of the operator for balancing of the electricity system (ES) and regulation with big individual capacities, in some settlement periods, related to minimum imbalances, result in high balancing energy prices. The operator has developed and applies an internal instruction on additional recalculation of extreme prices of balancing energy, pursuant to art. 6, par. 9 ETR*

This refers to the rules in place for dealing with situations in which there is a zero (or negligible) system wide imbalance. In such situations, a market participant in deficit would pay an imbalance price of BGN 141/MWh while a participant in surplus would receive a price of BGN 30/MWh. These prices are set by EWRC.

Compliance with Regulation

The current imbalance pricing rule based effectively on the weighted average cost of balancing actions taken by ESO could fail to reflect the cost of scarcity for the following reason:

- As long as the price of activated balancing energy continues to be restricted, the average cost of balancing actions will be below the marginal cost; or

The planned change in settlement period duration from one hour to 15 minutes, combined with restriction removal would, eventually, mitigate the issue above.

Regarding imbalance prices, Article 20(3)(c) of Regulation (EU) 2019/943 requires that Member States shall consider introducing a shortage pricing function for balancing energy to recover administrative costs and availability costs associated with balancing services.[39]Such a function is not currently in place in Bulgaria. Related to this, there is no specific rule governing how imbalance prices should be calculated for a balancing period in which ESO has to disconnect one or more consumers involuntarily.

The administrative cost multiplier applied may also reduce the efficiency of imbalance prices since, if it were to differ from its historic value of one, it would reduce the cost-reflectiveness of imbalance prices.

Finally, Article 55 of Regulation 2017/2195 requires that

> *"…in the event that no activation of balancing energy in either direction has occurred during the imbalance settlement period, the*

[39] It refers to Article 44(3) of the Regulation 2017/2195, which states that: '*Each TSO may develop a proposal for an additional settlement mechanism separate from the imbalance settlement, to settle the procurement costs of balancing capacity … administrative costs and other costs related to balancing. The additional settlement mechanism shall apply to balance responsible parties. This should be preferably achieved with the introduction of a shortage pricing function. If TSOs choose another mechanism, they should justify this in the proposal. Such a proposal shall be subject to approval by the relevant regulatory authority.*'

> *value of the avoided activation of balancing energy from frequency restoration reserves or replacement reserves."*

The price cap during situations of small system imbalances, as described above, is likely to violate this as the prices fixed by EWRC do not necessarily reflect the value of the avoided activation of balancing energy. In addition, the different price paid by parties in deficit compared to those in surplus may go against the general principle that a single imbalance price should apply in each settlement period.[40]

Options for Bulgaria

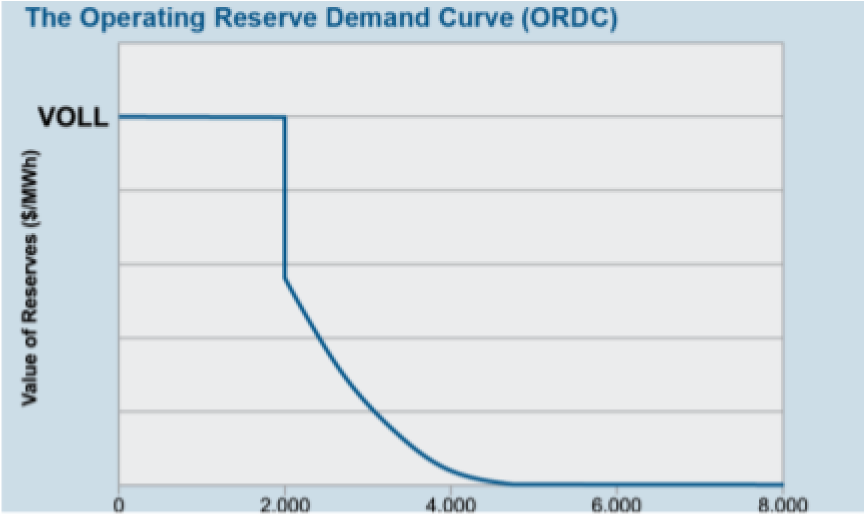
Bulgaria should consider the extent to which imbalance prices reflect the cost of scarcity. Imbalance prices act as an implicit cap in the wholesale market because it would not be rational for a market participant to pay more for power in the wholesale market than they would have to pay for being in deficit (relative to their contractual position in the wholesale market). To the extent that imbalance prices do not reflect the true cost of scarcity, then neither will market prices. Therefore, in turn, this represents a form of 'missing money' for investors, and hence can be a source of adequacy concerns.

- In advance of planned changes to how the price of balancing energy is determined and changes to settlement period determination, there may be a case, in the interim period, for considering basing imbalance prices on a closer representation of marginal cost of actions taken by the system operator (for example, an average of the most expensive 5MWh of actions taken in a settlement period). We note that while this is not explicitly required by EU legislation, Regulation 2019/943 does state that effective scarcity pricing will encourage market participants to react to market signals. We therefore consider a more marginal imbalance price calculation would be in line with what the Commission would consider a well-functioning electricity market.
- Bulgaria should consider the possibility of introducing an administrative scarcity pricing function. The basic principle of such a scarcity pricing function would be to ensure that, as levels of reserve fall, and the Loss of Load Probability (LOLP) increases, imbalance prices can rise to the level of VoLL, as illustrated in the figure below. In GB, the scarcity price is calculated as LOLP (for a given level of margin of available capacity over demand) multiplied by VoLL.[41] We understand that ESO already calculates LOLP as a function of the difference between total available capacity and demand as part of its annual (year-ahead) adequacy assessments. This would also result in imbalance prices rising to VoLL during periods in which ESO needs to disconnect customers involuntarily.

