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ARMENIA ENERGY STORAGE PROGRAM: LEGAL AND REGULATORY REVIEW AND ROADMAP FOR REFORMS

FINAL REPORT

PREPARED BY:
ARMENIA RENEWABLE RESOURCES AND ENERGY EFFICIENCY FUND

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ABSTRACT

As the share of variable renewable energy generation increases, Armenia might need to install battery storage systems to ensure the reliable and smooth operation of its power system. The Government of Armenia is looking to launch an energy storage program leading to the development of the first pilot storage projects in the country. Building on the results of an earlier report that analyzed the economic and financial viability of battery storage solutions in Armenia, this report focuses on assessing the country's legal and regulatory framework to identify challenges to the deployment of energy storage and recommend options for necessary reforms that are tailored to the various possible energy storage business models.

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ACRONYMS

ANPP - Armenian Nuclear Power Plant
BESS - Battery Energy Storage Systems
BSP - Balancing Service Provider
BM - Balancing Market
BPP – Balancing Power Plant /the Plant providing a secondary and tertiary reserve for the purpose of balancing and frequency regulation/
CCGT - Combined Cycle Power Plant
CPP- Competitive Power Plants
DAM - Day Ahead Market
DCM - Direct Contract Market
Dstr - Distributor
ETNR - Electricity Market Transmission Network Rules
GoA – Government of Armenia
MTAI – Ministry of Territorial Administration and Infrastructures
MO - Market Operator
PSRC - Public Services Regulatory Commission
PPPP-Public-Private Partnership Plants
PPG – Power Purchase Guaranty
RPP- Regulated Power Plants /except for PPPP plants, REPP plants and Balancing Service Provider/
RA - Republic of Armenia
RE - Renewable Energy
REPP - Renewable Energy Power Plants / power plants using renewable energy resources with a capacity of up to 30 MW, which have a guarantee for the purchase of electric energy defined by the Law, except for PPPP plants /
SO - System Operator
TSO - Transmission System Operator
TP- Trading Participant
Tmtr- Transmitter
VRE - Variable Renewables
WEM - Wholesale Electricity Market

BRIEF SUMMARY

The objective of the present report is to assess Armenia's legal and regulatory framework for energy storage and provide recommendations for reforms that would be needed to successfully implement energy storage projects in Armenia. The report also provides recommendations on amendments to the draft Law On Electricity (May 16, 2023) and draft Law On Renewable Energy and Energy Efficiency (May 31, 2023) that were developed by USAID and submitted to the Ministry of Territorial Administration and Infrastructure (MTAI) for consideration.

This reports builds on the findings of the study named "Armenia Energy Storage Program: Energy Modeling and Economic/Financial Analyses" (conducted by EKC and concluded in March 2023), which analyzed the economic and financial viability of battery storage solutions to ensure the reliable and smooth operation of Armenia's power system in the context of an increasing share of variable renewable energy sources in the grid. The economic and financial analysis study considered four business model options: (i) investor-owned storage with pure market remuneration (IOPMR), (ii) investor-owned storage with support scheme based on capacity payments (IOCM), (iii) TSO ownership (TSO), and (iv) investor-owned hybrid solution of energy storage and VRE plant (IOHS). Different revenue sources were also considered: (i) energy arbitrage, (ii) balancing reserve provision, (iii) balancing energy provision, and (iv) capacity payment. The economic analysis indicated that the implementation of a 30MW/120 MWh battery storage system with the IOPMR model would provide significant benefits to Armenia's society. Other models were not found to be economically attractive if Armenia is closely integrated with its neighboring power grids. However, these findings are indicative, and it is advisable to enable experimentation and piloting of different business models.

Building on the results of the economic and financial analysis, this report found that several reforms should be adopted to address different issues related to the various energy storage business models. For the IOPMR and IOCM models, key recommended reforms include the definition of the activity of electricity storage in the legislation, the creation of licensing or notification requirements, and the development of environmental impact and safety and security regulations. In addition to this, the IOCM model requires the definition of capacity payments and transparent and non-discriminatory access rules for the capacity market. In the TSO model (where the asset is developed and operated by the TSO) and the IOHS model (where the asset is essentially equivalent to an electricity generation asset), the only regulations to be developed are related to the need to evaluate the project from the environmental point of view, as well as to establish standards for the design, installation, operation, and maintenance of battery storage systems.

To implement these reforms, changes in the relevant legal acts will be necessary, as outlined in Gap Analysis table (section 4.2). In addition, it will be necessary to make amendments to the secondary legislation to make the regulator's and the government's decisions compliant with the requirements of the amended laws, as well as to adopt new normative legal acts necessary for the implementation of the amended laws.

EXECUTIVE SUMMARY

OBJECTIVE

The objective of the assignment is to assess the legal and regulatory framework, incentives, and obstacles from the perspective of different technological energy storage options in Armenia and business models feasible in the local energy market context. The analysis also aims to identify what reforms would be needed to realize energy storage projects in Armenia, including how projects must be remunerated. This study stems from the acknowledgment that to enable pilot investments in battery energy storage, Armenia must develop in a timely manner a sound legal and regulatory framework that establishes how battery storage projects can be designed, built, and operated.

The assignment consists of two tasks:

(i) Legal and Regulatory Framework Analysis and
(ii) Legal and Regulatory Framework Reforms' Roadmap.

The conclusions of the "Energy Modeling and Economic/Financial Analyses" report prepared by the consulting firm EKC were a critical factor in shaping the purpose and outcome of this research[1]. The study was conducted in 2022-2023. The main objective of this study was to further analyze the requirements of the electricity system to ensure its reliable and smooth operation with integration of large-scale variable renewable energy sources (VRES). The Study analyzed the economic and financial viability of potential battery storage variants and identified an optimal battery storage use case. Within the analysis conducted by EKC, four different business model options have been considered:

- **Investor-owned storage with pure market remuneration (IOPMR)** – in this model, battery storage is considered a commercial asset, owned and operated by the investor, who aims to operate the storage in a manner to maximize the revenues from the wholesale, ancillary services, and balancing energy markets. In this business model, battery storage competes with other portfolios like power plants and exports/imports.
- **Investor-owned storage with support scheme based on capacity payments (IOCM)** – in addition to the above-described model (investor-owned storage with pure market remuneration), here the energy storage obtains an additional revenue stream in the form of capacity payment based on the available capacity which contributes to either solving adequacy issue or shortage of balancing reserve. This model was assessed in the case that adequacy issues are detected within baseline analysis of the power system and electricity market operation in Armenia without new storage projects. It should be noted here that according to the EKC research only scenario without a new nuclear unit in 2040 brings a lot of adequacy risks to the system which could be a situation in which some state aid could be needed.
- **TSO ownership (TSO)** - energy storage should be generally considered a competitive business in the electricity market, similar to power plants. However, in the absence of commercial investments or where energy storage is used outside the wholesale market and is deployed for network services only, there is an option for TSO/Transmitter ownership. Hence, the storage project in this model will be treated as a network asset, constructed, owned, and operated by the System Operator/Transmitter. It is also worth noting that the launch of this model will affect the tariff. Thus, according to the conclusion of the EKC, tariff impact in all three scenarios (referent RES[2], high RES[3], no new nuclear unit in 2040) results in tariff increases between 0,09 $/MWh and 0,75 $/MWh in the analysed period.
- **Investor-owned hybrid solution of energy storage and VRE plant (IOHS)** - co-locating energy storage with wind/solar power plant provides an option for the owner to maximize revenues from both technologies by enabling minimization of the excess energy spilt (i.e. VRE curtailment) through energy storage charging, as well as maximization of the revenue generation through the energy shifting to the hours with the higher prices (i.e. storage charging in off-peak hours and discharging in peak hours). It should also be noted that according to the EKC, financial indicators for this (hypothetical) model show that it is financially unprofitable for the owner of a solar PV plant to build a battery storage system and it is not financially viable to invest in these battery storages.

In that context, different remuneration possibilities were explored and quantified:

[1] EKC. Energy Modeling and Economic/Financial Analyses, Final Report (March 2023).
[2] Scenario based on expected development of the Armenian power system till 2040 determined in the latest least-cost development plan
[3] Scenario based on Referent with assumed faster VRES (solar and wind capacity) development

- **Energy arbitrage revenues** – represents the revenues that can be generated by energy storage operation on the wholesale market. This means that the energy storage purchases electricity when the price is low and produces electricity when the price is high. If the spread between the buying and the selling price is sufficient to cover the marginal cost of operation and the conversion losses, an additional margin can be generated from the wholesale market participation.
- **Balancing reserve provision revenues** – represents the revenues gained from the provision of the reserve-related ancillary services. The simulation of energy storage dispatch on the wholesale market analyzes opportunities for balancing reserve provision. Having in mind the current practice of power system operation and power regulation strategies in Armenia, the study assumed that only secondary reserve (aFRR) would be procured within Armenia.
- **Revenues from balancing energy provision** – represents the difference between revenues obtained from balancing energy provision (dominantly upward direction) and costs from balancing energy provision (downward direction) in the Balancing Market of WEM.
- **Capacity payment** – if the capacity mechanism is in place and the energy storage is included in this form of state aid, additional financial revenues can be generated for the energy storage owner. The Economic and Financial viability of the application of the capacity mechanism in Armenia was assessed by the EKC, according to which, it is obvious that analyzed battery storage variants (30MW/120MWh and 100 MW/400MWh) do not have an important role in solving the adequacy risks in the more interconnected operation of the Armenian power system (case A)[4] and in this case, any state support cannot be considered as justified. On the other side, the role of battery storage related to adequacy risks is more important in almost isolated system operation (case B)[5] of the Armenian system, but in this case, both battery storage variants have good economic and financial results, and support from State is not needed.[6]

The economic analysis indicated that the implementation of a 30MW/120 MWh battery storage system with an Investor-owned storage model and pure market remuneration would provide significant benefits to the Republic of Armenia and its society, making it economically viable for the national economy. In this model, the battery storage system is considered a commercial asset owned and operated by investors who aim to maximize their revenue from the wholesale, ancillary services, and balancing energy markets. Other models were not found to be economically attractive if Armenia is closely integrated with its neighboring power grids. However, these findings are indicative, and it is advisable to enable experimentation and piloting of different business models. This way, market forces can identify optimal business models and technical specifications to meet the needs of the Armenian power network.

Building on the findings of the economic and financial analysis, this study assesses the legal and regulatory framework, incentives, and obstacles related to the proposed battery storage system and business models. The objective is to develop a roadmap for the Government of Armenia to create legal and regulatory frameworks for different types of battery storage investment.

In parallel with the development of this report, draft law On Electricity (May 16, 2023) and draft law On Renewable Energy and Energy Efficiency (May 31, 2023) were developed by USAID, which were submitted for consideration by MTAI. Therefore, within the framework of this task, the mentioned drafts were also studied from the point of view of the objectives of this assignment, and in this report, clear recommendations are presented to be taken into account in these drafts.

SUMMARY OF FINDINGS

The legal framework of the electricity sector in the Republic of Armenia needs to be reviewed to facilitate the implementation of battery storage projects. The reforms should be aimed to address the following key issues provided for each business model separately:

Investor-owned storage with pure market remuneration (IOPMR):

- Definition of electricity storage activity in the legislation;
- Licensing (or notification) requirements for large-scale electricity storage facilities;
- Environmental impact and classification of electricity storage activity in terms of environmental impact;
- Safety and Security Standards/Regulation of lithium-ion battery storage systems design, installation; operation, and maintenance;

[4] Case A: Exchanges with Georgia with realization of only one phases of the AM-GE B2B project (350 MW) and hourly optimized export to Iran with predetermined annual total export of 1.2 TWh based on “Electricity for gas” program with Iran

[5] Case B: No interconnection with Georgia and export to Iran simulated with predetermined hourly profiles.

[6] Energy Modeling and Economic/Financial Analyses, Final Report (January 2023)

- The classification and status of companies engaged in electricity storage as participants in the wholesale electricity market;
- The rights and responsibilities of companies involved in electricity storage, both as licensed entities and participants in the wholesale electricity market.

Investor-owned storage with support scheme based on capacity payments (IOCM): all the above-mentioned obstacles are also present for the implementation of this model. Apart from the above issues, it will be necessary to define the transparent and non-discriminatory access of the capacity mechanism for those participants of the wholesale market whose technical capabilities allow to provide such a service in accordance with the network rules. In addition, defining Capacity Payment will be necessary to implement the Capacity Mechanism.

TSO ownership (TSO): the storage project in this model will be treated as a network asset, constructed, owned, and operated by a network operator/transmitter and designated for network services only. Essentially, in the case of this model, there is no change or expansion of the operator's/transmitter's activity, there is no new type of activity in the sense of the RA Law "On Energy", there is no new WEM participant in the sense of the Market Rules, which means that the above-mentioned obstacles to the operation of this model do not exist, except for the need to evaluate the activity from the environmental point of view, as well as the existence of standards for the design, installation, operation, and maintenance of lithium-ion battery storage systems.

Investor-owned hybrid solution of energy storage and VRE plant (IOHS): from a legal point of view, this model can be considered as electricity generation and essentially, like the TSO model there is no new type of activity in the sense of the RA Law "On Energy" and no new participant of the WEM in the sense of the Market Rules, which means that the above-mentioned obstacles do not exist for the implementation of this model, except for the need to evaluate the activity from the environmental point of view, as well as the presence of standards for the design, installation, operation, and maintenance of lithium-ion battery storage systems.

To implement these reforms, changes in relevant legal acts will be necessary, as outlined in Gap Analysis table (section 4.2). In addition to that it will be necessary to make amendments to the secondary legislation to bring the PSRC/GoA decisions into compliance with the requirements of the amended laws, as well as to adopt new normative legal acts necessary for the implementation of the amended laws.

The findings of this research highlight the need for reforms in the legal and regulatory framework of the electric energy field in the Republic of Armenia. These reforms are crucial to ensure the successful implementation of large-scale energy storage projects and the realization of their monetized benefits for society and the national economy.

1 PROJECT BACKGROUND

Armenia is rapidly scaling up variable renewable power generation. The first utility-scale solar project in Armenia (with a PPA price of US$ 4.2c/kWh) reached its financial close in March 2021. The second competitive bidding for five additional solar power projects is completed (the Ministry of Territorial Administration signed the relevant agreement with the Abu Dhabi-based clean energy group Masdar in November 2021). The government is preparing a similar program for wind power. In parallel, the government promotes private investments into small industrial-scale solar power plants (from 1 to 5 MW) and solar net-metering by private households and small or medium-sized enterprises (SMEs). In total, the government is planning to have 1,000 MW of solar power commissioned by 2030 and 500 MW of wind by 2040, compared to a current peak load of around 1,300 MW. As of the writing of this report, a total of 435 MW of solar power has been installed.

