Analytical Note

On Policy Instruments in Energy and Agriculture towards the Low Emission Development Strategy

Artak Baghdasaryan

Task Leader/Mitigation Expert
EU4Climate UNDP-EU regional program

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The objective of this paper is to identify policy instruments in the energy and agriculture sectors from the perspective of the Low Emission Development Strategy (LEDS). An attempt is made to assess the gap and to identify opportunities for LEDS integration into sector strategies.

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PREFACE

Based on the studies conducted within the framework of the "EU4Climate" regional climate program and the brief overview developed on their basis, it has been identified that while setting priorities in the context of the Low Emission Development Strategy (LEDS) it is important to target those sectors which are pivotal in the national greenhouse gas (GHG) inventory or may become so in the near future. At the same time, in addition to the volume of GHG emissions, the sectors are also addressed in view of their potential for GHG emission reductions and existence of sectoral targets and/or harmonization with economic development issues. In this regard, the report addresses the energy and agricultural sectors. Additionally, considering the phased nature of LEDS development, the report will focus on the study and inventory of the policies in the said two sectors, identification of sectoral challenges and opportunities in terms of integrating regulations implicating low carbon practices.

Article 4 of the Paris Agreement, while calling on states to report their strategic commitments, assumes that, despite targeting mitigation, they are also required to include adaptation elements or considerations. However, considering that Armenia is expected to present a separate national adaptation plan in 2020, the energy and agricultural policies in this document will be considered predominantly from the mitigation perspective.

Thus, the "Long-term (up to 2036) development directions of the RA energy system" document approved by the Government Decree N 54 of the December 10 2015, is currently being revised to reflect more ambitious development goals for renewable energy sources, deeper diversification of fuel supply chains and regional co-operation and integration projects. This will serve as the basis for the new National Energy Efficiency and Renewable Energy Program of the Republic of Armenia for 2021-2030, which is the direct focus of interest for this paper. Therefore, the current draft of the first paper will be deliberated by expert assessment, and recommendations will be made in relation to the draft National Energy Efficiency and Renewable Energy Program.

In the field of agriculture, the subject of study will be "The 2020-2030 strategy on main directions ensuring economic development of the RA agricultural sector". Furthermore, considering that livestock breeding segment accounts for the major share of the emissions attributable to agricultural sector (53.1% constitute methane emissions from the intestinal fermentation of agricultural livestock), Armenia's 2019-2024 livestock development program will also be included in the scope of analysis.

EMISSIONS REDUCTION POLICY MECHANISMS AND THEIR IDENTIFICATION IN THE ENERGY AND AGRICULTURAL SECTORS OF ARMENIA

Mitigation strategies in the energy sector

For identifying GHG emission reduction policies and adequate mitigation tools in the Armenian energy sector, proper methodological approach is required. To address this issue within the framework of this section, two frameworks of mitigation policies in the energy sector are used: the policy framework addressing OECD countries and the strategic framework formed for EU countries.

OECD policy framework

Decarbonization of electricity is a prerequisite for the transition to a low-emission economy. Over the first two decades of the 2000s, OECD countries passed through this phase by means of the application of **climate policies, non-climate policies** and **socio-economic factors**[1]. It is important to emphasize that the implementation of one of the factors in isolation does not produce the expected results in terms of speed as well as quality.

Instruments envisaged under these policy frameworks were assessed according to significance of their impact. However, in addition to the final outcomes, all the hypotheses considered will be presented below (they are based on the results of various studies previously conducted), given the fact that typically an instrument is often adopted and / or considered based on its appearance of effectiveness at first glance, which however it is not substantially justified empirically. At the same time, it can also facilitate the process of political decision-making by providing comprehensive understanding of the adherent cost implications.

CLIMATE POLICIES

Various incentives such as carbon prices or targeted support for renewable energy are essential for decarbonization of electricity. These policies are relevant from the point of view of market failures and contribute to accelerating reduction of emissions. This trend it maintained even in the face of rapid decline in wind and solar energy prices. GHG emissions can be estimated directly through emissions trading or carbon tax mechanisms, and indirectly - by subsidizing emissions reduction activities, such as feed-in tariffs or renewable energy quotas. Thus, in order to identify effective mitigation tools, the following hypotheses have been formulated, which, as mentioned already, are based on various analytical studies.

Higher carbon prices presumably contribute to decarbonization. This becomes possible as it triggers changes in technology, in the behaviors of exporters and consumers, as well as innovations. As prices for emissions rise, utilities eventually opt for abandoning the use technologies that generate higher levels of emissions. Consumers also respond to increase in prices by consuming less electricity. Carbon prices can also stimulate private investment in new generation technologies, as it improves renewable energy risk/reward performance. New investments also lead to the

[1] Power struggle: Decarbonizing the electricity sector, OECD Environment Working Papers No. 139, 22 November, 2018

expansion of deployed renewable capacities, the expansion of their application and eventually to reduced emissions. Consequently, decarbonization is increasing as emissions prices rise.

The longer horizon of carbon price planning presumably contributes to decarbonization. An additional characteristic of carbon pricing is the distinct and persistent nature of perception of this policy. If an investor believes that the price of carbon is subject to change, there is virtually no incentive for any beneficiary to respond and adjust behavior, especially when that adjustment brings about a higher price or substantial shifts from accepted practices. Conversely, prices defined for a longer horizon indicate the government's commitment to fostering mitigation and low carbon footprint. The planning timespan is determined by the carbon prices, which are effective for the years remaining before the revision time spot envisaged by legislation. Thus, decarbonization is expected to increase with the expansion of the carbon price-planning horizon.

Public tenders presumably contribute to decarbonization. The public procurement policy aims to promote public and private engagement in the procurement processes. Consequently, government tenders that increase capacities of renewable energy are likely to stimulate investment in relevant technologies, leading to enhanced innovations. It should encourage the expansion and use of renewable power and upsurge the potential for emissions reductions. In this context, it is presumed that government tenders for renewable power may contribute to decarbonization.

Higher feed-in tariffs (FIT) and longer contract lengths are likely to contribute to decarbonization. FITs are widely used incentives for transitioning from the use of fossil fuels for electricity generation to the use of renewable resources, as an obvious complement and alternative to carbon pricing. In theory, FITs are accelerating the growth of renewable energy by serving as guarantee for renewable energy producers' long-term contracts. In practice, this interconnection does not always necessarily have a tangible effect on investor expectations regarding the investment recovery timeline or size of the investments. The latter determines the investors' attitude towards the level of FITs. Therefore, it is highly probable that the decarbonization increases in the context of increased level of FITs and prolonged FIT contract terms.

Renewable energy quotas presumably contribute to decarbonization: REQs, or in other words, renewable energy credits, are emerging as a market alternative to FITs. REQs, within the framework of the quota, provide economic incentives to increase efficiency for utilities. These are expected to drive investment and innovation in various renewable energy technologies. However, as with FITs, the effectiveness of REQs in practice is not unequivocal. It may be assumed that REQs can promote innovations in technologies that are close in competition with fossil fuels, while this may not be the case with more expensive technologies such as solar energy.

NON-CLIMATE POLICIES

Decarbonization may accelerate or fail as a result of ongoing non-climate policies that persist in promoting or restricting the use of fossil fuels and other carbon activities. Under non-climate policies, the scope of analysis included subsidies for fossil fuels, public RDIs (research, development, investment) in the areas of renewable sources and fuels, Basel III financial regulations.

Fossil fuel subsidies presumably inhibit decarbonization: These subsidies are "perpetuating" the use of fossil fuels by distorting prices and decisions on resource allocation. Given that the establishment of renewable energy infrastructures requires additional capital investment, these subsidies contribute the continued use of fossil fuels. Hence, elimination of subsidies will make the prices of renewable technologies more competitive. Moreover, the subsidies for fossil fuels contribute to the growth of innovations and investments in this area, ensuring their further development.

Public RD&D in fossil fuel presumably inhibit decarbonization: RDIs (with the exception of those in the area of carbon capture and storage) are a type of subsidy that perpetuate the use of fossil fuels and demonstrate lack of government commitment towards low carbon footprint. At the same time, these costs are incurred in lieu of potential investment in renewable technologies, which consequently downturns their development.

Public RD&D in renewable fuels increase decarbonization: These RDIs can accelerate the introduction of renewable technologies and testify to the government's commitment to a low carbon footprint. Despite the enormous resources invested, the development of renewable energy technologies is a long-winded process in terms of return on investment and administrative barriers. However, in theory, RDIs stimulate innovation and increase the competitiveness of renewable technologies.

Basel III leverage ratio (leverage ratio) inhibits decarbonization. Basel III aims to limit the excessive leverage and influence of banks. Such regulations exist to enhance the overall stability of the financial system, which is a prerequisite for any investment, including for decarbonization of electricity. Capital and liquidity requirements set by the regulations may act as inhibiting factors for the long-term financing required for renewable investments.

POLITICAL ECONOMY

Policy makers are required to constantly balance all interests involved, including those of public, stakeholder groups, political parties, whose support is viewed as a prerequisite for successful reform processes. Political variables include the interests of key players in electricity decarbonization. 1) producers (age of inactive/idle assets and market concentration), 2) state (state-ownership in power sector, employment), 3) consumers (public environmental concerns). It is important to keep in mind that these factors may also carry an indirect impact of on decarbonization, as they are likely to affect climate and non-climate policies.