40 *Article 52(2) of Regulation 2017/2019.*

41 *Elexon (2019), "Imbalance Pricing Guidance", Version 14.0, Appendix 1.*

Figure 6 Administrative shortage pricing function (illustration)



Source: ERCOT

Other reforms would also make imbalance prices more cost-reflective:

- It would be more efficient to recover ESO's administrative costs on a socialised basis (e.g. through grid tariffs) rather than via an adjustment to imbalance prices.
- Bulgaria should move towards a single imbalance price for periods of small or zero system-wide energy imbalance, equal to the avoided cost of activating balancing energy (i.e. the lowest cost offer for activating balancing energy submitted to ESO in the relevant settlement period).

2.5.Day-ahead market / IBEXexchange

Functioning of the Bulgarian market

Technical limits constrain prices to be within the range EUR -500.0 to EUR 3000.0. These limits have been developed jointly by nominated market operators ('NEMOs') and have been approved by ACER.[42]

The proposal approved by ACER includes an automatic adjustment mechanism for the harmonised maximum clearing price for single day-ahead coupling ('SDAC'), whereby it is increased by EUR 1000.0/MWh if the clearing price exceeds 60% of the harmonised maximum clearing price in at least one market time unit in a day in an individual bidding zone or in multiple bidding zones.

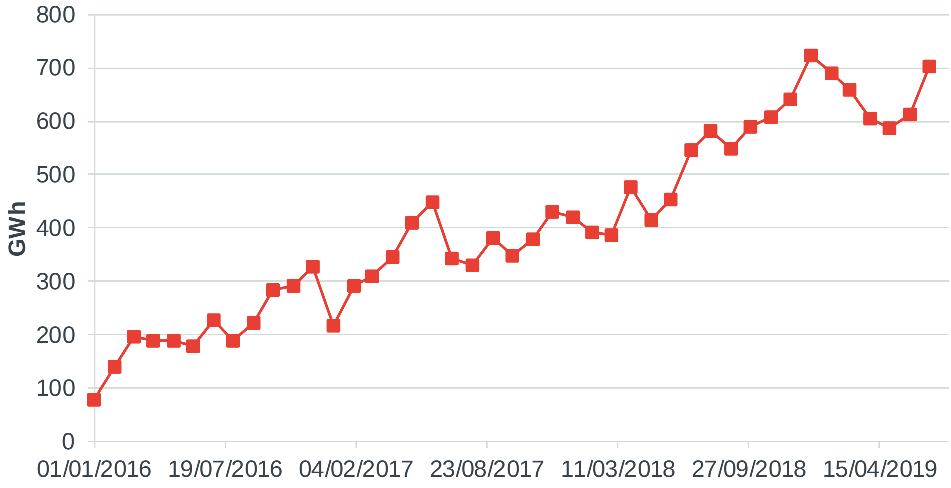
The day-ahead projects for market coupling on BG-RO and BG-GR borders are in an advanced stage of development and go lives are expected in Q2-Q3 2021. BG-RO market coupling will

[42] *Decision of the Agency for the Cooperation of Energy Regulators No 04/2017 on the Nominated Electricity Market Operators' Proposal for Harmonised Maximum and Minimum Clearing Prices for Single Day-Ahead Coupling, 14 November 2017*

be possible after the completion of the Interim project - MRC and 4M MC market coupling project. Regarding the BG-GR border, market coupling go-live is planed for April 2021.

The volumes traded on the day-ahead market have shown an upward trend (see figure below).

Figure 7 Day-ahead market volumes



Source: Frontier Economics based on IBEX data.

Complience with Regulation

Over time, as the wholesale market liberalises and as other market reforms (such as market coupling and reforms to imbalance pricing) bed in, it is likely that day-ahead market liquidity will improve.

One further suggestion to improve liquidity, identified by the World Bank in its 2016 report[43] would be to implement market-based purchases of losses by ESO and by DSOs. If this has not already been implemented, there may be a benefit in doing so, as it may also boost the case for compliance with Article 3(p) of Regulation 2019/943, the principle that *"…market rules shall facilitate trade of products across the Union."*

2.6.Intraday markets

Functioning of the Bulgarian market

The intraday market was introduced in April 2018. Technical limits constrain pricing to be within the range EUR -9999.9 to EUR 9999.9. These limits have been developed jointly by

