Sharing and dissemination of environmental information

Country maturity report: Azerbaijan

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Prepared by PricewaterhouseCoopers under contract with the European Environment Agency

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This report was produced by PricewaterhouseCoopers as part of the project for developing a roadmap and identifying feasible and practical means for integrating environmental information in national e-governance/open data processes and platforms. This action is done in the context of the ENI SEIS II East project 2016-2020. The report was built in 2018, and updated throughout 2019, including a review in March 2019 after the first regional meeting in Kyiv, and a second review after the roundtable in September 2019. The report has been commented by public authorities in Azerbaijan in January 2020.

This report contains information obtained or derived from a variety of publicly available sources described within the report in more detail and does not intended to be a comprehensive analysis of environmental information, open data and e-government in the country but a collection of the main elements shaping the national environmental information landscape.

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Abbreviation	Description
AIWM OJSC	Azerbaijan Irrigation and Water Management Open Joint Stock Company
API	Application Programming Interface
ASAN	Azerbaijan Service and Assessment Network
ASAN service	State Agency for Public Service and Social Innovations under the President of the Republic of Azerbaijan
ASIS	Azerbaijan Statistical Information Service
DCAT	Data Catalogue Vocabulary
DPSIR	The causal framework for describing the interactions between society and the environment adopted by the European Environment Agency: driving forces, pressures, states, impacts, responses (extension of the PSR model developed by the OECD).
EaP	Eastern Partnership
EEA	European Environment Agency
EGDI	E-Government Development Index
ENI	European Neighbour Instrument
ENP	European Neighbourhood Policy
EPI	Environmental Performance Index
EU	European Union
HCI	Human Capital Index
ICT	Information Communication Technologies
INSPIRE	Infrastructure for Spatial Information in Europe
ISO	International Organisation for Standardisation
MEA	Multilateral environmental agreement
MENR	Ministry of Ecology and Natural Resources
NFP	National Focal Point
NGO	Non-governmental organisation
ODIN	Open Data Inventory
OGP	Open Government Partnership
OJSC	Open Joint Stock Company
OSI	Online Service Index
PRTR	Pollutant Release and Transfer Register
REC Caucasus	Regional Environmental Centre for the Caucasus
SDGs	Sustainable development goals

Abbreviation	Description
SEIS	Shared Environmental Information System
SSC	State Statistical Committee
TII	Telecommunication Infrastructure Index
UNECE	United Nations Economic Commission for Europe

1 Methodological approach and policy context

The methodology followed to prepare the present report is based on the 2018 and 2019 European Union reports on open data maturity in Europe, with some adjustments made to accommodate the specific situation of Eastern Partnership countries as well as the focus on environmental information.

This report was produced by PricewaterhouseCoopers as part of the European Environment Agency (EEA) service contract No. 3437/R0-ENIE/EEA.57335 for developing a roadmap and identify feasible and practical means for integrating environmental information in national e-governance/open data processes and platforms. This action is done in the context of the EU-funded ENI SEIS II East project 2016-2020, which targets Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and, Ukraine – the Eastern Partnership countries (EaP).

In all countries of the Eastern Partnership, e-governance and open data initiatives are recognised as mainstream for making data and information easily accessible to the policymakers, public and other stakeholders. Sharing environmental information through national e-governance and open data frameworks based on the Shared Environmental Information System (SEIS) principles[1] has seen an important development in recent years. Nonetheless, it could be further underpinned with a clearly developed vision and comprehensive roadmap for this specific area. The benefits of sharing, disseminating, and promoting the use and reuse of environmental information can support the governmental policies and actions in environment and related areas, the transition towards a green economy, innovation compliance with various reporting obligations as well as support to the implementation of various Sustainable Development Goals (SDGs). Furthermore, it can streamline efforts and reduce the reporting burden for the national bodies by working together in a more structured and connected way.

The present project aims to facilitate such exchanges and helping the EaP countries advance in developing an open data policy for the environment. The list of the main deliverables of the ENI SEIS II East project per components, including all related outcomes of the open data component is presented in the Annex B. The project is strongly embedded in the context of several international commitments and strategic documents related to the collection, update, sharing, dissemination and use of environmental information as follows:

- Article 5 of the Convention on Access to Information, Public Participation in Decision-making, and Access to Justice in Environmental Matters (Aarhus Convention) and Decision VI/1 of the Meeting of the Parties to the Aarhus Convention on promoting effective access to information[2];
- The Protocol on Pollutant Release and Transfer Registers (Protocol on PRTRs)[3];
- The Batumi Declaration "Greener, cleaner, smarter!"[4] adopted by Ministers of the UNECE region calling to have SEIS in place in support to regular assessment in countries of UNECE region by 2021;

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[1] https://www.eea.europa.eu/about-us/what/shared-environmental-information-system-1/shared-environmental-information-system

[2] https://www.unece.org/env/pp/treatytext.html

[3] https://www.unece.org/env/pp/prtr/docs/prtrtext.html

[4] https://www.unece.org/fileadmin/DAM/env/documents/2016/ece/ece.batumi.conf.2016.2.add.1.e.pdf

- The Declaration on Cooperation on Environment and Climate Change in Eastern Partnership[5] (Luxembourg 2016);
- The 2030 Agenda for Sustainable Development[6];
- The European Green Deal (2019)[7];
- 'Eastern Partnership policy beyond 2020' Communication[8] adopted on 18 March 2020;

Figure 1.A digital future - one of the five objectives of Eastern Partnership policy initiative (2020,
Factsheet: The Eastern Partnership beyond 2020: Reinforcing Resilience – a partnership that delivers for all [9])

- UN Secretary-General's Roadmap for Digital Cooperation, June 2020[10];
- Eastern Partnership leaders' video conference, 18 June 2020[11].

SEIS is also an integral part of s the Good Environmental Governance flagship initiative of the EU. EEA is currently supporting this process in both the European Neighbourhood countries[12] East[13] and South[14] in the context of dedicated projects currently running until mid-2020.

As part of this project, the "Country maturity report on sharing and dissemination of environmental information" has been prepared. The report reflects on the national e-government and maturity level of open data. The report identifies synergies for fostering environmental information sharing and dissemination to support the implementation, among others, of the SEIS principles, of the UNECE Aarhus Convention and Protocol on PRTRs. As such, the project is aiming to 1) gradually expand the open data maturity approach to the European

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https://ec.europa.eu/environment/international_issues/pdf/declaration_on_cooperation_eastern_partnership.pdf

[6] https://sustainabledevelopment.un.org/post2015/transformingourworld

[7] https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf

[8] https://data.consilium.europa.eu/doc/document/ST-6930-2020-ADD-1-REV-1/en/pdf

[9] https://eeas.europa.eu/sites/eeas/files/eap_joint_communication_factsheet_18.03.en_.pdf

[10] https://www.un.org/en/content/digital-cooperation-roadmap/

[11] https://www.consilium.europa.eu/en/meetings/international-summit/2020/06/18/

[12] https://euneighbours.eu/en

[13] EU Neighbours East: Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova, and Ukraine

14 EU Neighbours South: Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, and Tunisia

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Neighbourhood East countries and to the specific topic of environment, 2) assess the EaP countries' status of development in e-governance and open data for the environment, and 3) develop with and for each EaP country a roadmap for fostering the process and gradually align it to similar developments taking place in the European Union and other more advanced countries.

The report highlights the main challenges in the country in this area. The report serves as a tool to initiate the discussion about the strategic development and potential initiatives at the national level, bringing stakeholders from e-government, open data, and the environment together. It can serve both as a tool for further implementation and as a possible replicable prototype for other countries.

The SEIS approach consists of three pillars: Content, Infrastructure and Cooperation[15], and this approach was followed for structuring the present report and for gathering the necessary information. The report also leverages the work done in the European Union for measuring the maturity level of open data in the Member States. Consequently, the report adopts a similar structure as the "Open Data Maturity in Europe 2019"[16] published on the European Open Data Portal but adapted to the specificity of EaP countries and also focusing on the connection between e-government, open data, and environmental information. As such, the report is built around three major blocks, namely 1) the assessment of environmental information readiness; 2) the assessment of technological enablers; and 3) the key challenges and their translation into a proposed roadmap. The structure of the report is similar for all EaP countries. This approach makes the analysis comparable across EaP countries and serves as a baseline for developing and sharing initiatives across the region.

In this regard, all country reports are complemented by the Good Practices Report which supports the implementation of the proposed roadmaps offering possible solutions and alternatives based on the example of other countries and international organisations.

Environmental information readiness	Technology enablers for environmental information sharing	Achieving a high level of maturity for environmental information management
• E-government, Open Data and environmental information legal and institutional framework • Environmental data flows • Progress so far	• Portals *for e-government, Open Data and environmental information dissemination* • Portal maturity for environmental data	• Main challenges *for e-government, Open Data and environmental information sharing* • Roadmap *per SEIS pillars: Content, Infrastructure and Cooperation*

Figure 2. Country maturity report structure

The report was prepared in close cooperation with EEA project team, the National Focal Points (NFPs) for the ENI SEIS project, the Aarhus Convention, and the Protocol on PRTRs and the UNECE secretariat for these treaties respectively, and, the ENI SEIS national assistants. Furthermore, a broad consultation with national experts across a wide range of topics was

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[15] https://eni-seis.eionet.europa.eu/east/governance/what-is-seis
[16] The report structure was prepared according to Open Data Maturity in Europe 2018 and updated according to Open Data Maturity in Europe 2019
https://www.europeandataportal.eu/en/dashboard#2019

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ensured, ranging from environment, statistics, sectoral policies up to e-government and IT infrastructure.