A recent World Bank study (Feb 2021) estimates that the increase in variable renewable energy (VRE) generation will lead to higher balancing reserve needs and higher balancing costs (with additional costs of supply reaching up to 7.6 $/MWh at 1,500 MW of VRE penetration and limited regional integration). Significant shares of VRE generation will be curtailed unless balancing services can be provided from regional interconnections. The World Bank has agreed to help the Government of Armenia assess energy storage options in Armenia and develop a roadmap for public support for the legal and institutional capacities and realizing energy storage projects in Armenia. With the Bank's help, the Government of Armenia will have access to all necessary information and materials to decide whether and how to move ahead with an energy storage pilot project in the power sector. The World Bank has the analytical foundations in place for a lending operation to support energy storage development in Armenia if the government decides to do so. The outcome will have concrete and actionable options that the Government of Armenia, the World Bank, and other stakeholders can use as the basis for legal and regulatory reforms and a support measure for public investment program development. The proposed analysis with specific legal and regulatory assessment and policy analyses will be a measure within the first phase of the Bank's support. It will describe the institutional prospects and legal and regulatory catalyzers of energy storage business models' benefits from the power system perspective.

The project aims to analyze the existing legal and regulatory framework related to energy storage projects in Armenia and identify any gaps or barriers that may hinder the development of such projects. The project will provide the necessary information to understand the legal and regulatory environment and prepare a clear understanding of the necessary reforms needed to realize energy storage projects in Armenia as well as to scale up renewable energy generation, develop regional energy markets, and increase grid connectivity. Energy storage has the potential to help to overcome the intermittent nature of renewable energy sources and enable their integration into the grid. To enable pilot investments in battery energy storage, Armenia must develop in a timely manner a sound legal and regulatory framework that establishes how battery storage projects can be designed, built, and operated.

2 METHODOLOGY

The proposed methodology for evaluating the existing regulatory framework for energy storage technology in Armenia involves conducting a comprehensive two-phase analysis.

Phase 1: Legal Framework Identification and Classification
In the first phase, a desktop exercise was carried out to identify and analyze the relevant legal rules and regulations, and to classify them based on hierarchy and their relevance and impact on the development of energy storage technology in Armenia. This involved:

- Conducting a comprehensive review of all relevant legal and regulatory documents, including national and international documents.
- Classifying the legal rules and regulations into different categories by hierarchy: Laws, Decrees of Government and PSRC decrees.
- Identifying the agencies responsible for implementing and enforcing the legal rules and regulations.

Phase 2: Functionality and Barrier Analysis
In the second phase, the focus was shifted from the legal rules and regulations to understanding what barriers exist to the development of energy storage technology in Armenia. This involved:

- Conducting in-depth research on the actual functioning of the legal rules and regulations and identifying any gaps or inconsistencies that may hinder the development of energy storage technology in Armenia.
- Conducting a barrier analysis to identify the key factors limiting the development of energy storage technology in Armenia.

The results of this two-phase analysis are presented in the section below and were used to develop recommendations and a roadmap for improving the existing regulatory framework and promoting the development of energy storage technology in Armenia.

3 INSTITUTIONAL FRAMEWORK

Below is presented the RA institutional framework in the energy sector, which includes RA state bodies, companies, and foundations.

The authorized body of the RA government in the energy sector is the RA Ministry of Territorial Administration and Infrastructures (MTAI), which implements the state policy in the energy sector.
State regulation in the field of public services is carried out through RA PSRC, the autonomous body operating based on Article 122 of the RA Constitution. According to Part 1 of Article 5.1 of the RA Law "On Energy", the commission directly implements the state policy in the field of energy within its mandate, and also supports the state regulation of the energy field. The commission's functions are presented in detail in Annex 2. The tasks of the PSRC are the creation of appropriate regulation mechanisms in the regulated areas of public services and the implementation of measures aimed at ensuring them.

Another important player in the field of energy of the Republic of Armenia is the "Settlement Center" CJSC, the purpose of which was to register electric energy and power in the wholesale electricity market and perform financial calculations. In accordance with the plan for the liberalization of the electricity market approved by the RA government, the PSRC, by its decision, made changes to the company's license, according to which the company organizes the operation of the wholesale electricity market, as well as other powers assigned to the market operator. "High Voltage Electric Networks" CJSC is a 100% state-owned company. The company is separate from the System operator and is the owner of the transmission network. The company is responsible for the construction, reconstruction, and maintenance of the transmission network. The System Operator is responsible for the operational management of the power system. The electric power system operator is prohibited from engaging in other licensable activities in the field of energy, with the exception of electric energy (power) transmission activities in the presence of a corresponding license.

"Armenian Nuclear Power Plant" CJSC and "Yerevan TPP" CJSC are 100 percent state-owned companies that generate electricity under a generation license. "Yerevan TPP" CJSC is the sole balancing service provider of WEM.

Armenia Renewable Resources and Energy Efficiency Fund is a Government Founded Organization actively involved in policy development, supporting new renewable energy ventures, implementing credit and grant programs, enhancing national energy security, and reviewing legal and regulatory aspects of the renewable energy sector in Armenia.

State organizations of the RA energy sector and their project-related functions are summarized below.

Table 1. Electricity-Related Functions of State Organizations

Organisation	Project-Related Functions
State Bodies	
MTAI on behalf of the Government of Armenia	The authorized body of the RA government in the field of energy directly implements the state policy in the field of energy within its competence, and also supports the state regulation of the field of energy.
PSRC	Among other functions, it performs: - Defines electric energy tariffs; - Provides licenses in the field of energy; - Approves the rules of the electricity market; - Defines the mandatory conditions or samples of contracts concluded between energy licensees.
State-Owned Companies	
"Power System Operator" CJSC (System Operator)	Among other functions, it performs: - Short-term planning and regulation in the power system; - Operational management of the electric power system;

Organisation	Project-Related Functions
	- Planning of electricity transmission network development.
“Settlement Center” CJSC (Market Operator)	Among other functions, it performs: - Organization of electricity market activity; - Registration of electricity market participants; - Recordkeeping of contracts concluded between participants of the wholesale electricity market, contracts providing for the import or export of electric energy (capacity).
“High Voltage Electric Networks” CJSC	Among other functions, it performs: - RA electrical energy (power) transmission; - Transmission network maintenance and operation; - Expansion and development of transmission network.
"Armenian Nuclear Power Plant" CJSC	Among other functions, it performs: - Electricity /power/ production; - Export of produced electricity/capacity belonging to the company.
“Yerevan TPP» CJSC	Among other functions, it performs: - Production, delivery, and sale of electric energy; - Production, transportation, and sale of thermal energy; - Provides the service of BSP in the WEM (refer to table 2).
State-owned Funds	
Armenia Renewable Resources and Energy Efficiency Fund (R2E2)	Among other functions, it performs: - Participation in the development of renewable energy policy; - Support for the creation of new productions and the organization of services promoting the development of renewable energy; - Organization of implementation of credit and grant programs in the field of renewable energy; - Implementation of other measures to increase national energy security; - Responsible for the legal and regulatory review and development of a roadmap for reforms within the Armenia Energy Storage Program.

More details on the functions of state organizations are provided in Annex 2.

4 LEGAL FRAMEWORK ANALYSIS

4.1 FINDINGS OF LEGAL FRAMEWORK ANALYSIS

4.1.1. Storage Definition in Laws

The definition of storage in primary legislation of the electricity sector has a large impact on policies and barriers for storage in a given state. A definition of storage as a specific class of actors in the electricity sector can ensure they are treated specifically in the regulatory framework. Market access rules may otherwise discriminate against storage, as they were created for producers, traders/suppliers, and (large) consumers. Also, in the absence of specific consideration for electricity storage, it can be treated as both consumer and producer of electricity and thus may have to pay double grid tariffs, taxes, or fees. This negatively affects the business case of storage and may lead to a situation where the economic benefits of storage to the system are not utilized. If no definition of energy storage does exist, in order to address double grid charges or taxation grid tariffs, taxes or fee provisions need then to be adapted for each case, which complexifies regulation and can result in the provisions not being technologically neutral. Moreover, all in all, a specific definition of storage in national law could increase investment security and therefore support the deployment of energy systems.[7]

In the Belgian electricity law of the 13th of July 2017, for example, electricity storage is defined as "any process whereby, through the same installation, electricity is withdrawn from the grid for the purpose to be completely re-injected into the system later on, subject to efficiently losses." In Poland, in May 2021 the bill amendments to change the definition of storage were adapted to "conversion of the electricity, received from the electricity grid and/or generated by the generation unit connected to such electricity grid and cooperating with such grid, to another form of energy, storage of such energy and subsequent conversion thereof to electricity and injection to the grid." The Spanish legislation defines owners of storage facilities as natural or legal entities that own facilities in which the final use of electricity is deferred to a time after it was generated, or that carry out the conversion of electrical energy in a type of energy that can be stored for subsequent reconversion into electric energy. In the Czech energy law, pumped hydro storage is not considered as storage but as a specific form of power generation. Finland defines electricity storage only concerning electricity and fuel taxes. Germany has in June 2020 provided a dedicated definition of energy storage. Ireland has recently defined energy storage in Irish legislation under statutory instrument no. 76 of 2022. Greece has defined hybrid installations where storage is a necessary part. The Italy regulator has defined storage in the context of integration in the electricity system in its regulatory decision 574/2014/R/eel: "A storage system is a set of devices able to absorb and release electric energy, foreseen to work continuously in parallel to the grid or able to modify the energy exchange with the electricity grid. The storage system may or may not be integrated with a generating plant. Systems that enter into function only in emergency conditions such as during a blackout are not considered to be a storage system."[8]

The best practice concerning the definition of storage is to address it in the primary legislation of the energy sector, in a technology-neutral (which includes BESS and plants where electricity is transformed into another form of energy) approach. There is also wide consensus globally on the classification of utility-scale battery storage assets as power grid infrastructure rather than generation assets, given the wide range of ancillary services they can provide to the power grid. The regulatory frameworks of Belgium, France, and Hungary include a definition of electricity storage in the primary legislation of the electricity sector. However, these require the re-conversion of the energy into electricity, while the French definition explicitly includes 4 technologies, namely pumped hydro, power-to-gas, batteries, and flywheels. Moreover, the definition does not necessarily eliminate barriers to storage in other policy categories.[9]

In Armenia, the relations between the RA state bodies, entities carrying out activities in the field of energy in accordance with the law, and consumers of electricity, thermal energy, and natural gas are regulated by the Law on Energy N148 dated 07.03.2001. The law does yet specifically refer to the activity of electricity storage and does not give any status (licensed entity or market participant) to entities engaged in this activity. Chapter 5 of the Law regulates the types of activities subject to licensing in the field of energy, conditions for obtaining a license and other conditions related to licenses and licensed entities, but this chapter does not address the activity of electricity storage and relations with entities engaged in this activity. Chapter 5.1 of the Law, among other issues related to the electricity market, also defines the market participants, among whom there are also no entities engaged in electricity storage activity.

[7] EnTEC – Study on Energy Storage (2023).
[8] EnTEC – Study on Energy Storage (March 2023).
[9] Study on Energy Storage – Contribution to the security of electricity supply in Europe (March 2020)

Armenia's Law on Renewable Energy and Energy Efficiency N122 dated 09.11.2004 regulates the relations between the RA state governing and local self-government bodies, legal entities, and individuals when carrying out activities in the field of energy efficiency and renewable energy. The law lacks comprehensive provisions for storage plants, fails to address important aspects related to their operation, and is limited to the definition of "Power Plant". In particular, the term "Power Plant" used in the law is defined as follows: "*equipment or a complex of interconnected equipment and structures designed for energy production, transformation, transmission, storage, distribution and consumption.*"

The draft law On Electricity produced by USAID (May 16, 2023) does not define the terms "storage plant" and/or "electricity storage" and does not give any status to the electricity storage activity (activity subject to licensing or notification), nor does it give the status of market participants to the persons engaged in the activity of electricity storage. An exception is pumped storage hydropower plant, which is considered a generating plant according to the definition of Electricity Facilities, which is defined as follows: "*electricity installations (generating plants including pumped storage hydropower plants), transmission and distribution overhead and cable lines, transformer substations, and power poles (including high-voltage transmission towers)), electric accumulators (batteries), and other facilities of electrical significance."*

The draft law On Renewable Energy and Energy Efficiency produced by USAID (May 31, 2023) defined the term "Storage Plant" as follows: "*Storage plant means a power facility where the final use of electricity is delayed from the moment of its generation to be used later, or where electricity is transformed into another form of energy that is stored and then transformed into electricity or used as another energy carrier.*" Thus, it can be concluded that the above definition is technology-neutral and includes both battery systems and other types of storage.

4.1.2. Permits

Permitting Regulation can be specific to storage facilities, depending on their technical characteristic and impact on the environment (including soil), safety, fire hazards, public health, and/or landscape. Usually, when there are no specific rules, storage is falling under the standard permitting framework. The lack of specific rules is *a priori* not considered as a main barrier to development of storage but could in some cases slow down the permitting process, moreover issues may result from the inadequacy of the standard legal framework for storage projects and/or the lack of enabling specific provisions for storage. For large storage facilities, a license to be issued by the national energy ministry according to the electricity legislative framework can be required. In the Netherlands for instance, the absence of a comprehensive national permitting regulation that also covers energy storage results in local authorities having the possibility to impose very strict conditions on storage units. This leads to diverging rules depending on the location, and uncertainty for potential investors in storage assets. For some other EU Member States, the lengthy permitting process with different concerned administrations becomes a critical aspect in developing storage projects.[10]

Legal acts establishing permits in Armenia do not address the activity of electricity storage. Organizations operating in the field of energy, among other permits, must also obtain the following permits in accordance with the procedure and in the cases established by RA legislation:

- License for relevant activities in the field of energy
- Positive conclusion of the environmental impact assessment of the project detailed design
- Positive conclusion of the technical examination of the project detailed design and construction permit

The types of activities subject to licensing and relations related to licensing are regulated by the RA Law on Licensing N193 dated 30.05.2001. In particular, the law specifies that in the field of energy, the production of electrical energy (including combined production of electrical and thermal energy), transmission, distribution, supply of electrical energy (including guaranteed), and wholesale trade are subject to licensing, however, there is no reference to electricity storage activity.

