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Carbon Pricing Possibilities in Armenia

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The purpose of this report is to assess the possibilities to perform the carbon pricing in Armenia, including identification of applicable market-based and/or non-market-based policies, indication of appropriate solutions to address carbon leakage.

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This report is prepared as part of the EU4Climate Project that supports countries the six EU Eastern Partner countries in the development and implementation of climate-related policies and implementation of the Paris Climate Agreement. EU4Climate is funded by the European Union (EU) and implemented by the United Nations Development Programme (UNDP).

The Ministry of Environment of the Republic of Armenia requested the UNDP to support a feasibility study on carbon pricing possibilities in Armenia to assess the potential, readiness and needs of Armenia with regard to the possible use of carbon pricing and to identify, assess and propose appropriate carbon pricing options for Armenia in the light of the domestic as well as regional and international context. The local stakeholders for this study include the Ministry of Environment, Ministry of Economy, Ministry of Finance, Ministry of Territorial Administration and Infrastructure, regional cooperation organizations, key private sector representatives, Academia, and civil society.

The first section of the report provides an overview of the current state-of-play for carbon pricing mechanisms internationally and assesses the lessons that can be learned from specific concrete carbon pricing efforts for Armenia. This overview also considers how the market rules could potentially evolve, but also takes into account of the current significant uncertainty.

I. CARBON PRICING AND LOW EMISSION TRANSITION

Carbon pricing in its most basic meaning refers to putting a price on greenhouse gas (GHG) emissions, often in the form of a direct price correlating with CO2e content of the emitted gases. Carbon pricing shifts the economic equation of GHG emissions from a 'free-for-all' to a specific cost and thus captures the externalities—the costs associated with climate change that ultimately the public pays for, such as damage to crops, health care costs from heat waves and droughts, and the costs of GHG removal.

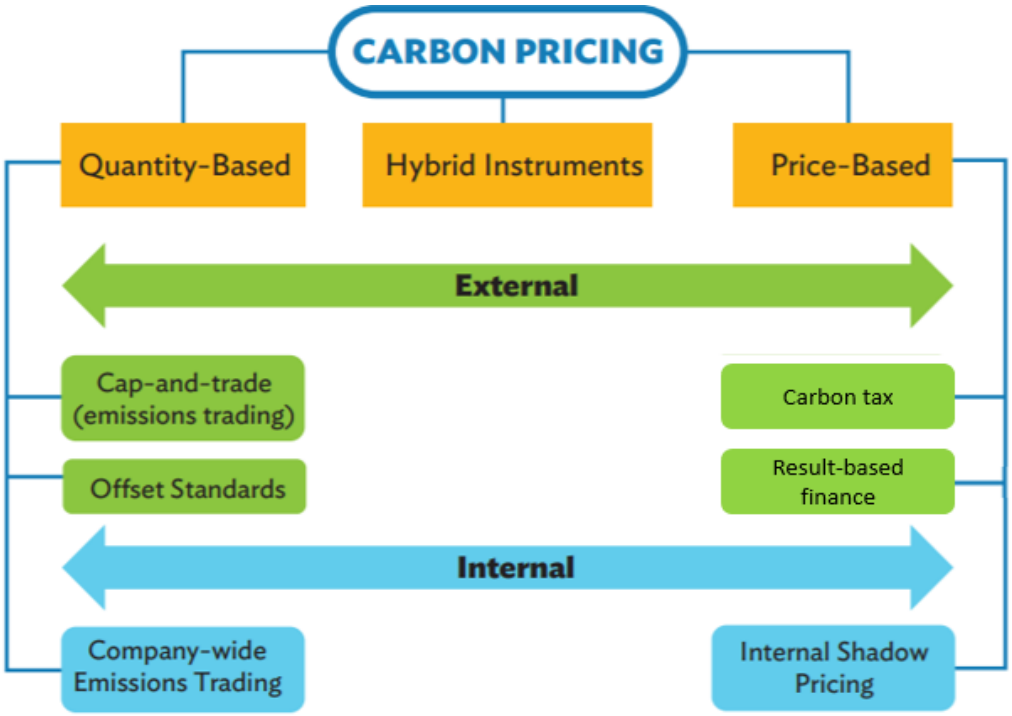
There is a growing consensus among both governments and businesses about the role of carbon pricing in the transition to decarbonization and net-zero economy. A carbon price sends an economic signal to emitters about the cost of pollution, which allows them to evaluate the impact of mandatory carbon prices on their operations, identify potential risks and make appropriate investment decisions. It provides economic incentives to internalize the external cost of climate change in decision making and to mobilize the financial investments required to stimulate clean technology and market innovation to achieve low carbon economic growth. This is especially pertinent for long-term investors assessing the potential impact of climate change policies on their investment portfolios to reevaluate investment strategies and reallocate capital toward low-carbon or climate-resilient activities. Finally, for governments, carbon pricing is not only one of the policy instruments to address climate change but also potentially a source of revenue.

1. Overview of existing carbon pricing instruments

As illustrated in Figure 1 below, carbon pricing combines different instruments and approaches, from those focusing on a fixed price assigned to carbon emissions ('price-based') to those aiming at limiting emissions to a specific level ('quantity-based'). Carbon pricing can be explicit, as in set by external factors such as taxes, emission trading, or offset prices or implicit and regulated through tailored internal approaches, such as in the cases of inter-company emission trading or internal shadow carbon pricing. Similarly, some of the carbon pricing instruments (CPIs) are primarily domestic in nature (e.g., carbon taxes), whereas others are more likely to involve international cross-border cooperation (e.g., result-based finance), although some mechanisms can be implemented at both levels.

The use of mechanisms is often combined in a given jurisdiction, i.e., carbon taxes are often implemented alongside emission trading, and in some cases an offset mechanism can be additionally integrated in the CPI structure. CPI application can be also sequenced in time so that different CPIs are implemented at different timelines within the same jurisdiction. For example, levying a carbon tax on emissions or fossil fuel consumption for a certain number of years prior to the introduction of an emission-trading scheme (ETS) can facilitate ETS preparedness by improving facility-level GHG data and getting authorities and operators acquainted with issues such as MRV before embarking on designing and introducing an ETS.

Figure 1: Overview of carbon-pricing instruments



Source: adapted from From the Ground Up: A Decade of Lessons on Carbon Pricing, 2021.[1]

This overview covers in detail four of the main CPIs: carbon tax, an emission trading system, an offset mechanism, and results-based carbon finance.

1.1 Carbon tax

A carbon tax is defined as a tax that explicitly states a price on greenhouse gas emissions or that uses a metric directly based on carbon2 by taxing goods or activities based on the emissions they produce e.g., as a price per tCO2e or a price that is approximated to the carbon content of material or activity taxed. A popular carbon pricing instrument in a larger climate, energy, and fiscal policy mix, carbon taxes are now implemented in 27 national and 8 subnational jurisdictions.[3]

Carbon taxes serve as a financial incentive to lower greenhouse gas emissions in order to reduce tax obligations. They also can be designed to generate other benefits, such as raising revenue, reducing

[1] From the Ground Up: A Decade of Lessons on Carbon Pricing. Partnership for Market Readiness. World Bank, Washington, DC. 2021. https://openknowledge.worldbank.org/handle/10986/36021

[2] Carbon Tax Guide: A Handbook for Policy Makers. World Bank, 2017

[3] Carbon Pricing Dashboard, World Bank, 2022. https://carbonpricingdashboard.worldbank.org/map_data Retrieved 25 January 2022.