The following sources of information were analysed for preparing the report, namely:

- Legislation:
  - o Legal acts related to public information;
  - o Legal acts related to open data;
  - o Legal acts related to e-government;
  - o Legal acts related to environmental information.
- Environmental reporting:
  - o Aarhus Convention national implementation reports;
  - o Protocol on PRTRs national implementation reports – where available;
  - o UNECE Environmental Performance Review – where available;
  - o EU Analytical Report 7: Open Data in the European Union Neighbourhood;
  - o UNECE Progress in the production and sharing of core environmental indicators;
  - o Interim Report on the Implementation of the Action Plan for Introduction of Open Government Partnership Initiative;
  - o EEA – Azerbaijan country report under ENPI-SEIS;
  - o Country Factsheets on the state of SEIS implementation in 2018[17];
  - o World Bank Country Environmental Analysis, where available;
  - o Country presentations made during the 4th ENI SEIS II East Project Steering Committee Meeting, 12 November 2019, Copenhagen;
  - o Other country-specific reports.
- Portals:
  - o EU Open Data Portal and national open data portals;
  - o E-government services portals;
  - o Environmental portals;
  - o Statistical Office websites.
- Other sources:
  - o Country-specific reports or/and analysis prepared by national and international bodies.

The challenges identified in each country, the related good practices, and the initiatives stemming from the roadmap were discussed initially during the regional event in Kyiv on 4-6 March 2019. Furthermore, the country maturity report was updated based on the discussions and presentations made at the national event in Baku on 27 August 2019 and was further discussed in the national roundtable, with a focus on the roadmap (way forward). The roundtable gathered over 30 stakeholders from various sectors, including e-government, open data and environmental information providers and users (including NFPs from the ENI SEIS project and the Aarhus Convention, few representatives from non-governmental organisations and Aarhus Centre). Comments, presentations, and conclusions from the national discussions were integrated into the report.

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[17] http://www.unece.org/environmental-policy/environmental-monitoring-and-assessment/areas-of-work/shared-environmental-information-system.html

Figure 3. Photo from the first regional meeting in Kiev – Credit: Nelli Baghdasaryan

Furthermore, the final draft version of the report was shared with the ENI countries, and the last consultation was organised in December 2019 before releasing the final version of the report.

All materials, including the summary of the discussions taking place in the events organised in the context of the project, are available at the links below:

- Regional workshop on Open Data and e-Government for the Environment (Kiev, 4-6 March 2019)
- National roundtable on open data and e-government for the environment in Armenia (Yerevan, 10 September 2019)
- National roundtable on open data and e-government for the environment in Azerbaijan (Baku, 27 August 2019)
- National roundtable on open data and e-government for the environment in Belarus (Minsk, 24 June 2019)
- National roundtable on open data and e-government for the environment in Georgia (Tbilisi, 13 June 2019)
- National roundtable on open data and e-government for the environment in the Republic of Moldova (Chisinau, 23 May 2019)
- National roundtable on open data and e-government for the environment in Ukraine (Kiev, 26 September 2019)
- Joint UNECE-EEA Workshop on Open Data for the Environment (Geneva, 2 October 2019)

2 Executive summary

The report was prepared and further updated between 2018 and 2020 as part of the EU-funded project implemented by EEA – 'Implementation of the Shared Environmental Information System principles and practices in the Eastern Partnership countries (ENI SEIS II East)'. National input in preparation of the report was ensured through a broad dialogue and consultation with various institutions in Azerbaijan, in particular those related to the environment and statistics. In addition, experts across various policy domains, including IT and e-government, have been involved through participation in national and regional events. These activities allowed an exchange of views on the future of e-government and open data in the country with particular focus on the environmental domain. As a result, the document presents an overview of the national e-government framework, the maturity level of open data and dissemination of environmental information in Azerbaijan. The analysis is covering:

- a review of the policy framework to identify existing strategic directions and available tools for environmental information dissemination using open data and e-government solutions;
- review of the legal framework to determine the requirements related to e-government, open data, and dissemination of environmental data and information;
- assessment of the technological solutions to determine the existing technical capabilities and improvements that need to be implemented in future.

Based on the above, the document proposes a roadmap that includes measures focusing on the development of e-government and open data frameworks, which would greatly support the environmental domain and even beyond. The road map is designed to be a living document throughout the implementation process and serve as a benchmark in assessing progress at various stages of development.

The methodology followed to prepare the present report is based on the 2018 and 2019 European Union reports on open data maturity in Europe. Some adjustments were made to accommodate the specific situation of Eastern Partnership countries as well as the focus on environmental information.

E-government

Over the past five years, Azerbaijan has been working to improve its governance framework, to increase the efficiency of the public administration sector and improve the quality of the public services provided. In 2014, the National Strategy for the Development of the Information Society in the Republic of Azerbaijan for the period 2014-2020 (National Strategy) was adopted. The strategy sets out concrete actions and responsibilities for the public authorities, focusing primarily on ICT development and the digitalisation of public administration. As the strategic objectives were planned up to 2020, there is a need to start evaluating the progress in the area of e-government and, based on the results achieved swiftly adopt a new strategic programme for the coming decade.

The existing legal framework covers the unified governance model, as well as the procedures for development, maintenance, and integration of state information resources. However, the legal framework could be further developed to embrace the interoperability aspects with all the associated legal, technical, and operational components.

To promote the data exchange between public authorities and to ensure the delivery of e-services to the public and businesses, the country has developed core technological solutions, such as the E-government Portal and the E-government Gateway.

Azerbaijan has established an integrated e-government portal that now provides 454 public e-services. In addition, an e-government gateway was introduced in 2018 unifying the exchange of data between public authorities. Currently 42 public authorities are connected to this infrastructure. The e-government gateway also ensures data exchange that allows to make the public e-service delivery processes more efficient. It is recommended to use the E-government Portal and the E-government Gateway to improve environmental data exchange and interoperability as well as the delivery of public e-services in the area of environment.

Open data

The existing legal framework in Azerbaijan defines the main principles of public access to information. However, the legislation does not establish an open data initiative or an open data governance framework, including regulating the responsibilities of public authorities for providing access to information in the form of open data and data management. The National Strategy adopted in 2014 also does not include open data as one of the strategic priorities. Thus, the open data policy is not developed in the country. Consequently, not many public authorities disseminate public information online. Existing data and information exchange between public institutions remains a "paper-based" processes and is very labour intensive. The supporting regulatory framework setting up rules and procedures for open data preparation, collection, regular update, quality assurance-quality control and dissemination has yet to be developed.

In view of the forthcoming development of a new strategic programme for the coming decade, it is essential that the aspect of open data would figure prominently in its content and to raise it at a comparable level with other EaP countries and harness economic, social and environmental benefits such as growth and international potential of technology market as well as reduced costs for public administration. In this respect, Azerbaijan could consider developing an open data policy, setting out the main principles of open data management and priority datasets to be published. In addition, public authorities could strongly benefit from clear responsibilities and well-defined procedures for open data management and dissemination which do not currently exist.

Nevertheless, the country made progress in developing open data infrastructure and launched the Open Data Portal in 2017 as a single access point to the open data. All datasets on the Open Data Portal are machine-readable and accessible for use and reuse. There are about 700 datasets available on the Portal and most of them have not been updated since 2017, thus limiting the potential and usability of open data.

Environmental information sharing and dissemination

The Law on Access to Environmental Information adopted in 2002 defines the main principles of access to environmental information. It regulates the obligation of public authorities involved in environmental monitoring and reporting to publish a national state of environment report once every 3 years and to provide other relevant environmental information managed by public authorities upon public request. The present legal framework should be further updated by including an obligation to publish environmental data or define the procedures for environmental data and information exchange and dissemination; provisions related to the use of common metadata standards in order to ensure discoverability and use/reuse of the data and information. Further work in these areas is recommended in order to enlarge the existing

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regulatory framework and ensure coherent procedures between various public authorities, as well as gradual alignment to international and EU standards.

In 2020, Azerbaijan developed the EcoPortal with the EU technical and financial support provided by EEA in the framework of the ENI SEIS II East project. Currently, the EcoPortal provides a single access point for the dissemination of data and information on water but it is designed as a flexible tool to promote the exchange and dissemination of any other type of environmental information. It is foreseen that the EcoPortal is expanded to other thematic areas of environmental data and information.

Suggested recommendations

Following the analysis of the current situation, a proposed roadmap outlines key areas for future development in the field of e-government, open data, and dissemination of environmental information, and provides concrete measures for improvement. Additionally, to facilitate the implementation of the roadmap, a number of examples and practical recommendations are provided in the report "Open data and e-government good practices for fostering environmental information sharing and dissemination".

The success and rapid advancement of the country in this challenging domain remain strongly dependent on clear priority-setting, multidisciplinary teamwork, and regular monitoring of progress. Furthermore, once progress is made in one or several areas proposed for consideration, readjustments and amendments of the roadmap will be needed to keep it relevant and focused on the key priorities for the country.

The measures recommended for Azerbaijan in the context of the roadmap have been grouped into the following categories: policy-related, legal, and technical measures. They cover, in particular, the following issues:

- Policy measures: referring, among others, to the adoption of a new e-government strategy as well as the development and adoption of open data and environmental data policies by public authorities holding environmental information;
- Legal measures: covering, among others, the revision of responsibilities of public authorities for environmental data management and dissemination, adoption of international standards for interoperability and metadata description, developing/updating licencing terms and conditions to promote open data access, use and reuse;
- Technical measures: addressing, among others, the further development and population of the EcoPortal, building capacity of public officials for integrated environmental data and information management and dissemination, preparation of metadata description and enhancing the multilingual aspect of web portals and websites in the area of the environment.

All of the measures need to be seen as strongly connected with and interdependent of each other and the impact of their gradual implementation needs to be closely monitored, as their synergies may bring systemic improvements across the whole data and information chain.

The ensure successful sustainable development the future work requires national policy commitment and resource mobilisation. To address these measures a multidisciplinary team should be put in place to address and oversee the implementation of all the proposed measures.

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Based on the findings of the report three specific recommendations should be considered as a priority for the country: (1) putting in place a regular state of environment reporting process, (2) digitalisation of current "paper" based environmental data management and dissemination processes, and (3) the further development and population of EcoPortal including other thematic areas of the environmental domain and interoperability with Open Data and Statistical portals. In practice these recommendations could be achieved by implementing relevant actions set out in the roadmap and summarised below:

- Specific policy measures, which could cover setting obligations for public authorities to ensure timely and regular environment reporting process, setting up priorities in the National Strategy for the upcoming decade for the digitalisation of environmental data management and dissemination process as well as the extension of EcoPortal to other thematic areas of the environmental domain;
- Specific legal measures, which could refer to the development and adoption of regulatory acts defining the responsibilities of public authorities in the environment reporting process and formalising the use of EcoPortal as the core information system in the area of environment, including legal obligations for public authorities to use it in environmental data management, exchange and dissemination process;
- Specific technical measures, which could target building technical competences of the specialists could also be further developed through training programmes and international cooperation in joint projects and experience sharing events. Technical competencies could be oriented to sustainable environment reporting, population of environmental data and enhanced knowledge of environmental data management and dissemination process.