Public relations in the field of state expertise of environmental impact assessments (including cross-border environmental impact assessments) in RA are regulated by the Law on Environmental Impact Assessment N110 dated 21.06.2014. The law defines the types of activities in the field of energy that are subject to environmental impact assessment and expertise. However, there is no reference to electricity storage activity.

[10] Study on Energy Storage – Contribution to the security of electricity supply in Europe (March 2020)

In the Republic of Armenia, relations related to the issuance of permits and other documents for the purpose of construction of residential, public, and industrial facilities and their complexes are regulated in accordance with the order approved by the Government of the Republic of Armenia Resolution No. 596 dated 19.03.2015 (Order). According to the Order, energy and engineering transport infrastructures, buildings and structures are objects of high-risk level (category IV out of 5 categories), the design documents of which are subject to complex state expertise. For construction objects of risk category II and higher, it is necessary to obtain a construction permit in accordance with the approved procedure. Therefore, according to the Order, storage facilities are objects of risk category IV and are subject to complex state expertise, after which it is necessary to apply for a construction permit. At the same time, the primary objective of the expertise is to ensure compliance of the project with the normative-technical documents in force in the Republic of Armenia. However, in the absence of specific normative-technical documents governing the design, installation, operation, and maintenance of BESS, conducting such expertise becomes impractical and merely a formal requirement which may cause safety, environmental and security issues (refer to section 4.1.3. below).

Considering the abovementioned, the permitting process should be reviewed and optimized, promoting efficient coordination among all relevant administrative bodies. The timeframe for the process should be reasonable and not unduly prolonged, while facilitating timely and meaningful public input. In cases where the storage project's features do not align with existing permitting regulations, regulatory bodies may be inclined to establish their own rules, potentially increasing the complexity of the permitting process.

4.1.3. Safety and Security Standards

Mandatory compliance with standards related to safety and security (e.g., fire protection), has an impact on the economics and technical feasibility of storage and can hence act as a barrier to specific storage types, in particular batteries. Although the manufacturing industry is responsible for the production of storage components, the safety of the consumers is to be ensured by the installation companies. Safety and security standards are needed, but they should be based on the real risks and avoid jeopardizing storage uptake.

The European Union (EU) has developed a set of standards for stationary battery energy storage systems (BESS) to ensure their safe and efficient operation. These standards cover various aspects of BESS, including design, installation, operation, and maintenance. One of the key standards for BESS is the EN 50600 series, which provides guidelines for data centers and other information and communication technology (ICT) facilities. Part 2 of this series, EN 50600-2-2, specifically addresses energy storage systems, including BESS.

Other relevant standards for BESS in the EU include:

- EN 62485-3: This standard provides requirements and recommendations for the safety of secondary batteries and battery installations, including BESS.
- EN 50549-1: This standard covers the safety requirements for lithium-ion battery systems used in stationary applications, including BESS.
- EN 50657: This standard provides guidelines for the installation and operation of stationary energy storage systems.
- EN 50600-4-2: This standard covers the environmental requirements for ICT facilities, including BESS.
- EN 61000-6-4: This standard covers the electromagnetic compatibility requirements for industrial environments, including BESS.

Mandatory rules for the design, implementation, and operation of urban planning objects, buildings, and constructions in Armenia are defined by the system of urban planning normative-technical documents. In Armenia, no normative-technical document regulates BESS's design, installation, operation, and maintenance.

4.1.4. Wholesale Electricity Market (WEM) Barriers

Market barriers for storage can be separated between barriers to entry and barriers to participation. Barriers to entry comprise for instance market rules not defining storage or excessive pre-qualification requirements (such as minimum nominal capacity), and barriers to participation comprise for example inappropriate market design parameters (for example a minimum bid size for several MWs). Specific market design may exhibit only barriers to entry or only to participation, with the similar end result of hindering the deployment of storage. Moreover, besides market barriers specifically affecting storage, other barriers such as market power of incumbents may affect all potential market entrants, including storage. Market barriers related to energy markets and capacity mechanisms

affect not only stand-alone storage but also hybrid cases where storage is aggregated with other resources such as other storage facilities, renewable energy generation, and/or demand response.

In the US, in 2018 FERC issued order No. 841 to remove barriers for the participation of storage in capacity, energy, and ancillary service markets operated by Regional Transmission Organizations (RTO) and Independent System Operators (ISO) (TRO/ISO markets). The order determines that RTOs and ISOs must define market rules that (1) ensure storage is eligible to provide all capacity, energy, and ancillary services that it is technically capable of providing in the RTO/ISO markets; (2) ensure that storage can be dispatched and can set the wholesale market clearing price as both a seller and buyer consistent with existing market rules; (3) account for physical and operational characteristics of electric storage resources through bidding parameters or other means; and (4) establish a minimum size requirement for market participation in the RTO/ISO markets that does not exceed 100 kW.[11] Following the requirements of the FERC order No. 841 PJM (an RTO serving a large portion of the eastern United States) implemented market rules allowing energy storage resources to participate in its capacity markets. Storage resources were eligible to bid as both buyers and sellers, offering services such as frequency regulation, capacity, and energy. PJM also developed a method to account for the unique operational characteristics of energy storage in its market.[12] California ISO (CAISO) implemented market rules to enable the participation of energy storage resources in its markets. They established bidding parameters and market mechanisms to facilitate the dispatch and pricing of energy storage resources. CAISO also established a minimum size requirement for storage participation, which did not exceed 100 kW.[13]

In Armenia, wholesale electricity market rules were approved by the PSRC Decision N 516 on 25.12.2019 in accordance with the law on Energy. The WEM rules regulate the structure of the wholesale electricity market, the principles of operation, the procedure for registering a participant of the wholesale electricity market, the rules for trading, the rules for submission of bids, the rules for the import and export of electricity, the procedure for the operation of direct contracts, day-ahead, and balancing markets, the procedures for the provision and payment of electric energy, capacity, system services, requirements for data storage and transparency in the WEM, the rules and procedures aimed at increasing the efficiency of WEM's work, as well as other rules necessary for the organization of WEM, its normal and effective operation.

The WEM rules do not in any way regard the entities engaged in the activity of electricity storage and do not give them any status (WEM participant, WEM trade participant). Therefore, in order to obtain the opportunity to purchase electricity in the WEM, the electricity storage company (Investor-owned storage) in the current structure of the WEM must act as a generator in order to build a plant, produce electricity (power) and acquire the right to sell or export it in the wholesale market according to the market rules. It should be noted that the generation license allows to purchase electricity in the WEM only in cases when the generator is unable to fulfill his contractual obligations or to satisfy his own needs with the electricity of his own generation, so the storage in the WEM must also act as a supplier in order to be able to buy electrical energy (capacity) in the wholesale market in the cases and according to the rules of the market.

Moreover, today's WEM model (refer to Annex 1) of Armenia provides that the secondary and tertiary reserve service for balancing and frequency regulation purposes is provided by only one company Yerevan CCGT-1 which is the BSP (Balancing Service Provider). Secondary and tertiary reserves for balancing and frequency regulation purposes, are provided by BPP (Balancing Power Plant) plants that are not WEM participants. BSP does not have the right to trade electricity in WEM components other than the Balancing Market. BSP can also import electricity. Under the current structure of the WEM, a storage plant (Investor-owned storage) can receive the status of BPP, being included in the balancing group of the BSP, and provide only a secondary reserve, or receive the status of market trade participant (as producer and supplier) and carry out electricity trading in the DCM and DAM components of the WEM.

It is necessary to refer to the TSO model separately, because the system operator is not a market trading participant and in the case of building a storage plant as a fully integrated network component[14] and using it in order to more effectively perform its functions defined by the law and the market rules, there will be no need to make changes in the market rules because in this case from the point of view of market rules, a new market participant and a new activities do not emerge. Here it is necessary to take into account the specificity of the RA, in that the transmission

[11] Study on Energy Storage – Contribution to the security of electricity supply in Europe (March 2020)
[12] https://www.pcienergysolutions.com/2021/08/23/ferc-841-and-energy-storage-integration-in-wholesale-power-markets-pjm-part-3/
[13] https://www.pcienergysolutions.com/2021/08/16/ferc-841-and-energy-storage-integration-in-wholesale-power-markets-caiso-part-2/#:~:text=in%20Order%20No.-,841.,participation%20would%20negatively%20impact%20competition.
[14] means network component that is integrated in the transmission system and that is used for the sole purpose of ensuring a secure and reliable operation of the transmission system and not for balancing or congestion management.

network is the property of the Transmitter and the right to build (reconstruct) the transmission network (according to Article 36, Part 1 of the Law of the Republic of Armenia "On Energy") also belongs to the Transmitter, which is a 100% state-owned closed joint stock company. Therefore, in the case of this model, the storage plant as an element of the transmission network should be built by the Transmitter and will serve the purpose of implementing network services more efficiently.

Article 35 (Dispatch and Balancing) of the draft law On Electricity produced by USAID (May 16, 2023) stipulates:

- *To cover electricity losses and ensure the necessary level of reserve capacity in the transmission network, the transmission network operator shall procure electricity in the wholesale market under transparent, nondiscriminatory, and competitive procedure.*
- *The rules and the price for providing the balancing service shall be transparent, objective, and nondiscriminatory and shall reflect the costs of the transmission network operator. The rules for the provision of the balancing service shall be based on the methodology for defining the balancing service provision conditions that has been approved by the commission.*
- *The balancing service shall be provided in the most economically efficient way by giving appropriate incentives for market participants to balance their input and offtakes. The balancing service shall be provided in a fair and nondiscriminatory manner and shall be based on objective criteria.*

Article 49 (Access to Electricity Networks and Access Fee) of the draft law On Electricity produced by USAID (May 16, 2023) stipulates:

- *The nondiscriminatory access of customers and producers to electricity networks shall be provided for by the connection procedure defined in the network codes, this law, technical regulations, and normative legal acts.*
- *For the connection of consumption systems and power plants to electricity networks, the customers, producers, and autonomous power producers shall pay a connection fee, which shall be calculated by network operators based on the methodology defined by the commission.*

Article 41 (building, owning, or operating of storage plants) of the draft law On Renewable Energy and Energy Efficiency produced by USAID (May 31, 2023) stipulates: The transmission network operator shall not have the right to:

- *Reject connection of a new storage plant on the basis that there will be potential limitations of the transmission network capacity in the future, including congestion in the farthest parts of the transmission network. The transmission network operator shall ensure provision of the required information to access the transmission network; and*
- *Reject new connection point on the basis that this will lead to additional costs related to the necessary expansion of capacity of the network elements in the immediate vicinity of the connection point.*

Articles 49, 41, and 35 of the draft ensure a non-discriminatory and transparent opportunity to connect to the network and procure balancing services, but the latter does not specify in which case and in case of meeting what criteria the participants of the wholesale market will be eligible to provide a balancing service.

4.1.5. Capacity Mechanism

Capacity mechanisms are measures taken in support of medium- and long-term electricity supply security. Capacity mechanisms enable power plants to be available for generating electricity when needed. In exchange, the mechanisms provide payments to these power plants. Capacity mechanisms can be implemented by a state if there are adequacy concerns demonstrated by a resource adequacy assessment and the state commits to implementing market reforms to eliminate distortions. In case capacity mechanisms are in place, they can represent an additional revenue stream for storage.

The recast EU Electricity Regulation article 22 states that any capacity mechanism shall be open to the participation of all resources that are capable\ of providing the required technical performance, including energy storage and demand side management. Furthermore, paragraph 343 of the new Guidelines on State aid for climate, environmental protection and energy 2022 requires that the aid measures [(for the security of electricity supply, including capacity mechanisms]) should be open to all beneficiaries or projects technically capable of contributing efficiently to the achievement of the security of supply objective. This includes generation, storage, and demand response, as well as the aggregation of small units of these forms of capacity into larger blocks. But besides formally allowing the participation of storage, the technical rules of the capacity mechanism also matter. The minimum eligible capacity, impossibility for aggregation and the minimum bid size can represent entry barriers. For example,

in Finland, the minimum bid size is 10 MW, whereas in Sweden and Germany the minimum bid size is 5 MW. In Germany, aggregation is not allowed, and thus storage units lower than 5 MW cannot participate.[15]

RA legislation on electric energy does not contain provisions on Capacity Mechanism, so the use of Capacity Mechanism is not regulated in RA. In order to effectively implement the Capacity Mechanism, it will be necessary to make appropriate changes in the primary legislative and secondary legislative acts. In particular, it will be necessary to define the transparent and non-discriminatory access of the capacity mechanism for those participants of the wholesale market whose technical capabilities allow to provide such a service in accordance with the network rules. In addition, it will be necessary to make changes arising from the above provision in the secondary legislation, in particular, in the rules of the WEM.
Apart from the above issues, defining Capacity Payment will be necessary to implement the Capacity Mechanism.

4.1.6. Double application of grid tariffs for storage units

This topic addresses grid charges that are applied to users of transmission and distribution networks. Usually, end-users pay grid charges based on the amount of electricity taken off from the grid (€/MWh), and/or based on their connection capacity or peak capacity taken off from the grid (€/MWh). Generators pay in some EU countries also grid charges depending on their injection volumes and/or capacity. Energy storage can physically be considered as both producer and consumer, and therefore both type of grid charges (double grid charges) apply in several EU Member States where storage is not specified in the regulatory framework, notwithstanding the potential contribution of storage to avoiding or reducing network congestion and investments. This is considered a distortion and a major barrier to the development of storage. However, for some grid operators, network tariffs should cover and reflect the actual use of the network. As a result, storage must pay the off-taking tariff when it takes off energy from the network, as any other consumer site does, and pay the injection tariff when it injects, as any other production site does. Any policy-related levies (such as for supporting renewable energy) recovered through the network tariff component are similarly detrimental.