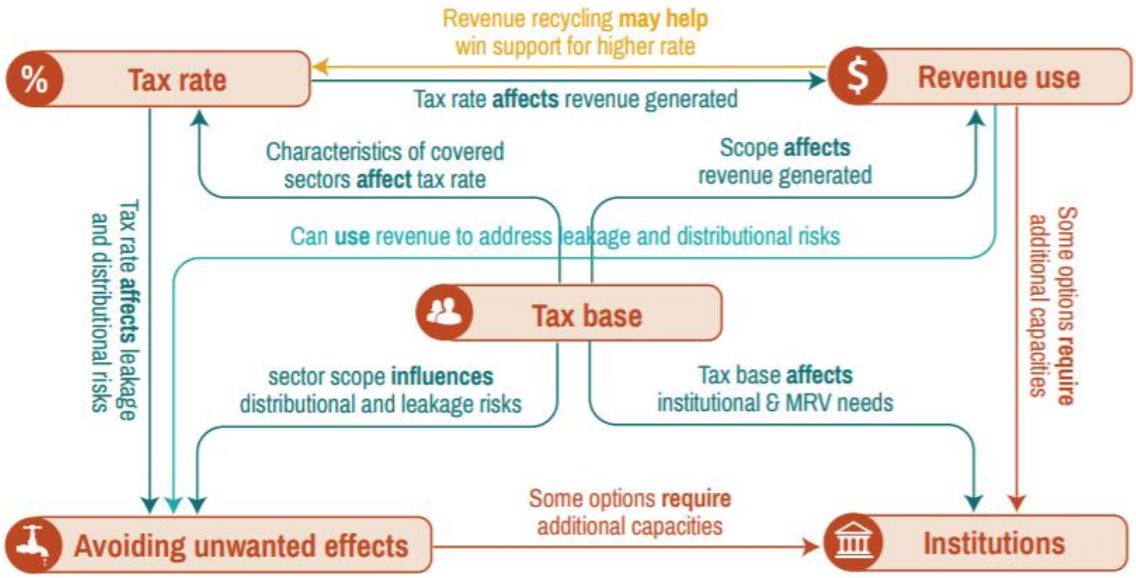
air pollution, and increasing the efficiency of the tax system. The fundamental difference compared to an ETS is that the carbon taxes fix the price of carbon, while an ETS fixes the maximum quantity of emissions. Carbon taxes thereby provide a more stable and predictable price signal to investors.

Carbon taxes typically cover either direct emissions from the targeted sectors or subsectors or, more commonly, carbon content of fossil fuels, primarily oil, gas and coal, and their derivative products.

Designing a carbon tax involves making decisions on a broad range of issues, starting from assessment of objectives to economic costs and distributional effects. Some of the design elements that require attention of the regulator include:

- Tax base:
    - *Sectors to cover:* for example, should the tax cover emissions or fuels, energy generation or other sectors too (e.g., industry and transport).
    - *Gases to cover:* only CO2 or other GHGs too (e.g., methane, N2O).
    - *Points of regulation:* at the point of use (e.g., where the fuel is burnt), at the point of entry (i.e., at the border) and/or production of the fuel (i.e., at the refinery).
    - *Entities and thresholds:* which companies/installations should pay the tax and how much are they allowed to emit before the carbon tax applies.
- Tax rate:
    - What should be the tax rate and if it should develop over time.
- Institutions:
    - Roles and functions for administering the tax, including whether new roles and capacities need to be created
    - Procedures to ensure coordination of key institutions
    - Addressing possible non-compliance
- Revenue use
    - Carbon tax revenues can be used for lowering income taxes, supporting the national budget, ear-marked for low emissions projects.

Figure 2: Carbon tax design elements and interlinkages between them



Source: Carbon Tax Guide: A Handbook for Policy Makers, 2017.[4]

It should be highlighted that in majority of jurisdictions where a carbon tax has been introduced so far it only applies to fossil fuels (e.g., diesel, gasoline, natural gas). It's fairly uncommon to consider process emissions, in other words, carbon which is found in raw materials used for industrial processes (e.g., carbonates used in cement and lime production, carbon in scrap steel used in ferroalloy production, etc.). Many jurisdictions, however, have considered or are considering a tax on methane emissions.

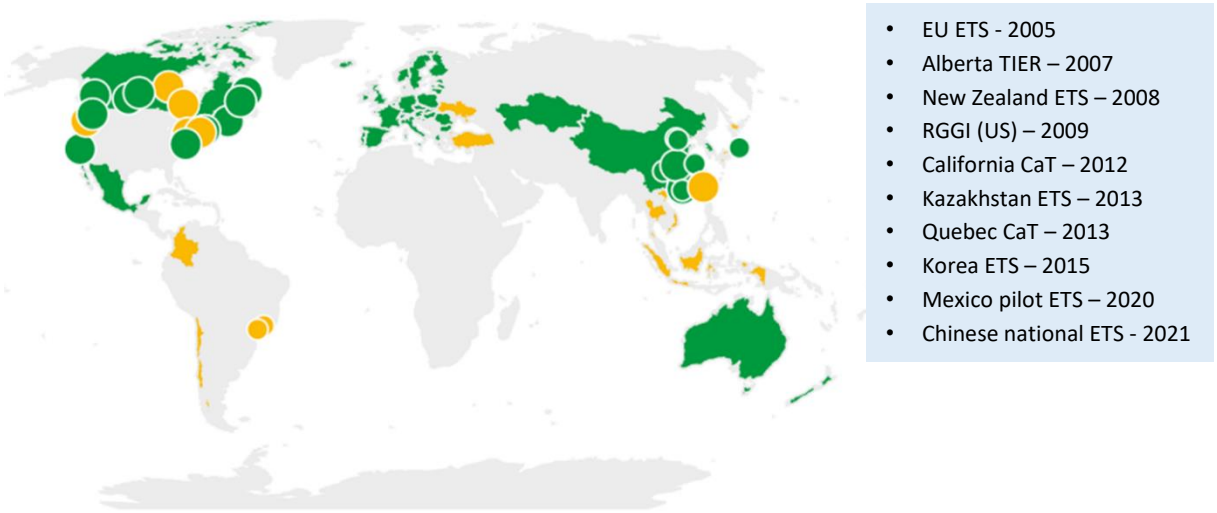
1.2 Emission trading system

An emissions trading system (ETS) is a regulatory scheme in which the government imposes a limit (also known as 'cap') on the total emissions of installations in one or more sectors of the economy and issues tradable allowances or units corresponding to the total volume of emissions allowed under the cap. Each allowance typically corresponds to one ton of emissions. Entities covered by an ETS must obtain and surrender an allowance for each unit of their emissions. They can obtain permits from the government or through trading with others. The government may choose to give the permits away for free or to auction them.

By creating supply and demand for emissions units, an ETS establishes a market price for GHG emissions (often called the "carbon price"). In order to comply with their emission targets at least cost, covered entities can either implement internal abatement measures or acquire emission units in the carbon market. Entities that hold additional allowances after surrendering the allowances needed for compliance can sell them or bank them for future use. Entities that require additional allowances may buy them on the market.

[4] Partnership for Market Readiness (PMR) 2017. Carbon Tax Guide: A Handbook for Policy Makers. World Bank, Washington, DC. https://documents1.worldbank.org/curated/en/728421535605566659/pdf/129668-V1-WP-PUBLIC-Carbon-Tax-Guide-Main-Report.pdf

Figure 3: Map of jurisdictions implementing an ETS[5]



Source: World Bank, 2021

There are a number of key design elements that need to be decided on when establishing an emissions trading system:

- *The cap:* the maximum volume of emissions the ETS-covered entities are allowed to emit sets the stringency of the scheme and is one of the key factors in determining the schemes' carbon price. The type of the cap can be absolute or dynamic/intensity based. The length of time over which the cap is set is also important to give participants visibility of long-term planning.
- *Sectors to cover:* it is typical for ETS to cover power generation, yet the coverage can also extend to large stationary combustion in heat supply or industrial sectors and can encompass process emissions.
- *Gases to cover:* CO2 is the most commonly covered gas, but some schemes include other GHGs too, including methane, N2O, PFCs, etc.
- *Entities and thresholds:* setting criteria for inclusion in an ETS in the form of emission or capacity thresholds allows to exclude small emitters. The choice of point of regulation should ideally reflect the most concentrated part of the supply chain.
- *Allocation of allowances:* Allowances can be given away for free or auctioned by the government. If the former, there are a number of approaches how free allowances are allocated, including historic (grandfathering) or based on a set of specific benchmarks developed for the ETS.

[5] Source: provides an overview of countries and regions who have introduced (green), or are planning to introduce (yellow), an ETS.