This report depicts the current status of e-government, open data and environmental information management and dissemination in Azerbaijan. Given the exponential development of this area and its recognition as a top policy priority for the near future, regular update and analysis of the situation is strongly recommended. All the measures proposed need to be seen in strong interaction and interdependence with each other and the impact of their gradual implementation closely monitored, as it might bring systemic changes across the whole data and information chain.

3 Readiness of environmental information

3.1 E-government, open data, and environmental information legal and institutional framework

This section contains a summary of the national documents on legal policy and institutional framework in terms of e-government, open data, and environmental information.

3.1.1 National policy and legal framework

3.1.1.1 E-government

This section presents the main legislation shaping the e-government landscape in the Republic of Azerbaijan.

Decree of the President of the Republic of Azerbaijan of 14 March 2018 No. 1885 on the development of electronic government and transition to digital government[18]
This decree defines the responsibilities of public authorities in the area of e-government. This decree also obliges the Cabinet of Ministers – including the Minister of Ecology and Natural resources – to submit proposals and adopt normative legal acts that would enable acceleration of the transition to digital government.

Decree of the President of the Republic of Azerbaijan of 12 September 2018 No. 263 on approval of rules for the development, maintenance, integration and archiving of state information resources and systems and some actions related to e-government[19]
This decree specifies the main principles for the development of e-government and transition to digital government that cover reliability, uniqueness, sustainability, security, modularity and scalability, the possibility of integration and efficiency. It also defines the procedures for development, maintenance, integration and archiving of state information resources.

Decision of the Cabinet of Ministers of 24 November 2011 No. 191 on approval of rules for the provision of electronic services in specific areas by central executive bodies and public-legal entities established by the President of the Republic of Azerbaijan and the list of types of electronic services[20]
This decision approved a list of more than 400 e-services to be provided to the public and the business sector by 40 state institutions. The Ministry of Ecology and Natural Resources provides e-services in 21 different areas related to the environment. The list can be accessed via the e-government portal[21].

Decision of the Cabinet of Ministers of 1 May 2014 No. 118 on approval of the list of information systems and resources to be connected to the E-government Portal and technical

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[18] http://www.e-qanun.az/framework/38229

[19] http://www.e-qanun.az/framework/40020

[20] http://www.e-qanun.az/framework/22639

[21] https://www.e-gov.az/az/services

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requirements for connecting information systems and resources, electronic services to the E-government Portal[22]

This decree specifies the state information systems that must be linked to the e-government portal and establishes technical requirements and administrative procedures for joining the portal.

Decree of the President of the Republic of Azerbaijan of 2 April 2014 No. 359 on the approval of a National Strategy for the Development of Information Society in the Republic of Azerbaijan for 2014-2020[23]

The "National Strategy for the Development of Information Society in the Republic of Azerbaijan for 2014-2020" sets concrete actions and duties for the development of information society up to 2020. The main areas for improvement identified in the National Strategy are:

- establishment of a national information society;
- effective use of the opportunities developed by it for the public, society, and the state;
- sustainable development of the country ;
- comprehensive application of information and communication technologies (ICT) in public administration;
- development of ICT as an economic sector promoting the development of socioeconomic and cultural domains.

Decree of the President of the Republic of Azerbaijan of 6 December 2016 No. 1138 on the approval of the Strategic Road Map on Development of Telecommunication and Information Technologies in the Republic of Azerbaijan[24]

The strategic roadmap aims to increase the capacity of ICT in the country, improve the ICT infrastructure for digitising the economy, effectively meet the demand for ICT services with internal sources, and increase the effectiveness of ICT applications in the public sector while considering the new challenges and opportunities facing the telecommunication sector.

The strategic roadmap includes a strategic vision and action plan until 2020, a long-term vision for the period up to 2025, and a target view of the post-2025 period, covering short, medium, and long-term actions. The strategic roadmap has identified three strategic goals up to 2020:

- Improvement of management structures and strengthening ICT, which covers priorities such as:
    - establishment of an independent regulatory body;
    - liberalisation of the telecommunications market;
    - increasing investments in mobile infrastructure;
- Increasing productivity and operational efficiency of business entities, which covers priorities such as:
    - expansion of digital financial operations;
    - expansion of technology-based operations by business entities;
    - renewal of technological education with the participation of businesses;
    - improving e-services of government agencies;

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[22] http://www.e-qanun.az/framework/27667

[23] http://www.e-qanun.az/framework/27456

[24]https://mida.gov.az/documents/Telekommunikasiya_v%C9%99_informasiya_texnologiyalar%C4%B1n%C4%B1_inki%C5%9Faf%C4%B1na_dair_strateji_yol_x%C9%99rit%C9%99si.pdf

- o increasing knowledge and skills in the field of ICT and use of ICT in the education system;
- Digitisation of government and social environment, which covers priorities such as:
  - o improving information systems in the public sector;
  - o establishing an integrated stable e-health infrastructure.

3.1.1.2 Open data

This section presents the main laws and policies in the area of the open data in the Republic of Azerbaijan.

Law on Information, Informatisation and Protection of Information[25]
This law was passed in April 1998. It regulates the usage of information resources in information collection, processing, storage, search, and dissemination. It regulates information systems, technologies, development and use of tools for the provision of information. It also regulates the rights of the people participating in the information processes. The amendments passed in March 2017 allow the authorities to block access to a website if it contains prohibited information posing a danger to the State or society.

Law on Information Access[26]
This law was passed on 30 September 2005. The purpose of the law is to establish the legal framework for ensuring free, unrestricted, and equal access to information. It allows the public of Azerbaijan to request and receive information from any public institution. It also states that information providers are obliged to disclose information, including information on the state of the environment, damage of the environment and harmful impact on the environment.

Law on Copyrights and Related Rights[27]
The Law on Copyrights and Related Rights defines the principles for copyrights and intellectual property rights related to the creation and use of scientific documents, literature, artworks, performances, recordings, programmes of broadcasting or cable distribution organisations (related rights). The law covers copyrights of derived works such as environmental reports and their translations). The law states that the work or documentation does not have to be registered by any means in order to be protected by the copyright law.

Law on Legal Protection of Datasets[28]
The law regulates the conditions of datasets[29] use and reuse. According to this law, users of datasets can use them to create derived products or services, but a direct copy is forbidden. In addition, datasets are a result of a creative activity and are protected by copyright, thus, it is applied in accordance with the Law on Copyrights and Related Rights.

3.1.1.3 Environmental information

This section presents the main laws and policies shaping the environmental information landscape in the Republic of Azerbaijan.

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[25] http://cis-legislation.com/document.fwx?rgn=2721

[26] https://www.stat.gov.az/menu/3/Legislation/information_rules_en.pdf

[27] http://www.e-qanun.az/framework/4167

[28] http://www.e-qanun.az/framework/5537

[29] In the context of this law, a dataset is an objective form of presentation of works, data and other materials compiled in a systematic or methodical manner and which can be obtained by electronic or other means.

Law on the Protection of the Environment[30]

This law was adopted in June 1999 and identifies the legal, economic, and social bases of environment protection. The objective of the law is to protect the environmental balance, thus ensuring environmental protection, preventing the hazardous impact of industry and other activities on natural ecosystems, preservation of biological diversity and sustainable use of natural resources.

Law on Access to Environmental Information[31]

This law was adopted in 2002. It defines environmental information as covering information on water, soil, atmosphere, living organisms, environmental and human health impacts, changes to environmental factors, their assessment, environmental protection and information on measures and expenditures related to environmental monitoring.

The law makes a distinction between "accessible" and "restricted" information, and states that every person has the right to access environmental information, with the exception of restricted information. In this regard, public authorities are obliged to provide access to information upon requests from individuals and to publish national reports at least once every three years. The law regulates the publication of complete and reliable information on the state of the environment and use of natural resources.

Decision of the Cabinet of Ministries of 14 December 1998 No. 237 on normative legal acts on hydrometeorology and environmental monitoring[32]

According to the provisions of the above-mentioned decision, legal and physical persons engaged in hydrometeorological activities – irrespective of their ownership, organisational and legal form – are responsible for providing data and information on hydrometeorology and environmental pollution to the Ministry of Ecology and Natural Resources.

In addition, this decision sets up the state data fund for hydrometeorology and monitoring of the environment and determines data categories, in particular which data are accessible for free and which data are accessible only after payment is received. The decision determines the procedure for carrying out observations and research on hydrometeorology and pollution of the environment.

Decision of the Cabinet of Ministers of 15 February 2003 No. 26 on the approval of "Classification of types of information on the environment with limited access" and "Classification of public authorities to which an address or request for information with restricted access on the environment can be sent"[33][34]

This resolution restricts access to environmental information related to some activities of public authorities, in particular: internal correspondence, state security matters, confidential material and judicial matters under preliminary investigation.

Decision of the Cabinet of Ministers of 13 May 2003 No. 60 on the approval of a "Procedure regulating the agreement with a person requesting to obtain certain information on the

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[30] http://www.cawater-info.net/library/eng/az_prot_env.pdf

[31] http://www.fao.org/faolex/results/details/en/c/LEX-FAOC047310

http://www.e-qanun.az/framework/1486

[32] https://cis-legislation.com/document.fwx?rgn=5925

[33] Literal translation.

[34] http://www.e-qanun.az/framework/10302

environment" and "Rules for the analysis, storage and update of information on the environment; list and registry of environmental information sources"[35]

These rules define the procedure of the agreement with a person requesting access to specific environmental information. If the person requests specific environmental information which is paid, they must pay for it according to the "Rates and rules for use of hydrometeorology and environmental monitoring data"[36].