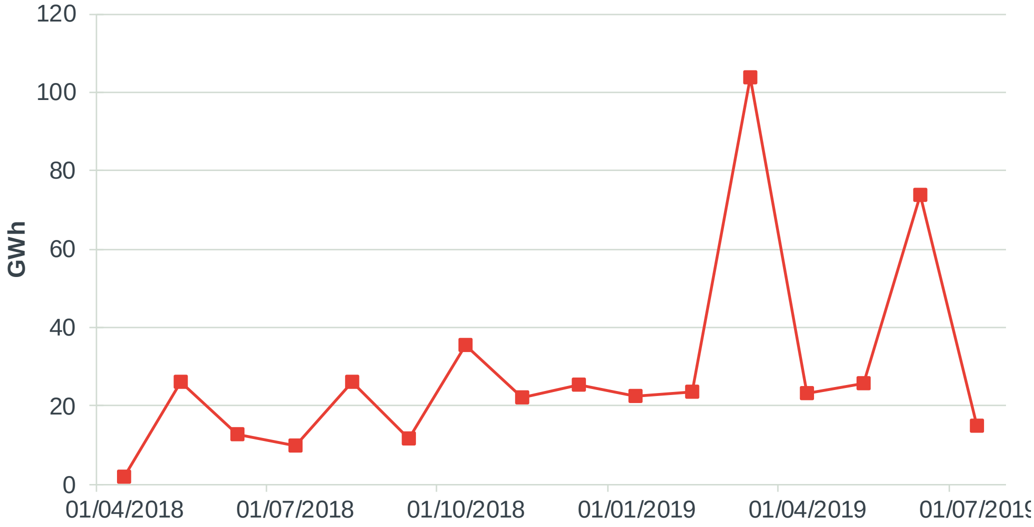
[43] World Bank (2016), p.8. "*Additional traded volumes in the DAM could be secured if the transmission system operator (TSO/ESO) and distribution system operators (DSOs) are obligated to buy at least a share of their losses from the [day-ahead market], with the remaining share to be bought through tendering a long-term contract. This approach is implemented in many European markets for liquidity reasons. It could be envisioned, for instance, that both the ESO and the DSOs procure up to 70 percent in long-term contracts to secure the base cost of the losses, and then procure the remaining volumes from the [day-ahead market]*".

nominated market operators ('NEMOs') and have been approved by ACER.[44] A mechanism, developed with other NEMOs, has been approved to automatically adjust the technical bidding limits in the event that the set limits are expected to be reached.

The proposal approved by ACER includes an adjustment mechanism for the harmonised maximum clearing price for single intra-day coupling ('SIDC') in the event that the harmonised maximum clearing price for SDAC is increased above the harmonised maximum clearing price for SIDC. In such a case, the harmonised maximum clearing price for SIDC shall also increase to be equal to the harmonised maximum clearing price for SDAC. As a first stage, the intraday market covers only the transactions in the Bulgarian market zone. The cross-border intraday market on the BG-RO border was introduced with the XBID project as part of the second wave go live in November 2019. In 2020, the intraday cross-border market was introduced on the BG-SR border by means of explicit intraday allocation.

The volumes traded on the intraday market appear to be on a modest but volatile upward trend, (see figure below).

Figure 8 Intraday market volumes



Source:Frontier Economics based on IBEX data.

Compliance with Regulation

No significant issues needing to be addressed from an economic perspective are identified. Over time, as the wholesale market liberalises and as other market reforms (such as market coupling and reforms to imbalance pricing) bed in, it is likely that intraday market liquidity will grow further.

[44] *Decision of the Agency for the Cooperation of Energy Regulators No 04/2017 on the Nominated Electricity Market Operators' Proposal for Harmonised Maximum and Minimum Clearing Prices for Single Intraday Coupling, 14 November 2017*

2.7. Forward liquidity

Functioning of the Bulgarian market

Article 3(o) of Regulation 2019/943 states that: *"…in order to allow market participants to be protected against price volatility risks on a market basis, and mitigate uncertainty on future returns on investment, long-term hedging products shall be tradable on exchanges in a transparent manner and long-term electricity supply contracts shall be negotiable over the counter, subject to compliance with Union competition law".*

Bilateral trading of forward products (for physical delivery) occurs in Bulgaria. In addition, EEX has set up a platform for trading financial futures products.

Options for Bulgaria

We note that forward trading and the availability of futures trading is limited in Bulgaria at present. However, other potential changes (e.g. to pricing of balancing energy and imbalances, and to regulated sales of generation) are likely to have significant effects on liquidity and price formation in shorter term markets. As such, it would make sense to give these changes time to take effect and evaluate their impact first, before any possible intervention to improve forward market liquidity.

2.8. Network congestion issues

Functioning of the Bulgarian market

The electricity transmission network of Bulgaria covers a network of 400kV, 220kV and 110kV, which are interconnected through system autotransformers and transformers. The transmission network is being developed in accordance with the internal TYNDPs of ESO which are updated annually.

The construction of new 400kV interconnections and the development of the 400kV internal network is coordinated with the development of neighbouring 380-400kV networks through the SEE Regional Investment Plans which are part of TYNDP of ENTSO-E.

In the future development of the 400kV network in the country, in addition to ensuring the operational security of the Bulgarian electricity system under normal and repair operating schemes, there is an aim to increase the cross-border capacity for power exchange with the SEE countries, in order to fulfil Article 16, p. 8 of Regulation (EU) 2019/943 on the internal market in electricity.[45]

According to ESO, there are currently no structural congestions in the internal electricity network under complete operating scheme of the transmission network. When issues arise, these are due to temporary issues, such as power line maintenance outages.[46]In such cases, some

[45] *This article states that "Transmission system operators shall not limit the volume of interconnection capacity to be made available to market participants as a means of solving congestion inside their own bidding zone or as a means of managing flows resulting from transactions internal to bidding zones".*

[46] *Typically, these are associated with hydro power plants that have only a single line connection to the transmission grid. When the connecting line is on outage, the hydro plant may still run on 'island mode', requiring re-dispatching actions to be taken by ESO.*

re-dispatching may be necessary. Re-dispatching instructions and payments are made to generators through the balancing mechanism.