1.3 Offset mechanisms and result-based carbon finance

An offset mechanism designates the GHG emission reductions from project- or program-based activities, which can be sold either domestically or in other countries. Offset programs issue carbon credits according to an accounting protocol and have their own registry.[6]

In a project or programme-based offset mechanism, an entity will develop a project which leads to real and verifiable reductions in GHG emissions. Once the project or programme is implemented and has been operating for a period of time, and reductions in emissions have been monitored, reported and verified by an independent third party, the resulting emission reduction can be sold as carbon credits to another party who may need them to offset their own emissions. These carbon credits can be used to meet compliance under an international agreement, a domestic mechanism (e.g., carbon tax or ETS) or for corporate citizenship objectives related to GHG mitigation (voluntary offset scheme). The following offset mechanisms will be discussed in further detail:

- Article 6 of the Paris Agreement
- CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation)
- Domestic offsets
- Voluntary offsets

Article 6 of the Paris Agreement

Three new mechanisms for international cooperation are covered under Article 6 of the Paris Agreement, of which two are market-based mechanisms with both centralized and decentralized governance and one is a framework for non-market approaches. The three approaches under Article 6 differ significantly in between themselves and are covered in their own section separately.

CORSIA

The International Civil Aviation Organization (ICAO) adopted the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) in 2016 to address CO2 emissions from international aviation. The aim is to achieve carbon-neutral growth of international aviation from 2020. For participating countries, CORSIA requires that airlines operating international flights surrender offsets to account for their share of the growth in emissions from international flights. For the period of 2021-2023, the baseline is year 2019. From 2024 until the end of the scheme in 2035, ICAO set 85% of 2019 emissions as CORSIA's baseline. From 2021, any units surrendered for CORSIA compliance would require host country authorization and corresponding adjustments.

To ensure the environmental integrity of CORSIA, the ICAO Council examines and approves a list of offset schemes that are eligible to supply emissions units that can be used for compliance, which currently consists of:

- American Carbon Registry (ACR) https://americancarbonregistry.org/
- Architecture for REDD+ Transactions (ART) https://www.artredd.org/art-registry/
- China GHG Voluntary Emission Reduction Program http://registry.ccersc.org.cn/login.do
- Clean Development Mechanism (CDM) https://cdm.unfccc.int/Registry/index.html
- United Nations Voluntary Cancellation Platform https://offset.climateneutralnow.org/

[6] Carbon Pricing Dashboard, World Bank, 2021

- Climate Action Reserve (CAR) https://thereserve2.apx.com/mymodule/mypage.asp
- Global Carbon Council (GCC) https://mer.markit.com/br-reg/public/public-view/#/account
- The Gold Standard (GS) https://registry.goldstandard.org/projects?q=&page=1
- Verified Carbon Standard (VCS) https://verra.org/project/vcs-program/registry-system/

Domestic offsets

An ETS or carbon tax mechanism could allow regulated entities to use credits as part of their compliance with the cap or to offset their emissions and thereby reduce their carbon price burden. Unlike carbon taxes and ETSs, however, domestic carbon crediting schemes do not in themselves create a carbon price, rather they complement regulatory schemes such carbon taxes and ETSs that create demand for emission reductions. The most well-known and largest domestic offsetting schemes currently is the Compliance Offset Program of the California Air Resources Board, which allows offsets from a pre-determined number of activities, such as agricultural and coal-mine methane, as well as forestry projects. Other schemes that allow use of domestic offsets for compliance include Quebec, China, and New Zealand.

Voluntary offsets

Nonstate actors, such as corporations, institutions, and individuals that wish to offset their GHG emissions or contribute to the reduction of GHGs within their control can do so by acquiring voluntary offsets through voluntary carbon markets. The demand for voluntary offsets is driven entirely by voluntary buyers, who may have varied objectives and different willingness to pay.

There is no uniform certification or a uniform crediting standard in the voluntary market and the voluntary offsets therefore could be of varying quality. There are several leading voluntary offset standards, of which those eligible under CORSIA are considered more reliable. The certification bodies as a rule establish their own processes and requirements, undertake registration of the project, list it in its data management system after validation, and issue credits upon completion of verification.

Lack of transparency in the voluntary market and proliferation of lesser-known certification bodies and registries often cited as the drawbacks of the voluntary offset market.

Result-based carbon finance

Both corporations and governments could purchase the credits in recognition of the delivered emission reductions (otherwise known as results-based climate finance). Results-based climate finance (RBF) is provided upon verifying achievement of agreed climate results but does not involve the transfer of assets from the recipient project. Results could be specified in the form of any milestone (typically verified GHG emissions reduced or removed) that marks progress toward greater climate mitigation.

The provision of RBF requires clear definition of the program or project that will generate emission reductions. The payment against the achievement of emission reductions is agreed between the project developer (or recipient) and the RBF provider. RBF thus provides an additional revenue stream for climate change-related projects and can play an important role in incentivizing climate action, enhancing project viability, and catalyzing private sector investment.

Figure 4: Uses and Implications of Various Offset Cases

Mechanism	Independent Verification	Registration and Issuance	Corresponding Adjustment	Use	Implication for Seller Country
Results-Based Climate Finance	Yes	No	No	Contribution to host country mitigation and climate finance	ER remains in the seller country and can be used toward NDC
Voluntary	Yes	Yes	No	Contribution to the generation of emission reductions	ER remains in the seller country and can be used toward NDC
Voluntary with authorization	Yes	Yes	Yes	Offsets emissions outside of compliance schemes	ER transferred out of seller country and cannot be used for NDC
Article 6.2	Yes	Yes	Yes	Contribution to buyer country NDC	ER transferred out of seller country and cannot be used for NDC
Article 6.4 without authorization	Yes	Yes	No	Contribution to host country mitigation	ER remains in the seller country and can be used toward NDC and cannot be used for NDC
Article 6.4 with authorization	Yes	Yes	Yes	Contribution to buyer country NDC	ER transferred out of seller country and cannot be used for NDC

Source: author, based on Defining Results-Based Climate Finance, Voluntary Carbon Markets and Compliance Carbon Markets, World Bank, 2021

2. International mechanisms under Article 6 of the Paris Agreement

Article 6 of the Paris Agreement recognizes that some Parties choose to pursue voluntary cooperation in the implementation of their nationally determined contributions to allow for higher ambition in their mitigation and adaptation actions and to promote sustainable development and environmental integrity.

Three new mechanisms for international cooperation are covered under Article 6 of the Paris Agreement, of which two are market-based mechanisms and one is a framework for non-market approaches:

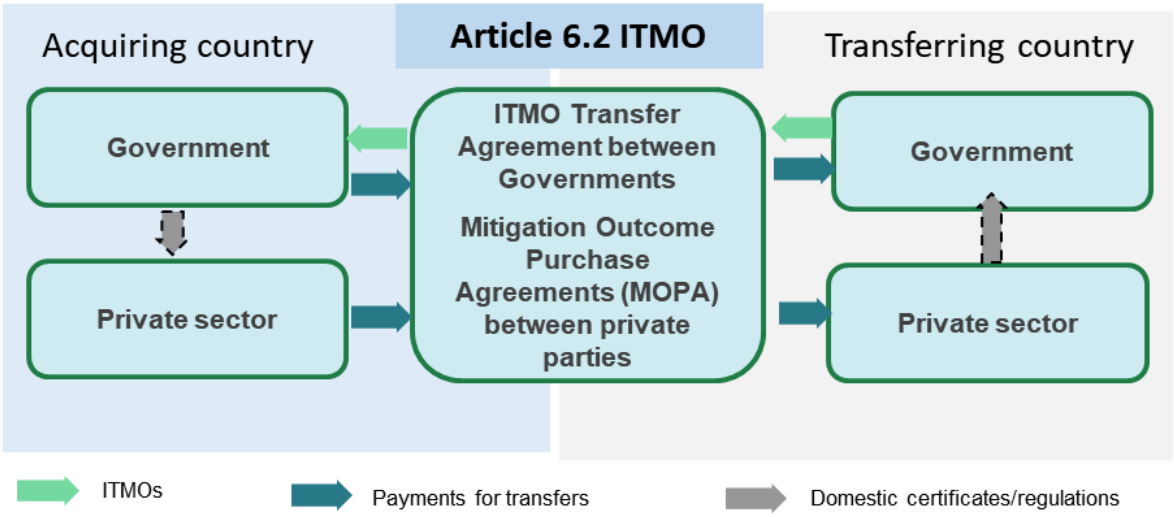
- International transfers of mitigation outcomes (paragraph 6.2)
- A mechanism to contribute to mitigation and support sustainable development (paragraph 6.4)
- A framework for non-market approaches (paragraph 6.8)

Article 6.2 of the Paris Agreement is designed to allow for international cooperation in carbon markets through decentralized governance. Under this article, bilateral or plurilateral cooperation between participating parties can be established through a mutually agreed policy and governance framework and reflected in the agreement between the parties involved. While the transfers would be

implemented by governments, private sector entities could be involved in the underlying mitigation activities.