Decision of the Cabinet of Ministers of 25 July 2003 No. 93 on the approval of the regulation to continuously increase the amount of environmental data and information available to the public[37]

Under this regulation, public authorities are obliged to continuously enlarge the amount of environmental data and information available to the public. This decision covers reports on the state of the environment and other national reports, legal acts in the area of the environment, environmental strategy and policy documents, as well as programmes and action plans for environmental protection, international conventions, protocols and other documents the country is party to, and agreements in the field of environmental protection, etc. The regulation also states the priority directions for further increase of environmental data and information available to the public, though it does not cover the list of specific datasets to be opened.

Other major environment-related legislation

Other major environment-related legislation is provided in the table below.

Table 1. List of environment-related legislation[38]

№	Title of the document	Date
1.	Forest Code	1997, last revision in 2017
2.	Water Code	1997, last revision in 2017
3.	Land Code	1997, last revision in 2018
4.	Law on Industrial and Household Waste	1998, last revision in 2019
5.	Law on Hydrometeorological Activities	1998, last revision in 2018
6.	Law on Fishery	1998, last revision in 2014
7.	Law on Subsoil	1998, last revision in 2018
8.	Law on Environmental Protection	1999, last revision in 2013
9.	Law on Water Supply and Wastewater treatment	1999, last revision in 2013
10.	Law on Soil Fertility	1999, last revision in 2017
11.	Law on Wildlife	1999, last revision in 2017
12.	Law on Specially Protected Natural Areas and sites of national heritage	2000, last revision in 2017
13.	Law on the Protection of Atmospheric Air	2001
14.	Law on Environmental Education and Public Awareness Raising	2002
15.	Law on the Protection of Biodiversity	2014, last revision in 2018
16.	Law on Environmental Impact Assessment	2018

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[35] http://www.e-qanun.az/framework/1306

[36] http://www.e-qanun.az/framework/4876

[37] http://www.e-qanun.az/framework/1376

[38] Non-official translation of the titles

3.1.2 Main international policies and agreements

The main international policies and agreements are presented below.

3.1.2.1 *Multilateral environmental agreements setting out public access to information and reporting obligations*

This section presents the main multilateral environmental agreements that set out public access to information and reporting obligations.

Convention on Access to Information, Public Participation in Decision-making, and Access to Justice in Environmental Matters (Aarhus Convention)[39]

Azerbaijan ratified the Aarhus Convention on 23 March 2000. Within its broad scope, the convention sets out obligations to provide effective public access to environmental information held by various public authorities, public participation in decision-making and access to justice in environmental matters. The progress of implementation of the Aarhus Convention by Azerbaijan is reflected in national implementation reports to the Convention.[40]

At the same time, Azerbaijan has not yet acceded to the convention's amendment related to genetically modified organisms.[41]

Protocol on Pollutant Release and Transfer Registers to the Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters (Protocol on PRTRs)[42]

The Protocol sets out obligations to establish pollutant release and transfer registers, namely a national database or inventory of potentially hazardous chemical substances released into the air, water and soil and off-site transfers. As such, the inventory allows public authorities to track each release and transfer of a hazardous chemical substance consistently over time. Azerbaijan has not ratified the Protocol on PRTRs.

Framework Convention for the Protection of the Marine Environment of the Caspian Sea (Teheran Convention)[43]

The objective of this convention is the protection of the Caspian environment from all sources of pollution, including the protection, preservation, restoration, and sustainable and rational use of the biological resources of the Caspian Sea. The riparian countries consider establishing common mechanisms and standards for environmental monitoring of the Caspian Sea to enable comparability of methods and of the results. Therefore, a dedicated Working Group under the convention was established to carry out this task. In addition, the draft Protocol on Environmental Impact Assessment in a Transboundary Context to the Tehran Convention was prepared to formalise this process. The protocol was signed in 2018 and ratified by Azerbaijan in 2019.[44]

Other multilateral environmental agreements

Azerbaijan is party to 19 global international treaties and 14 protocols in the fields of environment, natural resources, and climate change, with all the rights and obligations attached

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[39] http://www.unece.org/env/pp/welcome.html

[40] https://aarhusclearinghouse.unece.org/national-reports

[41] http://www.unece.org/env/pp/ratification.html

[42] https://www.unece.org/env/pp/prtr.html

[43] https://www.ecolex.org/details/treaty/framework-convention-for-the-protection-of-the-marine-environment-of-the-caspian-sea-tre-001396/

[44] http://www.tehranconvention.org/spip.php?article2

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(the full list of conventions and protocols is provided in Annex A). Consequently, the country has obligations to fulfil and regular reports to deliver in relation to these international commitments.

This section analyses selected multilateral environmental agreements (MEAs) in terms of public access to information, reporting and monitoring. The MEAs that are presented in the table below were chosen as examples to reflect on whether the country carries out relevant monitoring, report data in thematic areas of water, air, biodiversity, climate change and the ozone layer and provide effective public access to information. For this report, the analysis focuses on the following:

- **public access to information.** In this respect, a review of official Azerbaijani governmental institution portals was performed. The analysis shows the extent to which publicly available information covers the requirements of the MEA presented in the table below.
- **reporting**. In this case, a review of MEA related databases was performed to determine if the official national reports are provided by the Azerbaijani governmental institution was performed. The analysis indicates whether the national report related to each specific MEA was submitted on time as required by the MEA presented in the table below.
- **monitoring activities**. For this aspect, a review of the monitoring activities as defined by the respective MEA and available in the official portals, as well as reports provided by governmental institutions, was performed. The analysis shows if the monitoring activity was performed on time as required by the MEA presented in the table below.

The table below presents the examples of the MEAs analysed in this section.

Table 2. Analysis of selected MEAs in terms of public access to information, reporting and monitoring requirements (as of May 2020, developed by the report's authors)

MEA	Public access to information	Reporting	Monitoring
UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention)	Yes[45]	No[46]	Yes[47]
UNECE Convention on Long-range Transboundary Air Pollution	Yes[48]	Yes[49]	Yes[50]
UNECE Protocol to the 1979 Convention on Long-range Transboundary Air Pollution on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent	Not a party		
UNECE Protocol to the 1979 Convention on Long-range Transboundary Air Pollution Concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes	Not a party		
UNECE Protocol to the 1979 Convention on Long-range Transboundary Air Pollution to	Not a party		

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[45] https://www.stat.gov.az/source/environment/?lang=en

[46] National report is not available at:
https://www.unece.org/water/transboundary_water_cooperation_reporting.html

[47] https://www.stat.gov.az/source/environment/?lang=en

[48] https://www.stat.gov.az/source/environment/?lang=en

[49] https://www.ceip.at/ms/ceip_home1/ceip_home/status_reporting/2019_submissions/

[50] http://eco.gov.az/az/hidrometeorologiya/fealiyyet-istiqametleri

MEA	Public access to information	Reporting	Monitoring
Abate Acidification, Eutrophication and Ground-level Ozone			
UN Convention on Biological Diversity	Yes[51]	Yes[52]	Yes[53]
UN Framework Convention on Climate Change	Yes[54]	Yes[55]	Yes[56]
UN Vienna Convention for the Protection of the Ozone Layer	Yes[57]	Yes[58]	Yes[59]
UN Montreal Protocol on Substances that Deplete the Ozone Layer	Yes[60]	Yes[61]	Yes[62]

* Explanation of the markings in the table:

- *Yes – the country provides publicly available information on official portals or official reports related to MEAs;*
- *No – the country does not provide information on official portals or official reports;*
- *Not a party – the country has not acceded to the respective MEA.*

3.1.2.2 Other international processes promoting sharing and accessibility of environmental information

This section presents other international processes which promote the sharing and accessibility of information.

"Environment for Europe" process

The first "Environment for Europe" ministerial conference took place in 1991 at Dobris Castle in the former Czechoslovakia. A set of basic guidelines for a pan-European cooperation strategy was laid down[63]. The Shared Environmental Information System (SEIS) in the pan-European region was launched at the "Environment for Europe" ministerial conference in 2011, in Astana.

In 2016, the eighth "Environment for Europe" ministerial conference[64] took place in Batumi, Georgia. On the occasion, the ministers signed the ministerial declaration[65] "Greener, cleaner

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[51] https://www.stat.gov.az/source/environment/?lang=en

[52] https://www.cbd.int/doc/world/az/az-nbsap-v2-en.pdf

[53] http://eco.gov.az/az/fealiyyet-istiqametleri/biomuxteliflik/ovchuluq-teserrufatlari

[54] https://www.stat.gov.az/source/environment/en/010_3en.xls

[55] https://unfccc.int/sites/default/files/resource/azenc3.pdf

[56] http://eco.gov.az/az/hidrometeorologiya/fealiyyet-istiqametleri

[57] https://ozone.unep.org/countries/data?report_type=0&party%5B0%5D=17&period_start=1986&period_end=2019&output_type=odp-CO2e-tonnes

[58] https://ozone.unep.org/countries/profile/aze

[59] https://ozone.unep.org/countries/data?report_type=0&party%5B0%5D=17&period_start=1986&period_end=2019&output_type=odp-CO2e-tonnes

[60] https://ozone.unep.org/countries/data?report_type=0&party%5B0%5D=17&period_start=1986&period_end=2019&output_type=odp-CO2e-tonnes

[61] https://ozone.unep.org/countries/profile/aze

[62] https://ozone.unep.org/countries/data?report_type=0&party%5B0%5D=17&period_start=1986&period_end=2019&output_type=odp-CO2e-tonnes

[63] More information: https://www.unece.org/env/efe/historyofefe/history.en1991_01.html

[64] The Conference was organised based on the provisions of the Environment for Europe Reform Plan, adopted in 2009, and in accordance with the procedures for the Batumi Ministerial Conference, adopted in 2014.

[65] https://www.unece.org/fileadmin/DAM/env/documents/2016/ece/ece.batumi.conf.2016.2.add.1.e.pdf

and smarter!" calling for the continuation of efforts and the further development of national information systems to have SEIS in place in the countries of Europe and Central Asia by 2021[66].

The next "Environment for Europe" ministerial conference will review progress in the area of environment and celebrate 30 years of the "Environment for Europe" process.