Storage installations benefit in some EU Member States of grid charges exemptions, or specific tariff rules. These exemptions can be specific per technology, application, or grid service. Due to the variety of storage technologies, potential applications, and services, a case-by-case exemption regime can be complex and difficult to apply in practice. Exemption regimes for storage can apply to transmission or distribution charges only or to both, with some differentiation. Storage can specifically be addressed in the grid tariff regulation via two approaches: either by incentivizing specific storage technologies to support their uptake or by eliminating distorting practices (e.g., double grid charging) and reflecting in the tariff setting the potential benefits of storage to the network. In the second case, the approach should be the same for all types of storage, independently of the technology, application, or service.[16]

Eight EU Member States apply injection charges for pumped hydro and/or other storage facilities, although partial exemptions apply for two of those Member States (Belgium and France), Twelve EU Member States apply withdrawal charges for pumped hydro and/or other storage facilities. There are five EU Member States that explicitly exempt all storage providers from transmission tariffs (Italy, Lithuania, Latvia, Poland, Slovenia) and several others where it is not fully clear yet as the rules are not explicitly stated for certain network users, often because such network users (e.g., battery storage providers) did not exist yet. Regarding the withdrawal charges for the distribution grid, six EU Member States apply withdrawal charges to Pumped hydroelectric energy storage facilities. Moreover, eight EU Member States apply withdrawal charges to other facilities (e.g., batteries) and all EU Member States apply withdrawal charges to other network users (e.g., prosumers).[17]

In Armenia, end-users pay grid charges on the bases of the amount of electricity taken off from the grid (AMD/MWh). Grid charge includes the amounts to be paid to the WEM service providers, like System Operator, Market Operator, Distributor, and/or Transmitter in accordance with the tariffs set by PSRC. The tariffs are calculated in accordance with the tariff calculation methodology (tariff methodology) approved by the PSRC (decision 520 of 29.11.2022[18]) which defines the procedure for calculating the tariffs of licensed entities subject to tariff regulation in the electricity system. It is also worth noting that the launch of the TSO model will affect the tariff. Thus, according to the conclusion of EKC[19], tariff impact results in tariff increases between 0,09 $/MWh and 0,75 $/MWh in the analysed period.

[16] Study on Energy Storage – Contribution to the security of electricity supply in Europe (March 2020)
[17] EnTEC – Study on Energy Storage (March 2023)
[18] https://www.arlis.am/DocumentView.aspx?DocID=173597
[19] EKC. Energy Modeling and Economic/Financial Analyses, Final Report (January 2023).

Armenia does not apply injection charges for generators and thus the problem of double application of grid tariffs does not exist in RA.

4.1.7. Double Application of Taxes

Similarly, to the double charging of network tariffs, storage plants that are directly connected to the grid, may be considered as both producer (injection) and consumer (offtake). If storage is considered an energy consumer for taxation purposes, energy offtake by storage will constitute a taxable event. Subsequently, the discharge energy will be taxed once again when finally consumed by the end-user. This situation, called double taxation, has a negative impact on investment and use of storage.

In several EU Member States, double taxation occurs. This practice leads to a double burden on temporarily stored electric energy, as the final consumer of stored electricity has also to pay network charges, taxes, and levies on the same electricity volumes. Some EU Member States apply specific exemption or reduction regimes for storage, which can take different forms (exemption under certain conditions like coupling with a renewable energy production facility, technology, or size specific, ….). Such exemptions or reductions have in several EU Member States been implemented for pumped hydro storage. In some EU Member States, exemptions apply for electricity that is generated with a renewable unit or CHP (Combined Heat and Power) and then self-consumed, or for electricity which is fed into the grid to participate in the balancing market. In some EU Member States, levies and taxes apply to all electricity consumed irrespective if that energy comes from the grid or from an own production or storage facility behind-the-meter. Such a framework disincentivizes both local production and storage. In some EU Member States, as storage is not properly defined in the national legislation, the rules applicable regarding levies and surcharges are not clearly defined and remain vague and subject to diverging interpretation. A few national authorities are providing tax discounts (on taxable income) for purchasing energy storage equipment, particularly batteries.[20]

In the Netherlands energy storage facilities with a large-scale consumption connection are exempted from paying taxes per January 1st, 2022. Furthermore, several EU Member States had already addressed double taxation for front-of-the meter storage. For example, Finland already eliminated electricity taxation for large batteries before and further exemptions for pumped storage and smaller batteries are foreseen. Germany and Luxembourg also already had several exemptions in place for storage providers to address double taxation. And in Sweden, the possibility to refund consumption taxes paid by the storage providers already existed.[21]

In Armenia, organizations registered as VAT payers are required to pay VAT, which is calculated at a rate of 20% of the tax base. When it comes to electricity supply, the value of the supplied electricity in monetary terms, without VAT, is considered the basis for VAT taxation. Like the grid charge, the end-user pays VAT on the bases of the amount of electricity taken off from the grid (AMD/MWh) when it comes to VAT. Although in this case, discharged energy will be taxed at two points (once when energy is off taken by storage and once again when finally consumed by the end-user) the problem of double taxation does not arise, because energy storage company will reduce the VAT to be paid to the state budget by the amount of VAT already paid when energy was off taken, in accordance with the Tax Code of the Republic of Armenia. In the case of all the business models described in this report, the VAT legislation will be similar and the issue of double taxation will not arise.

[20] Study on Energy Storage – Contribution to the security of electricity supply in Europe (March 2020)
[21] EnTEC – Study on Energy Storage (March 2023)

4.2 GAP ANALYSIS BETWEEN THE REGULATION IN ARMENIA AND THE REQUIRED LEGAL AND REGULATORY CONDITIONS

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
RA laws					
RA Tax Code (TC)[22] (N165 of 04.10.2016)	The Tax Code regulates the relations related to the taxes applied in the Republic of Armenia and the fees stipulated by the Code, defines the principles of the tax system of the Republic of Armenia, the concepts of tax and fee, types, the range of taxpayers, tax rates, tax calculation, payment, and in the cases defined by the Code, tax obligations, charging order and terms, as well as tax incentives.	**State bodies:** State Revenue Committee	According to the RA TC (Article 8), there are general and special taxation systems in the Republic of Armenia. Within the general system of taxation, organizations are taxed, in particular, by VAT and (or) profit tax. **VAT** Organizations registered as VAT payers must pay VAT, *which is calculated at the rate of 20% of the tax base (their value of supplied electricity in monetary terms, without VAT).* **Profit Tax** *Profit Tax is calculated at the rate of 18% in relation to the tax base (the positive difference between the gross income and deductions defined by RA TC).*	***NO***	***N/A***

[22] https://www.arlis.am/DocumentView.aspx?DocID=172748

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
Law on Energy[23] (N148 of 07.03.2001)	The law regulates the relations between the RA state bodies, entities carrying out activities in the field of energy in accordance with this law, and consumers of electricity, thermal energy, and natural gas. The purpose of the law is to define the principles of the state policy in the RA energy sector and the mechanisms for their implementation.	**State bodies:** MTAI PSRC **Organizations:** "Power System Operator" CJSC "Settlement Center" CJSC (Market Operator) "High Voltage Electric Networks" CJSC "Electric Networks of Armenia" CJSC	*The law does not in any way address the activity of electricity storage and does not give any status (licensed entity or market participant) to entities engaged in this activity.* Chapter 5 of the Law regulates the types of activities subject to licensing in the field of energy, conditions for obtaining a license and other conditions related to licenses and licensed entities, but this chapter does not address the activity of electricity storage and relations with entities engaged in this activity. Chapter 5.1 of the Law, among other issues related to the electricity market, also defines the market participants, among whom there is also no entities engaged in electricity storage activity.	***YES***	Define the activity of electricity storage as a type of activity subject to licensing (or notification) in the field of energy. Define the rights and responsibilities of entities engaged in energy storage activity. Grant the non-discriminatory electricity market participant status to entities engaged in energy storage activity. To ensure non-discriminatory and transparent dispatching, access to balancing services, and to the grid. To ensure that storage can be dispatched and can set the wholesale market clearing price as both a seller and buyer consistent with existing market rules; To ensure storage is eligible to provide all capacity, energy, and ancillary services that it is
Law on Renewable Energy and	The law regulates the relations between the RA state governing and local self-	**State bodies:** MTAI	The law addresses the activity of electricity storage.	***YES***	

[23] https://www.arlis.am/DocumentView.aspx?DocID=162237

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
Energy Efficiency[24] (N122 of 09.11.2004)	government bodies, legal entities, and individuals when carrying out activities in the field of energy efficiency and renewable energy. The purpose of the law is to define the principles of the state policy for the implementation of energy efficiency and the development of renewable energy and the mechanisms for their implementation, aimed at: - Strengthening the economic and energy independence of RA. - Increasing the degree of reliability of the economic and energy security and energy system of the Republic of Armenia. - Creation of new productions and organization of services promoting energy efficiency	PSRC **Organizations:** “Power System Operator” CJSC “Settlement Center” CJSC (Market Operator) “High Voltage Electric Networks” CJSC “Electric Networks of Armenia” CJSC Armenia Renewable Resources and Energy Efficiency Fund “Armenian National Interests Fund” CJSC	For example, the term "Power Plant" used in the law is defined as follows: *equipment or a complex of interconnected equipments and structures designed for energy production, transformation, transmission, **storage**, distribution, and consumption.* *Therefore, the regulations related to the power plant of the law also apply to electricity storage systems.*		technically capable of providing in the WEM.

[24] https://www.arlis.am/DocumentView.aspx?DocID=162218

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
	and development of renewable energy; - reduction of man-made impact on the environment and human health.				
Law on State Technical Supervision in the Field of Energy and Energy Consumption[25] (N36 of 14.12.2004)	The law` a) Regulates the relations related to the organization and conducting of technical inspections at power plants, as well as at the entities engaged in the operation and maintenance of consumption energy networks, b) Defines the powers of entities and consumers carrying out activities in the field of energy, as well as the authorized body carrying out state technical control in the field of energy and energy production.	**State bodies:** Urban Development, Technical Standards, and Fire Safety Inspectorate	The operation of the law extends to the entities and consumers who carry out activities in the field of energy of the Republic of Armenia. The operation of the law also extends to the activity of electricity storage.	***NO***	***N/A***

[25] https://www.arlis.am/DocumentView.aspx?DocID=158716

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
Law on Licensing[26] (N193 of 30.05.2001)	The law defines the types of activities subject to licensing and regulates relations related to licensing. The objectives of licensing to engage in certain types of activity are: 1) Consumer rights protection; 2) Contributing to the regulation of developing market relations; 3) Increasing the quality of goods and services; 4) Implementation of control over those engaged in the types of activities fraught with the threat to life, health, property, interests of the state and society, protection of nature, cultural heritage; 5) Implementation of control over the activities of licensed	**State bodies:** PSRC	The law does not address the activity of electricity storage. In particular, the law specifies that in the field of energy, the production of electrical energy (including combined production of electrical and thermal energy), transmission, distribution, supply of electrical energy (including guaranteed), and wholesale trade are subject to licensing, however, there is no reference to electricity storage activity.	***YES***	Define the activity of electricity storage as an activity subject to licensing in the field of energy in compliance with the requirements of the amended laws (as provided above).

[26] https://www.arlis.am/DocumentView.aspx?DocID=169860

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
	entities in order to ensure the fulfillment of the international obligations assumed by the Republic of Armenia in the field of ensuring international security.				
Law on Environmental Impact Assessment [27] (N110 of 21.06.2014)	The law regulates public relations in the field of state expertise of environmental impact assessments (including cross-border environmental impact assessments) in RA. The purpose of the assessment is to predict, prevent, reduce or exclude possible harmful effects on the environment and human health as a result of the implementation of activities.	**State bodies:** Ministry of Environment Environmental Protection and Mining Inspection Body	The law defines the types of activities in the field of energy that are subject to environmental impact assessment and expertise, however, there is no reference to electricity storage activity.	***YES***	Classify the activity according to the appropriate category, taking into account the impact of the activity on the environment. When classifying, it is necessary to take into account the technology, power, and the area occupied by the plant.
On Public-Private Partnership[28]	The law establishes the legal framework for public-private partnership (PPP) regulation, including rules and	**State bodies:** Ministry of Economy	The law was adopted on 28.06.20192, but there were a number of omissions in the law that hindered the full operation of the	***NO***	***N/A***

[27] https://www.arlis.am/DocumentView.aspx?DocID=178468
[28] https://www.arlis.am/DocumentView.aspx?DocID=154385

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
(N113 of 28.06.2019)	procedures related to the development and implementation of PPP projects, the institutional framework for governance, applicable criteria, the private partner selection procedure, and other PPP-related matters.		system, causing certain risks in the phases of PPP projects selection and preparation, their approval, private partner selection, and project management. Taking into account the above, on June 30, 2021, the law providing for amendments to the Law was adopted, which essentially addresses the above issues.		
RA Government Decisions					
On approving the strategic Program for the development of the RA energy sector (until 2040), the program-schedule ensuring the implementation of the strategic Program for the development of the RA energy	With the decision, the RA government approves the strategic Program for the development of the energy sector of the Republic of Armenia (until 2040) and the plan-schedule ensuring the implementation of the strategic Program for the development of the energy sector (until 2040).	**State bodies:** MTAI PSRC	The Programs outlines the government's objectives for the country's energy sector. It aims to significantly increase solar energy production by constructing solar plants with a capacity of around 1000 MW, including autonomous ones. The programs recognize the potential of energy storage systems in conjunction with renewable energy plants to compete with traditional power generation sources. This highlights the relevance of energy storage activity as it can enhance the efficiency and	***NO***	***N/A***

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
sector (until 2040) and revoking a number of decisions of the RA government[29] (N48 of 14.01.2021)			reliability of renewable energy integration. Furthermore, the development of wind farms is included in the program, with a focus on constructing significant wind plants with a capacity of up to 500 MW. The implementation of these projects, including potential public-private partnerships, is contingent upon competitive electricity prices. Energy storage systems can play a crucial role in mitigating the intermittent nature of wind power and improving grid stability. In summary, the Programs recognize the importance of energy storage activities within its broader goals of expanding renewable energy generation, reducing dependence on imported fossil fuels, and improving the reliability and security of the country's energy systems.		
About the Program of the RA government [30] (N1363 of 18.08.2021)	The decision approves the RA government's five-year program.	**State bodies:** MTAI		***NO***	***N/A***

[29] https://www.arlis.am/DocumentView.aspx?DocID=172693
[30] https://www.arlis.am/DocumentView.aspx?docID=155313