Article 6.2 allow Parties to buy and sell internationally transferred mitigation outcomes (ITMOs, i.e. Article 6.2 units) across borders. Any transfer of ITMOs would trigger a corresponding adjustment, which would allow accounting for those transfers towards the NDCs of the respective countries.

Figure 5: Illustration of Article 6.2 cooperation



Source: Randall Spalding-Fecher, 2021

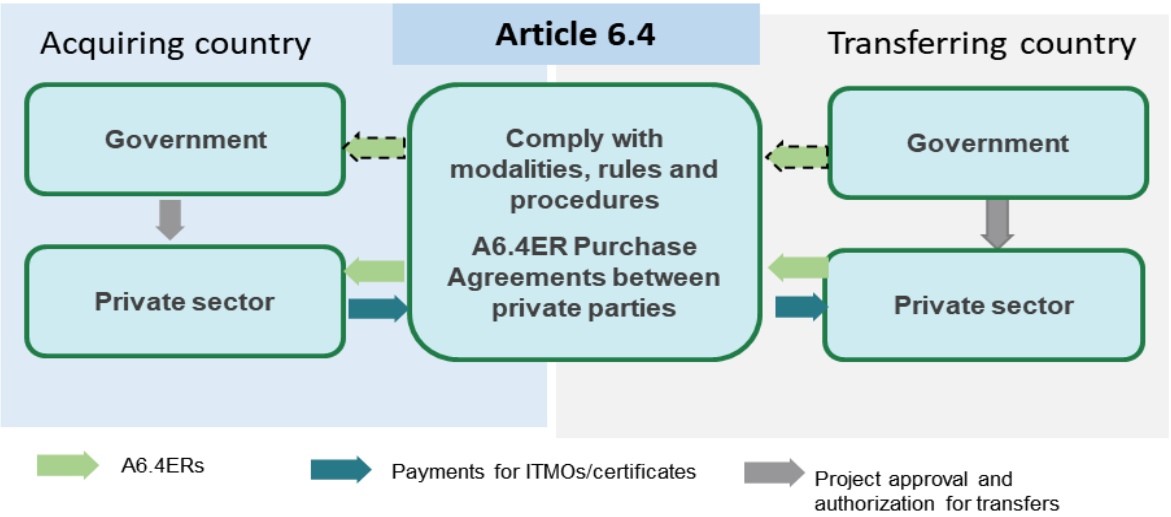
The scope of Article 6.2 could be much broader than the CDM to include scaled-up, sectoral and policy crediting. These approaches could involve different rules and methodologies for baseline setting, monitoring, reporting and verification than traditional carbon markets. Transfers of ITMOs also could include a wide variety of cooperation models, including linking and coordination between national and sub-national trading schemes.

In case private entities participate in the mechanism, it is most likely that they would be required to have some sort of pre-authorization with the contracting government to ensure that the government would enact the transfers related to their activities in the partner country. National or programme registries could be then used for transactions and private entities would be able to have their own accounts in registries if the governments involved have made provisions for such functionality.

Concerns have been raised that such a system could be weaker in terms of ensuring environmental integrity if there was less stringent international oversight. The Glasgow rules, modalities, and procedures therefore envisaged development of process for review of Article 6.2, which was elaborated and adopted at COP27 in Sharm-el-Sheikh. Such review, however, would primarily check on conformity and consistency of information reported and data.

Article 6.4 (Mechanism to contribute to mitigation and support sustainable development), on the other hand, introduces a new international mechanism for cooperative mitigation of greenhouse gases and supporting sustainable development that would be overseen by centralized international governance and is direct descendant of the Clean Development Mechanism (CDM) under the Kyoto Protocol. Article 6.4 governance structures include a Supervisory Board, methodological guidance for project implementation and assessment, standard methodologies for quantifying emission reductions, project eligibility and country participation requirements.

Figure 6: Illustration of Article 6.4 cooperation



Source: Randall Spalding-Fecher, 2021

Much like the CDM, Article 6.4 will be a crediting mechanism, with transfer of GHG emission reduction units ("Article 6.4 Emission Reductions" - A6.4ERs). From the moment of first (international) transfer A6.4ERs will be counted as ITMOs and will be governed by Article 6.2 rules. However, it is also possible to use A6.4ERs for domestic purposes with so-called "mitigation contribution A6.4ERs", which will not be authorized for international transfers.

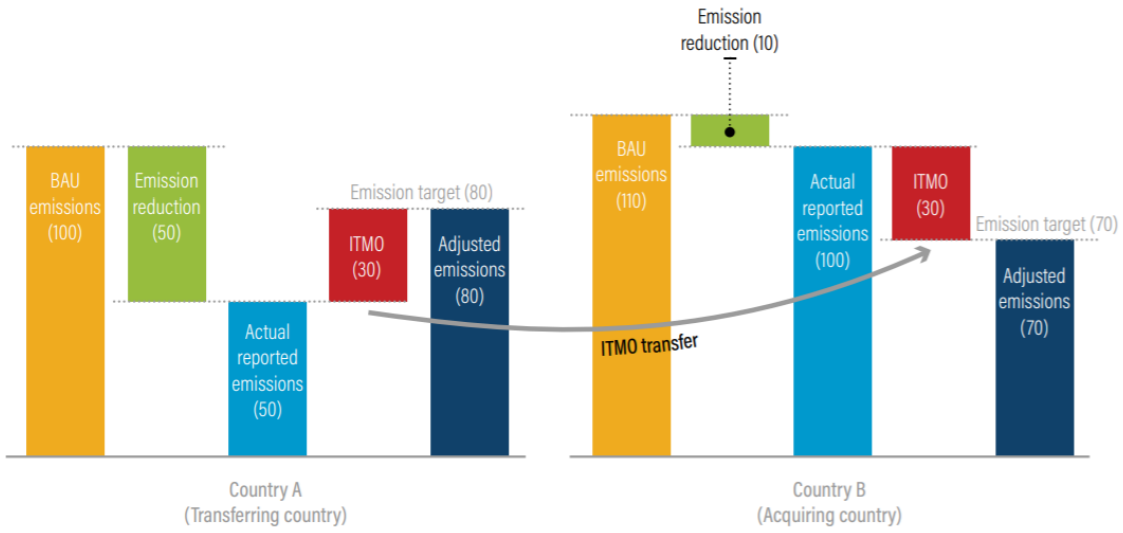
Because of the interlinkages between Article 6 and NDC progress, one of the participation requirements for Article 6.4 is determination of the sectors in which the Party will approve Article 6.4 projects and an explanation of how the Party expects Article 6.4 to contribute to the progress of its NDC. Second, depending on the type of the country's NDC (economy-wide or sectoral), there could also be some restriction on which sectors are available for Article 6 activities, should those sectors fall inside the scope of the transferring country's NDC pledges.

Article 6.8 (Framework for non-market approaches): Article 6.8 defines a framework for non-market approaches to cooperation on NDC implementation, with potential links to climate finance, technology cooperation and capacity building.

3. Corresponding adjustments in Article 6 and voluntary market

One of the most important differences of Article 6 mechanisms compared to the Kyoto Protocol mechanisms is that, under the Paris Agreement, all countries have mitigation pledges, unlike the Kyoto Protocol where only the industrialized countries have quantified emission reduction commitments. Armenia, for example, as part of its first NDC has an economy-wide pledge to reduce GHG emissions by 40% compared to 1990 by 2030. The emission reductions achieved as a result of any mitigation activity in Armenia, therefore, could be used to move towards Armenia's NDC goal or they could be sold to another country to use for compliance with the acquiring country's NDC.