Open Government Partnership Initiative[67]
The Open Government Partnership (OGP) is a multilateral initiative of national reformers, all determined to make their governments more responsive to the needs of the public. Azerbaijan joined the OGP initiative in 2011. Azerbaijan adopted the National Action Plan for the Promotion of Open Government 2020-2022 and has nine commitments aimed at achieving greater progress in the areas of improvement and digitalisation of public services, prevention of corruption, strengthening citizen oversight, expanding public participation, increasing financial transparency, and ensuring access to information.

Azerbaijan is currently suspended from OGP pursuant to the Response Policy (as of May 2020).[68] The Response Policy was activated by the letter of concern submitted by CIVICUS, Publish What You Pay c/o Open Society Foundation, Article 19, and Human rights watch. After OGP has taken a measure of suspension the Republic of Azerbaijan has taken multiple actions to address the challenges stated in the letter of concern by preparing the roadmap for the Development of the 2020-22 OGP Action Plan, assigning responsible people to OGP related initiatives, participating in OGP steering committee meetings and communicating with NGOs.[69]

3.1.2.3   Cooperation with the European Union

This section provides an overview of the main agreements with the EU.

Declaration on Cooperation on the Environment and Climate Change in the Eastern Partnership[70]
The EU cooperates with Azerbaijan in the framework of the European Neighbourhood Policy and its eastern regional dimension, the Eastern Partnership. The European Union's bilateral relations with Azerbaijan are based on the EU-Azerbaijan Partnership and Cooperation Agreement in force since 1999.

Negotiations are underway with the European Union for a new bilateral agreement with the aim of enhancing bilateral cooperation[71]. In February 2017, the EU and Azerbaijan began negotiations on a new framework agreement designed to give new impetus to political dialogue and mutually beneficial cooperation. Partnership priorities were also endorsed in 2018 by the Cooperation Council.

In 2016, the European Union (EU) and the countries of the Eastern Partnership (EaP) adopted the declaration on Cooperation on Environment and Climate Change (Luxembourg Declaration).

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[66] The main outcome of the conference is available here: https://www.unece.org/index.php?id=41721

[67] https://www.opengovpartnership.org/countries/azerbaijan

[68]

[70]

http://ec.europa.eu/environment/international_issues/pdf/declaration_on_cooperation_eastern_partnership.pdf

[71] More information on cooperation between the European Union and Azerbaijan is described here: https://ec.europa.eu/neighbourhood-enlargement/neighbourhood/countries/azerbaijan_en

The declaration aims to strengthen regional cooperation on environmental and climate action, and sustainable development in the Eastern Partnership region by implementing relevant international commitments such as the 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change. It seeks to raise awareness among and enhance cooperate between relevant stakeholders, support the involvement of civil society in the decision-making process, strategic planning, and implementation, and monitor the results of implementation of environmental policies, programmes and plans, and other commitments.

The second EaP ministerial meeting on the environment and climate change took place on 9 November 2018 in Luxembourg, co-organised by the European Commission and Austrian Presidency. The progress achieved by the countries was discussed and assessed in view of further strengthening that cooperation[72]. The third Eastern Partnership high-level meeting is scheduled now for early 2021 (while only a virtual summit will take place on 18 June 2020 due to coronavirus restrictions).

EaP Connect Project[73]

The EaP Connect Project was launched in July 2015. It aimed to link the national research and education networks in the partner countries to the pan-European research and education network GÉANT. It connects more than 2 million scientists, academics, and students from 700 institutions across the region. The joint initiative of the EU, Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova, and Ukraine is an example of the efforts undertaken to foster the creation of digital economies and promote open data in EaP countries.

As part of EaP Connect Project, Eastern Partnership e-infrastructure conferences were held, namely in 2016 (Tbilisi), 2017 (Minsk), 2018 (Chisinau) and 2019 (Yerevan). The conferences served as a platform for collaboration on policy and research and supporting community building in e-infrastructures between the Eastern Partnership region and the EU Member States. Conferences focused on e-infrastructures for open science and fostered the exchange of ideas in research areas such as physics and seismology, biomedical sciences, robotics, high-performance computing and data analytics, and climate and ecology[74].

3.1.3 National standards, interoperability, and quality control
3.1.3.1 Metadata standards

The following table presents the list of metadata standards used in Azerbaijan.

Table 3. Metadata standards of portals (as of May 2020)

Component	Metadata standards
Open data	Datasets on the Open Data Portal are described in a structured way. It is not clear if the standard is based on the international metadata standards as no indication for it is provided.
Spatial	Multiple dedicated geoportals exist, but no metadata standard is described. It would be beneficial for public authorities to have access to the geospatial metadata standards in use so that more data could be published on the geoportals.

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[72] Azerbaijan progress factsheet: https://eeas.europa.eu/sites/eeas/files/eap_factsheet_azerbaijan_en.pdf
[73] https://www.eapconnect.eu/
[74] https://www.eapconference.org/eapec-2019

Component	Metadata standards
Environmental information	The system of environmental indicators was developed in accordance with the UNECE Guidelines for the Application of Environmental Indicators in Eastern Europe, the Caucasus, and Central Asia. Environmental reports are published in various environmental portals and platforms, though no additional metadata is provided regarding published data and information e.g. description of published data, public authority responsible for published data, the date when data was published. Azerbaijan published its State of Environment Report 2013 on to the Dropbox platform without any metadata description.
Statistical	The State Statistical Committee's metadata are prepared in accordance with DCMI (Dublin Core Metadata Initiative) and ESMS (Euro-SDMX Metadata Structure) standards. Since 2012, the GSBPM (the Generic Statistical Business Process Model) is used as a basis for standardising processes. Details about metadata can be accessed on the Azerbaijan Statistical Information Service (ASIS) portal[75]. In addition, a unified classification system, harmonised with relevant European classifications, is used. All the metadata descriptions are available only in the national language – no translation is available. All metadata are divided into two groups – metadata by indicators and metadata by questionnaires. Metadata by questionnaires contain information on periodicity, the deadline for submitting the questionnaire, the groups of statistical units for which this questionnaire is relevant, etc. Metadata description is publicly available for 21 environmental indicators[76]. In addition, recently metadata descriptions for 13 official statistical reports in the area of the environment have become available on the State Statistical Committee portal[77].

3.1.3.2 Interoperability

As a tool enabling interoperability, Azerbaijan has implemented the e-government gateway developed on the basis of the X-road platform (originally developed and implemented in Estonia). The e-government gateway is a decentralised system that unifies the interfaces and protocols for data exchange between government information systems. Any information system managed by a public authority can be connected to the e-government gateway and receive data using standard rules and APIs as well as provide data for other information systems. All organisations must adapt their information systems and data exchange protocols to standard solutions provided by the e-government gateway.

In 2018, 91 information systems managed by public authorities and commercial organisations were connected to the e-government gateway and approximately a 1,000 e-services were created using the information received through this tool. In the period 2016 – 2018 more than 40 million transactions (data exchange operations) were made via the e-government gateway using the data for e-service delivery and public administration processes.

Public authorities from the environmental domain could benefit from using the e-government gateway and by exchanging data and information between each other as well as with other

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[75] https://www.azstat.org/MetaDataInd/

[76] https://www.azstat.org/MetaDataG/

[77] https://www.azstat.org/MetaDataW/

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public authorities. As of May 2020, environmental information systems were not integrated into the e-government gateway.

3.1.3.3 Quality control of environmental data

Quality control mechanism for environmental monitoring
To ensure the quality measurements of the environment, all equipment and devices go through a quality check and calibration procedures to ensure the quality of the data produced. Moreover, within the National Environmental Monitoring Department and Central Laboratory, there are quality managers responsible for data quality and ensuring that data verification tools are used.

Quality control mechanisms and standards for statistical data and information dissemination
Based on the European Statistics Code of Practice, a Code of Practice for the State statistical bodies of Azerbaijan was developed and approved by the Statistical Council of the State Statistical Committee. The activity "Production and dissemination of official statistics" was certified according to the requirements of international standards – ISO 9001:2008 "Quality Management Systems. Requirements" in August 2013 and ISO 9001:2015 in April 2017[78]. The State Statistical Committee implemented/updated all related statistical procedures to be compliant with internationally recognised ISO 9000 standards for quality control/assurance.

In 2010, the State Statistical Committee adopted a quality policy and its quality objectives, which are reviewed annually. The quality manual was approved by order of the State Statistical Committee No. 07/07s, dated 25 May 2016. This document was prepared for the first time in 2010 and is updated on a yearly basis. Quality management procedures in the organisation are set up in line with ISO 9001:2015 "Requirements for Quality Management Systems"[79].

Internet-based questionnaires are used to implement quality checks of data received from public authorities. Data obtained through questionnaires are compared with data received from public authorities to identify discrepancies and, if necessary, bring them to conformity.

3.1.4 Institutional framework for environmental information management and involvement of various stakeholders

The following diagram illustrates the main environmental information, open data, and e-governance main stakeholders.

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[79] Quality management documentation is available here: https://www.azstat.org/portal/
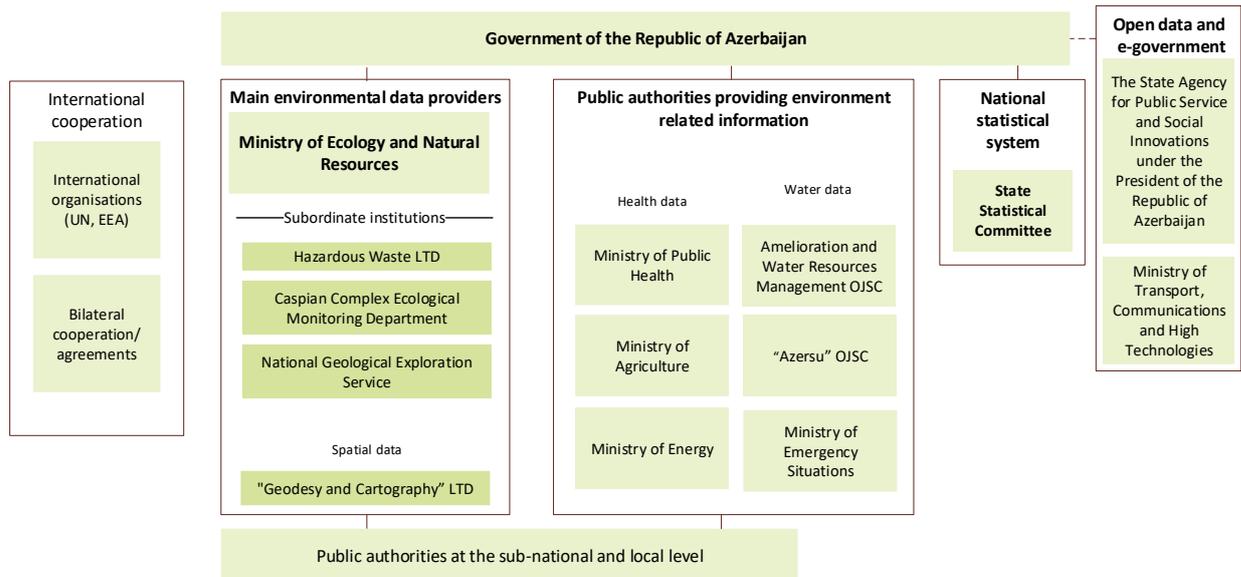
Figure 4. Institutional set-up with the environmental, open data and e-government responsibilities of Azerbaijan (as of May 2020, developed by the report's authors)

Ministry of Ecology and Natural Resources[80]

The Ministry of Ecology and Natural Resources (MENR) was established on 23 May 2001 (the last institutional changes were implemented in 2018). The ministry is responsible for the development and implementation of environmental policy, development of environmental legislation, monitoring implementation of environmental legislation and enforcing sanctions.