State-owned enterprises in the electricity sector may foster as well as inhibit decarbonization. State-owned enterprises are likely to encourage or disrupt the government's efforts towards electricity decarbonization. They often receive preferential treatment, which may be beneficial for decarbonization, as state-owned enterprises may be motivated not only by financial returns but also by social and environmental objectives, such as decarbonization. Preferential treatment is likely to create opportunities for cheaper renewable sources. However, in practice the predominant trend is the opposite, which gives way to uncertainty in making conclusions. The impact of SoEs on climate

and non-climate policies is also vague, as their support may be in favor as well as in opposite to decarbonization.

Market concentration presumably suppresses decarbonization. Market concentration can have a restraining impact by limiting startups' entry to the electricity market and thereby reducing investment in renewable sources. Such startups also appear to be on unequal footing in terms of competition, as compared to fossil fuel.

On average long useful lives of power plants presumably increases decarbonization. Infrastructures in the energy sector are characterized by relatively long useful lives. The transition to a low-carbon economy alongside with existing fossil-fueled plants will lead to their write-off earlier than the allowed period of useful life, which suggests that these assets will be depreciated or prematurely converted into liabilities. Consequently, the higher average time in use of the stations implies a smaller number of passive assets, which means that decarbonization will be less costly.

The number of jobs in the fossil fuel industry presumably suppresses decarbonization. Steady employment is the next impediment in line for decarbonization in this as well as other related sectors. Decarbonization will cause structural shifts in employment, which in its turn will incite employees' perception of climate policies in negative light. Even considering existing jobs in renewable sources sector, the labor force is the least flexible component in production as compared to capital or land. It requires time, costs, even relocation.

Public environmental concerns contribute to decarbonization. This is exercised by making impact on governments. Policy usually responds to these concerns in an effort to maintain public trust.

According to studies, higher feed-in tariffs and higher renewable energy quotas significantly increase the use of renewable sources, while fossil fuel subsidies tend to substantially reduce them. However, these factors apparently fail to have rigorous effect on emissions. This may be a symptom of "weak" climate policies or continued use of high-emission sources in the "non-green" sector of electricity.

In contrast, economic and political factors (jobs in the fossil fuel industry) substantially increase emissions in the electricity sector. Additionally, employment/labour considerations also significantly inhibit the implementation and use of renewable resources.

Targeting climate policies and exclusively emphasizing the need for renewable sources is not an inherently adequate measure in decarbonization context. Introduction of more stringent climate policies will not be positioned to foster expected decarbonization levels as long as non-climate policies continue to directly or indirectly promote the use of fossil fuels. Addressing issues beyond the scope of climate policies, e.g. undermining interest in the use of regular fossil fuels (by means of labor market reforms or identifying other sources of income) can accelerate decarbonization processes.

"Clean Planet for All"[2]. On November 28, 2018 the European Commission issued a report presenting its long-term strategic vision of a prosperous, contemporary, competitive and climate-neutral economy by 2050, which is known as the *Clean Planet for All*. The long-term strategy outlines how Europe is positioned to lead climate-neutral practices by investing in viable technology solutions, empowering people and coordinating actions in various directions, in particular, production policies, finances, research, at the same time upholding social equity in transitional process. The strategy envisages streamlined actions in the following seven strategic directions:

1) Maximize the benefits from **energy efficiency**, including zero-emission buildings;
2) Maximise the deployment of **renewables** and the use of electricity to fully decarbonise Europe's energy supply;
3) Embrace clean, safe and connected **mobility**;
4) A competitive EU industry and the **circular economy** as a key enabler to reduce greenhouse gas emissions;
5) Develop an adequate **smart network infrastructure** and **inter-connections**;
6) Reap the full benefits of **bio-economy** and create essential **carbon** sinks;
7) Tackle remaining CO2 emissions with **carbon capture and storage**.

"Clean Energy for All Europeans" [3]. On its way to upholding commitments undertaken by the Paris Agreement for the transition to clean energy from fossil fuels and to reduce GHG emissions, the EU has fundamentally revised its energy policy framework, which was published as package, titled "Clean Energy for All Europeans". It consists of 8 legal acts which came into full force in mid-2019, whereas 1-2-year timeline was set for EU countries to bring their national laws in coherence with these directives. The changes embodied significant benefits for consumers, the environment, and the overall economy. The framework also will significantly contribute to fulfilment of objective set by long-term strategy for achieving carbon neutrality by 2050. Thus, the policy-making directions (including the relevant 8 directives) are:

Energy performance in buildings. In the EU, this sector accounts for 40% of energy consumption and 36% of CO_2 emissions. For comparison, in Armenia, as of 2016 the same indicators were 36% and 18%, respectively.

Renewable Energy. Claiming to be a leader in renewables, EU targets by 2030 to increase the share of renewable energy up to 32%.

[2] https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2050-long-term-strategy

[3] https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans

Energy Efficiency. Prioritizing energy efficiency is a key issue reflected in the package, as energy saving is the most straightforward way to save consumer resources and reduce GHG emissions.

Governance regulation: The package includes a rigorous management system set by Energy Union that requires member states to formulate their 10-year national energy and climate programs for 2021-2030.

Electricity Market Design. This measure aims to establish a contemporary context for the EU electricity market to foster its adaptation to new realities, ensure more flexible, more market-oriented and more favorable environment in terms of accommodating greater share of renewable sources.

In addition to legal acts, the Commission has also launched several non-legal initiatives aimed at ensuring smooth transition to clean energy.

European Green Deal. In pursuit of its ambitious goal to become the leading climate- neutral continent in the world by 2050, the European Commission released the European Green Deal on December 11, 2019. This is a new growth strategy which aims to set the EU economy on a sustainable track by transforming climate and environmental challenges into opportunities. The transition is designed in a way as to ensure adherence to principle of justice is and fully respect the inclusiveness principle, where interests of any stakeholder groups are taken into consideration. The strategy covers all sectors of the economy, particularly - energy, transport, agriculture, residential sector, industrial sector (copper, cement, telecommunications and information technologies, textiles, chemicals). Accordingly, the components of the European Green Deal are:

- ✓ Increasing the EU's climate ambition for 2030 and 2050
- ✓ Supplying clean, affordable and secure energy
- ✓ Mobilising industry for a clean and circular economy
- ✓ Building and renovating in an energy and resource efficient way
- ✓ Accelerating the shift to sustainable and smart mobility
- ✓ From 'Farm to Fork': designing a fair, healthy and environmentally-friendly food system "
- ✓ Preserving and restoring ecosystems and biodiversity
- ✓ A zero pollution ambition for a toxic-free environment

At the same time, the strategic declarations in these areas are materialized through the relevant roadmap, which envisages the key actions and measures for developing and adopting appropriate strategies, action plans, research, legal regulation in each direction by 2020-2021 (primarily within 2020).

"20 results for 2020". Through the Declaration of the 5th Eastern Partnership Summit held in Brussels in November 2017, the 20 key results to be achieved by 2020 were set out, which are expected to have substantial benefits for the European Union and the six Eastern Partnership countries in terms of transparency and inclusion. The annex to the Declaration identifies the four

priority areas where the Parties undertake to record tangible results in the daily lives of their citizens. Stronger cohesion in the fields of transport and energy, as well as environmental and climate change are envisaged under the declared 3rd priority - Stronger Cohesion. In particular, the abovementioned priority will include, amongst other things, increasing energy efficiency and renewable energy use, reducing GHG emissions.

Comprehensive and Enhanced Partnership Agreement between the European Union and Armenia. The European agenda for climate, and in its context – energy sector mitigation policies, as of its current contents, is included in the Armenian agenda by the **EU-Armenia Comprehensive and Enhanced Partnership Agreement**, which was signed on November 24, 2017. In the framework of the revised European Neighborhood Policy and the Eastern Partnership, the new agreement replaces the EU-Armenia Partnership and Cooperation Agreement ratified in 1999. Thus, Chapter 4 of the Agreement is related to climate-related activities, under which a number of measures will be promoted by means of cooperation, in particular, related to:

- climate change mitigation,
- climate change adaptation,
- market and non-market mechanisms to address climate change issues;
- exploring, developing, demonstrating, deploying, transmitting and disseminating new, safe, sustainable and tailor-made innovative low-carbon technologies;
- incorporating climate change considerations in general and sectoral policies, and
- Awareness raising, training and education.

At the same time, it is stipulated that the cooperation shall pursue such objectives as:

- ✓ Actions aimed at fulfilling the commitments under Paris Agreement,
- ✓ Capacity-building measures aimed at taking effective actions on climate change;
- ✓ Developing an overall climate-related strategy and action plan for long-term climate change mitigation and adaptation;
- ✓ Developing vulnerability and adaptation assessments;
- ✓ Elaborating low carbon development plan,
- ✓ Developing and implementing long-term climate change mitigation measures by addressing the issue of GHG emission quotas;
- ✓ Measures towards the sale of carbon emissions quotas;
- ✓ Measures to promote the technology transfer process;
- ✓ Activities aimed at incorporating climate change considerations in general and sectoral policies
- ✓ Measures related to ozone depleting substances and gases containing fluoride.

In the context of trade and investment contributing to sustainable development, it is stipulated that the Parties seek to support the elimination of barriers to trade and investment in such products and services, which are of crucial importance in terms of climate change mitigation and adaptation, in particular, sustainable renewable energy and energy efficient products and services, including:

(i) by adopting a policy that promotes the use of the best available technologies;

(ii) by encouraging standards that meet environmental and economic needs;

(iii) by minimizing technical barriers to trade.

The chapter on Energy Cooperation (Part 5, Chapter 2) focuses on cooperation in the **use of renewable energy sources, promotion of energy efficiency and energy saving**.

For the implementation of the Comprehensive and Enhanced Partnership Agreement between the Republic of Armenia and the European Union and the European Atomic Energy Community and their Member States, the Prime Minister of the Republic of Armenia approved the relevant roadmap by the Decree N 666-L of June 1, 2019, by which 250 actions are stipulated.