According to ESO, it is not currently possible to separately identify the costs of re-dispatching actions taken through the balancing mechanism (as opposed to the costs of actions required for overall energy balance of the Bulgarian system).

When carrying out the annual maintenance program, congestions shall be avoided through inconsistencies of the outages of transmission network elements with the planned repairs of large generating sources and large consumers. Coordination of the tie line maintenance program by the TSOs from South-east Europe is carried out by the Working Group "Annual Maintenance Schedule" for the region of South-east Europe to ENTSO-E, which develops and coordinates the maintenance program of the interconnections and some major internal power lines for the year ahead. The members of this working group are the representatives of TSOs of Bulgaria, Romania, Serbia, Montenegro, Macedonia, Albania, Greece, Bosnia and Herzegovina, Kosovo, Croatia, Hungary and Turkey.

We note that, even though no major re-dispatching has been needed in the electric power grid until now, the construction of a new interconnection with Romania or the increase in transfer capacityon the existing interconnection may require the situation to be re-assessed.

Compliance with Regulation

Article 14 of Regulation (EU) 2019/943 specifies that Member States shall take all appropriate measures to address congestions, and that bidding zone borders shall be based on long-term, structural congestions in the transmission network.

- Since ESO believes that no congestions are expected in their network in the short-term, there is no need to reconfigure bidding zones in Bulgaria. It may however still be helpful for Bulgaria to state to the Commission that the situation will be monitored (for example as new interconnection capacity is built), and appropriate action (whether investments or definition of bidding zones) will be taken in case structural congestions materialise.

Article 30(1)(b) of Regulation 2017/2195 requires that bids accepted by the system operator for congestion management purposes shall not set the marginal price of balancing energy. Given that bids selected for congestion management purposes cannot currently be separately identified, it would not currently be possible to meet this requirement.

Options for Bulgaria

A first step would be to ensure 'tagging' of bids accepted by ESO for re-dispatch purposes. 'Untagged' bids could enter the process for calculating balancing energy prices (and, in turn, imbalance prices). While 'tagged' bids could be paid their bid price (consistent with Regulation 2017/2195 as well as the all TSOs proposal.[47] The costs of remunerating re-dispatching actions could be recovered from consumers through use of system charges. On the basis that such costs

[47] *ENTSO-E (2018) "All TSOs' proposal on methodologies for pricing balancing energy and cross-zonal capacity used for the exchange of balancing energy or operating the imbalance netting process pursuant to Article 30(1) and Article 30(3) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing 18 December 2018"*

would be limited and that there are no structural congestion issues in Bulgaria, it would be reasonable for the costs to be socialised across energy consumers (i.e. a flat BGN/MWh fee per period, monthly or annually).

2.9.Interconnection capacity and cross-border trade

Functioning of the Bulgarian market

According to the draft integrated Energy and Climate Plan of the Republic of Bulgaria, there is:

- 12 000 MW total installed generating capacity in the Bulgarian electricity system ‘EES) and available capacity of 8 300 MW
- 1 950 MW export transfer capacity; and
- 1 590 MW import transfer capacity.

The following figure shows the capacity from and to each of Bulgaria’s neighbour as well as the estimated utilisation rate of the interconnections

Figure 9 Interconnector capacities an utilisation

2018	Export capacity	Export utilisation rate	Import capacity	Import utilisation rate
Greece	471 MW	94%	379 MW	7%
Macedonia	272 MW	93%	217 MW	12%
Romania	318 MW	63%	277 MW	36%
Serbia	293 MW	79%	254 MW	27%
Turkey	388 MW	30%	282 MW	48%

Source: Frontier Economics analysis. Data on flows is based on ENTSO-E transparency platform and data on average monthly capacity is based on ESO data

Note: Monthly utilisation rates are calculated as the mean hourly flows across each month of the year divided by capacity. A yearly utilisation rate is then calculated as the weighted average (by capacity) of monthly utilisation rates. Day-ahead flows are used for the purpose of this analysis.

The report also mentions that according to ENTSO-E, after the construction of planned new power lines of electricity transmission, the transfer capacity for electricity exchange is expected to reach 22%.

EWRC’s pricing decision for 01.07.2019 to 30.06.2020 removes the electricity export fees that had previously been in place in Bulgaria.

In 2015, a requirement was introduced for all generators in Bulgaria and importers to Bulgaria to pay a contribution equivalent to 5% of monthly revenues to the Electricity Security of Supply Fund (ESSF). The charge faced by importers was abolished by the May 2019 amendments to the Bulgarian energy act. There are no current plans for amendment or removal of the 5% contribution.

Compliance with the Regulation

Article 20(3) of Regulation (EU) 2019/943 specifies that Member States should increase their interconnection and internal grid capacity so as to reach at least their interconnection targets as referred in point (d)(1) of Article 4 of Regulation (EU) 2018/1999.

- Article 4(d)(1) of Regulation (EU) 2018/1999 sets an interconnection target of 10% by 2020 and of at least 15% by 2030.
- Bulgaria seems to have already reached the 2020 target and seems that reached also the 2030 target.