The ministry and its subordinated structures monitor the quality of air, climate, soil, surface water and groundwater, biological resources and radioactive pollution, as well as perform state of environment assessments. In addition, the MENR is responsible for the development of environmental information systems for environmental data and information monitoring, management, and dissemination.

The following institutions are subordinated to the Ministry of Ecology and Natural Resources and do not have official sites to provide information[81]:

- Geodesy and Cartography LTD;
- Hazardous Waste LTD;
- National Geological Exploration Service;
- Caspian Complex Ecological Monitoring Department.

In addition, in 2010, the Public Environmental Council was established under the Ministry of Ecology and Natural Resources, which is a joint group with representatives from both NGOs and public authorities. The main objective of the council is to enhance cooperation with the NGO community as well as increase the efficiency of implementing the provisions of the Aarhus Convention. Furthermore, the council aims to enhance the capacity of NGOS to develop project proposals, programmes and other actions towards environmental protection and revitalisation, ecological security, and the efficient use of natural resources.

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[80] http://eco.gov.az
[81] http://eco.gov.az/az/nazirlik/tabeli-qurumlar

State Statistical Committee[82]

The State Statistical Committee is an administrative authority established in 1994 under the Government of the Republic of Azerbaijan for leading and coordinating activities in the area of statistics. It oversees the collection, processing, and dissemination of statistical data on the economy, demographics and other areas including the environment.

Currently, statistical data are collected from companies and public authorities. The State Statistical Committee produces environment statistics based on the information it receives from MENR. The committee also publishes a comprehensive National Statistical Yearbook which also contains environmental statistics.

Other environmental data providers

- **Ministry of Public Health[83]**
  The Ministry of Public Health is responsible for the healthcare system in Azerbaijan. The ministry formulates the main policy directions for the healthcare sector, coordinates and supervises to ensure accountable and high-quality healthcare services and manages and disseminates data in the area of public health and healthcare services. In the context of the environment, the ministry data related to the quality of drinking water are sent to MENR in paper form.

- **Ministry of Agriculture[84]**
  The Ministry of Agriculture is the central executive authority that develops policy in the areas of agriculture, fishing, and rural development. In performing its tasks, the ministry develops plans, programmes, and projects to develop these areas. The ministry collects various data related to agriculture such as main agricultural equipment, yearly financial results of agriculture sector and use of fertilisers. The data and information managed by the ministry is shared with MENR and the State Statistical Committee in paper form.

- **Ministry of Energy[85]**
  The Ministry of Energy of Azerbaijan is the central executive authority implementing state policy in the energy sector. The ministry develops regional programmes, oversees the production of oil related products, engages in relevant international agreements related to the energy sector and supervises the activities of subordinated institutions. The ministry publishes annual reports and collects data related to the energy sector such as consumption of electricity, consumption of oil related products, total energy supply and others. The ministry shares environmental-related data with MENR in paper form.

- **Ministry of Emergency Situations[86]**
  The Ministry of Emergency Situations is a central executive authority implementing state policy in managing emergency situations, civil defence, firefighting and public safety areas. The ministry is responsible for the development of a national emergency management framework covering procedures, actions, and tools. The ministry supervises the activities of subordinate authorities as well as companies operating in the mining and construction

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[82] www.stat.gov.az/index.php

[83] www.sehiyye.gov.az

[84] https://www.agro.gov.az/en

[85] www.minenergy.gov.az

[86] www.fhn.gov.az

industries. The ministry publishes statistics on natural disasters, man-made disasters, fires, and explosions[87] through specific data categories and datasets in the area of the environment, which are shared with MENR and further used to calculated environmental indicators that are not publicly accessible and identified.

- **Azersu OJSC[88]**
  Azersu OJSC is a company that supplies drinking water and provides sanitation services. The company designs centralised water supply and sewerage systems in residential areas, prepares feasibility studies and engineering surveys for construction, and performs scientific research. The company provides data and information about water management through specific data categories and datasets which are shared with MENR and further used to calculated environmental indicators that are not publicly accessible and identified.

- **Amelioration and Water Resources Management OJSC [89]**
  Amelioration and Water Resources Management OJSC is a company providing public services in the field of water management. The company manages the water supply in Azerbaijan, monitors water use, implements flood prevention measures and develops technical solutions for the management of water resources. No information on the data and information collected by the company is publicly available.

Open data and e-government stakeholders

- **Ministry of Transport, Communications and High Technologies[90]**
  The Ministry of Transport, Communications and High Technologies was established in 2004 (the last institutional changes were implemented in 2017) and is the central executive authority implementing state policy in the areas of transport, communications, and technology, including e-government. In the area of e-government, the ministry coordinates the development of action plans and programmes as well as the development of e-services at a national level. The State Agency for Public Service and Social Innovations under the President of the Republic of Azerbaijan subordinate to the ministry is responsible for the maintenance and development of the e-Government Portal.

- **The State Agency for Public Service and Social Innovations under the President of the Republic of Azerbaijan[91]**
  The State Agency for Public Service and Social Innovations under the President of the Republic of Azerbaijan (ASAN service) is the central body of executive power that is responsible for the delivery of public services to citizens and businesses operating in Azerbaijan. The ASAN service provides public services and its activities include: the management of public service requests, providing call centre services, delivering public service results and providing consultations for citizens and businesses. In addition, the ASAN service is responsible the implementation of technology measures to develop e-government in Azerbaijan. The ASAN service provides e-services through ASAN service centres in various regions of the country and e-government portal. ASAN service centres represent "one-stop-shop"-based locations that provide services to 10 public authorities (Ministry of Taxes, Ministry of Internal Affairs, Customs Committee, and others) as well as to private

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[87] http://www.fhn.gov.az/index.php?eng/pages/150

[88] http://azersu.az/en/azersu

[89] http://www.mst.gov.az/en

[90] https://mincom.gov.az/en/

[91] http://vxsida.gov.az/en

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companies. ASAN service centres provide more than 300 services using the public-private partnership model, among others personal data registration, identity cards, passports, driver licences, real estate records and immigration status. Public services as well as e-services in the environmental domain are not yet included in the ASAN service public service portfolio and should be implemented in the next stage of ASAN service public service portfolio extension, together with technology solutions needed for public service delivery.

Non-governmental organisations

In 2019, there were around 4,500 registered non-governmental organisations (NGOs) in Azerbaijan. In parallel, it is estimated that around 300 non-registered NGOs are carrying out activities in the country[92]. The most important one dealing with environmental issues is the NGO Ruzgar. This NGO was established in 1996 by an interdisciplinary group of scientists, engineers, doctors, sociologists, lawyers, economists, and journalists, working in various fields of environment protection. The main activities of Ruzgar are directed towards contributing to the monitoring of the state of the environment complementary to state bodies, the organisation of civic activities for the protection of the environment and improvement of environmental education in the country.

Aarhus Centres[93]

Aarhus Public Environmental Information Centres were established in 2003, with assistance from the Organization for Security and Cooperation in Europe. They have been set up by the Ministry of Ecology and Natural Resources in various cities, including Baku, Ganja and Gazakh, with the specific objective of supporting the practical implementation of the Aarhus Convention. As of May 2020, the information is not publicly available on the dedicated portal http://www.aarhuscenter.az.

Regional Environmental Centre for the Caucasus (REC Caucasus)[94]

Since its establishment in 1999, the REC Caucasus has implemented about 60 medium and large-scale projects in the region, which have contributed to policy development, capacity-building, facilitating dialogue and networking, information exchange on environmental issues and supporting civil society in the three Caucasus states. The REC Caucasus provides numerous publications and video materials related to projects implemented in areas of land degradation, waste management, climate change, green economy, forests, biodiversity, and water management.

3.2 Environmental data flows

The following diagram illustrates environmental data flows in Azerbaijan.