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
On approving the Energy Saving and Renewable Energy 2022-2030 Programme, the Program-Schedule for the Implementation of the First Phase of the Energy Efficiency and Renewable Energy 2022-2030 Program (2022-2024)[31] (N 398 of 24.03.2022)	With the decision the RA government approves the Energy Efficiency and Renewable Energy 2022-2030 Program and the Program-Schedule for the Implementation of the First Phase of the Energy Efficiency and Renewable Energy 2022-2030 Program (2022-2024).	**State bodies:** MTAI PSRC **Organizations:** Armenia Renewable Resources and Energy Efficiency Fund "Armenian National Interests Fund" CJSC	The Program prioritizes the further development of renewable energy over the next decade. The program highlights the potential of renewable energy, particularly solar energy, and emphasizes the importance of energy storage battery systems to enhance the security and reliability of the country's energy system. The program aims to develop business models for constructing energy storage battery systems, with a focus on public-private partnerships. Two potential models include combining a large solar plant with an energy storage battery system on the same site or constructing separate energy storage battery systems. The program also highlights the intention to study grid energy storage battery systems, taking into account international experience and best practices.	***NO***	***N/A***
On Approving the Public - Private Partnership	With the decision the RA government approves the PPP procedure, the	**State bodies:**	- The Decision approved PPP procedure;	***NO***	***N/A***

[31] https://www.e-gov.am/gov-decrees/item/37978/

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
procedure, the procedure for creation and management of the database on Public-Private Partnership projects, the sectors of public services provided within Public-Private Partnership projects, the Public-Private Partnership Subdivision, and determining the form and submission term of the report on the implementation of the Public-Private Partnership project and revoking the decision N1241 of September 20,	procedure for creation and management of the database on PPP projects, the sectors of public services provided within PPP projects, the PPP Subdivision, and determines the form and submission term of the report on the implementation of the PPP project.	Structural division of the Ministry of Economy of the Republic of Armenia	- *Health, education, **energy**, water management, transport infrastructure, solid waste collection, treatment and disposal, postal infrastructure and services, issuance of biometric passports, and electronic identification system are defined as sectors of PPP implementation.* - The structural division of the Ministry of Economy of the Republic of Armenia is defined as a unit of public-private partnership. It is noteworthy that the PPP procedure and other procedures approved by this decision have been devised based on the successful implementation of the construction projects at the "Ayg-1" and "Masrik-1" solar plants. This has ensured that the procedures take into account the practical experience gained from these projects.		

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
2012 of the Government of Armenia.[32] (N1183 of 28.07.2022)					
On approving the procedure on the application of the tariff privilege (in particular privilege of exemption from customs duties) on the import of technological equipment (their constituent and complementary parts, raw materials, and (or) materials) imported within the framework of the investment project in the priority sector and	With the decision, the RA government approves the procedure which regulates relations related to the application of the privilege of exemption from customs duties on the import of technological equipment (their constituent and complementary parts, raw materials, and (or) materials) imported within the framework of the investment project in the priority sector by legal entities and individual entrepreneurs registered in the Republic of Armenia.	**State bodies:** Government of Armenia Ministry of Economy	The decision stipulates that the import of technological equipment (their constituent and complementary parts, raw materials, and materials) intended for use exclusively in the territory of the Republic of Armenia within the framework of the investment project implemented in the priority sector is exempted from customs duty, if such technological equipment (their constituent and complementary parts, raw materials and materials) are not produced in the member states of the Eurasian Economic Union, or are produced in insufficient quantities for the implementation of the investment project, or do not meet the technical standards necessary for the implementation of the investment project.	***NO***	***N/A***

[32] https://www.arlis.am/DocumentView.aspx?docid=166779

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
identifying the authorized body.[33] (N1118 of 17.09.2015)			- Priority is given to the following sectors: agriculture, industry, tourism, transport, information (high and information technologies) and communication, ***energy,*** and healthcare.		
PSRC Decisions					
On approving the procedure for licensing activities in the field of energy and revoking a number of decisions [34] (N 374 of 01.11.2013)	The order defines the procedures for issuing a license, extending the validity period, fixing and adjusting the periods, reformulation, suspension, and termination of the license for the implementation of the types of activities subject to licensing in the field of energy.	**State bodies:** PSRC	The decision does not address the activity of electricity storage.	***YES***	Make amendments to bring the PSRC decisions into compliance with the requirements of the amended laws (as provided above).
On approving the methodology for calculating tariffs in the electricity system, the procedure for setting and	The decision approves the methodology for calculating tariffs in the electricity system, the procedure for setting and revising tariffs, including the tariffs for the sale of electric energy	**State bodies:** PSRC	The decision does not address the activity of electricity storage.	***NO***	***N/A***

[33] https://www.arlis.am/DocumentView.aspx?DocID=176024
[34] https://psrc.am/contents/document/6013

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
revising tariffs, making changes and additions to the decisions of the RA PSRC No. 359 of October 23, 2013, No. 275 of June 15, 2007 and revoking a number of decisions of the RA.35 (N 520, of 29.11.2022)	delivered from electric energy generating plants using renewable energy resources in the territory of the Republic of Armenia.				
On approving the trading rules of the RA electricity wholesale market and revoking RA PSRC decision N 344 of August 9, 2017 [36] (N 516 of 25.12.2019)	The WEM rules regulate the structure of the wholesale electricity market, the principles of operation, the procedure for registering a participant of the wholesale electricity market, the rules for trading, the rules for submission of bids, the rules for the import and export of electricity, the procedure for	**State bodies:** PSRC **Organizations:** Power System Operator CJSC “Settlement Center” CJSC (Market Operator)	The WEM rules do not in any way regard the entities engaged in the activity of electricity storage and do not give them any status (WEM participant, WEM trade participant). Sub-clauses 14 and 15 of Clause 2 of the WEM Rules define the terms "WEM Participants" and "WEM Trading Participants" as follows:	***YES***	Define the status of companies engaged in electricity storage as participants in the wholesale electricity market. Define the rights and responsibilities of the companies engaged in the activity of electricity storage as a participant of the wholesale electricity market that will enable the operation of energy storage battery systems as a

[35] https://psrc.am/contents/document/10997
[36] https://psrc.am/contents/document/9646

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
	the operation of direct contracts, day-ahead, and balancing markets, the procedures for the provision and payment of electric energy, capacity, system services, requirements for data storage and transparency in the WEM, the rules and procedures aimed at increasing the efficiency of WEM's work, as well as other rules necessary for the organization of WEM, its normal and effective operation.	"High Voltage Electric Networks" CJSC "Electric Networks of Armenia" CJSC «Yerevan TPP» CJSC	**WEM Participants**: Generator, Guaranteed Supplier, Supplier, Wholesale Licensee, Qualified Consumer, Transmitter, Distributor, System Operator and Market Operator. **WEM Trade Participants**: Generator, Guaranteed Supplier, Supplier, Entity with a Wholesale Trade License, Qualified Consumer, as well as Transmission and Distributor in terms of electricity purchased for own needs and loss compensation.		wholesale trade participant in the electricity market and balancing service provider (including secondary reserve). Make any other amendments to bring the PSRC decisions into compliance with the requirements of the amended laws (as provided above), as well as to adopt new normative legal acts necessary for the implementation of the amended laws.
On approving the RA electricity market transmission network rules and revoking RA PSRC decision No. 161 of May 17, 2017[37]	RA Electricity Market Transmission Network Rules regulate development planning of the electric power system, short-term planning in the electric power system, operational management and regulation of the electric power system, connection of new capacities to the electric power transmission network,	**State bodies:** PSRC **Organizations:** "High Voltage Electric Networks" CJSC	The decision does not address the activity of electricity storage.	***YES***	

[37] https://psrc.am/contents/document/9649

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
(N 522 of 25.12.2019)	requirements for electric energy metering complexes in the electric power system, and procedures aimed at increasing the efficiency of the electric power system.				
On approving the RA electricity market distribution network rules and revoking a number of decisions of the RA PSRC [38] (N 523 of 25.12.2019)	RA Electricity Market Distribution Network Rules regulate development planning of the distribution network, operational management of the distribution network, short-term planning, and regulation in the power system, relations related to the connection of consumption systems and new capacities to the distribution network (their changes), requirements for commercial electricity metering systems in the distribution network, procedures aimed at increasing the efficiency of the distribution network.	**State bodies:** PSRC **Organizations:** "Electric Networks of Armenia" CJSC	The decision does not address the activity of electricity storage.	***YES***	

[38] https://psrc.am/contents/document/8891

Name of the legal act	The Subject of Regulation and the Purpose	Implementing Organizations	Findings	Immediate Need for Amendment/ Reforms (Yes/No)	Recommendations
On defining the model form of the RA electricity wholesale market contract (offer) and revoking a number of decisions of the RA PSRC [39] (N 518 of 25.12.2019)	The decision defines the model form of the RA electricity wholesale market contract (offer).	**State bodies:** PSRC **Organizations:** Power System Operator CJSC “Settlement Center” CJSC (Market Operator) “High Voltage Electric Networks” CJSC “Electric Networks of Armenia” CJSC “Yerevan TPP» CJSC	Terms used in the WEM rules are used in the decision, so in case of making appropriate changes in the WEM rules, they will also apply to this decision.	***NO***	***N/A***

[39] https://psrc.am/contents/document/8868

4.3 COOPERATION IN ENERGY SECTOR

4.3.1. Common energy market of the Eurasian Economic Union

Armenia actively participates in the creation of the Eurasian unified electricity market. It is planned to be put into operation in 2025, according to the action plan approved by the decision of the Eurasian Economic Council No. 31 dated 20.12.2019. According to the mentioned plan, the adoption of five main regulatory documents is also defined, which are:

- Rules of access to interstate transmission services of electric energy (capacity) within the EAEU common electricity market,
- Rules of mutual trade of electricity,
- Rules for determining the capacity of interstate power transmission lines and rules for distribution,
- Information exchange rules,
- Regulation of development of interstate networks.

Currently, the drafts of these documents are developed and are under discussion.

The establishment of the Eurasian unified electricity market presents a significant opportunity to advance energy storage solutions, allowing for more efficient utilization of energy resources across the region. With greater interconnection across the region, energy storage can become an integrated network component, enabling more efficient use of energy resources. In this context, the TSO model of energy storage is an option that could be considered to increase the net transfer capacity. This model offers greater flexibility and increased trade, providing an additional mechanism to balance energy supply and demand while enhancing the stability and security of the grid. With the implementation of the TSO model, energy storage systems can play a vital role in supporting the integration of renewable energy sources into the grid and improving the overall efficiency of the energy market.

4.3.2. EAEU common natural gas market

The common gas market of the Eurasian Economic Union is planned to be launched in 2025. To this end, the concept of the formation of the common gas market and its implementation plan was adopted by the decision No. 7 of the Eurasian Supreme Economic Council of 31.05.2016. An international agreement will be signed between the member countries for the purpose of the full operation of the common market. The following regulatory documents will also be adopted in connection with the full operation of the gas market:

- The procedure for gas exchange trading,
- Unified rules for access to the gas transportation system in member countries,
- Protocol on the completion of complex measures that are prerequisites for ensuring access to the gas transport system in member countries,
- Trading rules in the common gas market,
- Definition of information interaction documents in the information exchange system

4.3.3. EAEU technical regulations

Section X of the Treaty on the Eurasian Economic Union defines the Union's technical regulations and standards, general principles of technical regulation, product circulation, and accreditation processes. The unified list of products for which mandatory requirements must be established was defined by the decision of the Commission of the Customs Union dated January 28, 2011, N 526. And the decision of the Eurasian Economic Council No. 79 of October 1, 2014, approved the program-schedule for adoption of technical regulations and implementation of changes, according to which the processes of development, the adoption, and implementation of changes in technical regulations continue. The drafts of the EAEU technical regulations "On the safety of high-voltage equipment" and "On the transportation of liquid and gaseous hydrocarbons by transmission gas pipelines" are under discussion.

4.3.4. Armenia-EU Comprehensive and Enhanced Partnership Agreement

On November 24, 2017, with the signing of the Comprehensive and Enhanced Partnership Agreement (CEPA) concluded between RA and the European Union and the European Atomic Energy Community and their member states, RA undertook to implement large-scale reforms in the field of energy in order to bring RA's legal framework closer to the European one. In order to implement the provisions of the agreement, the RA Prime Minister's decision N 666-L of June 1, 2019, adopted a road map, which clearly states the dates of implementation and the responsible bodies. The preparatory works (Electricity Market GAP Analysis) in this direction have already been carried out, and the works regarding the corresponding legislative changes are in progress. Cooperation under CEPA covers

such areas as energy policy, energy security, diversity of energy sources, diversification of transmission channels, competitive energy markets, use of renewable energy sources, promotion of energy efficiency and energy saving, regional energy cooperation, scientific and technical cooperation, etc. As a result of approximating the EU directives and regulations, it is planned to align the regulations of the RA energy sector with the European standards, as a result of which the investment environment in the energy sector will become even more attractive, trade in the energy sector with neighboring countries will be promoted, the degree of energy security and diversification will increase. A new incentive toolkit will be introduced for the use of renewable energy sources, as a result of which new players will appear in the market. The degree of nuclear safety will also be increased, including the management and control of radioactive waste and spent fuel issues. New standards of energy efficiency and energy saving will be established, including in the field of energy labeling and eco-design.[40]

In adopting the EU's regulatory framework, the Republic of Armenia can benefit from a solid platform that can be amended with specific regulations if required. In case other neighboring countries continue the same path, the common rules will enable coupling of the markets, including intraday and frequency regulation, which are valuable for storage solutions. It is worth noting that the EU Directive 2019/944 allows for a derogation of the general principle that Transmission System Operators (TSOs) cannot own storage. Instead, storage can be considered an asset that is integrated into the network component, used to improve grid utilization and network security. However, a restriction would apply in such cases whereby storage assets cannot participate in the electricity market.
"According to the Article 54 of EU Directive 2019/944: *Member States may allow transmission systemoperators to own, develop, manage or operate energy storage facilities, where they are fullyintegrated network components and the regulatory authority has granted its approval, or where all of the following conditions are fulfilled:*

- *(a) other parties, following an open, transparent, and non-discriminatory tendering procedure that is subject to review and approval by the regulatory authority, have not been awarded a right to own, develop, manage, or operate such facilities, or could not deliver those services at a reasonable cost and in a timely manner;*
- *(b) such facilities or non-frequency ancillary services are necessary for the transmission systemoperators to fulfill their obligations under this Directive for the efficient, reliable, and secureoperation of the transmission system and they are not used to buy or sell electricity in theelectricity markets; and*
- *(c) the regulatory authority has assessed the necessity of such a derogation, has carried out* an exante *review of the applicability of a tendering procedure, including the conditions of thetendering procedure, and has granted its approval."*

Article 41 of draft law on Renewable Energy and Energy Efficiency produced by USAID (May 31, 2023) also addresses the issue of the operator owning a storage facility, which is essentially a localization of EU Directive 2019/944 requirement and is set out as follows:
"The transmission network operator shall not have the right to build, own or operate storage plant, except for the following cases:

1) *The storage plant is designed exclusively to ensure the reliability and security of the transmission network and will not be used for congestion management, and there is Commission's consent; or*
2) *All the following conditions are in place:*

    (a) *Other market participants defined in the Law on Electricity have not been granted the right to build, own or operate a storage plant in the open, transparent, non-discriminatory, and competitive procedure of the Commission, or third parties have not been able to provide the mentioned services at reasonable price and in proper time;*
    (b) *The storage plant is necessary for the transmission network operator to fulfill its obligations prescribed by this law; and*
    (c) *The Commission has assessed the necessity for building, owning, or operating the storage plant by the transmission network operator, considered the possibility for implementation of its competitive procedure in advance, and permitted building, owning, or operation of the storage plant.*

4.4 REGIONAL ELECTRICITY MARKET INTEGRATION

It is important to note that isolated operations represent a less flexible environment where battery storages become important. In a more isolated operating regime, battery storages are able to show much more potential and be more useful to the system.