Figure 7: Illustration of corresponding adjustments



Source: Robust Accounting of International Transfers under Article 6 of the Paris Agreement, German Emissions Trading Authority (DEHSt), 2017

Because Parties can transfer mitigation outcomes across borders and account for those transfers towards their respective NDCs, Article 6 framework ensures that the same mitigation outcome cannot be used by both countries. For example, if Armenia transfers emission reductions to another country and that country the transferred ITMOs/A6.4ERs towards meeting their NDC target, then Armenia cannot do the same, as this would mean that the same emission reductions would be used to meet both countries' NDC targets.

The first international transfer of any internationally transferred mitigation outcomes (ITMOs) under Article 6, including of A6.4ERs, triggers corresponding adjustments of the host country's Nationally Determined Contribution (NDC).

To avoid double counting, transferred emissions are subtracted from the buyer country's reported NDC progress (i.e., not their actual national GHG emission inventory but rather NDC progress reporting). Similarly, any transferred emission reductions would be added back to the host seller country's emissions in their NDC progress reporting. This is called "corresponding adjustments". In other words, if the transferred mitigation outcomes will be used to lower the acquiring country's emissions in their NDC performance reporting, then this amount must be "added back" to increase the transferring country's NDC reported emissions. This is also linked to the objective of avoiding "overselling" mitigation outcomes, which would also compromise the environmental integrity of Article 6.

Assuming that the mitigation activity lowers the actual GHG inventory of the transferring country, the net result is that the transferring country's reported emissions for NDC compliance are unchanged by the activity. This is illustrated in **Error! Reference source not found.** 7, where the 30 units transferred from the seller to the acquiring country are added back to the seller country's actual emissions when these are reported (i.e. as "adjusted emissions") for NDC compliance.

In the figure, if the transferring country's mitigation pledge was to reach 100 units, then they would still achieve their goal after the transfer was complete. If their goal was to reach 70 units, however, then the transfer would mean that they would miss this target. Even though their actual emissions

inventory would be lower than this level, reported emissions for NDC compliance would be higher than the pledge. In summary, because of corresponding adjustments, Article 6 transactions cannot help a transferring country move closer to its NDC goal, because the mitigation outcomes can only be used by one country (i.e., in this case, the acquiring country). Of course, a transferring country might utilize Article 6 cooperation to go beyond their mitigation pledges to implement more actions, or it could agree to transfer only a portion of the reductions, keeping the rest for its own compliance, effectively "taxing" the projects (this was done in the past in the case of Kyoto Protocol's Joint Implementation). If everything is transferred, then because of the corresponding adjustments, however, they will not receive "credit" for these actions in their NDC reporting – since only one country can account for the mitigation outcomes.

The implication of the need for corresponding adjustments on transferring countries is that they need to be cautious of the quantity and origin of the mitigation outcomes they sell to the acquiring country. If the transferring country sells mitigation outcomes at a price of, for example, 20 USD/tCO2e, it needs to make sure it still has the abetment potential to meet its own NDC targets without having to resort to implementing abatement measures which cost more than 20 USD/tCO2e. Thus, all ITMO contracts, authorizations, and transfers need to be closely monitored by the host country to ensure that the trading does not compromise the environmental integrity and achievement of their NDC goals.

Corresponding adjustments and voluntary market

Corresponding adjustments were not necessary for the CDM because only the acquiring countries had mitigation pledges to meet, so only one country needed to claim the emission reductions for compliance. For the Paris Agreement, however, corresponding adjustments are an essential component of the cooperative approaches to avoid double counting of emission reductions. For the same reason some of the offset schemes and voluntary certification bodies are either already requiring (e.g., CORSIA) or considering requiring corresponding adjustments of the offsets.

Avoiding double counting will require robust accounting and tracking of units, not only those used for NDC compliance but also those used for other international obligations (e.g., CORSIA). Such accounting may require additional measures and infrastructure (e.g., international registries for tracking units) as well as government oversight of transactions to ensure that all the necessary adjustments are complete.

The technical implementation of these adjustments is still being developed through the UNFCCC process. One of the issues that specifically still remains unresolved is the draft guidance on how to convert NDC targets into a multi-year emissions trajectories or budgets for the NDC implementation period that are consistent with implementation and achievement of the NDC. Having a budget or trajectory allows the government to determine how many tons of GHGs can be emitted over the entirety of the NDC implementation period, i.e. we know the number from which sold ITMOs will be subtracted. Whenever an ITMO is sold, this needs to be added to the country's emissions. By contrast, purchased ITMOs are to be subtracted from total emissions. Figure 8: Example of accounting for an ITMO transaction provides an example of how a hypothetical transaction is accounted for. The guidance also proposes that additional guidance is developed on the matter of avoiding double counting.

Figure 8: Example of accounting for an ITMO transaction

Party	Emissions at start of NDC (2020)	Carbon budget under the NDC (2030)	Total permitted emissions during NDC	Change	Post-adjustment NDC emissions
1. Accounting status before transaction					
Chile	100	80	990		
Korea	50	34	462		
Total	*150*	*114*	*1452*		
(Chile sells 10 ITMOs to Korea)					
2. Accounting status after transaction					
Chile	100	80	980	-10 ITMOs	980
Korea	50	34	472	+10 ITMOs	472
Total	*150*	*114*	*1452*		*1452*

Registries. The guidance also includes regular reporting requirements and the requirement to either set up a registry or have access to a registry provided by the UNFCCC secretariat. The registry shall ensure that such registry records, including unique identifiers, the following, as applicable: authorization, first transfer, transfer, acquisition, cancellation, use towards NDCs, authorizations for use towards other international mitigation purposes, voluntary cancellation, and shall have accounts as necessary. The registry shall be linked to an Article 6 database, which will record information on all adjustments and transactions. The UNFCCC Secretariat will be in charge of checking the database for consistency. A publicly accessible centralized accounting and reporting platform will be maintained by the secretariat.

Overall, in order to ensure full environmental integrity of international transfers, it is important that at a minimum the MRV and GHG accounting standards are kept high, and that any transfers can be tracked, whether conducted domestically or internationally. With a robust accounting and trading infrastructure in place, ITMO trading will afford countries greater flexibility in managing policy interactions to meet their NDCs. The existence of such international markets can furthermore influence the standardization of MRV, contracts and other services, thereby lowering transaction costs over time and increasing the market's effectiveness.

4. Summary of advantages and disadvantages of different CPIs

Based on the information provided above, a summary of the advantages, disadvantages and specific applicability of the different CPIs is provided in Table 1. This table should facilitate consideration of options for carbon pricing in Armenia based on the national circumstances, country targets and the abatement opportunities.

Table 1: Summary of advantages, disadvantages, and applicability of different CPIs

	Advantages	Disadvantages	Optimum applicability
Carbon tax	Predictability and certainty of carbon price	Emission reductions are not guaranteed, and the government may therefore implement other solutions if the reductions from the carbon tax fall short of the NDC target	A carbon tax is most effective when it applies to fuels only, and therefore is a good choice in jurisdictions where the majority of emissions originate from combustion activities. It is also less complex than an ETS to implement and can therefore begin operating in a shorter time frame
	Relatively easier to implement: carbon can be taxes based on a variety of sold or consumed products: fossil fuels, power, road trips, etc.	Can face political challenges in cultures traditionally opposed to national taxes	
	Immediate revenues to the government	Not economically efficient: cannot be levied based on marginal abatement costs	
ETS	The cap ensures that emissions go down: precise emission reduction goal can be prescribed	Complex, requires local expertise in verification of emissions	An ETS works best when there are a significant number of entities which are covered, which assures liquidity in the market. It is also more applicable when significant emissions originate from industrial processes and not simply from burning of fossil fuels.
	Economically efficient: companies are given incentives to reduce emissions in the most economical way	Can face significant regulatory barriers	
	Revenues to the government in the form of potential auctions	Requires considerable institutional capacity	
		Carbon price not known in advance, and can be very volatile	
		7-10 years to mature market (as opposed to potentially < 3 years for a carbon tax)	
Domestic carbon crediting	Promotes mitigation projects in sectors that are not or cannot be covered by domestic ETS or carbon tax	Not a stand-alone mechanism, needs to be integrated with another CPI (i.e., ETS, Carbon tax)	Applies best when integrated with an ETS and/or a carbon tax mechanism. Most relevant where there are opportunities for mitigation projects which will not be facilitated by either an ETS or a carbon tax, due to the nature of the sector where the opportunities are (e.g., agriculture), the gas (e.g., methane) or the nature of the project (e.g., renewables)
	Country focused, so can target specific sectors of interest	Complex, requires local expertise in verification of emissions	
	Allows for a wider participation in climate measures, with regards to sectors/measures (e.g., renewable energy) or stakeholders (e.g., housing). May also facilitate mitigation measures targeting gases such as methane which are challenging to include in with an ETS or carbon tax	Requires considerable institutional capacity	
		Requires registry of offset projects and emission reductions	
International carbon crediting (e.g. Art. 6, CORSIA)	Promotes mitigation projects in sectors that are not or cannot be covered by domestic ETS or carbon tax	Requires institutional capacity, but can rely on some international institutional capacity	Works best when integrated with domestic policies and mechanisms which promote implementation of (low-cost) abatement options, and where specific abatement opportunities have been identified which could benefit from international carbon finance
	Can rely on international expertise in verification of emissions	Need to ensure a clear mechanism is in place for making corresponding adjustments	
	Can rely on international registry	Not country focused, so may not be so effective in targeting country specific sectors of relevance	