In particular, specifically in the context of cooperation in the field of energy, 42 measures are envisaged, **34 of which cover the field of energy saving and energy efficiency**, **as well as alternative energy**. Majority of these measures (27) are aimed at developing new technical regulations at the EAEU or national level, and 6 are related to amendments and enforcement of legal regulations on standardization and certification.

The Roadmap also envisages 12 measures within the framework of climate change actions. These measures are mainly related to mitigation policy.

Mitigation policy framework in Armenia's energy sector development policy documents

The key document of Armenia's energy sector is the long-term development strategy. Its new, revised draft - "Strategic Development Program for the Armenian Energy Sector (up to 2040)" (Strategy) is currently underway, at the stage of discussion by the Government.

It is noteworthy that the Strategy should be developed based on fundamental principles embodied in the Government of Armenia program, which in particular stipulates a very clear agenda for energy sector. More specifically, as declared by the Government, the energy policy will be aimed at fostering energy independence and security of the country, facilitation of regional integration process, sustainable development of the energy sector based on comprehensive use of local primary (renewable) energy sources, further development of nuclear energy, diversification of energy supply and introduction of new and energy efficient technologies.

Government has planned initiatives and policy directions in the field include, in particular:

- ✓ The process of gradual liberalization of the electricity market;

- ✓ Development of legislative incentives for the implementation of contemporary high technologies, driving energy sector progress and elaboration of policies for the introduction of energy efficiency measures;
- ✓ Promoting the efficient use and development of renewable energy sources;
- ✓ Construction of solar power plants by 2022, whereby the share of these stations in the internal consumption structure to be expected to reach no less than 10%.

In general, the Government declares its intention to support further deployment of sustainable energy, in view of the requirement to introduce a system of energy management which will contribute to enhancing capacities and increasing efficiency of energy consumption by public and private sector, developing private-public cooperation opportunities at community level, strengthening cooperation with international institutions in an effort to promote mechanisms for energy efficiency and renewable energy use, as well as forming the scope of energy efficiency and long-term targets for renewable energy.

Based on the program objectives formulated by the Government of the Republic of Armenia, the Draft Strategic Plan reflect the long-term (2040) vision of the energy sector by "clean and energy-saving sustainable development" objective. It is noteworthy that two of the 5 key development priorities are specifically targeted towards mitigation policy and one priority, in particular has a significant effect in terms of:

- **Maximized use of renewable energy potential**

  Maximized use of renewable energy potential, especially in view of the fact that it is part of a least cost electricity generation capacity development plan, is one of the key priorities for the development of the energy sector. The construction of solar power plants, which are the most economically feasible for Armenia's conditions, given the resources available and technology development trends worldwide, will take precedence over the other types, taking into consideration the constraints imposed by the system's reliability and security indicators.

- **Full utilization of energy saving potential**

  All sectors of the Armenian economy have ample potential for energy saving, including transport, production, multi-apartment buildings, the public sector, fuel and energy systems etc. The Government of the Republic of Armenia strives to consistently pursue the deployment of a new energy saving culture, and to that end, it aims to implement institutional reforms, promoting investment in energy saving and increasing accountability.

- **Gradual liberalization of the electricity market**

  The current model of the Armenian electricity market has been in effect since 2004 and is based on the "sole buyer (seller)" principle, according to which the holder of electricity distribution license is authorized to purchase electricity from the power stations and sell it to consumers. In several developed and developing countries, electricity markets are already liberalized. Armenia has also launched this process and is planning to make transition to a

new liberalized market model in the coming years, which, although carrying some constraints for competition, yet will have a clear roadmap towards full liberalization, given the process of the EAEU common energy market formation and the EU Comprehensive and Enhanced Partnership Agreement.

The strategy stipulates that the operational life of the **nuclear power plant** will be prolonged to 2026 by implementing the relevant investment program. At the same time, it is envisaged that if as a result of relevant studies, the safe operation of the nuclear power plant would be justified beyond 2026 too, the government intends to prolong its operation until 2036. Leaving aside the geopolitical, financial, and security considerations of the issue, it is noteworthy that the Strategy emphasizes its climate impact, noting that **"... only with the existence of a nuclear power plant in the system it becomes possible to achieve the lowest possible greenhouse gas emission levels."** At the same time, the Strategy stipulates that after the end of the nuclear power plant's operating life (including its extensions), the option of building a lower capacity power block on the existing power plant platform is under consideration, which on one hand will definitely contribute to lessening Armenia's dependence on imported natural gas, while it may also presumably diminish the emissions reduction potential.

Findings of research covering OECD countries indicate that rising **fossil energy prices** contribute to decarbonization. In this context, the following observation envisaged by Strategy is remarkable: "As concerns possible changes in the price of imported natural gas by 2040, should such increase materialize, the costs of the overall energy system can be brought down by maximizing the potential of solar and wind power plants."

The Strategy contains several statements from the perspective of maximizing approximation to European energy policy. In particular, it is envisaged that the liberalization of the electricity market will require the transition to a **new market model**, which will be implemented over the next few years, with long-term targeting to full market liberalization. The new market model will at this stage be based on modern electricity trading rules, operate through supply and demand balancing, and will define market participants' accountability mechanisms during trade. This first phase of reforms will be followed by the development of a new RA Law on Electra energy, which will take into account the requirements of the EU directives, thereby marking the launch of the second phase of reforms. During this phase of reforms, opportunities for a fully competitive market formation will be considered.

At the same time, in the context of the regional energy cooperation it is also stated that "Armenia, being a member of the EAEU, participates in the formation of the EAEU common energy market. At the same time, Armenia has concluded a Comprehensive and Enhanced Partnership Agreement with the European Union, which envisages the gradual introduction of European Union energy directives."

Moreover, with reference to the EU CEPA Roadmap, the Strategy stipulates that as a result of the approximation to EU directives and regulations, a new set of incentive tools will be introduced for the **use of renewable energy sources**, thereby attracting new players in the market. It is envisaged that **new standards of energy efficiency and energy saving will be set**, **including in energy labeling**

and eco-design. These approximations are planned to be implemented within the upcoming ten-year period, thereby giving new impetus to the state policy carried out in the field of energy saving and energy efficiency (buildings and structures, energy consuming equipment and transportation means), which will significantly reduce internal energy consumption levels.

Another evidence of Strategy's orientation towards mitigation policy is a separate section dedicated to **energy saving**, which specifically highlights that the Government of the Republic of Armenia considers energy saving as a national priority in terms of energy security, economic competitiveness and reduction of negative impact on the environment. However, it should also be noted that the section mainly outlines the benefits of energy saving in general, and in terms of the policy to be implemented, it merely refers to the development of National Energy Efficiency and Renewable Energy Program of the Republic of Armenia for 2021-2030.

In the context of the management of state-owned companies, the Strategy sets out the goal of developing renewable and energy-saving production, whereby **maximum utilization of alternative energy sources (wind power plants, solar photovoltaic plants)** is envisaged with the introduction of a new management model.

Finally, in the event of implementation of the Strategy and ensuring appropriate investment flows, the document stipulates expectations by 2040, which, in particular, include:

- **Economically feasible and efficient use of renewable energy resources** in accordance with all environmental standards. Take efforts towards maximizing renewable energy share in the energy balance, with at least 10% to be attributed to solar energy.
- **Large-scale implementation of energy saving and energy efficiency measures**, introduction of energy saving and energy efficient technologies in the transition to a green and knowledge-based economy.
- **Liberalized electricity market** based on the best international models.
- **Development of nuclear energy for peaceful purposes**, in particular, the construction of new nuclear power block(s) in Armenia.

Mitigation strategies in agriculture

Agriculture is the second largest sector on the GHG inventory in terms of emissions. For comprehensive understanding and adequate response to climate change impacts on agriculture, it should be considered that there are two main areas of policy intervention. The first strategy is to reduce the magnitude and pace of climate change itself, by reducing GHG emissions, i.e. the anthropogenic causes of climate change. The second (complementary) option is to develop climate change adaptation capacities in order to reduce the impact and be able to fully benefit from emerging opportunities. Moreover, adaptation efforts may also include a possible response to the effects of climate change (potential market impact, shifts in comparative advantages, increased migration levels, etc.) elsewhere in the world, or of mitigation actions (increased biofuel production or changes in land use).

Numerous approaches can be applied to reduce GHG emissions related to agricultural and livestock products. There are many alternative intervention options for each source of emissions, and the efficiency of each is determined by the particular system of agriculture. Interventions aiming to mitigate severity of production emissions are generally in concordance with increased productivity and/or savings perspectives and are therefore in the best interests of agricultural businesses. Nevertheless, emission-boosting practices also carry environmental risks or entail social compromises. In other cases, while mitigation measures may not have direct impact on productivity, yet they may provide opportunities to address other issues, such as improved water quality through good management of manure stock.

In general, in terms of the supply in the field of agriculture, mitigation strategies can be outlines as follows:

- Sustainable intensification
- Improved nitrogen fertilizer management
- Reduction of emissions from enteric fermentation
- Sequestering carbon in agricultural systems
- Manure management
- Forest emission reductions and forest carbon sequestration

Sustainable intensification

It is well known that agricultural yields may be improved either through expanding production or through production intensification (intake). In terms of mitigation effectiveness, intensification is more preferred option. Thus, intensification diminishes the magnitude of agricultural emissions. Intensification implies "more output with less resources" leading to more efficient use of investment. Traditional intensification practices are usually based on changes or direct incremental investments such as improved species/breeds, agrochemicals, water, machinery. The expansion can cause significant increase in emissions, particularly as a result of the conversion of soil using large carbon reserves, especially in view of poor forest management. However, in some cases, expansion

may be beneficial, for example, when the expansion is exercised by means of degraded lands use. On the other hand, intensification usually increases the emissions effect (lower emissions per unit of output). With good management practices, intensification may circumvent land conversion as larger agricultural production may be deployed on the given land area. In practice, intensification and expansion are applied as combination options. Applications of intensification are complex, and its drivers should be carefully evaluated to avoid possible disruption. Most efficient production methods may lead to reduced investment costs and higher rates of return, thereby encouraging the business to expand land use or production. This is known as the rebound effect of intensification. This level in its turn depends on a number of factors - elasticity of demand and price, availability of additional land, prices, etc.