Article 3(h) requires that *"barriers to cross-border electricity flows between bidding zones or Member States and cross-border transactions on electricity markets and related services markets shall be progressively removed"*.

- Bulgaria has now removed the export fees that were previously in place.
- The removal of the requirement of importers to pay the 5% contribution resolves one potential issue that may arise because of the implementation of market coupling. While the original form of the 5% contribution did not necessarily result in a distortion to imports (since imports and domestic generation were on a level playing field), it did distort exports (since Bulgarian exporters were exposed to the fee when domestic generators in neighbouring markets are not). It was also unclear how it could be administered following the introduction of market coupling. With market coupling, Bulgaria will no longer be able to identify importers (as the market coupling algorithm will decide on the allocation of production between Member States), making it impossible to require them to pay the contribution.
- While the recent exemption of importers from the contribution addresses the issue with market coupling, it now creates a distortion between domestic generation (which is required to pay) and foreign generation. This may in turn harm the profitability of domestic generators operating in the market.
- That said, the extent of the distortion may gradually reduce over time since the need for the 5% contribution should itself reduce over time as regulated prices at wholesale level are phased out.

Options for Bulgaria

To the extent revenues from the sales of EU ETS allowances are insufficient for ESSF to pay the costs of support for RES and CHP, as well as any other purchases from producers at regulated prices, Bulgaria should consider changing the basis of recovery of the 5% contribution. For example, Bulgaria could consider recovering the required revenues from general taxation or through a levy applied equally to all energy consumers.

2.10.Demand-side response, storage, autogeneration and energy efficiency

Functioning of the Bulgarian market

Demand-side response

Currently, all types of demand-side response (DSR) are eligible to participate in the wholesale electricity markets (including day-ahead and intraday), as individual players or via aggregators (although there is no legal definition for an aggregator in the electricity market rules – they are therefore treated as another Balancing Responsible Party).

Any DSR provider who can provide at least 5 MW of demand response is also eligible to participate in providing RR services and also can participate in FCR and FRR competitive mountly tender which have been perform from December 2020. Some large industrial consumers do currently participate in providing RR. However, there are currently no DSR aggregators active in Bulgaria, and neither is there a licensing regime for such players.

Apart from a relief for energy-intensives for the part of the obligation to society fee that recovers the costs of supporting RES-E and CHP, no exemptions from network or energy-related costs as well as surcharges (RES, CHP, capacity mechanisms, etc.) exist for specific classes of consumers which might affect demand response incentives.

Smart meters

The latest data indicates that 100% of industrial users, 53% of business customers in the free market and almost 0% of consumers in the regulated market are provided with smart meter. According to EWRC, all the smart meters are capable of metering and transmitting at least hourly metering values and data management systems enable suppliers to settle customers based on at least hourly metering values (i.e. against at least hourly spot market prices, for the purpose of dynamic pricing).

Finally, all customers in the free market have, at least in principle, access to a dynamic price contract linked to wholesale spot market prices. Most suppliers offer dynamic price contracts, which offer a tariff equal to the hourly spot market price plus a surcharge. No such contracts exist for customers in the regulated market.

Compliance with Regulation

Regulation 2019/943 does not provide further details as to which issues need addressing in respect of the demand-side response, storage, autogeneration and energy efficiency. However, other provisions of internal market legislation may provide some guidance as to what the Commission expects in this regard.

- Article 19 of Directive 2019/944 requires Member States to deploy smart meters where they would assist the active participation of consumers in the electricity market, subject to a cost-benefit analysis. As far as we are aware, there are no legislative plans for the roll-out or mandatory offering of smart meters to residential customers and smaller businesses, or for the evaluation of such a roll-out policy.

- Article 17 of Directive 2019/944 requires specifies that a calculation method for allocating imbalance costs from DSR aggregation shall be approved by the regulatory authority. EWRC has clarified that no such method has yet been approved, since there are currently no independent DSR aggregators in Bulgaria. However, the lack of a clear framework could itself create a barrier to the development of the market.

Options for Bulgaria

Bulgaria should set a timeline for the following:

- Bulgaria should develop market rules to enable participation of aggregators (of DSR and of smaller generation) in the wholesale market and in tenders for reserve services. Specific steps required include the development of a licensing regime for DSR aggregators and the development of a method for allocating imbalance costs from DSR aggregation.
- Bulgaria should commit to undertaking a cost-benefit analysis to identify if deployment of smart meters would be cost-effective for all or a subset of consumers.