II. APPLICABILITY OF CARBON PRICING INSTRUMENTS TO ARMENIA

Armenia submitted its Intended Nationally Determined Contribution (INDC) to the UNFCCC in September 2015, in which it undertook to pursue economy-wide mitigation measures, striving to achieve per capita net emissions of 2.07 tCO2eq in 2050, subject to adequate international financial, technological and capacity-building support. In its updated NDC submitted in 2021, Armenia adopted a ten-year NDC implementation period (2021-2030) and maintained its 2050 mitigation goal of reducing its GHG emissions to at most 2.07 tCO2eq/capita, to be reflected in its Long Term - Low Emission Development Strategy (LT-LEDS). The new mitigation target to be achieved in 2030 equals 40 per cent reduction below 1990 emissions levels.

Armenia's GHG emission profile

Armenia's GHG emissions in 1990 amounted to 25,855, Gg CO2eq. Because of its economy wide NDC, Armenia's climate policy has to apply a holistic approach encompassing overall emissions, particularly in key sectors and among key emission sources. In 2017, Armenia's greenhouse gas total emissions in were 10,624 Gg CO2 eq (excluding Forestry and Other Land Use), a modest 3% growth over emission level in 2016.

Figure 9: Armenia's GHG emissions in 2017

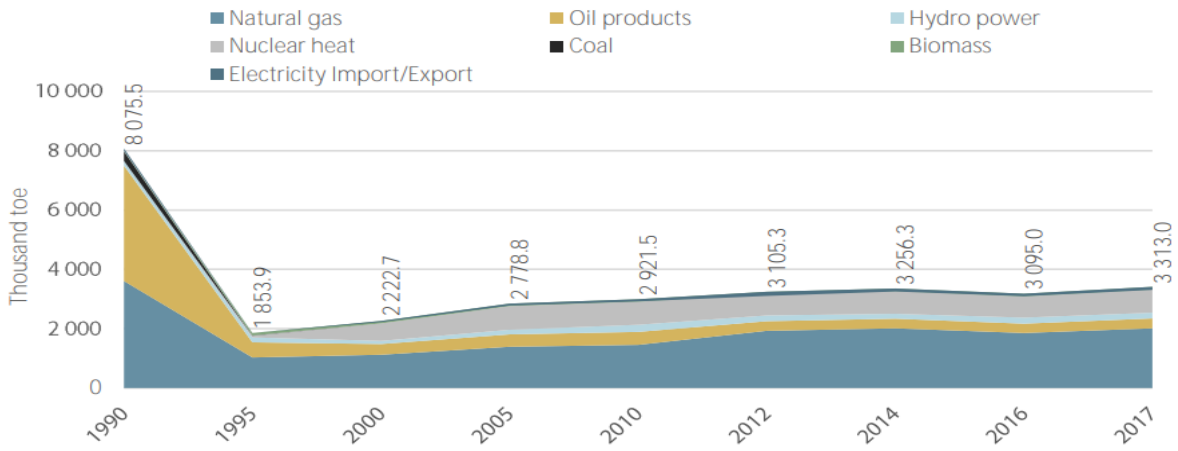
Sector	Net CO_2	CH_4	N_2O	HFCs $CO_{2\ eq.}$	SF_6 $CO_{2\ eq.}$	Total $CO_{2\ eq.}$
Energy	5,361.5	80.6	0.11	NA	NA	7,087.4
Industrial Processes[32]	262.6	NA	NA	NA	NA	262.6
F-gases[33]	NA	NA	NA	685.3	2.6	687.9
AFOLU (without Forestry and Other Land Use)[34]	2.7	48.2	3.1	NA	NA	1,965.4
Waste	4.3	25.9	0.2	NA	NA	620.7
Total GHG Emissions	**5,631.1**	**154.8**	**3.4**	**685.3**	**2.6**	**10,624.0**
Forestry and Other Land Use	-471.0	NA	0.001	NA	NA	-470.6
Net GHG Emissions	**5,160.1**	**154.8**	**3.4**	**685.3**	**2.6**	**10,153.5**

Source: Third biennial update report of Armenia, 2021

As can be seen from the table above, Armenia GHG emissions come primarily from the energy sector.

In 2017, total primary energy supply (TPES) in Armenia amounted to 3.313 million toe.

Figure 10: Armenia's energy mix, k toe



Source: Third biennial update report of Armenia, 2021

Majority of Armenia's energy supply is made up by natural gas, which accounted for 60.8 per cent of Armenia's TPES in 2017 (2.01 million toe), followed by oil products, which added 9.9 per cent TPES (0.3 million toe). Armenia has practically no domestic natural gas or oil resources and is thus highly dependent on imports for largest share of its energy supply. Since 1990, Armenia gradually and completely phased out fuel oil (mazut) from the electricity mix. Only 32.2 per cent of the TPES is covered by indigenous resources: nuclear energy, hydro energy, biofuels, and small share of solar and wind energy.

Figure 11: Armenia's energy mix

	Primary energy	Electricity
NG	60.8%	40%
Oil	10%	
Nuclear	24%	39%
Hydro	6%	31%
Biomass	2.6%	

Source: Third biennial update report of Armenia, 2021

IPCC Energy sector is by far the largest source of GHG emissions in the country, accounting for 66.7% of Armenia's total GHG emissions. In fact, CO2 emissions almost entirely come from the IPCC Energy sector, i.e., combustion. Energy industries and transport make up the two largest source categories in the IPCC Energy sector, with residential gas consumption making up the third largest emission source category.

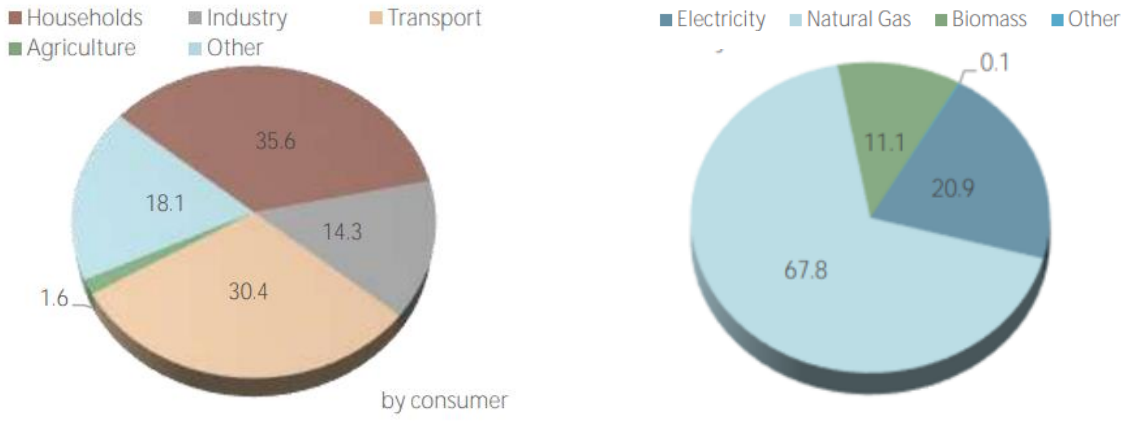
Figure 12: Armenia's CO2 emissions, total and in the IPCC Energy sector, 2017