Thus, the strategy of sustainable intensification is generally geared to meet the growing demand through acceptable agricultural productivity while maintaining social, environmental and behavioral sustainability standards.

CO - BENEFITS	TRADE - OFFS
Food safety Contributing to food availability, sustainability and improved nutrition.	**Long-term risks** Structural Vulnerability: Reliance on modern inputs (agrochemicals, fewer species, energy) accompanied by social (loss of habitats, diminished cultural and social values) and environmental (biodiversity, animal loss) compromises which threaten the sustainability of global agriculture.
Economic development New opportunities for economic development. In particular, intensification within inefficient systems can contribute to increased rates of return for businesses profitability and improved living conditions.	**Social and economic exclusion** Significant socio-economic and cultural implications, especially when the majority of the population depends on an extensive, inefficient agricultural system in the context of their employment, livelihoods, social security, cultural traditions.
Environmental quality Alleviating the pressure on land, forests and natural resources, the benefits of which may have larger than merely local significance.	**Environmental Degradation** Excessive use of technology solutions can have serious inadvertent effects on the environment (groundwater pollution due to abuse of fertilizers, adverse effects from manure accumulation, and antibiotic-induced adverse global effects on health).

Improved nitrogen fertilizer management

The basic approach to good management over the use of fertilizers is the adequate use of nitrogen by ensuring coherence between the nitrogen fertilizer supply and the crop's nitrogen demand. In this regard, the following are essential factors: 1) quantity (supply to the plant's absorption capacity), 2) timing (supply when the plant needs to be supplied), 3) type (required nutrition balance), 4) location (supply where the plant can uptake it undisrupted, such as injecting into the soil and closer to the root, rather than scattering). These practices, although not very costly, yet are

knowledge-consuming and often resource-consuming, too. There are many technologies and tools that can ensure efficient use of nitrogen. In particular:

1. **Plant breeding and genetic modification** to increase nitrogen uptake by the plant to yield the same harvest with less fertilizer used.

2. **Better estimates and usage of organic fertilizer** to make the agricultural system less dependent on external instilments. At the same time, it is not desirable to underestimate the effect of nitrogen instilments.

3. **Intervention management decision support tools** (time, degree, type). These tools range from region-specific consulting to computerized models with, e.g. management through mobile devices.

4. **Regular soil testing** to develop a suitable nitrogen management plan. This process can be organized at the regional level, providing appropriate consultations are available.

5. **Technologically advanced fertilizers**. For example, these can be a slow-release fertilizer that regulates nutrient transfer by preventing duplication of uptake, as well as nitrification inhibitors, which slow down the degradation of nitrogenous fertilizer so that chemical elements remain active and accessible to the plant over a longer period. Newer-generation fertilizers are as a rule more expensive and are generally viewed as second-stage technology after initial considerations (time and degree) have already been put to use. In addition to the misuse and fertilizer management challenges, synthetic fertilizers are also a major source of GHG emissions and air pollution, as their production consumes a considerable amount of energy as well as fossil fuels used as raw materials. Significant improvement can be achieved in production, by fostering efficient productivity. They are usually costly solutions; however, they can lead to increased productivity, which is in the best of interests for both producers and the government.

CO - BENEFITS	TRADE - OFFS
Cost efficiency Increasing fertilizer use along with production efficiency reduces capital costs	**Potentially less harvest yield** Businesses accept the informed risk of potentially less harvest yield due to reduced nutrition. This will happen when nutrition level is less than optimal.
Increase in yield Optimal use of fertilizer contributes to long-term yield on soil.	**Potential shortage of workforce and capacities** Changes in fertilizer management practices may require additional workforce and technical knowledge
Reduced pollution Increased nitrogen availability in the vegetation system reduces environmental leakage and contamination of surface and groundwaters. Moreover, less demand for synthetic fertilizer and improved fertilizer production leads to reduced air pollution.	**Special inputs** Often, identifying the right type of fertilizer can be a challenging task.

Improved health safety
High quality of air and water as a result of fertilizer management and production safeguards, leads to improvement of health safety and reduced public health costs.

Reduction of emissions from enteric fermentations

Intestinal fermentation is part of the digestive process in herbivorous animals. Their four-chamber stomach with complex microbial environment allows them to digest complex carbohydrates, resulting in production of methane as an auxiliary product. In 2016, methane emissions from intestinal fermentation of agricultural animals accounted for 53.1% of total emissions attributable to "Agriculture" sub-sector. At the same time, the major part, 90%, of methane emissions from the intestinal fermentation of agricultural animals is attributed to large cattle.

There are three ways to reduce intestinal fermentation.

1. **Improving feeding practices**. Feed processing and supplementation of dietary structure by grain concentrates are effective ways to improve digestion and rapid growth of livestock. These are the most popular methods of intervention because they are typically low tech, low cost, low risk and at the same time ensure productivity growth.

2. **Supplements and additives**. These interventions may contribute to reducing methane production by altering the microbiological environment in the stomach. This option is particularly characteristic for highly efficient systems where the animal relocations are restricted at least at a certain phase, as the basic diets in this system are already optimized and it can be challenging to supply supplements in pastures. This intervention carries some potential but still requires further research and/or it may not prove to be cost effective.

3. **Herd management and breeding**. Optimizing the health and reproductive capacity of the herds can reduce the number of livestock required for production in herds. Interventions can be manifested through the prevention of major diseases, effective maintenance of barns and supply of high-quality breeds. After all, the optimal method of reducing intestinal fermentation emissions is to reduce grazing populations. When livestock are kept for non-rearing purposes or for purposes other than meat production, their life expectancy is significantly prolonged. When the livestock is kept long enough to reach the slaughter weight, the per-unit emission attributable to that animal increases, furthermore, the entire flock is forced to maintain full volume of output. Feeding and herd management practices target a lower level of livestock required to ensure a given level of production. Since this intervention option is in line with the objective of increased productivity, for many livestock populations the reduction of intestinal emissions contains significant potential for cost-effective mitigation in agriculture.

CO - BENEFITS	TRADE - OFFS
Productivity and profitability Improved efficiency contributes to productivity growth and open opportunities for smallholder farms.	**Mirror effect** Improvements are likely lead to a mirror effect, resulting in reduced production costs and high profitability which in its turn leads to production expansion, often accompanied by various negative side effects, such as deforestation.
Health and reproduction Nutrition targeting Improves livestock health and reproduction, and hence improves overall livestock production and livelihood.	**GHG emissions** Some practices, such as pasture fertilization, may become the source of additional GHG emissions or other environmental impacts, such as competition with other forms of biomass utilization.
Food safety and quality Increased efficiency contributes to meeting growing demand, especially for smallholder livestock farms.	
Other environmental benefits High level of productivity can have a positive environmental impact, such as less land degradation, less pressure on forests and other resources.	

Sequestering carbon in agricultural systems

Soil absorbs huge amounts of carbon. A number of soil and crop management practices exist which can increase organic carbon content in agricultural soils. Agricultural carbon stocks can also be formed by ground biomass. This method comprises three main directions:

1. **Carbon management in plant systems.** There are two ways of expanding carbon reserves in arable lands: 1) protect the resources available in the system by reducing erosion and slowing down decomposition of organic matter; 2) increase the amount of carbon in the system. The preliminary method for the first approach is to reduce the frequency of plowing the land. Another option is to introduce erosion control practices, such as stratification, outlining, vegetation. The most common approach under the second option is to leave plant residues on the soil surface. Alternative options include ensuring availability of perennial plants, the use of biochar, or the use of fertilizers.

2. **Agroforestry**. This is an intensive land management system that combines terrestrial biomass with plants and livestock breeding (tree planting in pastures, forestry).

3. **Improvement of carbon storage in pastures**. Carbon storage in pastures can be protected and expanded through various measures that also promote pasture productivity (timing, rotation, grass cover types, use of biochar, fertilizers, and irrigation).

CO - BENEFITS	TRADE - OFFS
Food safety Improvement of soil organic matter contributes to higher soil productivity, reduces erosion, enables moisture retention and crop growth	**An alternative to using biomass** Biomass sources often have alternative uses: fuel for households, forage
Climate Resilience Better organic structure of soil contributes to higher resilience of agricultural lands to climate change. In particular, soil's high moisture retention feature helps to sustain soil resilience in dry conditions.	**Movement / Replacement** Processes (such as the expanded use of perennial plants) can replace the primary plants, which may result in reduced crop yields and indirectly contribute to change in targeted land use.
	Uncertainties and MRV Challenges There are no cost-effective means of recording carbon stocks in the soil as well as their changes over time.
	Reversibility Even if carbon is absorbed, there is no guarantee it will be retained by soil over a long period.

Manure management

Cattle are the main source of emissions in livestock breeding, yet they have less share in the manure stock, as they spend most of their pastime in grazing. Major part of manure stock is attributed to mostly monogastric animals (animals with single-chambered stomach, e.g. pigs, chickens). Although manure may be an effective and nutritious source for plants and pastures, however, when livestock is highly industrialized and geographically concentrated, existing soils will not be sufficient to absorb the manure generated. As a result, they often trigger water and air pollution, as well as become a source of GHG emissions. Although the primary mitigation option for the accumulated manure is anaerobic digestion, which is highly technological and costly, there are other, less technology-consuming and less costly alternatives.