Part III: IMPLEMENTATION PLAN FOR THE REQUIRED MARKET REFORMS AND TIMELINE FOR THEIR ADOPTION

Implementation Plan for the Required Market Reforms and Deadlines for their Introduction, in Compliance with Art. 20, para. 3 of Regulation 2019/943.			
No.	*Responsible party*	*Required reforms*	*Deadline for implementation and measures proposed by Bulgaria*
	WHOLESALE MARKET		
1	**Supply and demand irregularities on the wholesale market**		
1.1	*Ministry of Finance (MF), Ministry of Energy (ME)*	*Termination of the long-term contracts with Maritsa East 1 (ME1) and Maritsa East 3 (ME3)*	In 2001, Natsionalna Elektricheska Kompania EAD concluded two long-term electricity purchase contracts, respectively with Consolidated Continental Commerce Ltd (currently AES-3C Maritza East 1 EOOD) and Energy Company Maritsa East 3 AD (currently ContourGlobal Maritsa East 3 AD). The EU rules on state aid and the intended changes in the wholesale market in relation with eliminating market regulation, necessitate the termination of the existing long-term contracts. The termination of the two referred contracts is the basis for the liberalisation of the wholesale market of electricity and is a prerequisite for the acceptability of the introduction of a capacity mechanism. Negotiations are under way to settle the relations under the long-term electricity purchase contracts between NEK and both power plants (ME1 and ME3) in compliance with the applicable EU rules on state aid. Bulgaria has elaborated the necessary methodology and calculations in relation with identifying the non-recovered costs. The calculations for ME3 have been made available to the EC. Talks are expected to be held, with support from the EC, for termination of the contracts. ***Deadline for completion: by 30 June 2021***

1.2	*ME*	*Removing the existing quotas and the role of the public provider*	There are two market segments in Bulgaria at present - regulated and free. The regulated operates for purchase of electricity for securing the needs of the consumers at regulated prices. According to the applicable laws, all generators in the electricity market with installed capacity of over 1 MW are obliged to sell the electricity they produce on an organised electricity market (the platforms of IBEX for the territory of Bulgaria), except for the generation units which: Have concluded long-term contracts with NEK for purchase of the electricity - ContourGlobal and AES, and the power plants which have quotas determined by the national regulatory authority for the amounts of electricity to be sold to the Public provider, to secure the needs of the regulated market. This legislation does not prohibit electricity exports. In the course of the market liberalisation process, Bulgaria plans to eliminate the role of the public provider and the existence of quotas. After the intended complete market liberalisation, all producers shall sell the electricity they generate on the free market. ***Deadline for completion: Immediately after implementation of item 1.1., and in parallel with the introduction of a Capacity mechanism.***
2	**Disadvantages of the balancing market and the ancillary services market**		
2.1	*Electricity System Operator (ESO)*	*Contracts for balancing capacity shall not be concluded more than one day before the provision of the balancing capacity and the contracting period shall no be longer than one day, unless and to the extent that the regulatory authority has approved earlier contracting or longer contracting periods, in order to ensure the security of supply or improve the economic efficiency.* *Where a derogation is granted, for at least 40 % of the standard balancing products and a minimum of 30 % of all products used for balancing capacity, contracts for*	The transmission system operator is introducing a new platform for conducting auctions for balancing capacity. Since the beginning of November 2020, the pre-qualification phase for the balancing services providers has been under way. The providers of balancing services that apply and complete this phase, shall be included in a public register, entitling them to participate in auctions. This phase for the applicants for balancing services providers was finalized by mid-December, and the first monthly auction (for the provision of balancing capacity/reserve for January 2021) was performed at the end of December 2020. As of 1 July 2021, Bulgaria intends to ensure that at least 40% of all balancing capacities are purchased on a daily basis. By granting derogation, for the remaining

		the balancing capacity shall be concluded for no more than one day before the provision of the balancing capacity and the contracting period shall be no longer than one day. The contracting of the remaining part of the balancing capacity shall be performed for a maximum of one month in advance of the provision of balancing capacity and shall have a maximum contractual period of one month. (Art. 6, item 9 of Regulation 2019/943)	part it is intended that the balancing capacity is purchased one month prior to its provision at most and the contracting period not to exceed one month. ***Deadline for completion: 01 July 2021***
2.2	*ESO*	*Market participants shall be allowed to bid as close to real time as possible, and balancing energy gate closure times shall not be before the intraday cross-zonal transmission capacity gate closure time. (Art. 6, item 4 of Regulation 2019/943)*	An overall change of the balancing market organisation mechanism is intended in the coming months. The present organisation of the balancing market does not allow for submission of offers by the balancing energy providers after the intraday cross-zonal transmission capacity market gate closure time. The determining of the amount of energy for regulation (automatic frequency restoration reserve) from each dispatchable unit is not done based on offered amount, nor based on automatically generated schedule by the SCADA system in case of activation. In the case of automatic frequency restoration reserve, the offers only include prices. The balancing energy offers (with amount and price) are only provided for manual frequency restoration reserve, however, this type of balancing energy is rarely used in the Bulgarian energy system. For the automatic frequency restoration reserve, each deviation from the trade schedule is considered balancing energy. According to the requirements of Regulation 2019/943, the balancing energy gate closure time shall be introduced with the connection to the balancing platforms. For the purpose of earlier compliance with this provision, TSO intends to implement amendments in the functionalities of the platform for administration of the balancing energy/capacity auctions, to make it possible to update the prices of the offers by the balancing energy providers up to two hours prior to the intraday cross-zonal market gate closure time. ***Deadline for completion: by 31 December 2021***