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[92] http://www.icnl.org/research/monitor/azerbaijan.html
[93] https://aarhus.osce.org/azerbaijan/baku
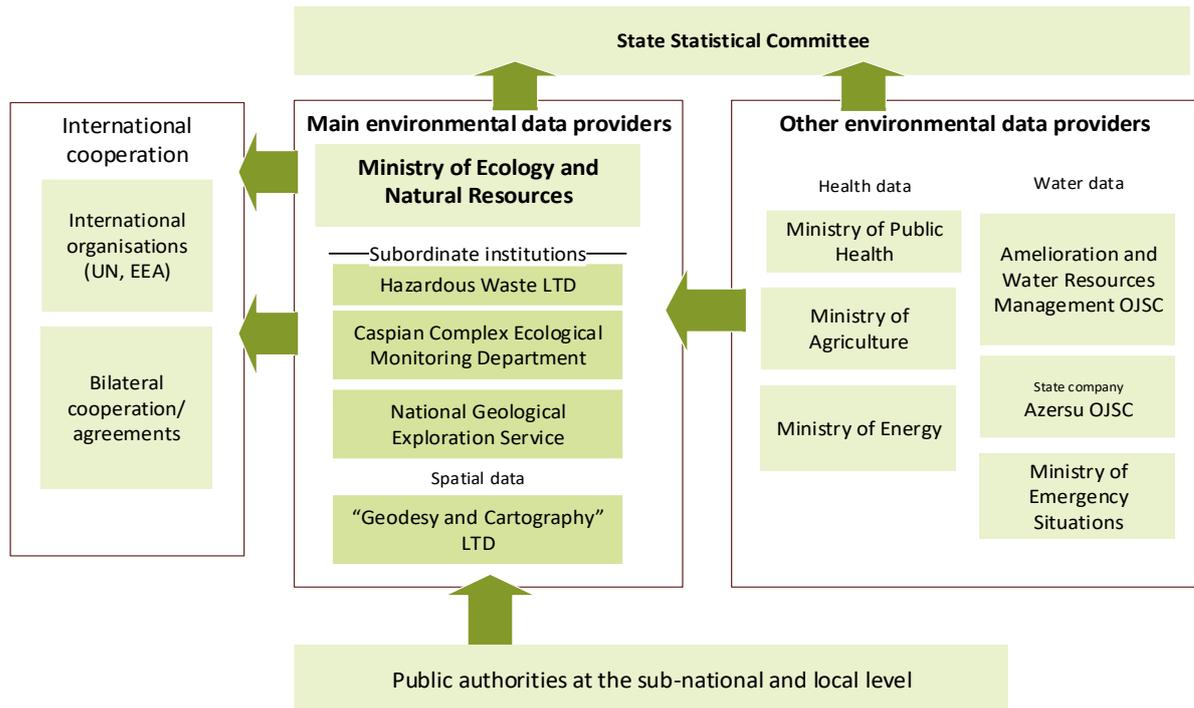[94] https://www.rec-caucasus.org/en

Figure 5. High-level environmental data flows in Azerbaijan (as of May 2020, developed by report's authors)

Environmental information is mostly centralised under the MENR. In general, MENR is responsible for collecting, analysing, and disseminating environmental data and information at a national level.

There is no central system for environmental data storage and exchange, institutions develop and maintain specific thematic systems (e.g. water monitoring) which are not integrated into each other. The recently built EcoPortal under the ENI SEIS II project could be further developed to be an Integrated Environmental Information System. Environmental data integration from various sources and remaining paper-based processes in the area of environmental data and information exchange and dissemination remain the main challenges of successfully populating the EcoPortal. The EcoPortal is currently populated with water data (as part of the pilot project implemented by the EEA) but it is expected to be further expanded with other areas of the environmental domain. MENR share environmental data and information with the State Statistical Committee which produces statistical reports and provides access to the Azerbaijan Statistical Information Service (ASIS). There are 13 reporting forms used by the State Statistical Committee for collecting data:

- protection of the atmosphere, including pollutant emissions from stationary sources, their disposal (utilisation), greenhouse gas emissions;
- generation, utilisation, maintenance, and disposal of waste;
- geological exploration actions;
- environmental protection expenditure;
- air pollution, including the total amount of pollutant emissions by motor vehicle;
- protected areas, including reserves, national parks, and game reserves;
- volume of waste, including waste generation per sector, product and related mining and mineral processing;

- volume of municipal waste;
- hazardous waste includes waste that is controlled under the Basel Convention;
- forested areas and forestry;
- water resources, including reserves of surface and underground water.

In addition, data are gathered from administrative sources, including data on:

- the use of water resources – from the Amelioration and Water Resources Management OJSC;
- emissions of pollutants into the atmosphere from motor vehicles – from MENR;
- environmental control – from MENR;
- meteorological station data – from MENR;
- sanitary control of potable water– from the Ministry of Public Health;
- medical waste – from the Ministry of Public Health.

3.2.1 Available environmental assessment reports, indicators, and statistics

3.2.1.1 Environmental assessment reports

The ENI SEIS II East webpage[95] summarises the environmental assessment reports published in Azerbaijan. Most reports are published by the MENR and the State Statistical Committee. The reports are published in the form of books, newsletters, or brochures. Published reports usually cover a period of 5-10 years; annual reports are usually published on the websites of respective national authorities in *.pdf* format, or on the sites of multilateral environmental agreements. The following table presents the main environmental reports available in Azerbaijan.

Table 4. List of main environmental assessment reports (as of May 2020, from ENI SEIS II East project website)

Type of report	Report description
National environmental report (State of Environment Report)	State of Environment Report Data source: https://www.dropbox.com/sh/8yi8uit6ol7sbly/AAA7kIYNmgzBh-0S8qWnluoUa?dl=0&preview=Jurnal-1.pdf Prepared by: MENR Last year published: 2013 Frequency: irregular
Thematic reports – climate (national communications to UNFCCC)	Third National Communication to the United Nations Framework Convention on Climate Change Republic of Azerbaijan Data source: https://unfccc.int/resource/docs/natc/azenc3.pdf Prepared by: MENR Last year published: 2015 Frequency: irregular
Thematic reports – land	No data available
Thematic reports – air	Informative Inventory Report of Azerbaijan 2019 Submitted under the Convention on Long-range Transboundary Air Pollution (LRTAP)

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[95] https://eni-seis.eionet.europa.eu/east/countries/azerbaijan

Type of report	Report description
	Data source: https://webdab01.umweltbundesamt.at/download/submissions2019/AZ_IIR2019.zip?cgiproxy_skip=1 Prepared by: MENR Last year published: 2019 Frequency: Annual
Thematic reports – water	Template for summary reports in accordance with Article 7 of the Protocol on Water and Health Data source: https://www.unece.org/fileadmin/DAM/env/water/Protocol_reports/reports_pdf_web/2019_reports/Azerbaijan_summary_report_4th_cycle_22Apr19_Eng.pdf Prepared jointly by: the Ministry of Health and MENR Last year published: 2019 Frequency: Annual
Thematic reports – biodiversity	Azerbaijan Fifth National Report Submitted under the Convention on Biological Diversity Data source: https://www.cbd.int/doc/world/az/az-nr-05-en.pdf Prepared by: MENR Last year published: 2014 Frequency: every four years
Thematic reports – waste	About waste movement in 2019 (an article in the https://www.stat.gov.az portal) Data source: https://www.stat.gov.az/news/index.php?id=4567 Prepared by: the State Statistical Committee Last year published: 2020 Frequency: annual
National Statistical Yearbook	Statistical Yearbook of Azerbaijan Data source: https://www.stat.gov.az/menu/6/statistical_yearbooks/?lang=en Prepared by: the State Statistical Committee Last year published: 2019 Frequency: annual
Report on sustainable development	Voluntary national review of the Republic of Azerbaijan on the first steps in the implementation of the 2030 Agenda for Sustainable Development Prepared by: the Government of Azerbaijan Data source: https://sustainabledevelopment.un.org/content/documents/16005Azerbaijan.pdf Last year published: 2017 Frequency: irregular

3.2.1.2   UNECE environmental indicators

The "Environmental indicator system of the Republic of Azerbaijan" was adopted by the Decree of the President of 21 December 2012 No. 2621, according to the "State Programme on the development of official statistics during 2013-2017"[96] based on Guidelines on the Application of Environmental Indicators in the countries of Eastern Europe, Caucasus, Central Asia (EECCA).

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[96] https://www.stat.gov.az/menu/2/state_programs/2013_2017/indexen.php

Currently, 45 out of 49 UNECE environmental indicators are available on the State Statistical Committee's website[97].

Table 5. List of UNECE indicators produced regularly in Azerbaijan (as of May 2020, https://www.stat.gov.az/source/environment/?lang=en)

Thematic areas	UNECE indicator	Status
A. Air pollution indicators	A1. Emissions of pollutants into the atmospheric air	Publicly available Frequency: Annual
	A2. Ambient air quality in urban areas	Publicly available Frequency: Annual
	A3. Consumption of ozone-depleting substances	Publicly available Frequency: Annual
B. Climate change	B1. Air temperature	Publicly available Frequency: Annual
	B2. Atmospheric precipitation	Publicly available Frequency: Annual
	B3. Greenhouse gas emissions	Publicly available Frequency: Annual
C. Water[98]	C1. Renewable freshwater resources	Publicly available Frequency: Annual
	C2. Freshwater abstraction	Publicly available Frequency: Annual
	C3. Total water use	Publicly available Frequency: Annual
	C4. Household water use per capita	Publicly available Frequency: Annual
	C5. Water supply industry and population connected to water supply industry and C6. Connection of population to public water supply	Publicly available Frequency: Annual
	C7. Water losses	Publicly available Frequency: Annual
	C8. Reuse and recycling of freshwater	Publicly available Frequency: Annual
	C9. Drinking water quality	Publicly available Frequency: Annual
	C10. BOD and concentration of ammonium in rivers	Publicly available Frequency: Annual
	C11. Nutrients in freshwater	Publicly available Frequency: Annual
	C12. Nutrients in coastal seawaters	Publicly available Frequency: Annual
	C13. Concentrations of pollutants in coastal seawater and sediments (except nutrients)	Publicly available Frequency: Annual
	C14. Population connected to wastewater treatment	Publicly available Frequency: Annual
	C15. Wastewater treatment facilities	Publicly available Frequency: Annual

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[97] https://www.stat.gov.az/source/environment/?lang=en
[98] C1-C5 and C10-C11 are comparable with the C1-C5 and C10-C11 water indicators calculated under EEA methodology