1. **More efficient use of manure as a source of energy and nutrition for crops**. With adequate planning, proper manure management can reduce the need for synthetic fertilizers, replace fossil fuel, become a profitable business, increase arable land and pasture yields. The most common mitigation practices for accumulated manure consist in the use of methane or anaerobic autoclaves, which convert manure into electricity or natural gas. These autoclaves, however, are quite expensive and as a rule, not profitable for businesses unless there are special incentives envisaged under current policy.

2. **Storage and handling practices**. Emissions from stored manure can be substantially reduced in a number of ways, including reduced shelf life, manure covering, straw removal, deployment of waste management systems, etc. Although these measures are low technology and low cost, yet they are often resource-consuming and time-consuming. Therefore, there is a need for additional incentives to help increase productivity.

3. **Dietary change.** Changes in livestock diets (balanced protein, tannin and other nutritional supplements) can affect the volume and composition of manure, thereby contributing to reduced level of emissions. These too may require special incentives as they are not within business interests in terms of economic profitability.

4. **Diversified farming system**. For medium-scale diversified agricultural farms that combine crop and livestock breeding, it may be more efficient to derive benefits from manure. With good management, use of manure will increase productivity and reduce demand for nitrogen fertilizers.

In many countries, improved manure management was achieved by means of adequate environmental regulations. However, since manure has potential to create surplus value (electricity, fuel, fertilizer) and moreover, it embodies environmental and health benefits, combined introduction of regulatory measures and economic incentives may provide the best result.

CO - BENEFITS	TRADE - OFFS
Less environmental degradation Improved manure management reduces surface and groundwater contamination as well as air pollution.	**Cost of interventions** Mitigation costs are not covered by the benefits of increased livestock production, as manure is the ancillary effect of livestock breeding. Consequently, there is a demand for markets of potential manure transformations (electricity, fuel, fertilizer).
Health Improvements Improved manure management reduces odor and decreases health risks associated with pathogen transmission.	**Workforce and technological requirements** Labor-intensiveness, current level of access to technology and technical knowledge hinder progress.
Power source Manure can become a source of bioenergy.	
Source of fertilizer An opportunity to replace synthetic fertilizers.	

Forest emission reductions and forest carbon sequestration

Agro-ecosystems, particularly forestry and the crops sub-sector, are considered the most vulnerable to climate change. Almost 90 percent of countries in the Southern-Eastern Europa and Central Asia region prioritize adaptation in the agriculture sectors, particularly around forestry. At the same time, 60 percent of countries prioritize mitigation options on forestland. As it has been mentioned above, in terms of mitigation effectiveness, intensification tends to be preferable to expansion. Expansion can cause substantial emissions from the conversion of land with high carbon stocks, especially in forested areas with weak governance. Relevant activities, such as the restoration of degraded lands, afforestation and the reduction of emissions from deforestation should be included in any land use related mitigation strategy. Substantial emissions reductions are possible by reducing land use change driven by the conversion of forests to agricultural lands. These emissions reductions should be possible, in theory, through sustainable intensification of agricultural lands combined with strong

forest conservation policies. Across mitigation and adaptation options, afforestation/ reforestation is the most prevalent, as increases in above and below ground biomass can sequester carbon from the atmosphere on one hand and prevent erosion and reduce floods on the other. With floods and landslides amongst the most reported climate-related hazards in all sub-regions, as well as pest and disease incidence in forests amongst observed and/or expected climate impacts, it is not a surprise that ecosystem management, conservation and restoration activities in forest and woodland ecosystems is the most prioritized adaptation measure outside of farming systems. Enhancing forest cover in combination with sustainable forest management can address the GHG hotspots, climate-related vulnerabilities and policy gaps, including forest degradation, forest biomass burning, vulnerable forest ecosystems and pest and disease incidence in forest ecosystems.

As it was noted, mitigation strategies aimed at reducing emissions from agriculture have been considered from the supply perspective. However, demand-driven strategies evidently carry significant potential. Demand-oriented approaches have become increasingly popular globally, which is also gradually reflected in Armenian realities. Obvious conclusion called for is that one strategy in isolation cannot address the entire potential of mitigation in the field of agriculture. GHG emission reductions (supply) and consumption behavior shifts (demand) are the key pillars of the strategy. Naturally, there are also many cross-intersecting policies that foster new approaches and innovations.

Addressing mitigation in Armenian agricultural development documents from strategic and programmatic perspective

Mitigation strategies are addressed to the extent that they concur with issues of increased effectiveness.

In the “Strategy directions for economic development of the Republic of Armenia Agriculture Sector for 2020-2030” (Strategy) and in the “Livestock farming development program of the Republic of Armenia for 2019-2024” (Program) mitigation goals aimed at GHG reduction are not explicitly stated as such. Where specific emphasis and focus has been made in the context of climate change, they relate to policies for increasing resilience or adaptation policies in the sector or sub-sector. Existing concurrences with mitigation strategies are a consequence of addressing the goals of increasing efficiency, which although adds value, yet does not constitute adequate targeting in terms of emission reduction policy.

Thus, the **ten-year vision** of the Strategy directly stipulates adaptation to climate change and, at the same time, as a result of sectoral developments, it expects to have "... a happy and prosperous rural population living in harmony with environment..." which may presumably be achieved given the low-emission development prospects. In the context of the program, the objective is set differently. The formulated purpose of the program is to provide affordable conditions to livestock farmers in the RA, in particular by supply of breeding cattle at partially subsidized interest rates, which will motivate the farmers to replace cattle of unknown ancestry, or low-reproductive, low-yielding animals in herds by pedigree cattle with economically valuable features, develop the breeding, improving the local animal yields through interbreeding practices, to increase milk and meat production, reduce cost of milk and meat production, and eventually making it more competitive against imported similar products.

From the supply perspective, the *objective* of the Program directly correlates with the potential option of reducing emissions from intestinal fermentation, namely - improved herd management.

As noted above, this is definitely the case when emission reduction practices are in line with the goal of increasing efficiency, and thus beneficial to all parties. However, it should be borne in mind that the consideration pertains to emission reductions per unit, whereas the Program estimates gross product output from livestock breeding to be highly inadequate and targets to achieve a substantial increase in livestock headcount. In addition, as stated in the Program, during the period 2013-2018 a total of 2,195 heads of pedigree cattle was imported into the country, which constitutes around 49% of the total cattle headcount imported into the country during the same period. The maximum number of cattle imported in the country in the given time period is attributed to the year 2013 (705 heads) and the lowest number is recorded in 2014 (65 heads). The program targets for the period 2019-2024 to have imported 9960 heads of cattle. In other words, on the one hand, increase of livestock headcount is envisaged, on the other hand, gradual intensification of livestock breeding sector is expected. **This means that while the number of emissions may decrease on per unit count, it will still record increase in total count, quantitative assessment of which will require additional analysis.**

***Strategic principles, priorities, and program challenges* very incompletely and indirectly address mitigation components.**

The core principles on which the Strategy is based, have certain potential in terms of the policy instruments stipulated in concordance with GFG emissions reduction practices. In particular, the 1st Principle (Aggregation) which refers to supporting the consolidation of smallholder farms and fragmented value chains through the reduction of non- cultivated land and improvement of farming practices. The 2nd Principle (Commercialization) emphasizes the development of intensive gardening. The 6th Principle (Climate Change Adaptation, Resilience and Environmental Sustainability) has specific address, with directly emphasizing the formulation of "... functions related to sustainable use of mitigation resources ...". However, the interpretation of this principle also has an underlying context relevant for adaptation: awareness-raising, monitoring, application of "smart" farming practices, circulation of species with varied maturity and drought-tolerant species, as well as introduction of best practices in water and land management. There are also indirect interrelations stipulated in terms of the priorities declared by the Strategy, which contain elements of mitigation, in particular **encouraging intensification, capacity building and diversification of activities**. Among the identified challenges, a specific focus is made to the qualitative features of the land. In particular, it is stated that after privatization, the land was mainly cultivated without adherence to agrochemical rules, with predominantly prevailing unilateral fertilization and absence of scientifically-supported crop cultivation practices, which resulted in deterioration of soil quality and fertility, crop yields, and crop resilience, as well as yield quality. The program already stipulates that "the majority of livestock in the herd is of low breeding value", whereby the difficulties associated with breeding and rearing herds of high-yield pedigree cattle are characterized as mainly due to the "high cost of livestock, inadequate level of assets owned by livestock breeding farmers, high interest rates on loans, lack of animal insurance and animal collateral mechanisms, sharp fluctuations in livestock production and feed prices".

However, in order to fully disclose the potential for emission reductions in the sectoral policy documents in question, we need to take into consideration the set of measures to address the objectives specified under the set priorities. Thus, it can be assumed that some measures envisaged under the identified seven priorities and policy areas have some degree of overlap with mitigation strategies and mechanisms in the agricultural sector. In particular, the following may be distinguished as such:

- Under the **land reform** a targeted policy is envisaged to address the issue of deserted land. Given that degraded soils will also be included in the scope of deserted soils, the policy may contribute to the reduction of emissions (see *Sustainable Intensification*).

- The policy of **improving the quality of seeds and seedlings, promoting modern livestock breeding** is coherent with the concept of intensification, herd management and breeding practices (*see Sustainable Intensification, Reduction of emissions from intestinal fermentation*).

