APSTE
Association for Production, Storage and Trading of Electricity

ENERGY STORAGE IN BULGARIA

EXECUTIVE SUMMARY

2021

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In late June 2021, the Council of the European Union signed on the first **European Climate Law**, setting into legislation the bloc's stated goal of reducing greenhouse emissions by 55% (compared to 1990 levels) by 2030 and reaching climate neutrality in the next 30 years. On July 14, 2021, the European Commission followed up with its Fit for 55 legislative package. The bundle of interconnected legislative proposals aims to align climate, energy and transport policies with the targets agreed in the European Climate Law, translating climate goals into concrete actions.

Against this acceleration of climate change informed policy on the European level, Bulgaria remains on the sidelines, reluctant to commit to a clear path for the green transition within a set timeframe for fear of the impact on its coal industry and to some extent for lack of informed political debate on the issue. This runs counter to the expectations of Bulgarian citizens as shown by a recent extensive research into the ways in which Bulgarian businesses and citizens view the EU's green recovery and climate policy efforts.

In a public opinion poll commissioned by the Sofia office of the European Council on Foreign Relations (ECFR, 2020), **85%** of respondents believe that global warming and its consequences are a problem of paramount importance, while just **3%** are climate change sceptics – 4 percentage points lower than the EU average.

Equipping the economy for a low-carbon future requires an informed debate and bold decisions by politicians, businesses, and citizens alike. This report aims to raise awareness of the state-of-the-art energy storage technologies that exist today and fill an important gap in the debate for the climate neutral transformation of the energy sector in Bulgaria – forward-looking solutions for energy storage and how these can drive the country's decarbonisation while creating businesses and jobs for the economy.

While renewable energy power sources like wind and solar power have gradually gained popularity and economic sense in Bulgaria, their characteristic feature – variable output depending on the momentarily available resource (wind or sunshine) and the resulting challenges to grid management have received disproportionate attention into the public debate, sometimes blatantly used as an excuse for the remarkably unambitious decarbonization targets Bulgaria has set for itself so far.

Energy storage technologies are the obvious answer to increasing the power system flexibility and accommodating an ever-growing share of intermittent RES generation across all sectors. Moreover, most energy storage technologies can be deployed rapidly with high public acceptance, and at any scale and level of the electricity system (generation, transmission, distribution, consumption). As such it can provide both local services (i.e. congestion at distribution level) and system services (capacity, frequency regulation, energy cost minimisation) with unlimited aggregation capability.

> ***By 2030, the global stationary and transportation energy storage markets are estimated to grow by 2.5–4 terawatt-hours (TWh) annually, approximately three to five times the current 800-gigawatt-hour (GWh) market*** [1]**.** (U.S. Department of Energy, 2020)

Energy storage is also a strong enabler of sector coupling, linking the electricity sector to the heating and cooling sector, as well as to transport. Roughly 80% of heating demand in Bulgaria is currently met by fossil fuels, sometimes with detrimental effects to air quality, especially in urban areas, so the electrification of heating via storage is a very effective way to decarbonise the heating sector.

The interface between energy storage and mobility is a very promising area, too. Vehicle to grid (V2G) technologies could facilitate the faster rollout of electric vehicles (EVs), helping to replace the aging fossil-fuelled vehicle fleet in Bulgaria and simultaneously solving the air pollutions issues in many cities. Looking forward, V2G deployed at scale can also be used to optimise RES generation and consumption and enable active consumers (including at residential and community level) to participate fully in electricity markets.

In Bulgaria too, utilities and independent power producers, grid operators, households or business and community consumers can all benefit from the different applications of energy storage technologies provided that adequate policy and market rules are set soon to allow different viable business cases to emerge.

[1] U.S. Department of Energy, 2020, "Energy Storage Grand Challenge: Energy Storage Market Report", 2020, NREL/TP-5400-78461, DOE/GO-102020-5497, Available at: https://www.energy.gov/sites/default/files/2020/12/f81/Energy%20Storage%20Market%20Report%202020_0.pdf

On the energy generation side, **utilities and RES producers** which have grid balancing responsibilities can strongly benefit from coupling energy storage with RES generation assets to smooth the production curve, lower imbalance charges and even profit from energy shifting to peak demand times.

The sonnenCommunity (see detailed case study in report) in Germany offers an excellent **case study** of how 10 000 small-scale customers with battery storage, solar PV generation or both can b—e aggregated into a virtual power plant that is able to deliver frequency regulation services to the grid.