[40] The Strategic Program for the Development of the RA Energy Sector (until 2040), Chapter VII
https://www.arlis.am/DocumentView.aspx?DocID=172693

4.4.1. Armenia-Iran Energy Cooperation

The power system of Armenia works in parallel with the power system of the Islamic Republic of Iran, which significantly increases the reliability of the power system of Armenia. Also, the gas pipeline connecting the two countries is an alternative route for natural gas supply. In this sense, Armenia-Iran relations in energy have a strategic nature and will continue to remain so in the long term. Extending the terms of the Armenia-Iran gas-electricity exchange program as much as possible and increasing the volume of exchange on mutually beneficial terms is the guarantee of further deepening of these relations. For this purpose, the projects for the construction of a new 400 kV power transmission line between Armenia and Iran and the Caucasian Energy Network are also being implemented. The operation of new infrastructures will make it possible to increase the export of electricity to at least 5.0 billion kWh within the framework of the gas-electricity exchange program. Electricity exports will reach their maximum volume by the end of 2025.

4.4.2. Armenia-Georgia energy cooperation

The power system of Armenia is also connected with the power system of Georgia and has a strategic importance for Armenia. However, it is subject to various technical restrictions, taking into account the fact that Armenia works synchronous-parallel with Iran and Georgia with Russia. In order to eliminate the existing restrictions, as well as to increase the capacity, the construction project of the Caucasian Energy Network (Armenia-Georgia transmission line/substations) is being implemented, which will allow the energy cooperation of the two countries to give new momentum. Along with the implementation of the above-mentioned infrastructural project, it is planned to develop the agreement on the principles of electricity trade between Armenia and Georgia, which will create prerequisites for the implementation of regular electricity trade between the two countries, relying as much as possible on the requirements of the European Union directives. Relations with Georgia are also important as a natural gas transit country in terms of supplying natural gas from Russia to Armenia.[41]

[41] The Strategic Program for the Development of the RA Energy Sector (until 2040), Chapter VII
https://www.arlis.am/DocumentView.aspx?DocID=172693

5 RECOMMENDATIONS

To address the key legal gaps identified in the legislation of Armenia for promoting large-scale energy storage facilities, the following recommendations are proposed:

5.1 STORAGE DEFINITION IN LAWS

The definition of electricity storage activity should be clearly defined in the legislation of Armenia to provide clarity and certainty for stakeholders. Defining electricity storage in primary legislation of the energy sector in a technology-neutral approach is considered the best practice. This approach allows for flexibility in the deployment of various storage technologies, without favoring or discriminating against specific technologies. While some countries have included a definition of electricity storage in their primary legislation, such as Belgium, France, and Hungary, the implementation of these definitions may still pose challenges. For instance, the regulatory frameworks of Belgium and Hungary require the re-conversion of the energy into electricity, which may limit the deployment of certain storage technologies that are not designed for electricity re-conversion. In contracts, the French definition of electricity storage explicitly includes four technologies, including pumped hydro, power-to-gas, batteries, and flywheels, providing a more comprehensive approach. However, even with a comprehensive definition, there may still be policy barriers that prevent the deployment of storage technologies in other policy categories, such as tax policies, grid codes, and planning regulations.

Therefore, it is important to ensure that the definition of electricity storage in primary legislation is accompanied by supportive policies and regulations that enable the deployment of various storage technologies and remove any unnecessary barriers. The regulatory framework should be designed to encourage the development of storage projects that can provide flexibility and reliability to the energy system while also promoting the adoption of renewable energy sources. Furthermore, the definition of electricity storage should be periodically reviewed and updated to reflect the latest technological advancements and policy developments to ensure that the regulatory framework remains relevant and effective in promoting the deployment of energy storage projects.

In the draft law on Electricity produced by USAID (May 16, 2023) it is proposed to make the following additions:

- To define in the draft all types of activities in the field of electricity presented in part 1 of Article 18, so that it is clear what is meant by electricity production, supply, etc.
- In the draft, define the term *"**Electricity storage**" as follows: "means, in the electricity system, deferring the final use of electricity to a moment later than when it was generated, or the conversion of electrical energy into a form of energy which can be stored, the storing of such energy, and the subsequent reconversion of such energy into electrical energy or use as another energy carrier[42]."*
- Define the term "**Renewable energy generation**" in the draft as follows: *"means energy generation from renewable, non-fossil sources (wind, solar hydro, geothermal, biomass, biogas and other) applicable for the generation of electric and/or thermal energy and **energy storage**."*

In the Article 41 of draft law on Renewable Energy and Energy Efficiency produced by USAID (May 31, 2023) it is proposed to make the following additions: *"In addition to the rights reserved to the producer under Article 26 of the law on Electricity, the storage plant also has the right to **purchase electricity** in the wholesale electricity market."*

As a result of implementing these additions, the licensing (or notification) requirements for Electricity Storage activity will be clear, which will be the same as for Renewable Energy Generators. The priorities defined by the draft law related to renewable energy generation will apply to storage plants, for example, Article 35, part 3 states: *"When carrying out the dispatch, the transmission network operator shall give priority to the electricity generation plants using renewable energy resources, provided that this priority does not jeopardize the security of the electricity system, as well as will not violate the nondiscrimination and transparency principles. The transmission system operator may also give priority to combined-cycle generation plants."* In addition to that by making proposed additions in Article 41 of the draft law on Renewable Energy and Energy Efficiency the storage plants will be able to purchase electricity in the wholesale electricity market (for storage and resale) which is not allowed to producers.

5.2 PERMITS

While the lack of specific permitting rules for energy storage projects may not necessarily be considered a primary barrier for the development of large-scale energy storage activity, it can slow down the permitting process and create uncertainty for developers. In the absence of a comprehensive national permitting regulation that specifically addresses energy storage projects, state authorities may impose very strict conditions on storage units, leading to

[42] As defined in point 59 of Article 2 of Directive (EU) 2019/944

delays and increased costs for developers. This can also create uncertainty and make it difficult for developers to accurately forecast project timelines and budgets.

Considering the above mentioned, it is highly recommended to initiate amendments to key legal documents, such as the Law on Energy, Law on Licensing, and the PSRC Decision N 374 of 01.11.2013. These amendments should aim to address the identified gaps and facilitate the development of large-scale energy storage facilities in the country.

To this end, it is recommended that the activity of electricity storage be defined as a type of activity subject to licensing (or notification) in the field of energy. This will provide clear regulatory oversight and promote a level playing field for market participants. Additionally, the rights and responsibilities of entities with a license for electricity storage activities should be clearly defined to ensure proper accountability and promote a fair market environment.

Granting the status of electricity market participant to entities engaged in electricity storage activities is also recommended. This will provide them with the ability to participate in the wholesale electricity market, thereby promoting competition and encouraging investment in the sector.

It is also important to define the procedures for issuing a license (or notification procedure), extending the validity period, fixing and adjusting the periods, reformulation, suspension, and termination of the license for the implementation of electricity storage activities. This will help to streamline the licensing (or notification) process and ensure that licenses (or permits) are issued in a timely manner.

In addition to the gaps mentioned above, the classification of electricity storage activity in terms of environmental impact is a crucial aspect that needs to be addressed. Currently, the RA Law on Environmental Impact Assessment and Expertise defines two categories of activities, A and B, and the energy sector is represented in both categories. However, energy storage activity is not included in any of these categories, indicating a significant regulatory gap. Therefore, it is highly recommended to amend the existing law and include the energy storage activity in one of the two categories of activities, depending on the technology, power, and the area occupied by the plant. This will ensure that energy storage facilities are subject to the same environmental impact assessment as other energy sector activities and that potential environmental risks are properly evaluated.

Furthermore, RA Law on Environmental Impact Assessment and Expertise defines requirements for public consultations to be conducted for the projects subject to Environmental Impact Assessment and Expertise. The law defines conduction of 2 public consultations. Meaningful public input can provide valuable feedback and insights to regulators and developers, and help to identify and address potential concerns or issues early on in the process. The assessment and expertise process provides opportunities for public input, including public hearings and consultations, and ensure that feedback is taken into account when making decisions. This can help to build public trust and support for energy storage projects, and facilitate the successful deployment of these projects.

5.3 SAFETY AND SECURITY STANDARDS

The system of normative and technical documents is a means of state regulation of urban development activities, which defines the reliability, environmental protection, fire protection, sanitary hygiene, ensuring accessibility for the disabled and other necessary norms, rules, indicators, as well as quality assurance conditions for the object during design, implementation and operation, with the requirements for a separate building, structure or building materials. Urban planning normative and technical documents are an integral part of the system of legal acts in the urban planning field and serve as a basis for expertise, control of urban development activities, and resolution of controversial issues. The fulfillment of the requirements of urban development normative and technical documents is mandatory for the subjects of urban development activities[43].

According to the Decree of GoA N 351 dared 26.05.1999[44], the state administration body that approves the republican normative-technical documents included in the system of urban planning normative-technical documents is the Urban Development Committee of the Republic of Armenia.

The standardization (development of normative-technical document) of lithium-ion battery storage systems design, installation, operation and maintenance should be developed to ensure safe and reliable operation. The normative-technical documents should consider the design, construction, and testing of the energy storage system. The

[43] Article 16 of the Law on Urban Development N 217 dated 05.05.1998 https://www.arlis.am/DocumentView.aspx?DocID=177568
[44] https://www.arlis.am/DocumentView.aspx?DocID=56903

normative-technical documents should also cover the operation and maintenance procedures to ensure the longevity and reliability of the system.

It is recommended to initiate the development and approval of normative-technical documents for BESS design, installation, operation and maintenance, which can be implemented through the localization of EU standards or through the development of new normative-technical documents.

5.4 WEM BARRIERS

The classification and status of companies engaged in electricity storage as participants in the wholesale electricity market should be established. The regulatory framework should recognize the value of energy storage in the electricity market and provide appropriate incentives for energy storage companies to participate.

To enable energy storage companies (Investor-owned storage) to operate effectively in the wholesale electricity market, the rights and responsibilities of these companies must be clearly defined. This includes ensuring that energy storage companies have equal access to the market and are treated fairly, and that the regulatory framework enables energy storage companies to operate as a wholesale trade participant and balancing service provider (including secondary reserve (aFRR)) at the same time. In particular, it is recommended to provide the following in the Law on Energy and Law on Renewable Energy and Energy Efficiency:

- *to define electricity storage as an activity in the electricity sector and to define the rights and obligations of companies engaged in this activity, including licensing (or notification) requirements;*
- *ensure non-discriminatory and transparent dispatching, access to balancing services and to the grid;*
- *ensure that storage can be dispatched and can set the wholesale market clearing price as both a seller and buyer consistent with existing market rules;*
- *ensure storage is eligible to provide all capacity, energy, and ancillary services that it is technically capable of providing in the WEM.*

After making the proposed changes in the mentioned laws, it will also be necessary to bring the secondary legislative framework into compliance with the requirements of the amended laws, as well as to adopt new sub-legislative normative legal acts necessary for the implementation of the amended laws.

However, the above does not apply to the TSO model, because in this case there is no need to change the market structure. In order to realize the TSO model, it is proposed to make the following addition to Part 1 of Article 36 of the RA Law "On Energy": *"The Transmitter has the right to own, develop, manage or operate energy storage facilities, where they are fully integrated network components and are used exclusively to ensure the reliability and security of the transmission network."*

It should also be noted that the draft law on electricity produced by USAID (May 16, 2023) essentially provides a non-discriminatory opportunity to connect to the network and provide balancing services, but the latter does not specify in which case and in case of meeting what criteria the participants of the wholesale market will have the opportunity to provide a balancing service. Thus, the following additions are proposed:

- In the Article 35 of draft law on Electricity produced by USAID (May 16, 2023) it is proposed to make the following additions: "*Those participants of the wholesale market whose technical capabilities meet the requirements set by the transmission network rules have the opportunity to provide balancing service."*
- In the Article 41 of draft law on Renewable Energy and Energy Efficiency produced by USAID (May 31, 2023) it is proposed to make the following additions: *"Transmission System Operator shall ensure that storage plant is eligible to provide all capacity, energy, and ancillary services that it is technically capable of providing in the wholesale market."*

5.5 OTHERS

The government should explore options to encourage the development of decentralized battery storage, similar to its promotion of small industrial-scale solar power plants. This could speed up the adoption of battery storage technologies and enhance the reliability of the power system. While this approach is recommended, it is not included in the reform roadmap below, as it is beyond the scope of this report.

6 REFORM ROADMAP

In Task 1 (Legal and Regulatory Framework Analysis), the Consultant conducted an in-depth analysis of the legal and regulatory framework, identifying specific legal acts that require amendment or change. These findings are presented in the GAP Analysis table (section 4.2) of this report. Building upon the results of Task 1 and the Energy Modeling and Economic/Financial Analyses Consultant's assessments of technology, capacity, and business models, Task 2 (Reforms' Roadmap) aims to develop a comprehensive roadmap for legal and regulatory framework reforms.