- Addressing **the sustainable development of organic farming** implies the design and improvement of infrastructures that are particularly in demand in terms of effective

implementation of "Nitrogen Fertilizer Management" and "Intestinal Fermentation Reduction" strategies.

- Targeting **human and institutional capacity building in the agricultural sector**, which implies providing agricultural advice, including in relation to innovations and up-to-date technologies, can help to record developments across *all five mitigation strategies.*

- **In the framework of support for sustainable development of rural communities,** it is planned to develop voluntary programs to promote good agricultural practices among agricultural producers and consultants. The latter will be related to soil erosion, soil organic matter, soil structure, minimum level of protection. In this context, it is possible to anticipate realization of some potential for emission reduction through the *"Improvement of Nitrogen Fertilizer Management"* and *"Carbon Capture in Agricultural Systems"* mitigation strategies.

- Under the priority formulated as **promoting digital agriculture and technological innovation,** several issues are emphasized, in particular: "majority of agricultural innovations are not digital in nature, e.g. different types of biotechnology (e.g. improved species), chemicals (e.g. new pesticides/herbicides), energy (e.g., autonomous solar grid systems), materiology (e.g., building material used for greenhouse construction), crop protection (e.g. anti-hail grids) and innovations in the field of land cultivation (for example, landless, no-till and vertical cultivation systems). " The solutions envisaged in these areas may contribute to the implementation of *"Sustainable Intensification", "Improvement of Nitrogen Fertilizer Management"* and *"Carbon Capture in Agricultural Systems"* practices.

GHG emission reductions practices in the context of priorities set out by the Strategy and underlying measures envisaged are expressed through highly incidental and indirect impact channels.

At the same time, the Government implements nine annual state assistance programs (including the Program), of which 3 can be singled out (4, 5, 7) in terms of emission reduction potential. The possible impact of other programs is circumstantial, and mainly conditioned by the ancillary effects of increased efficiency and infrastructure development.

1. **Agriculture loans interest rates subsidizing Program**: It is aimed at lending coverage for development programs implemented in the agri-food sector across all communities of Armenia.

2. **State assistance program on financial leasing of agricultural machinery in the Republic of Armenia,** within the framework of which the farmers have the opportunity to obtain new agricultural machinery and equipment under leasing terms.

3. **State assistance program on financial leasing of agri-food equipment in the Republic of Armenia**, within the framework of which individuals, private entrepreneurs and legal entities, including agro-economic cooperatives, operating in the agricultural farming sector, have the opportunity have the opportunity to obtain required machinery and equipment under leasing terms.

4. **State assistance program for the construction or reconstruction of small and medium-sized smart barns and their technological refurbishment**, which offers 2 options of unbounded box-supported livestock barns and their technological refurbishment: lightweight construction livestock barns and other types of livestock barns.

5. **2019-2024 cattle breeding program for the Republic of Armenia**. The program is aimed at creating affordable lending conditions to livestock farmers in the Republic of Armenia, in particular by providing partial subsidies for the interest on loans received with the purpose of buying pedigree cattle. Within the framework of the project, farmers have the opportunity to acquire pedigree cattle locally or import it.

6. **Program for subsidizing interest rates on loans for procurement (purchase) of agricultural raw materials.** Under program on subsidizing the loan interest, targeted loans are provided to fruit and vegetable, grape and milk producers for the purpose of launching procurement processes, including for making prepayments.

7. **State support program for the establishment of intensive fruit orchards and vineyards, developed in Armenia with the use of modern technologies.** A subsidized loan or partial reimbursement of expenses is anticipated.

8. **Subsidy program for interest payments on loans provided for the introduction of hail protection grids in the RA.** The project framework envisages subsidizing interest on targeted loans for the introduction of hail-protection grids in orchards and vineyards.

9. **Co-financing program for introduction of modern irrigation systems.** Is it envisaged to provide subsidized loans or reimburse costs incurred by beneficiaries for the introduction of modern irrigation systems in areas cultivated by agricultural crop types (with the exception of hothouses and greenhouses). At the discretion of the beneficiary, drip or rain systems (waylaying pipe, head unit and distribution network) can be installed either by using contractor resources or by the beneficiaries on their own resources.

OPPORTUNITIES FOR LEDS TARGETING IN SECTOR STRATEGIES

Considerations for integrating Low-Emissions Development Strategy into energy sector policy

In this section, based on the European Energy Strategic Framework and stipulated policy mechanism, as well as considering the impact assessments of decarbonization methods in terms of above-mentioned OECD countries, we will make an attempt to identify to the extent possible, the gaps in Armenia's energy sector strategy documents from the point of view of approximation to European clean energy practices, and to identify policy mechanisms from the point of view of establishing a model that is approximated to the maximum possible extent to the European framework.

Essentially, the Comprehensive and Enhanced Partnership Agreement between the EU and the European Atomic Energy Community and their Member States, as well as the roadmap adopted for its implementation, constitute the mechanism through which the European Clean Energy Agenda is incorporated into an Armenian agenda. Accordingly, the following is a comparative table of policy priorities and tools in the light of European framework, the aforementioned agreement and the strategic approaches adopted by the Government of the Republic of Armenia.

Table 1. EU/RA comparative snapshot of clean energy policies

European strategic framework	EU-RA CEPA commitments / *roadmap*	RA energy sector policy
ENERGY PERFORMANCE OF BUILDINGS - **National roadmap on buildings' decarbonization** - **Smarter buildings (automated efficiency and monitoring systems)** - **Measure a building's capacity to use new technologies and electronic systems to adapt to the needs** - **E-mobility in buildings (e.g e-charging points)** - **Support and investment towards renovation of buildings** - **Combating energy poverty and reduction of electricity fees by means of renovation and improvement of performance in old buildings**	○ *Paragraph 58 states that the Law of the Republic of Armenia "On Energy Conservation and Renewable Energy" includes the requirement; "Technical Regulation on energy conservation and energy efficiency in the new residential building under construction, as well as in facilities constructed (reconstructed, renovated) at the expense of state funds" was adopted by the Government of the Republic of Armenia Decree N 426-N dated April 12, 2018.* ○ *Paragraphs 59 and 60 state that by Decree N 426-N dated April 12, 2018 the Government of the Republic of Armenia instructed the Ministry of Economic Development and Investments of the Republic of Armenia and the Urban Development Committee of the Republic of Armenia to develop and implement within twelve-month period normative technical documents, standards and template of compliance certificates to ensure energy efficiency of buildings (Energy Efficiency Certificate) and assessment of their performance indicators, together with the instructions for filling out the form.*	**HEATING SUPPLY OF BUILDINGS** - The government plans to gradually expand the implementation of such programs, encouraging that each building is equipped with its own heating and hot water production system, based on renewable energy resources. - In terms of heating supply and hot water production, solar water heaters and other individual systems using renewable energy sources for the production of energy for own needs may be a viable alternative to individual heating boilers. **ENERGY CONSERVATION IN BUILDINGS** - Consumption of energy for heating residential and public buildings can be reduced by at least 40% by means of efficient thermal insulation.
RENEWABLE ENERGY (target 2030 – RE portion - 32%) - **provides long-term certainty for investors and speeds up procedures to receive permits for projects** - **puts the consumer at the centre of the energy transition with a clear right to produce own renewable energy** - **increases competition and market integration of renewable electricity** - **accelerates the uptake of renewables in the heating/cooling and transport sectors** - **strengthens the sustainability of bio-energy and promotes innovative technologies**	- Promoting the use of renewable energy sources - Elimination of barriers to trade and investment in renewable energy products and services (technology transfer, development of standards, removal of technical barriers to trade) ○ *New legislative and sub-legislative regulations to promote the use of environmentally friendly and energy efficient motor transport*	**Renewable energy potential unleashed to its maximum capacity, as one of the key strategic priorities** - Development of a legislative framework for the provision of access to virtual power grids, which should allow remote interconnection of small-scale producers, including consumers, who have installed solar and wind power generating plants to meet their own needs, to sell electricity in the wholesale market, on equal footing with system- level grids. - Ensure the increase of the renewable energy share in the energy balance to maximum possible extent, whereby at least 10% should be contributed to solar energy - Each building should be equipped with its own heating and hot water production system based on renewable energy resources

		- Gradual penetration of electric cars can be encouraged, in particular, with exclusive use of solar and wind power - New incentive tools will be introduced for the use of renewable energy sources, because of which new players will enter the market.
ENERGY EFFICIENCY (Target by 2030 - 32.5%) - **reduced energy consumption for households and businesses – thereby lowering energy bills** - **lower consumption, making Europe less reliant on energy imports** - **incentives for producers/manufacturers to use new technologies and innovate** - **more investment, for example in the building sector, thereby creating jobs** - **clearer information in household bills**	- Promoting energy efficiency and energy conservation - Elimination of barriers to trade and investment in energy-efficient products and services (technology transfer, development of standards, removal of technical barriers to trade) o *Amendments to a set of legal acts aimed at encouraging energy conservation projects, including the construction of combined-cycle power plants and thermal power plants,* o *Paragraphs 62-68: approximation is achieved by means of the adoption of the draft EEU Technical Regulation "On Energy Efficiency Requirements for Energy Consumption Equipment". EAEU TR Project passed the EAEC collegial approval phase by Order N 118 dated 17.07.2018.* o *Paragraphs 69-88; Development of new technical regulations at EAEU or national level.*	**Realization of renewable energy potential to its maximum capacity, as one of the key strategic priorities** - Forming a new EE culture by implementing institutional changes, stimulating investment in the EC and increasing accountability - Large-scale implementation of EE and EC measures - Introduction of EC and EE technologies in the transition to a green and knowledge-based economy - The EC as a means to enhanced energy security of the country, achieving higher level of economic competitiveness and reduction of negative impact on the environment. - Promote energy conservation in all sectors of the economy. - TIMES Armenia platform allows for the least cost optimization to select the most efficient model for use of resources and technology implementation - New EE and EC standards will be established, including in energy labeling and eco-labeling. EU approximations envisaged to be implemented in the next 10 years, giving new impetus to the state policy in EE and EC sectors (buildings and structures, energy-consuming equipment and transport facilities) that will significantly reduce the levels of internal energy consumption.
GOVERNANCE (National 10-Year Energy and Climate Plans) - **cover all dimensions of the energy union, including energy security, the internal market, inter-connections, and research, innovation and competitiveness** - **ensure a transparent and coordinated planning, reporting and monitoring process, and promote**	- Energy strategies and policies, including those aimed to promoting energy security and diversity of energy suppliers and energy production - Enhanced energy security, including by promoting the diversification of energy sources and their transmission routes - Development of competitive energy markets - Promotion of regional cooperation around integration of energy and regional markets - Pricing policies, transit and transmission, in particular, a comprehensive cost-based energy transfer system and, where	- Development of a National Energy Efficiency and Renewable Energy Program of the Republic of Armenia for 2021-2030, which should be driven by considerations related to economic and energy security, enhanced level of energy system reliability, strengthening economic and energy independence, establishment of new industries and setup of services that promote energy efficiency and development of renewable energy, as well as reduction of the homogeneous impact on the environment and human health