IPCC code	IPCC Category	Greenhouse gas	Emissions, Gg CO2 eq
	Total GHG Emissions	**CO_2**	**5,631.1**
1.A	*Energy*	*CO_2*	*5,361.5*
1.A.1	Energy Industries - Gaseous Fuels	CO_2	1,297.95
1.A.2	Manufacturing Industries and Construction - Gaseous Fuels	CO_2	407.67
1.A.2	Manufacturing Industries and Construction - Liquid Fuels	CO_2	62.19
1.A.3.b	Road Transportation - Gaseous Fuels	CO2	971.86
1.A.3.b	Road Transportation - Liquid Fuels	CO2	721.73
1.A.4.a	Commercial/institutional - Gaseous Fuels	CO2	531.42
1.A.4.b	Residential- Gaseous Fuels	CO2	1,264.95
1.A.4	Other Sectors - Liquid Fuels Agriculture	CO2	69.49
1.B.2.b	Fugitive emissions from Natural Gas transportation and distribution	CH4	1,626.88

Source: Third biennial update report of Armenia, 2021

Because of predominant share of natural gas in electricity and heat generation, energy production in Armenia is relatively clean and less carbon intensive than in many of the countries in the region. In 2018, Armenia produced 0.67 million toe electricity, of which 43.3 per cent came from natural gas fired thermal power plants, 29.8 per cent came from hydro power plants, 26.6 per cent came from nuclear power plant and 0.3 per cent from wind and solar plants.

Figure 13: Energy consumption by final consumer and household energy consumption structure, %, 2017



Households and transport constitute the largest share of the final energy consumption (66%). Household natural gas consumption is driven by its widespread use for heating and cooking, heating in part appears to be also done by biomass.

Armenia does not have sizeable industries: industrial fossil fuel consumption results in modest 0.4MtCO_2 emissions, while cement and refrigeration represent the largest sources of industrial emissions.

Figure 14: Armenia's industrial GHG emissions, 2017

IPCC code	IPCC Category	Greenhouse gas	
		CO_2	HFCs
1	**Energy**		
1.A.2	Manufacturing Industries and Construction - Gaseous Fuels CO2	407.67	
1.A.2	Manufacturing Industries and Construction - Liquid Fuels	62.19	
2	**Industrial Processes and Product Use**		
2.A.1	Cement production CO2	224.55	
2.A.2	Lime production	28.35	
2.A.3	Glass Production	5.43	
2F	**Product Uses as Substitutes for Ozone Depleting Substances**		
2.F.1	Refrigeration and Air Conditioning		653.92
2.F.2	Foam Blowing Agents		23.01

Other sizeable sources of GHG emissions in Armenia include agriculture and waste management.

Figure 15: Armenia's GHG emissions in agriculture and waste management, 2017

IPCC code	IPCC Category	Greenhouse gas	Emissions, Gg CO2 eq
3.A.1.a	Enteric Fermentation - Cattle	CH4	849.02
3.A.1.b-j	Enteric Fermentation - Other	CH4	124.48
4.A	Solid Waste Disposal	CH4	426.22
4.D	Wastewater Treatment and Discharge	CH4	105.60
3.C.4	Direct N2O Emissions from managed soils	N2O	671.00

Selecting carbon pricing mechanism to match Armenia's GHG profile

Selection of a carbon pricing mechanism for a country should be based on mitigation potential, mitigation measures that could be used to access such potential, suitability of the carbon pricing mechanism to the identified mitigation measures, national priorities, and last but not least the capacity to implement the mechanism.7

Based on the emission profile, the energy sector, namely electricity and heat generation represent the largest greenhouse gas mitigation potential. Transport is the second largest final fossil fuel consuming. Both of these sectors are well suitable for carbon pricing: Armenia does not subsidize the use of fossil fuels, further strengthening the opportunities for carbon pricing in these sectors and the sectors are prioritized internally in Armenia. Energy efficiency, energy conservation and renewable energy

[7] Carbon pricing for climate action, World Bank, 2021.

development are key priorities for Armenia both to improve the country's energy security and as key drivers of low carbon development.

Other prominent mitigation options, such as soil management, waste, removals, and agriculture are less suitable for carbon pricing unless or it is based on project-based or result-based carbon financing.

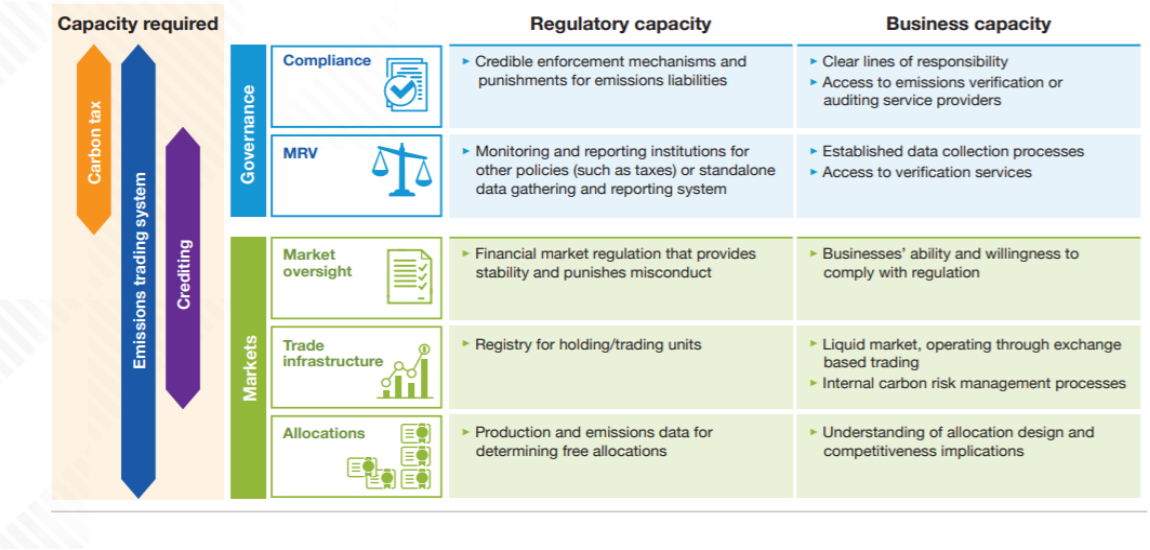
Figure 16: Armenia's GHG emissions in agriculture and waste management, 2017

Emission source	
Fossil fuel consumption	Energy efficiency or renewables
Transport sector	Switch to electricity
Fugitive methane emissions	Leak detection and repair (LDAR)
Enteric fermentation	Feed additives
Solid waste Disposal and wastewater treatment	Methane capture systems
Direct N2O emissions from managed soils	Soil management
Removals	LULUCF, agricultural soil management

Selection of each specific mitigation option can be based on the economic analysis, the so-called marginal abatement cost curve (MACC curve), however when selecting the specific mitigation policies and implementation options the capacity to implement the mechanism and their suitability to the local conditions would be a more critical for assessment.

When it comes to selection of carbon pricing instruments for Armenia, the size of Armenia's economy, the readiness of its institutions and businesses, clearly suggest that carbon tax would be a more preferrable option to emissions trading due to small number of potential installations, likely difficulty to ensure liquidity and lack of existing exchange-based trading for linked energy commodities which are all essential prerequisites for successful emissions trading schemes.

Figure 17: Institutional and business capacity required for implementation of various CPIs



Source: World bank (2021)

Existence of commitments or promising regional markets is another issue worth considering when choosing a carbon pricing instrument. In this regard, Armenia needs to consider primarily the obligations and possibilities relating to the European carbon market, European Union Emissions Trading Scheme (EU ETS).