The results of Task 1 showed that the legal framework regulating the electric energy field in the Republic of Armenia needs to be reviewed to facilitate the implementation of the large-scale energy storage projects. The reforms should focus on addressing the following key issues:

- Definition of electricity storage activity in the legislation
- Licensing requirements for large-scale electricity storage facilities
- Environmental impact and classification of electricity storage activity in terms of environmental impact
- Safety and Security Standards/Regulation of lithium-ion battery storage systems design, installation, operation, and maintenance.
- The classification and status of companies engaged in electricity storage as participants in the wholesale electricity market;
- The rights and responsibilities of companies involved in electricity storage, both as licensed entities and participants in the wholesale electricity market;

These issues formed the basis of the roadmap and were taken as goals to be achieved. Based on these goals, milestones and other elements of the roadmap were determined, as outlined in table 2 below.

Table 2: Reforms' Roadmap

Goals	Milestones	Gaps and barriers	Action items/Recommendations	Business model	Timelines (year)	Action by *(role)*	Stakeholders
Definition of electricity storage activity in the legislation The licensing (or notification) requirements for large-scale electricity storage facilities The rights and responsibilities of the companies involved in electricity storage.	Law on Energy[45] (N148 of 07.03.2001) Law on Renewable Energy and Energy Efficiency[46] (N122 of 09.11.2004)	The law on Energy does not in any way address the activity of electricity storage and does not give any status (licensed entity or market participant) to entities engaged in this activity. Chapter 5 of the Law regulates the types of activities subject to licensing in the field of energy, conditions for obtaining a license, and other conditions related to licenses and licensed entities, but this chapter does not address the activity of electricity storage and relations with entities engaged in this activity. Chapter 5.1 of the Law, among other issues related to the electricity market, also defines the market participants, among whom there is also no entities engaged in electricity storage activity. The law on Renewable Energy and Energy Efficiency lacks comprehensive provisions for storage plants, fails to address important aspects related to their operation, and is limited to the definition of "Power Plant". In	Define the activity of electricity storage as a type of activity subject to licensing (or notification) in the field of energy. Define the rights and responsibilities of entities engaged in energy storage activity. Grant the non-discriminatory electricity market participant status to entities engaged in energy storage activity. To ensure non-discriminatory and transparent dispatching, access to balancing services, and to the grid. To ensure that storage can be dispatched and can set the wholesale market clearing price as both a seller and buyer consistent with existing market rules; To ensure storage is eligible to provide all capacity, energy, and ancillary services that it is	IOPMR IOCM	2024-2025	***The National Assembly /Parliament/*** *(adoption of the law)* ***The Government of Armenia (GoA)*** *(give consent and submission to the Parliament)* ***MTAI*** *(initiating, drafting, and submission to the GoA)* ***PSRC*** *(cooperate with MTAI)*	"Power System Operator" CJSC "Settlement Center" CJSC (Market Operator) "High Voltage Electric Networks" CJSC "Electric Networks of Armenia" CJSC Armenia Renewable Resources and Energy Efficiency Fund "Armenian National Interests Fund" CJSC

[45] https://www.arlis.am/DocumentView.aspx?DocID=162237
[46] https://www.arlis.am/DocumentView.aspx?DocID=162218

Goals	Milestones	Gaps and barriers	Action items/Recommendations	Business model	Timelines (year)	Action by *(role)*	Stakeholders
		particular the term "Power Plant" used in the law is defined as follows: "*equipment or a complex of interconnected equipment and structures designed for energy production, transformation, transmission, storage, distribution, and consumption.*"	technically capable of providing in the WEM.				
		According to the Article 36, paragraph 1 of the Law Transmitter has the right to build (reconstruct) the transmission network.	It is proposed to make the following additions in the paragraph 1 of the law: "*The Transmitter has the right to own, develop, manage or operate energy storage facilities, where they are fully integrated network components and are used exclusively to ensure the reliability and security of the transmission network."*	TSO	2024-2025		
	The draft law on Electricity produced by USAID (May 16, 2023)	The draft does not define the terms "storage plant" and/or "electricity storage" and does not give any status to the electricity storage activity (activity subject to licensing or notification), nor does it give the status of market participants to the persons engaged in the activity of electricity storage. An exception is pumped storage hydropower	It is proposed to make the following additions in the draft law: - To define in the draft law all types of activities in the field of electricity presented in part 1 of Article 18, so that it is clear what is meant by electricity production, supply, etc.	IOPMR IOCM	2024-2025		

Goals	Milestones	Gaps and barriers	Action items/Recommendations	Business model	Timelines (year)	Action by *(role)*	Stakeholders
		plant, which is considered as a generating plant according to the definition of Electricity Facilities, which is defined as follows: *"electricity installations (generating plants (including pumped storage hydropower plants), transmission and distribution overhead and cable lines, transformer substations, and power poles (including high-voltage transmission towers)), electric accumulators (batteries), and other facilities of electrical significance."* Articles 49 and 35 of the draft ensure a non-discriminatory and transparent opportunity to connect to the network and procure balancing services, but the latter does not specify in which case and in case of meeting what criteria the participants of the wholesale market will be eligible to provide a balancing service.	- In the draft law, define the term "***Electricity storage***" as follows: *"means, in the electricity system, deferring the final use of electricity to a moment later than when it was generated, or the conversion of electrical energy into a form of energy which can be stored, the storing of such energy, and the subsequent reconversion of such energy into electrical energy or use as another energy carrier."* - Define the term "***Renewable energy generation***" in the draft law as follows: *"means energy generation from renewable, non-fossil sources (wind, solar hydro, geothermal, biomass, biogas and other) applicable for the generation of electric and/or thermal energy and **energy storage**."* - In the Article 35 of the draft law it is proposed to make the following additions: "*Those participants of the wholesale market whose technical capabilities meet the*				

Goals	Milestones	Gaps and barriers	Action items/Recommendations	Business model	Timelines (year)	Action by *(role)*	Stakeholders
			requirements set by the transmission network rules have the opportunity to provide balancing service."				
	The draft law on Renewable Energy and Energy Efficiency produced by USAID (May 31, 2023)	The draft law does not ensure that storage can set the wholesale market clearing price as both a seller and buyer consistent with existing market rules. The draft law does not ensure access to the capacity, energy, and ancillary services for storage plants.	In the Article 41 of the draft law it is proposed to make the following additions: - *"In addition to the rights reserved to the producer under Article 26 of the law on Electricity, the storage plant also has the right to purchase electricity in the wholesale electricity market."* - *"Transmission System Operator shall ensure that storage plant is eligible to provide all capacity, energy, and ancillary services that it is technically capable of providing in the wholesale market."*	IOPMR IOCM	2024-2025		
	Law on Licensing[47]	The law does not address the activity of electricity storage.	Define the activity of electricity storage as an activity subject to licensing in the field of energy in compliance with the	IOPMR IOCM	2024-2025		

[47] https://www.arlis.am/DocumentView.aspx?DocID=169860

Goals	Milestones	Gaps and barriers	Action items/Recommendations	Business model	Timelines (year)	Action by *(role)*	Stakeholders
	(N193 of 30.05.2001)	In particular, the law specifies that in the field of energy, the production of electrical energy (including combined production of electrical and thermal energy), transmission, distribution, supply of electrical energy (including guaranteed), and wholesale trade are subject to licensing, however, there is no reference to electricity storage activity.	requirements of the amended laws (as provided above).				
	PSRC Decision on approving the procedure for licensing activities in the field of energy and revoking a number of decisions [48] (N 374 of 01.11.2013)	The decision does not address the activity of electricity storage.	Make amendments to bring the PSRC decisions into compliance with the requirements of the amended laws (as provided above).	IOPMR IOCM	2025	***PSRC*** *(initiating, drafting and adoption)*	MTAI "Power System Operator" CJSC "Settlement Center" CJSC (Market Operator) "High Voltage Electric Networks" CJSC "Electric Networks of

[48] https://psrc.am/contents/document/6013

Goals	Milestones	Gaps and barriers	Action items/Recommendations	Business model	Timelines (year)	Action by *(role)*	Stakeholders
							Armenia" CJSC Armenia Renewable Resources and Energy Efficiency Fund "Armenian National Interests Fund" CJSC
The environmental impact and classification of electricity storage activity in terms of environmental impact.	Law on Environmental Impact Assessment [49] (N110 of 21.06.2014)	The law defines the types of activities in the field of energy that are subject to environmental impact assessment and expertise, however, there is no reference to electricity storage activity.	Classify the activity according to the appropriate category, taking into account the impact of the activity on the environment. When classifying, it is necessary to take into account the technology, power, and the area occupied by the plant.	IOPMR IOCM TSO IOHS	2024-2025	***The National Assembly (Parliament)*** *(adoption of the law)* ***The Government of Armenia*** *(give consent and submission to the Parliament)*	MTAI "Power System Operator" CJSC "Settlement Center" CJSC (Market Operator) "High Voltage Electric Networks" CJSC

[49] https://www.arlis.am/DocumentView.aspx?DocID=140512

Goals	Milestones	Gaps and barriers	Action items/Recommendations	Business model	Timelines (year)	Action by *(role)*	Stakeholders
						The Ministry of Environment *(initiating, drafting and submission to the GoA)* ***PSRC*** *(cooperate with MTAI)*	"Electric Networks of Armenia" CJSC Armenia Renewable Resources and Energy Efficiency Fund "Armenian National Interests Fund" CJSC
Safety and Security Standards /Development of normative-technical documents regulating BESS design, installation, operation and maintenance	N/A	In Armenia there are no normative-technical documents regulating the design, installation, operation and maintenance of BESS	Develop safety and security normative-technical documents regulating the design, installation, operation and maintenance of BESS. Standards should be based on the real risks and avoid jeopardizing the uptake of storage.	IOPMR IOCM TSO IOHS	2024-2025	***Urban Development Committee*** *(initiating, drafting and adoption of the order)* ***Scientific Research Institute of Energy CJSC***	MTAI PSRC "Power System Operator" CJSC "Settlement Center" CJSC (Market Operator) "High Voltage Electric

Goals	Milestones	Gaps and barriers	Action items/Recommendations	Business model	Timelines (year)	Action by *(role)*	Stakeholders
						(development of the standards)	Networks" CJSC "Electric Networks of Armenia" CJSC Armenia Renewable Resources and Energy Efficiency Fund "Armenian National Interests Fund" CJSC
The classification and status of companies engaged in electricity storage as participants in the wholesale electricity market	PSRC Decision on approving the trading rules of the RA electricity wholesale market and revoking RA PSRC decision N 344	The WEM rules do not in any way regard the entities engaged in the activity of electricity storage and do not give them any status (WEM participant, trade participant or service provider). Today's market model provides that the secondary and tertiary reserve service for balancing and frequency regulation purposes is	Define the status of companies engaged in electricity storage as participants in the wholesale electricity market. Define the rights and responsibilities of the companies engaged in the activity of electricity storage as a participant of the wholesale	IOPMR IOCM	2025	***PSRC*** *(initiating, drafting and adoption)* ***MTAI*** *(give consent)*	"Power System Operator" CJSC "Settlement Center" CJSC (Market Operator)

Goals	Milestones	Gaps and barriers	Action items/Recommendations	Business model	Timelines (year)	Action by *(role)*	Stakeholders
The rights and responsibilities of companies involved in electricity storage, as participants in the wholesale electricity market.	of August 9, 2017 [50] (N 516 of 25.12.2019)	provided only by the BSP (Balancing Service Provider). Secondary and tertiary reserves for balancing and frequency regulation purposes, are provided by BPP (Balancing Power Plant) stations that are not WEM participants. BSP does not have the right to trade electricity in WEM components other than the Balancing Market. BSP can also import electricity.	electricity market that will enable the operation of energy storage battery systems as a wholesale trade participant in the electricity market and balancing service provider (including secondary reserve). Make any other amendments to bring the PSRC decisions into compliance with the requirements of the amended laws (as provided above), as well as to adopt new normative legal acts necessary for the implementation of the amended laws.				"High Voltage Electric Networks" CJSC "Electric Networks of Armenia" CJSC Armenia Renewable Resources and Energy Efficiency Fund "Armenian National Interests Fund" CJSC
	PSRC Decision on approving the RA electricity market transmission network rules and revoking RA PSRC decision No. 161 of May 17, 2017[51] (N 522 of 25.12.2019)			IOPMR IOCM	2025	***PSRC*** *(initiating, drafting and adoption)* ***MTAI*** *(give consent)*	
	PSRC Decision on approving the RA electricity market distribution network rules and revoking a number of			IOPMR IOCM	2025	***PSRC*** *(initiating, drafting and adoption)* ***MTAI*** *(give consent)*	

[50] https://psrc.am/contents/document/9646
[51] https://psrc.am/contents/document/9649

Goals	Milestones	Gaps and barriers	Action items/Recommendations	Business model	Timelines (year)	Action by *(role)*	Stakeholders
	decisions of the RA PSRC [52] (N 523 of 25.12.2019)						