closer cooperation between EU countries in these areas - **offer more clarity and predictability to unlock clean energy investments across the EU** - **ensure consistent reporting**	necessary, further adjustments to the availability of hydrocarbon reserves, as deemed appropriate. - Scientific and technical cooperation, including the exchange of information in the areas of technologies development and improvement in energy production, transmission, supply and end-use, with particular focus on energy efficient and environmentally friendly technologies o *Amendments to a number of legal acts aimed at creating a competitive market in the RA energy sector, encouraging competition, ensuring non-discriminatory market entry opportunities, segregation of system operators, strengthening the independent role of the regulator, and further elaboration of regulatory tools in line with the development of the competitive market.*	- Elaboration of a new prospective development plan for the Armenian power system to identify power system development measures for a 10-year period (planned for 2nd half of 2021) - Regional and EU cooperation
REGULATION OF POWER MARKET (more flexible, more market-oriented, more favorable for inclusion of larger share of renewable resources) - **Providing the Consumers with debriefs containing key contractual terms and conditions** - **Suppliers' connection to the grid within 24 hours (2026)** - **Providing the consumer free of charge with at least one instrument for choice of alternative energy** - **Obtain more specific and comprehensive information on electricity bills** - **More distinct identification of vulnerable and poor consumers in the energy consumption context, increased targeting of support** - **Active involvement of consumers (individually or in combination) in all market areas: production, consumption, sales, storage, etc.** - **Option to use smart meters and dynamic pricing contracts**	- Promoting regulatory principles reflecting key principles of energy market regulation as well as non-discriminatory access to energy networks and infrastructures with competitive, transparent and cost-effective tariffs and regulatory controls, and adequate and independent control mechanisms	- Free power market using the best international models - Expanding the existing mechanisms for reciprocal flows of autonomous energy producers, enabling them to establish virtual groups, involve residents and organizations, generate and consume electricity at different enrollment units within power system, etc. - fully digitalized control of processes in the energy sector, both in terms of production and consumption, through the application of smart consumption systems concept - Introduction of international environmental standards, automated management information system (MIS) and international management system based on ISO standards - All consumers to be connected to an automated power accounting system that will allow them to read commercial metering data remotely, making this data available in real time to both consumers and new entrants in retail power supply market, as well as for the market operator, creating a favorable environment for the liberalization of the retail market along with the digitalization process.

As stipulated in Article 42 of the Agreement: "… Cooperation shall aim at regulatory approximation in the areas of the energy sector areas referred to hereinafter, taking into account the need to ensure access to secure, environmentally friendly and affordable energy." This means that Armenia is committed to ensure approximation of regulations in the energy sector to the EU framework, irrespective of the fact that the European climate and energy policy framework refers directly to the EU Member States, while Armenia is not a member of the EU Energy Union.

The Strategy stipulates that it will serve as the basis for the elaboration of a National Energy Sector Program-Timeline, which will set out specific target indicators and action plans to ensure implementation of the Strategy by 2040. The National Energy Sector Program-Timeline will be approved by the end of 2020. On the other hand, Paragraph 118.2 of the Government of the Republic of Armenia 2019-2023 Action Plan provides that by the 2nd half of 2021, the 10-year new Armenian Power System Perspective Development Plan of the (PSPDP) will be presented, and Paragraph 125 envisages presentation of National Energy Efficiency and Renewable Energy Program of the Republic of Armenia for 2021-2030 (NEEREP). This way of structuring strategic planning may to some extent jeopardize the system of strategic targeting and subordination of priorities. There may be a situation whereby all directions are rendered equal importance, yet, due to limited nature of allocated resources, the government will be positioned to choose the top priority among equals. Consequently, we may come across a situation where tactical decisions are not based on strategic decisions, resources are routed to channels, which are proven to be effective, and consequently the implementation of the strategy may not deliver the expected results. Naturally, the described strategic planning practice is not exclusively relevant for the energy sector, and it is likely that energy sector may eventually be positioned on a more favorable standing as compared to other sectors. However, it is appropriate to emphasize the issue in the context of this paper, as it becomes challenging to identify the policy mechanisms and/or to assess the gaps against the benchmarks selected. This is conditioned not only by the inadequate subordination within the strategic document, but also by the culture of formulating the actual wording of those documents. Furthermore, this issue will regularly emerge in the context of further discussion of specific areas.

The position and mission of the strategy in the system of sector-level strategic documents is unclear, given the uncertainty in terms of subordination of priorities, the overly descriptive nature of the provisions, and the insufficient disclosure of policy instruments and mechanisms.

Following is the comparative analysis of the Strategy's directions versus the individual components of the European Energy Strategic Framework.

ENERGY PERFORMANCE OF BUILDINGS. The Strategy in this area addresses the issues of heat supply in buildings as well as thermal insulation of buildings in the energy savings context. The transition from the individual heat supply model to the building-wide heat supply approach is overall positive as a concept, however the document does not demonstrate sufficient level of determination, either in terms of coming up with a comprehensive policy package, or specific targeting of emissions reductions. The latter, perhaps, calls for the need to establish a more thorough research base than mere observation of the fact that combined heating option is preferred over the individual option. Furthermore, the combined option should not be limited to one single building unit. Scenarios can be diverse (single building, building complexes, blocks, etc.), which can be identified only by applying appropriate models. Different policy tools would then be identified based on possible scenarios. Whereas, the Strategy emphasizes the possibility of resolving the problem within the framework of a single lending program (the Energy Efficient Lending Program implemented in the non-gasified communities of Armenia with the participation of the Renewable

Energy and Energy Efficiency Fund). Presumably, in view of the variety of options to solving the issue, the European framework provides a separate roadmap for decarbonizing buildings. As concerns the reduction of energy consumption in buildings by 40% by thermal insulation, this section (Energy Efficiency) does not provide policy tools or mechanisms other than descriptively highlighting the general benefits of energy efficiency. The NEEREP to be elaborated is specifically underlined, which implies that the national program should formulate a comprehensive policy package in this direction, including smart building concept, technology absorption capacity assessment, energy poverty alleviation areas. It should also be noted that these issues cannot be expected to be fully resolved solely in the energy policy domain: systematic, sustainable and long-term solutions could be achieved by implementing fundamental reforms in the multi-apartment building management.

From the point of view of improving the energy performance of buildings, the approaches set out in the Strategy fail to reflect adequate level of determination in terms of establishing long-term solutions and formulating a comprehensive policy package. Specifically, policy gaps in the concept of smart buildings, building decarbonization, technological absorption capacity enhancement, energy poverty alleviation should be eliminated both by means of the National Energy Efficiency and Renewable Energy Program, as well as by initiating reforms in the area of building management.

RENEWABLE ENERGY. The strategy defines the most efficient use of renewable energy as one of the key strategic priorities. Moreover, the construction of solar plants is prioritized over other types, considering it the most economically beneficial for Armenia. At the same time, the prospect of solar energy's long-term development is largely driven by the existence of storage plants whose cost (as presented in the Strategy) is not economically viable at present. This is a targeted policy approach, especially when the commitment of the state is also stipulated, by envisaging US $ 600-700 million investment in public-private partnerships to address the issue. Another policy mechanism consists in the approach that under the more ambitious targeting scenario, the government proclaims that public-private co-operation contracts will be concluded exclusively through attracting investors by the competitive bidding process, and only when their entry into the electricity market is impossible without additional guarantees from the Armenian government. In general, these approaches correlate with the instruments envisaged by European Strategic Framework for Renewable Energy. However, it should be emphasized that the Strategy does not address goals for ensuring long-term credibility for investors and accelerated process of issuing permits. Whereas these, in particular, are the key challenges on the way to the elimination of barriers to trade and investment in renewable energy products and services (technology shifts, standards development, technical barriers to trade), addressed by the Roadmap for the Implementation of the RA – EU CEPA.

The strategy on renewable energy generally covers the European agenda, except for the need to provide investors more credibility, as well as more viable and attractive conditions. In this sense, there is a need to improve the regulatory framework, especially in terms of facilitating administrative procedures for market entry and eliminating technical barriers to trade.