If reforms in the regulatory framework in Bulgaria recognize the value of fast-reacting storage facilities and additional revenue streams can be stacked, like provision of ancillary services to the grid. This will help spur private investments in storage facilities while also having an overall beneficial effect on the electricity system as a whole.

Grid operators, both at the **transmission and distribution level**, can use storage to solve local grid congestion, reduce technical losses for electricity transportation, defer or altogether replace grid expansion investments, increase network capacity, and maintain lines without reducing security of supply. In remote areas where there is no electricity grid or where power line infrastructure is becoming prohibitively expensive to maintain (remote areas with few customers), micro and mini-grids, integrating RES systems with storage can provide reliable power supply, even in harsh ambient conditions.
Energy storage can also assume the role that gas turbines traditionally play in providing capacity, reserves and peaking power, which is particularly suiting in the case of Bulgaria where o lot of thermal power capacities will have to be retired over the next decade.

On the consumption side, **energy citizens and communities, as well as industrial clients** alike could also benefit from the capabilities of storage in demand-side management.

Bulgaria is yet to introduce the Clean Energy package concept of energy prosumers and communities, and this presents an opportunity to introduce policy measures that incentivise prosumers to invest in storage in order to increase their self-consumption, in turn allowing them, for example, to avoid low feed-in prices, and/or to reduce grid costs and related surcharges.

Yet, Bulgaria-based companies are already involved in the development of smart grids around the world as illustrated by the case studies in the report and so well placed to expand the local market fast if the policy and regulatory framework evolves to offer higher climate ambitions and clear path to the economy decarbonisation.

- **Innovation drives new business, but policy must still lead.**

A survey carried out by APSTE among 32 energy professionals and key stakeholders in the energy storage market development in Bulgaria showed that the existing regulatory framework and power market set-up is almost unanimously considered inadequate for incentivising the development of innovative business models for widespread integration of energy storage technologies.

Market signals and policy to support the development of storage in Bulgaria are currently severely lacking, is the conclusion of the survey respondents. The regulatory framework is still highly complex.

Patchy updates of regulations have been made to at least transpose the definition energy storage from Article 2 of the Electricity Directive, but a comprehensive legal framework designed to support its development is still lacking. Perceptions are that the outdated market regulations limit the current energy storage market in Bulgaria mostly to off-grid coupling with RES self-consumption systems.

Taking a cue from successful policy measures in support of energy storage in other EU markets as outlined in a report by Solar Power Europe (Solar Power Europe, 2020) and insights from interviews with stakeholders in Bulgaria, we hope to draw the attention of **policy makers and regulators** to several policy recommendations to help develop the Bulgarian market to its true potential.

First and foremost, **eliminating market and regulatory barriers** (e.g. discriminatory rules) for modern energy storage technologies to participate in the wholesale energy market, the balancing energy market or ancillary services provision and capacity mechanisms, is the faster and most efficient way to drive the development of the storage market in the country.

Uptake of energy storage systems in the **residential & small commercial sectors**, for example can be additionally incentivised by:

- **direct financial incentives for end consumers**

The fastest and most direct way to support the deployment of residential storage involves cash subsidies based on the kWh of the storage system.

The measure could very well complement and combine with incentives to install a RES system for self-consumption. Customers are incentivised to add a storage system (usually a battery energy storage system - BESS) through a lump-sum payment or a voucher that reduces the upfront cost of the installation for the end user. This boosts self-consumption shares for households/offices and improves grid stability in areas with a high penetration of distributed RES systems.

- **tax depreciation for storage installations**

Storage can also be incentivised through a depreciation mechanism in a citizen's yearly income or corporate tax statement. This approach minimises administrative work for the government and the ESS owner because no separate grant application system is required. At the same time, the indirect impact through tax alleviations might lower consumer visibility of the grant (and, therefore, might be less effective than direct subsidies).

- **tax, fees exemptions to prosumers**

These may include exemptions from charges, fees and taxes on the self-consumed electricity. Such measures encourage prosumers to maximise their self-consumption ratio and thereby incentivise investment into storage.

- **integrated building renovations and efficiency standards**

Bulgaria can offer grants to private and commercial customers to carry out integrated renovations to decarbonise buildings. Such measures should be implemented along minimum efficiency standards for buildings to drive the upgrade of buildings with low energy performance. Alongside energy efficiency improvements and the deployment of on-site renewables, BESS technologies are cost-effective solutions that deliver high energy efficiency and increase self-consumption rates of the RES systems.