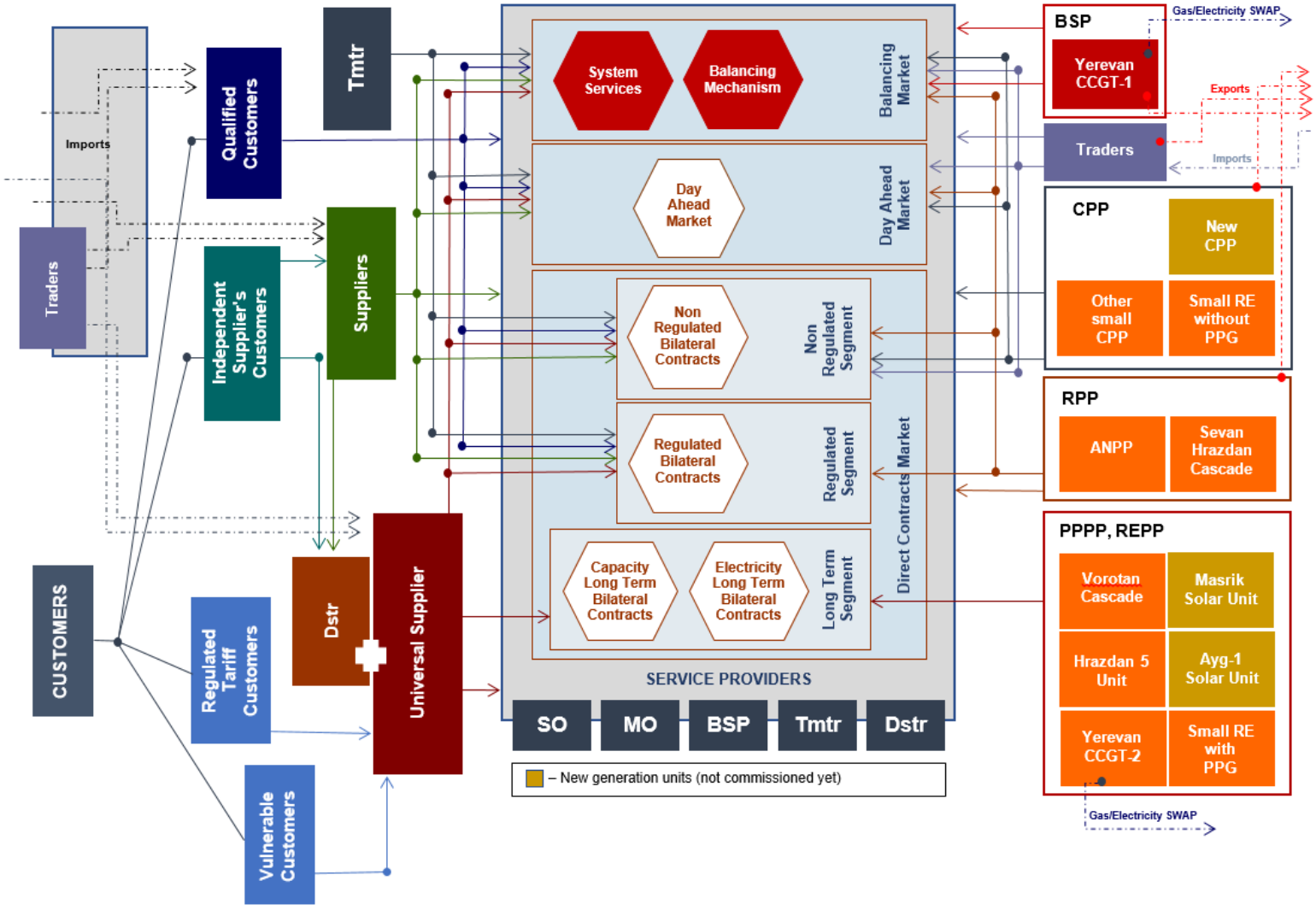
[52] https://psrc.am/contents/document/8891

Table 3: Roadmap Timeline Chart

Milestones	Timeline																								
	Number of Months																								Year
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Primary Legislation																									
Law on Energy (N148 of 07.03.2001)																									2024-2025
Law on Renewable Energy and Energy Efficiency (N122 of 09.11.2004)																									
The draft law on Electricity produced by USAID (May 16, 2023)																									
The draft law on Renewable Energy and Energy Efficiency produced by USAID (May 31, 2023)																									
Law on Licensing (N193 of 30.05.2001)																									
Law on Environmental Impact Assessment (N110 of 21.06.2014)																									
Secondary Legislation																									
PSRC Decision on approving the procedure for licensing activities in the field of energy and revoking a number of decisions (N 374 of 01.11.2013)																									2025

PSRC Decision on approving the trading rules of the RA electricity wholesale market and revoking RA PSRC decision N 344 of August 9, 2017 (N 516 of 25.12.2019)																								
PSRC Decision on approving the RA electricity market transmission network rules and revoking RA PSRC decision No. 161 of May 17, 2017 (N 522 of 25.12.2019)																								
PSRC Decision on approving the RA electricity market distribution network rules and revoking a number of decisions of the RA PSRC (N 523 of 25.12.2019)																								
Safety and Security Standards /Development of normative-technical documents regulating BESS design, installation, operation and maintenance																								

ANNEX 1: ARMENIA ELECTRICITY MARKET STRUCTURE



Source: Settlement Centre CJSC

ANNEX 2: FUNCTIONS OF STATE ORGANIZATIONS

STATE BODIES

MTAI on behalf of the Government of Armenia

The authorized body of the RA government in the field of energy directly implements the state policy in the field of energy within its competence, and also supports the state regulation of the field of energy.
The authorized body of the RA government in the field of energy:
a) Develops and submits to the approval of the Government of the Republic of Armenia the strategic plans for the development of the energy sector of the Republic of Armenia;
b) Develops and submits to the approval of the Government of the Republic of Armenia normative legal acts in the field of energy, including the rules and requirements for the operation and safety of energy facilities;
c) Cooperates with the commission in the direction of promotion of interstate trade in electric energy (power), expansion of interstate cooperation in the field of energy;
d) Submits recommendations to the commission regarding the maximum amounts of annual total capacity within the framework of the licenses granted by the commission for the production of electricity in plants using renewable energy resources with an installed capacity of up to 30 MW, taking into account the strategic plans for the development of the RA energy sector;
e) Gives consent to the commission's granting of licenses for the production of electrical energy with an installed capacity of 30 MW and more, taking into account the strategic plans for the development of the RA energy sector;
f) Gives consent to the market rules presented by the commission;
g) Gives consent to the plans of actions presented by the commission to be carried out under conditions leading to unavoidable restrictions on the supply of electricity, thermal energy and natural gas;
h) Gives consent to the power system safety and reliability indicators presented by the commission;
i) Prepares and submits to the Government of the Republic of Armenia recommendations regarding public-private partnership transactions in the field of energy and participates in their implementation.[53]

PSRC

The commission is authorized:
a) To set tariffs for electric energy (capacity) production, thermal energy production, energy transmission (transportation), distribution, system operator, electricity market operator and system services defined by market rules;
b) To define the sales tariffs for natural gas, thermal energy, electric energy (capacity) sold to consumers by a guaranteed supplier, as well as the tariffs for the provision of services to consumers by licensed entities;
c) To carry out licensing in the field of energy in accordance with the procedure established by the commission: to issue licenses, extend their validity periods, amend, suspend and terminate their operation, as well as to define the conditions of licenses, monitor their execution and apply the liability measures established by law;
d) To approve the procedure for approving the alienation, transfer or pledging of the share (share) or the right to it of the entity with the license, as well as the alienation, transfer or pledge of the property necessary for the implementation of the licensed activity or the right to it;
e) To define the rules for the supply and use of thermal energy, as well as natural gas;
f) To approve the market rules with the consent of the authorized body of the RA Government;
g) To define the mandatory conditions or samples of energy and natural gas supply and service provision contracts concluded between the licensed entities, to register the import and export contracts concluded between the licensed entities in the field of energy in the order established by the commission;
h) To define mandatory conditions or samples of contracts for the supply and provision of services of electric energy, thermal energy and natural gas concluded between licensees and consumers and to ensure their implementation;
i) To organize discussions, to make decisions and (or) give clarifications as a result of discussions related to disagreements between licensees, questions and complaints of consumers, electric energy, thermal energy and natural gas supply;
j) For the purpose of monitoring the implementation of the law, legal acts of the commission, license conditions and investigating the reliability of reports and information submitted to the commission to monitor the activities of licensed entities in accordance with the procedure established by the commission;
k) To request from the licensed and the entities applying for a license all the information and data necessary for the issuance of licenses, control of their conditions, setting of tariffs, discussion of disputes and other issues;
l) To establish the minimum requirements for the quality of consumer service provided by licensees;

[53] RA Law on Energy, Article 5.1. https://www.arlis.am/DocumentView.aspx?DocID=162237

m) To establish accounts and sub-accounts in accordance with RA laws and other legal acts for submitting reports related to settlement;
n) To give consent to the investment programs presented by the licensees, for the purpose of their full or partial inclusion or rejection in the future tariffs;
o) To ensure the implementation and interpretation of the decisions taken by the commission;
p) to cooperate with the authorized body of the RA government in the field of energy in the direction of promoting interstate trade in electric energy (capacity), expanding interstate cooperation in the field of energy;
q) To approve the plans of actions to be implemented under conditions leading to unavoidable restrictions on the supply of electricity, thermal energy and natural gas, developed by license holders, with the consent of the authorized body of the RA Government in the field of energy;
r) To approve the safety and reliability indicators of the electric power system developed by the electric power system operator, with the consent of the authorized body of the RA government in the field of energy;
s) To establish additional accounting requirements for licensees regarding licensed activities.[54]

STATE COMPANIES

Power System Operator CJSC

The System Operator is granted the right and is obliged to provide power system operator service in the power system with the following exclusive functions:

- short-term planning and dispatching in the power system;
- operational management of the electric power system.
- planning of electricity transmission network development.
- ensuring the parallel operation of the RA electric power system with the regional electric power systems, as well as performing other non-exclusive functions provided by the license terms and market rules.

The System Operator in cooperation with the licensed entities develops the electricity market transmission network rules, the safety and reliability indicators of the system and submits them for the approval of the commission.
When dispatching entities with an electric energy generation license, the System Operator shall take all necessary measures that will lead to the generation and transmission of electric power (capacity) at the lowest cost for consumers, taking into account the purchase guarantees given to electric energy generators. The System Operator is prohibited from engaging in other licensable activities in the field of energy, except for the activity of transmitting electric energy (power) in the presence of a corresponding license.[55]

"Settlement Center" CJSC (Market Operator)

The Market Operator is granted the right and is obliged to provide market operator service in the wholesale electricity market with the following exclusive functions:

- organization of electricity market activity.
- registration of electricity market participants.
- recordkeeping of contracts concluded between participants of the wholesale electricity market, contracts providing for the import or export of electrical energy (capacity);
- accounting of purchased and sold electrical energy (capacity) according to the contracts signed in the electricity market and the contracts providing for import or export, drawing up documents and presenting them to wholesale market trade participants and service providers;
- other non-exclusive functions provided by the license terms and market rules.

The Market Operator in cooperation with the licensed entities develops the trading rules of the electricity market (wholesale and retail) and submits them for the approval of the commission.
The Market Operator is prohibited from engaging in other licensable activities in the field of energy.[56]

"High Voltage Electric Networks" CJSC

The purpose of the establishment of the company is to make a profit by carrying out economic activities.
The types of activities of the company are:

- RA electrical energy (power) transmission.
- Production of electricity through a wind power plant.

[54] RA Law on Energy, Article 17 https://www.arlis.am/DocumentView.aspx?DocID=162237
[55] RA Law on Energy, Article 37 https://www.arlis.am/DocumentView.aspx?DocID=162237
[56] RA Law on Energy, Article 39 https://www.arlis.am/DocumentView.aspx?DocID=162237

- The company has the right and is obliged to carry out the following functions that make up the activity of electric energy (power) transmission:
  a) Transmission network maintenance and operation;
  b) Wholesale sale of electrical energy (capacity) to the distributor or directly to the consumer or exporter;
  c) Transmission of electrical energy owned by him and (or) Importer(s) and (or) Distributor and (or) Consumers and (or) Producer through the transmission network;
  d) Transportation of electrical energy to third countries;
  e) Expansion and development of transmission network;
  f) Provision of scheduled and unscheduled repair and state calibration of meters owned or under its management;
  g) Performance of research and design works of energy facilities;
  h) Construction of energy facilities and high-voltage power transmission lines.
- Construction of a wind power plant;
- Production of electrical energy (power) in the wind farm;
- The company has the right to carry out conversion (transformation), delivery (sale) of the electric energy (capacity) it produces and operation of power plants necessary for their implementation;
- Construction of natural gas utilization network.

The company can carry out any economic activity not prohibited by law.[57]

"Armenian Nuclear Power Plant" CJSC

The purpose of the establishment of the company is to make a profit by carrying out economic activities.
The types of activities of the company are:
- Safe and efficient operation of facilities using atomic energy for the production of electrical energy;
- Production of electricity /power/;
- Export of produced electricity / capacity / belonging to the company;

The company can carry out any economic activity not prohibited by law.

"Yerevan TPP" CJSC

The purpose of the establishment of the company is to make a profit by carrying out economic activities.
The types of activities of the company are:
- Production, delivery and sale of electrical energy;
- Production, transportation and sale of thermal energy.

The company can carry out any economic activity not prohibited by law.[58]

STAT FUNDS

Armenia Renewable Resources and Energy Efficiency Fund

The Fund carries out the following types of activities:
a) Participation in the development of policies in the field of energy efficiency and renewable energy,
b) Presenting recommendations on legislative reforms aimed at the development of the energy efficiency and renewable energy market,
c) Support for the creation of new productions and the organization of services promoting the development of energy efficiency and renewable energy,
d) Training and capacity building of energy service companies, financial institutions and management bodies of multi-apartment buildings in connection with the implementation of investments in the field of energy efficiency and renewable energy;
e) Public awareness of new technologies related to energy efficiency and renewable energy sector;
f) Organization of the implementation of credit and grant programs in the field of energy efficiency and renewable energy in accordance with the relevant international agreements and the authorities provided by the Government of the Republic of Armenia;
g) Organization of financing in the field of energy efficiency and renewable energy;
h) Financing of residential and industrial energy efficiency projects;
i) Financing of energy efficiency and renewable energy projects by providing loans or grants;

[57] Charter of the "High Voltage Electric Networks" CJSC
[58] Charter of the "Yerevan TPP" CJSC

j) Support for the reduction of man-made impact on the environment and human health through the development of energy efficiency and renewable energy, including the identification of Clean Development Mechanism programs of the Kyoto Protocol;
k) Implementation of other measures to increase national energy security;
l) Examination and approval of projects presented to the fund, financing of their implementation, preparation of tenders (preparation of technical tasks and tender documents) and organization for the selection of consultants, suppliers and contractors, preparation and signing of all types of contracts related to the implementation of the project;
m) Preparing reports on the implementation of programs and submitting them to relevant organizations;
n) Implementation of the works provided for in the plans, implementation of control over the contractor;
o) Management of payments within the programs.[59]

[59] https://www.arlis.am/DocumentView.aspx?DocID=28817

ANNEX 3: INTERVIEWEES

Name, Position	Company	Date Interviewed
Ashot Ulikhanyan, Head of the Tariff Policy Department	Public Service Regulatory Commission (PSRC)	February 21, 2023
Mesrop Mesropyan, Director	Market Operator	March 2, 2023
Garnik Balyan, Deputy Director	Power system operator	May 5, 2023
Armen Petrosyan, General Director	Scientific Research Institute of Energy	May 8, 2023