ENERGY EFFICIENCY. This agenda includes an energy saving component, which is another priority set by the Strategy. The document states that there is a great potential for expanding energy efficiency in all sectors of the Armenian economy and emphasizes the need for cultural change and institutional reform to be able to fully unleash its potential. At the same time, the intention is declared to implement large-scale energy saving measures, as well as the importance of energy security, economic efficiency and environmental protection are highlighted in this context.

However, it should be noted that a rather limited package is provided in terms of policy instruments. The primary emphasis is made on approximation to European standards, including in terms of energy labeling and eco-labeling. Without prejudice to the role of the introduction of new standards, other components of the European Energy Efficiency Agenda should not be ignored either, which, unlike "coercive" instruments (if we qualify the introduction of standards as such), are predominantly incentives and motivating mechanisms, and hence - more sustainable and efficient. They pertain to encouraging producers to apply new technologies, attracting more investment for buildings, and providing clear information on household payments. There is an explicit need to complement the policy mechanisms in these areas, which should be one of the key goals of the National Energy Efficiency and Renewable Energy Program. At the same time, the Strategy fails to set a quantitative target or outcome that would express the country's ambition in terms of increasing energy efficiency.

In terms of energy efficiency, the Strategy contains rather declarative provisions or more specifically targets the energy saving component. In terms of policy instruments, the main focus is on the introduction of pragmatic standards, while the European framework, in addition to "coercion" instruments, also includes incentives such as encouraging producers to apply new technologies and attract investment for buildings.

MANAGEMENT: In this area, the European policy package is expressed through integrated national 10-year energy and climate plans, which should be harmonized with the objectives and targets of the Energy Union. In practice, Armenia addresses the Energy Union pillars in the Strategy, in the new National Energy Efficiency and Renewable Energy Program for 2021-2030, Armenia's electricity system prospective development plan, as well as through regional (including with the EU) cooperation. The fundamental concern here perhaps relates to ability to adequately develop and implement these documents, which are designed to contribute to the achievement of goals related to economic and energy security, enhanced level of reliability in the energy system, strengthening of economic and energy independence, creation of new production types and provision of services aiming to promote development of energy saving and renewable energy, as well as mitigation of anthropogenic impact on the environment, human health.

The planned strategic documents in fact address the European agenda on management. It is necessary to ensure their proper development and effective implementation while respecting the principle of integration with climate policies.

ELECTRICITY MARKET REGULATION: The strategy addresses the substantive reforms in the electricity market regulation and its subsequent phases, essentially addressing the commitment stipulated by EU-CEPA Roadmap implementation, i.e. to cooperate with the EU on regulation aspects reflecting key principles on energy market regulation, as well as to ensure promotion of non-discriminatory access to energy networks and infrastructures by means of competitive, transparent and cost-effective tariffs , as well as adequate and independent oversight. In order to ensure sustainable. The strategy emphasizes the need to adopt best international models of the electricity market, the introduction of digital management practices, the implementation of international environmental and management standards, the liberalization of the market and ensuring full access to information for consumers.

Regarding the electricity market regulation, the Strategy provides a comprehensive scope of reforms, covering the phase already launched as well as the subsequent phases along with their objectives.

Considerations for integrating low-emission development strategies into agricultural policy

The relevant section of this analysis set out possible mitigation strategies in the agricultural sector from the perspective of the supply. Simultaneously, “Strategy directions for economic development of the Republic of Armenia Agriculture Sector for 2020-2030” and the “Livestock farming development program of the Republic of Armenia for 2019-2024” were included in the scope of analysis in terms of their addressing mitigation targets for GHG emissions reduction. The results of analysis were subsequently considered from comparative standpoint. Based on these studies, a comparative outlook will be presented in this section aiming to highlight the key conclusions from the point of view of low emissions development.

Thus, the first column of Table 2 presents the mitigation practices. The next column sets out the appropriate priority in the Strategy (and the measures to be taken under the priority), which can be inherently considered in the context of this mitigation practice, irrespective of whether the Strategy provides direct emphasis to this aspect. The last column lists the state assistance program(s) that have some potential in terms of the given mitigating practices, and in this case, too, regardless of whether they contain direct addressing.

It is obvious at first glance, that the effectiveness of the integration of mitigation strategies into the agricultural sector development agendas almost in all cases is invariably conditioned by the efficiency of human and institutional capacity building in the agricultural sector, as well as by the effective promotion of digital agriculture and technological innovation. And this is not incidental, as the sector development prospects are largely dependent on the fundamental implementation of knowledge-based economics.

Table 2.

ADDRESSING MITIGATION STRATEGIES IN PROGRAM DOCUMENTS

MITIGATION PRACTICES	STRATEGIC PRIORITY	STATE SUPPORT PROGRAME P1 - P9
SUSTAINABLE INTENSIFICATION **IMPROVED** - **SPECIES** - **BREEDS** - **AGROCHEMICALS** - **WATER** - **MECHANIZATION**	✓ **Land reform** (targeted policy related to the issue of abandoned land, includes also degraded land) ✓ **Improving the quality of seeds and seedlings, promoting use of modern practices for animal breeding** (intensification, herd management and breeding) ✓ **Development of human and institutional capacities in the field of agriculture** ✓ **Promoting digital agriculture and technological innovation** (digital innovations, such as improved varieties, new pesticides / herbicides, solar autonomous grid systems, greenhouse construction materials, anti-hail grids, soilless, no-till and vertical cultivation systems	**P1** **P2** **P3** **P6** **P7** **P8** **P9**
IMPROVED NITROGEN FERTILIZER MANAGEMENT **PLANT BREEDING AND GENETIC MODIFICATION,** **BETTER ESTIMATES AND USAGE OF ORGANIC FERTILIZER,** **INTERVENTION DECISION SUPPORT TOOLS,** **REGULAR SOIL TESTING,** **TECHNOLOGICALLY ADVANCED FERTILIZERS**	✓ **Sustainable development of organic farming** (design and improvement of relevant infrastructures) ✓ **Development of human and institutional capacities in the field of agriculture** ✓ **Support to sustainable development of rural communities** (volunteer programs to promote good agricultural practices among agricultural exporters and consultants on soil erosion, soil organic matter, soil structure, minimum level of protection) ✓ **Promoting digital agriculture and technological innovation** (digital innovations, such as improved varieties, new pesticides / herbicides, solar autonomous grid systems, greenhouse construction materials, anti-hail grids, soilless, no-till and vertical cultivation systems	**P1** **P2** **P3** **P9**

REDUCTION OF EMISSIONS FROM ENTERIC FERMENTATION **IMPROVEMENT OF FEEDING PRACTICES, SUPPLEMENTS AND ADDITIVES, HERD MANAGEMENT AND BREEDING**	✓ **Improving the quality of seeds and seedlings, promoting use of modern practices for animal breeding** (intensification, herd management and breeding) ✓ **Sustainable development of organic farming** (design and improvement of relevant infrastructures) ✓ **Development of human and institutional capacities in the field of agriculture**	**P1** **P2** **P3** **P4** **P5**
SEQUESTERING CARBON IN AGRICULTURAL SYSTEMS **CARBON MANAGEMENT IN PLANT SYSTEMS, AGROFORESTRY, IMPROVEMENT OF CARBON STORAGE IN PASTURES**	✓ **Development of human and institutional capacities in the field of agriculture** ✓ **Support to sustainable development of rural communities** (volunteer programs to promote good agricultural practices among agricultural exporters and consultants on soil erosion, soil organic matter, soil structure, minimum level of protection) ✓ **Promoting digital agriculture and technological innovation** (digital innovations, such as improved varieties, new pesticides / herbicides, solar autonomous grid systems, greenhouse construction materials, anti-hail grids, soilless, no-till and vertical cultivation systems	**P1** **P2** **P3** **P9**
MANURE MANAGEMENT **MANURE - A SOURCE OF ENERGY AND NUTRITION FOR CROPS, STORAGE AND HANDLING PRACTICES, DIETARY CHANGE DIVERSIFIED FARMING SYSTEM**	✓ **Development of human and institutional capacities in the field of agriculture** ✓ **Promoting digital agriculture and technological innovation** (digital innovations, such as improved varieties, new pesticides / herbicides, solar autonomous grid systems, greenhouse construction materials, anti-hail grids, soilless, no-till and vertical cultivation systems	**P1, P2** **P3, P4** **P5, P9**

- The practices that are included in the Sustainable development Package are overall reflected in the Strategy. At the same time, state assistance programs (7 out of 9) have a considerable potential in terms of enabling development in these areas. Human and institutional capacity building can ensure effective implementation of other priorities as well as the assistance programs.
- Improving nitrogen fertilizer management package is mainly covered in terms of practices where the equivalent strategic priorities are predominantly future-oriented initiatives. Basically, this "burden" will be borne by policies promoting digital farming and innovative technologies and sustainable development of organic agriculture.
- Known practices to reduce enteric fermentation are reflected in the Strategy in aggregated form. More specifically, the document sets priorities in certain directions, which should presumably include those practices as well. In this respect is the existence of a livestock breeding development program is particularly noteworthy (another 4 assistance programs could have significant contribution), which carries a tangible potential to make progress following the same logic. It should be borne in mind that this is the largest segment in the National GHG Inventory accounting for agricultural emissions and therefore requires specific attention.
- Known practices under carbon capture strategy in agricultural systems are not directly represented in the Strategy scope. They would be capable of driving positive trend only by virtue of secondary effect, due to excessively generic context i.e. in the light of overall development and progress, which is largely dependent on the level of human and institutional capacity building.
- Manure management is one of the multi-layer mitigation strategies where the underlying practices require associated infrastructure and a certain level of technological pursuit. The relevance and effectiveness of this strategy will most likely be reflected in the later stages of the agricultural reforms envisaged by the Strategy, when advanced approaches are fundamentally embedded in livestock management practices.