Increasing the scale, **incentivising storage to support grid flexibility**, both on distribution and transmission level calls for:

- **hybrid renewable energy plus storage auctions**

Thanks to the complementarity of their profiles, hybrid renewable systems comprised of various renewable technologies plus BESS provide a solution to grid issues by increasing security of supply and lowering system costs. With hybrid renewable systems, electricity can be dispatched to better match the load profile and thus respond more efficiently to electricity consumption needs.

- **auctions for grid services by storage systems**

Understanding the revenues of a storage project over its lifecycle is vital to encourage investment, which is why long-term auctions for grid services procurement could be a win-win solution to encourage new development of storage market while increasing grid flexibility at an affordable price.
Frequency response, for example, is a key market for energy storage as one of the few technologies capable of reacting at the close-to real time speed required.

For this regime to be applicable in Bulgaria, however, the grid code must be revised to allow such services to be provided by storage facilities other than hydro-pumped storage. As **Luis Munuera**, energy technology analyst at the International Energy Agency, explains:

> ***One of the advantages of batteries is that they only take a few months to build, compared with several years for pumped storage. They are also very flexible in the sense that you can install them on the grid or next to a solar or wind farm.***

Simply put, climate urgency pushes for a quicker energy transition and modern energy storage solutions are integral for Bulgaria to be able to speed up the pace significantly without compromising its energy security.

Financial support for speeding up the energy transition is increasingly available too, for example, from the European Investment Bank (EIB) and the EU Innovation Fund. In addition to EIB loans, there will also be grants available under the EU Innovation Fund, which is one of the world's largest funds for low-carbon technologies. For the period 2020-2030, the Fund may amount to about EUR 10 billion and more, depending on the carbon price. Bulgaria and Bulgarian companies will also have the opportunity to finance climate and energy transition related projects under the EU funds available under the multiannual financial framework (MFF) for 2021-2027 and the Next Generation EU (NGEU) recovery instrument.
Moreover, the European Commission has set up a EUR 17.5 billion Just Transition Fund to mitigate the social impacts in coal regions such as Bulgaria's Stara Zagora. The Fund - and its sister schemes under the Just Transition Mechanism, in combination with the right national and private funds - are a huge opportunity to shift to a durable, climate-neutral economy.

Meanwhile, keeping reliance on coal for power generation is becoming so expensive that it defies economic logic.

> ***None of the Bulgarian hard coal or lignite plants are likely to have operating costs in 2021 that are lower than adding new utility-scale solar PV or onshore wind, assuming European Emissions Trading Scheme (ETS) permits average EUR 50/tonne of CO2 in 2021,*** notes a detailed cost analysis published by IRENA in June 2021.

The analysis also shows that replacing 3.7 GW of uncompetitive coal power plants with renewable energy, including additional integration costs of USD 5/MWh, will actually result in USD 700,000 savings per year for Bulgaria. (IRENA, 2021).

Against this backdrop, it is highly unlikely that the current ***missing*** policy, which limits the energy storage development to small-scale off-grid applications, can be sustained. The European Union is accelerating its green and digital transition, shifting focus from strategy to delivery. The ***Fit for 55 package*** which was officially announced on July 14, 2021, will lead to overhauling of climate and energy legislation, in line with the new target to reduce emissions by at least 55% by 2030. At minimum, Bulgaria will have a new, more ambitious NECP in just two years from now. If Bulgaria finally steps in line with the EU and commits to a higher level of ambition in order to deliver on the bloc's EU Green Deal and the 2030 and 2050 decarbonisation targets, the prospects for the storage solutions market development could change rather quickly.

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In a low-carbon policy driven scenario for the energy market development in Bulgaria, APSTE projects that **4,650 MW of new PV capacity and 2,350 MW of onshore wind, along with 1,750 MW of energy storage capacity could be easily deployed by 2030.** The RES share in the country's total installed capacity will grow to 58%.

On average, 2-5 jobs are created per 1 MW in the engineering and installation phase of a PV/wind power system plus storage and 1-2 more permanent jobs per MW are created in the O&M phase. Indirectly, the sector development will support 5-6 jobs in the local services sector in the legal and financial services, environmental consultations as well as various local crafts and nature-based business that could profit from improved local economy and environment at the RES power plant site.

If we take this policy driven growth scenario of close to 7 GW new RES plus 1,750 MW of energy storage systems by 2030, **over 100,000 renewable energy/storage jobs will be created in Bulgaria in just a decade**.

As profound and historic as these changes may look today, they will be dwarfed by the changes anticipated over the next decades to 2050, both in how we generate electricity and how we

manage the grid and the demand side. The ongoing transition of the energy sector from fossil fuels to renewable generation will continue regardless of any headwinds encountered from current policy or economic downturns, and the deployment of energy storage systems will accelerate with it.

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