Climate Policy and Carbon Pricing requirements in CEPA*

The Comprehensive and enhanced partnership agreement between the European Union and Armenia (CEPA) sets out main areas of cooperation between the EU and Armenia, including implementation of the Paris Agreement, enhancing capacity for climate action, development of an overall climate strategy and action plan for the long-term mitigation and adaptation to climate change, vulnerability and adaptation assessments, a low-carbon development plan, long-term mitigation measures, measures to mainstream climate considerations into sector-specific policies, measures to promote technology transfer, measures related to ozone-depleting substances and fluorinated gases, and, finally, measures to prepare for carbon trading (Article 54 (g)).

CEPA language on carbon trading does not obligate Armenia to commit to carbon trading, rather it encourages cooperation on preparation for carbon trading. The intention of the Agreement becomes even clearer on the examination of its Annexes. Annex IV to Chapter 4: Climate action of Title V: other cooperation policies lists specific EU regulations that Armenia is obligated to transpose from the EU, including:

I. Two regulations covering installation-level MRV system that serves as a preparation for carbon trading, i.e.
   - **Regulation No 601/2012** of 21 June 2012 on the *monitoring and reporting* of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council (EU ETS Directive),
   - **Regulation No 600/2012** of 21 June 2012 on the *verification* of greenhouse gas emission reports and tonne-kilometre reports and the accreditation of verifiers pursuant to Directive 2003/87/EC of the European Parliament and of the Council.

   Both regulations are applicable to aviation activities and their emissions.

II. Regulation guiding the establishment and running of the national institutions for monitoring national (rather than installation-level) greenhouse gas emissions, i.e.
   - **Regulation No 525/2013** of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC, which governs:
   - Establishment of a national greenhouse gas inventory system (Article 5),
   - Establishment of a national system for policies, measures, and projections (Article 12).

The regulations mentioned in the Annex need to be transposed within 8 years of the agreement's entry into force, which will be in 2029.

The CEPA requirements are set up in a way that present a good balance for a country like Armenia. The requirement to introduce installation-level MRV would be useful for any policy scenario, from carbon trading to CO2-based carbon taxation and offsets, could serve as a important tracking tool for implementation of policies and measures, and, last but not least, could prepare the country for the implementation of European Carbon Border Adjustment Tax.

CEPA also requires establishment of national policy-level MRV institutions, existence of which is important for effective implementation of climate change policies: e.g., the national inventory system, also required under the Paris Agreement, and the national system for tracking of policies and measures, which will be of significant assistance to tracking NDC progress, and the development of projections, which will be useful in development of Article 6 baselines. Importantly, CEPA does not call for establishment of an ETS nor does it make any requirements for the preparation towards it, besides installation-level MRV. The Agreement thus achieves a good and substantive balance in facilitating the advancement of the local capacities without imposing unrealistic expectations.

To assist with that objective, the EU4Climate has prepared the Roadmap to Monitoring, Reporting and Verification (MRV) of GHG emission at the installation level in Armenia, which provides steps to fulfilling the CEPA ETS-related obligations. The document proposes that the following is implemented by Armenia:

- Adoption of national legislation and designation of competent authority/ies;
- Establishment of a system for identifying relevant installations and for identifying greenhouse gases (Annexes I and II);
- Establishment of monitoring, reporting, verification, and enforcement systems and public consultation procedures (Articles 14, 15, 16(1) and 17).

In the process, Armenia will have to address the roles and obligations of all the stakeholders involved, including the operators of industrial installations, competent authority, verifiers and environmental inspections. The establishment of the system for identifying the relevant installations and gases will assist in identifying the industrial installations subject to the ETS Directive-relevant MRV, as well as introducing the MRV procedures. The Roadmap has also provided a provisional timeline for the implementation of the ETSD MRV system in Armenia.[8]

EU Carbon Border Adjustment Mechanism (CBAM) and Carbon Pricing

In March 2022, the European Council agreed in principle the European Carbon Border Adjustment Mechanism (CBAM), which is one of the cornerstones of EU's long-term climate policy vision. The main objective of this environmental measure is to avoid carbon leakage where carbon-intensive get displaced from the EU to reappear outside of its borders.

For that purpose, CBAM targets imports of carbon-intensive products, in full compliance with international trade rules, to prevent offsetting the EU's greenhouse gas emissions reduction efforts through imports of products manufactured in non-EU countries, where climate change policies are less

[8] https://eu4climate.eu/2022/09/06/eu4climate-assists-armenia-moldova-ets/

ambitious than in the European Union. It is also designed to help prevent the relocation of the production or the import of carbon-intensive products.

CBAM will cover products of the following sectors: cement, aluminum, fertilizers, electric energy production, iron and steel.

Potential impact of CBAM on ARMENIA

- In 2021, the total value of exports of products from Armenia into the EU was €452 million.
- 41% were primary products and 58% were manufactured products.
- First focus on products benchmarked in EU ETS

Figure 18: Armenia's exports to the EU[9]

Manufactured product	Value, €mln	% of manufactured products
Iron and Steel	**150**	**57**
Clothing	78	14
Other semi-manufactures	23	8.7
Machinery and transport	4	1.4
Other manufactures	6	2.2
Chemicals	1	0.3
Other manufactures	6	2.2

III. CONCLUSIONS

The size of Armenia's economy, the readiness of its institutions and businesses, clearly suggest that from the variety of domestic carbon pricing mechanisms carbon tax, perhaps in combination with domestic offsets scheme, would be the most preferrable option. On the contrary, emissions trading does not appear suitable for Armenia due to small number of potential installations, likely difficulty to ensure liquidity and lack of existing exchange-based trading for linked energy commodities which are all essential prerequisites for successful emissions trading schemes.

International carbon pricing mechanisms, such as Article 6, result-based climate finance, and international voluntary markets also appear to as a credible possibility for Armenia. The following table compares various carbon pricing instruments and specific recommendations for their implementation in Armenia.

Figure 19: Recommendations regarding implementation of CPIs in Armenia

Instrument	Potential coverage	Scope	Pros	Cons	Next steps
Carbon Tax	Fuel consumption	Commercial, industrial residential, vehicles	Easy to administer Can be redistributed	Nobody likes taxes Social impacts	Follow WB Carbon Tax Guide and prepare a national roadmap

[9] Source: https://webgate.ec.europa.eu/isdb_results/factsheets/country/details_armenia_en.pdf

Emissions Trading Scheme	CO_2 emissions	Energy production and industry	Economic efficiency, value creation	Very small number of installations Huge administration costs: benchmarking, MRV, trading	Hold off unless there is a regional ETS
Article 6.4	EnEf Renewables Innovation	Energy Industry Agriculture LULUCF Waste	Investment and mitigation of GHG emissions in target sectors	Danger of overselling	Establishment of A6.4 DNA 6.2 Initial report 6.2 Bilateral arrangements Project approval and ITMO handling procedures Determining national baselines Supporting better inventories in target sectors
Voluntary projects	EnEf Renewables Innovation	Energy Agriculture LULUCF Waste	Investment and mitigation of GHG emissions in target sectors	Lower prices compared to ca'ed A6	Support in the form of a public registry

Next steps

Carbon Tax. There is significant international experience with development of carbon taxes in a variety of jurisdictions as well as ready availability of guidance and methodological materials with regards to the analysis, development, and implementation of carbon taxes. It is recommended that as a next step Armenia prepares a white paper on carbon taxation and a national roadmap for carbon tax based on *Carbon Tax Guide: A Handbook for Policy Makers* prepared by the World Bank's Partnership for Market Readiness.

For Article 6.2, there are specific requirements for participation of implementation that include preparation and submission to the UNFCCC of initial report, **arrangements for authorizing the use of ITMOs** towards achievement of NDCs, arrangements for tracking ITMOs, timely submission of national inventory reports, and an explanation of how participation in the mechanism contributes to the implementation of the NDC.

For Article 6.4, the requirements include designating a national authority for the mechanism and communicating it to the secretariat; elaborating how participation in the mechanism contributes to sustainable development; indicating to the Supervisory Body the types of Article 6.4 activities Armenia would consider approving, and how such types of activities would contribute to the achievement of its NDC, LEDS, and the long term goals of the Paris Agreement.

Further areas of improvement that could prepare the country for international carbon pricing cooperation would be strengthening the MRV framework by increasing the number of sectors assessed at Tier 3, developing country-specific, region-specific, and activity-specific emission factors, which would inform and facilitate the assessment and delineation of carbon pricing and domestic NDC implementation.

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