2.3	*EWRC, ESO*	*Removal of the price restrictions for balancing energy activation, as well as the shortage and surplus prices. Such may only apply in a small number of cases only, to address specific issues, taking all required actions to eliminate or limit the impact on the market behaviour (Art. 10, Regulation 2019/943)*	The pricing of the balancing energy at marginal price (the highest accepted offer price) has been implemented since 1 July 2020 and ESO pays all balancing energy providers the highest price for the activated offers in the case of upward balancing, while all balancing energy providers are paying ESO the lowest price for an activated offer in the case of downward balancing. On the other hand, the offered prices are tied with the prices on the day ahead market, as the market structure and market segments have strong coherence with respect to the real time market, where the prices need to have a sanctioning effect to the grid users. The current price cap for the balancing energy providers' prices are a regulatory solution, made on the basis of analysis carried out by the Regulator, appeals by the market participants, and some bad practices and price disturbances in 2014, when the balancing market was introduced. After the launch of the platforms (projects TERRE, MARI and PICASSO), the price restrictions for activation of balancing energy will be removed. ***Deadline for completion: 01 July 2022***
2.4	*ESO*	*Publishing of the current system balance, the estimated imbalance prices and the estimated balancing energy prices, to be done as close to real time as possible, with a delay after delivery of no more than 30 minutes (Art. 6, Regulation 2019/943).*	The publishing of the current system balance is not related with inflow of data from the commercial measuring devices. It is a value supported by the SCADA/EMS system. The system balance and the estimated marginal price of the balancing energy shall be published with a delay of no more than 30 minutes. ***Deadline for completion: 01 February 2021***
2.4	*ESO*	*Introduction of a single balancing price for periods with no activation of balancing energy. The price of imbalance shall reflect the value of the avoided activation of balancing energy from frequency restoration reserves or replacement reserves, in compliance with Art. 55 of Regulation 2017/2195. (i.e., the lowest price offer for balancing energy activation, submitted to TSO in the respective period of settlement)*	The mechanism provided for in Regulation 2017/2195 for the periods with no activation of balancing energy, differs from the one currently applied by TSO. During such periods, the Bulgarian transmission system operator ESO applies an official price, which is different for shortage and surplus. ESO has drafted a proposal for the introduction of a uniform balancing price, but this is a huge change in the algorithm of the balancing market as compared with the current model, and it shall take time for it to be discussed, coordinated and approved. In order to be successfully implemented, this new model for the

			balancing market requires that the present 60-minute imbalance settlement period be replaced by a 15-minute one. ***Deadline for implementation: 31 December 2022***
2.6	*ESO*	*Introduction of a 15-minute imbalance settlement period* *(Art. 8 of Regulation 2019/943)*	TSO has the technical capability to introduce a 15-minute imbalance settlement period as of January 2021, in compliance with the requirements of Art. 52 (1) of the Guidelines on balancing. The question is about the availability of 15-minute products (MTU) on the power market. The Power exchange operator has asked the regulator for derogation. The transmission system operator does not agree to a derogation after the end of 2021, as the standard balancing energy products are modelled with a 15-minute resolution and the balancing platforms are expected to be functional by the end of 2022. NRAs are expected to grant a derogation on the introduction of 15-minute ISP till the introduction of a 15-minute MTU on day-ahead and/ or intraday market segments by the Bulgarian Independent Energy Exchange EAD, but not later than 31.12.2022. ***Deadline for completion: by 31 December 2022***
3	**Long-term market, day ahead and intraday markets**		
2.1	*ESO, IBEX*	*Market couplings in the day-ahead market frame*	Considering the geographical location of Bulgaria and its neighbouring countries, the possible market couplings depend on the following factors: • Romania is part of the 4M MC market coupling (the local coupling of Romania, Hungary, Czech Republic and Slovakia). Prior to the start of the Interim project (the market coupling of DE-AT-PL borders with 4M) at the end of 2018, it was impossible to launch a project for coupling of the markets on the BG-RO border (the BGRO MC project), due to technical incompatibility between the 4M MC and MRC market couplings. Works are already under way on a project for coupling of the markets on the BG-RO border, which is to be launched as soon as possible (within 3 months)

			after the launch of the Interim project The multiple postponement of the Interim project has had a negative impact on the start of real operation of the BGRP MC project At present, the expected start of the project is by August 2021. • Since 1 November 2020, Greece has an operational day-ahead market, in compliance with the European legal framework. The market coupling on the GR-IT border launched in December and will be followed by the market coupling on the BG-GR border. For purpose of launching the market coupling project as soon as possible, the Greek and Bulgarian transmission and market operators, supported by the national regulatory authorities, submitted a request for adding the Bulgarian market zone through the BG-GR border to the IBWT (Italian borders working table) initiative. The market coupling on the BG-GR border is expected to be implemented in April 2021. • North Macedonia - in 2018 a memorandum was signed on the coupling of both countries' day-ahead markets, and this initiative was carried out within the framework of the Programme for integration of the West Balkan countries' energy markets (the WB6 initiative), implemented by the secretariat of the Energy Community. After several meetings on the project, it came to a stage requiring legislative changes in the legal regulations of North Macedonia, to ensure market organisation on compliance with Regulation 2015/1222. In September this year, the exchange operator of the Republic of North Macedonia (MEMO) was assigned for a Nominated Electricity Market Operator (NEMO). This opened an opportunity to resume the project for market coupling on the Bulgarian-Macedonian border in the day-ahead time segment. The project is based on the principles and procedures for implementation of the single European day-ahead market coupling (SDAC). The transmission system operators and NEMOs of the Republic of Bulgaria and the Republic of North Macedonia started again active works on the project. The market coupling is expected to be implemented in Q1 of 2022.

			• Republic of Serbia - in 2018 negotiations were initiated on a trilateral coupling between Bulgaria, Serbia and Croatia. In 2019, the countries developed an analysis of the prerequisites and viability of the project, and this document was coordinated between the three countries. Works on the project are ongoing, some of the required next steps being related with legislative changes in the legal regulations of the Republic of Serbia, on order to ensure market organisation in compliance with Regulation 2015/1222. The market coupling is expected to be implemented in the time horizon after 2021.
3.2	*ESO, IBEX*	*Market couplings in the intraday market frame*	ESO and IBEX participated in the second wave of coupling of the intraday markets through the Bulgarian-Romanian border, and since 19 November 2019, they are participating in SIDC as operating parties. The implementation of a market coupling on the Bulgarian-Greek border for the intraday time frame through participation in the third wave of market coupling for SIDC had to be implemented by means of a local project LIP 14, including also all Italian borders. ESO EAD, jointly with the Bulgarian power exchange operator are part of the project and are ready for conducting all tests under the project, which is expected to be in operation in May 2021. As the Greek party is unable to perform its obligations under the concluded agreement and participate in the planned tests due to absence of technical preparedness, this shall affect the BG-GR border, which shall postpone the launch for a later stage, when the Greek participants are ready, possibly end of 2021.
4	**RETAIL MARKET**		
4.1	*ME*	*While keeping some kind of price intervention, it has to be considered whether this measure may be considered a public service obligation within the meaning of Directive 2019/944/EC (Article 9).*	**Non-household customers** The liberalisation for non-household customers took effect on 1 October 2020, as a result of amending and supplementing the Energy Act. As of that date, the supply to all non-household customers, including micro enterprises, is no longer under the terms of regulated prices, they rather sign contracts with traders at freely negotiated prices.

		The presence of public interventions in price setting is only possible in compliance with the conditions listed in Art. 5 of Directive 2019/944. *1. Suppliers shall be free to determine the price at which they supply electricity to customers. Member States shall take appropriate actions to* ***ensure effective competition*** *between suppliers.* *2. Member States shall ensure the protection of energy poor and vulnerable household customers pursuant to Articles 28 and 29 by social policy or by means* ***other than*** *public interventions in the price setting for the supply of electricity.* *3. By way of derogation from paragraphs 1 and 2, Member States may apply public interventions in the price setting for the supply of electricity to energy poor or vulnerable household customers. Such public interventions shall be subject to the conditions set out in paragraphs 4 and 5., including, but not limited to: Offering contracts with dynamic prices, implementation of a platform for competitive market offers and opportunities for economies on the competitive market, intelligent measuring devices or economically justified analysis about the postponement of the mass implementation, compulsory installation of intelligent devices at the request by the customer, etc.*	In order to avoid stress situations, the transition to a liberalised market for the non-household customers has been slow, with a provision for a non-household customer that has not selected a new supplier by 30 September 2020, to have the option to automatically sign a standard contract with its current supplier (the end provider), with a period of delivery 1 October 2020 - 30 June 2021. The wording and clauses of the standard contracts have been approved by the Regulator and the prices are market determined. **Households** During the liberalisation, measures shall be applied to ensure a gradual and staged transition to a liberalised electricity market, starting from regulated prices, through partial regulation until entire elimination of the price regulation. This staged transition is to last until 31 December 2024. Bulgaria understands the need for applying an instrument to support the household customers in order to promote competition, and for this reason the country intends to achieve complete market liberalisation at stages, respectively in compliance with the provisions of Directive 2019/944. As Bulgaria clearly set it intentions for a staged liberalisation of the retail market, this is expected to give a clear signal to the market participants - end suppliers and traders - about the need to take an active stance and be competitive on the market, in order to retain or attract new customers. The gradual liberalisation is expected to incentivize them to be more active on the market and offer a range of services, reflecting more precisely the consumption characteristics of the different groups of customers. Taking into account the benefits of developing a platform for comparing electricity supply offers, freely available to all household customers to allow comparison of market offers, the country introduced amendments to the Energy Act, providing for such an instrument to become operational in early 2021, under NRA administration.

			The process of full liberalisation of the market of electricity for household customers is interrelated with the introduction of a mechanism for protection of the vulnerable electricity consumers, in compliance with Directive 2009/72, as amended by Directive 2019/944 on the internal market for electricity (see s. 1.2). ***Deadline for completion: by 31 December 2024***
4.1	*ME*	*Defining the concept for vulnerable customers and energy poverty, protection of the vulnerable customers*	In its Integrated National plan for Energy and Climate, notified to the European Commission at the beginning of the year, Bulgaria has set targets related with reducing the energy poverty and protection of the vulnerable customers, as well as policies and measured to achieve these targets. The targets set are related with ensuring adequate protection for the energy poor people and applying a mechanism for protection of vulnerable customers upon the launch of the process towards full liberalisation of the electricity prices for the end consumers, including the households. By the transposition of the provisions of Directive 2019/944 in the national laws, Bulgaria is planning to determine criteria for identifying households in a position of energy poverty, taking into account the criteria in the Directive, such as low income, high energy costs as a share of the available income, and low energy efficiency. This shall allow to make an estimation of the number of households in a position of energy poverty, according to Art. 3, para. 3, item d) of Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action, and possibly setting an indicative target to reduce this number. At present Bulgaria is not planning to introduce public interventions. ***Deadline for completion: 31 December 2021***