Thematic areas	UNECE indicator	Status
	C16. Polluted (non-treated) wastewaters	Publicly available Frequency: Annual
D. Biodiversity	D1. Protected areas[99]	Publicly available Frequency: Annual
	D2. Biosphere reserves and wetlands of international importance	Publicly available Frequency: Annual
	D3. Forests and other wooded land	Publicly available Frequency: Annual
	D4. Threatened and protected species	Publicly not available
	D5. Trends in the number and distribution of selected species	Publicly not available
	D6. Invasive alien species	Publicly not available
E. Land and soil	E1. Land uptake	Publicly available Frequency: Annual
	E2. Area affected by soil erosion	Publicly not available
F. Agriculture	F1. Irrigation	Publicly available Frequency: Annual
	F2. Fertiliser consumption	Publicly available Frequency: Annual
	F3. Gross nitrogen balance	Publicly not available
	F4. Pesticide consumption	Publicly not available
G. Energy	G1. Final energy consumption	Publicly available Frequency: Annual
	G2. Total primary energy supply	Publicly available Frequency: Annual
	G3. Energy intensity	Publicly available Frequency: Annual
	G4. Renewable energy consumption	Publicly available Frequency: Annual
	G5. Final electricity consumption	Publicly available Frequency: Annual
	G6. Gross electricity production	Publicly available Frequency: Annual
H. Transport	H1. Passenger transport demand	Publicly available Frequency: Annual
	H2. Freight transport demand	Publicly available Frequency: Annual
	H3. Composition of road motor vehicle fleet by fuel type	Publicly available Frequency: Annual
	H4. Age of road motor vehicle fleet	Publicly available Frequency: Annual
I. Waste	I1. Waste generation	Publicly available Frequency: Annual
	I2. Management of hazardous waste	Publicly available Frequency: Annual
	I3. Waste reuse and recycling	Publicly available Frequency: Annual
	I4. Final waste	Publicly available

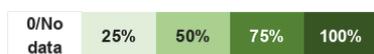[99] D1 is comparable with the SEBI 007 biodiversity indicator calculated under EEA methodology

Thematic areas	UNECE indicator	Status
		Frequency: Annual
J. Environmental financing	J1. Environmental protection expenditure	Publicly available
		Frequency: Annual

The website of the ENI SEIS II East project provides an assessment of the environmental information available as well as links to national environmental indicator reports and other thematic environmental reports. Azerbaijan is one of the leading EaP countries in producing the UNECE environmental indicators. The overall assessment in producing environmental indicators by thematic areas is provided in the table below.

Table 6. Assessment of the performance of Azerbaijan in producing UNECE indicators by thematic areas (as of May 2020, ENI SEIS II East website)[100]

Thematic areas	Evaluation
A. Air pollution and ozone depletion	
B. Climate change	
C. Water	
D. Biodiversity	
E. Land and soil	
F. Agriculture	
G. Energy	
H. Transport	
I. Waste	
J. Environmental financing	
Total	

0/No data	25%	50%	75%	100%

3.2.1.3   Environmental statistics published

The State Statistical Committee provides a large amount of environmental statistics on its website. All statistics are available as xlsx files for download. The table below provides an overview of the main publicly available statistics in the area of environment.

Table 7. Environment statistics published on State Statistical Committee website (as of May 2020, developed by the report's authors)

Thematic areas of environmental statistics disseminated by State Statistical Committee	Environmental statistics
A. Air pollution and ozone depletion	Example of environmental statistics prepared and disseminated by State Statistical Committee: • Air pollutant emissions from stationary sources; • Emission of air pollutants from mobile sources; • Greenhouse gas emissions; • Air temperature.
B. Climate change	All environmental statistics are provided in the dedicated sections of State Statistical Committee and ASIS websites and accessible using the links:
C. Water	
D. Biodiversity	

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[100] https://eni-seis.eionet.europa.eu/east/countries/azerbaijan

Thematic areas of environmental statistics disseminated by State Statistical Committee	Environmental statistics
E. Land and soil	• https://www.stat.gov.az/source/environment/?lang=en
F. Agriculture	• https://www.azstat.org/portal/tblInfo/TblInfoList.do#994_026
G. Energy	
H. Transport	
I. Waste	
J. Environmental finance	

3.2.2 Environmental data sharing arrangements/agreements

There are no mechanisms adopted at the national level that would define environmental data and information exchange among various environmental data providers. The following table presents how data are received/provided to MENR and the State Statistical Committee.

Table 8. Environmental data-sharing arrangements (as of May 2020, developed by the report's authors)

Institution	Environmental component	Inter-institutional cooperation for data sharing and exchange
Ministry of Ecology and Natural Resources	A. Air pollution and ozone depletion B. Climate change C. Water D. Biodiversity E. Land and soil F. Agriculture G. Energy H. Transport I. Waste J. Environmental finance	There are no specific arrangements between MENR and other environmental information providers for data exchange and dissemination; the main principles of data exchange are defined by the Law on Access to Environmental Information. MENR receives data from companies, as they have an obligation to complete and provide regular reporting forms on paper. These forms are checked and further sent to the State Statistical Committee in paper form.
State Statistical Committee	A. Air pollution and ozone depletion B. Climate change C. Water D. Biodiversity E. Land and soil F. Agriculture G. Energy H. Transport I. Waste J. Environmental financing	Environmental data are submitted to the State Statistical Committee by all public authorities and other legal entities in the country, if applicable. They provide official reporting forms to the State Statistical Committee as a hard copy or electronically using the functionality of the portal www.stat.gov.az. Most of the data and information for the State Statistical Committee is provided in paper form.

3.2.3 Licencing norms

Overall, there are no licencing norms defined for environmental data. As licences are not explicitly specified, the data and information published fall under the Law on Copyright and Related Rights, and under the Law on Legal Protection of Datasets. The following table summarises the licencing information available on the main environmental portals.

Table 9. Licencing norms of the portal (as of May 2020)

Institution and portal	Copyright licencing

Open data portal	The portal indicates that all rights are reserved and protected by copyrights. However, it is stated that data can be reused for creating new products or services.
Website of MENR	All material published on this website is protected by copyright. It is also indicated that "when using the site materials, a reference to the source is required."
State Statistical Committee and ASIS	All material published on these websites is protected by copyright laws. It is also indicated that in both websites "when using the site materials, a reference to the source is required".

3.3 Progress so far

3.3.1 Main initiatives

The ENI SEIS II East project[101]

Since the Seventh Environment for Europe Ministerial Conference (Astana 2011) and the following Batumi Conference in 2016, Azerbaijan has been making significant progress in developing and implementing the principles of the Shared Environmental Information System (SEIS).

Substantial progress has also been made in the second quarter of 2020 in ensuring the implementation and national production of UNECE environmental indicators, which are increasingly being published on the websites of national environmental authorities, statistical agencies, and open data portals. To achieve this, Azerbaijan actively participates in the UNECE Working Group on Environmental Monitoring and Assessment (WGEMA) and the UNECE Joint Task Force (JTF) on Environmental Statistics and Indicators. Both UNECE groups are assisting countries in Europe and Central Asia to achieve the overall goal of having SEIS in place across the region by 2021.

The last ENI SEIS II East Project Steering Committee Meeting, held on 25 June 2020, highlighted the latest achievements of Azerbaijan under the SEIS project:

- EcoPortal: EcoPortal was established and is currently accessible at the website address http://meteo.az/index.php?ln=az&pg=120. The development of EcoPortal focused on data sharing among those public authorities responsible either for the monitoring of water quality or managing of water resources. More information about EcoPortal is provided in the initiative "EcoPortal".

- Biodiversity: Azerbaijan is currently working on improving coverage of Emerald sides, and on increasing the capacity to report data on species and habitats under the Bern Convention. The country is also involved in the production of regionally comparable biodiversity indicators in accordance with EEA methodology and UNECE environmental indicators (particularly indicators on protected areas).

- Air quality: Azerbaijan is currently increasing the use and public accessibility of air quality measurement data and prepared a country factsheet[102] on air quality management and

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[101] https://eni-seis.eionet.europa.eu/east
[102] https://eni-seis.eionet.europa.eu/east/governance/project-documents/Azerbaijan_Country_Final_MIH_v2cleaned.pdf

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monitoring. In parallel, the Finnish Meteorological Institute (FMI) led an EU-financed Twinning project aiming to modernise the air quality monitoring systems, by supporting the acquisition of new air quality monitoring stations and training the necessary staff[103].

- Land use: Azerbaijan finalised a pilot project applying the CORINE Land Cover (CLC) methodology to capital areas of the EaP partner countries. The pilot involved training environmental experts and preparing comparable data layers of CLC and CLC change over the past two decades.

AzDATACOM[104]

AzDATACOM is a joint project of the Ministry of Transport, Communications and High Technologies and the United Nations Development Program. Under the project launched in 2004, the AzDATACOM network was built in four stages. During the first and second stages, the segment of the network covering Baku, Sumgait cities and the Absheron peninsula was implemented. Baku-Ganja, Yevlakh-Shirvan, Baku-Astara and surrounding regions of the country were joined to the network in the third and fourth stages. The results achieved by the project include:

- a high-speed connection between Baku and other regions;
- a developed internet connection and increased opportunities for the use of ICT in all regions;
- support for the connection of post offices to AzDATACOM;
- next-generation network technology and IP-telephony services provided for the customers of AzDATACOM.

AzDATACOM provides various services to both government agencies and the public, such as internet connection and IP-telephony services.

Upgrading the National Environmental Monitoring System (NEMS) of Azerbaijan on the basis of EU best practices[105] (2016 – 2019)

The overall objective of the project was to contribute to the improvement of the environmental performance of Azerbaijan, especially regarding air quality.

This project was funded by the EU and implemented by a consortium of institutions from EU Member States. The project consisted of four components:

- **Institutional framework**. As a result, roles, and responsibilities within MENR regarding environmental data collection, processing and reporting were revised and streamlined, organisational changes were proposed and endorsed by the MENR.
- **Development of technical systems for environmental monitoring.** As a result, the environmental monitoring system was modernised, enhancing data collection and reporting processes.
- **Capacity-building and training.** As a result, the ability of the local experts from the MENR regarding handling environmental data, as well as their management and dissemination was increased.
- **Practical implementation of modernised systems through concrete case studies.** As a result, environmental data management and dissemination procedures were tested through concrete case studies and produced environmental information was disseminated.

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[103] https://eeas.europa.eu/delegations/azerbaijan/67488/air-quality-project-azerbaijan-concluded-successfully_en
[104] http://www.rabita.az/en/c-projects/AzDataCom-en/
[105] https://www.euneighbours.eu/en/east/stay-informed/opportunities/upgrading-national-environmental-monitoring-system-nems-azerbaijan

European Environment Agency

EcoPortal[106]

Azerbaijan developed the EcoPortal with the technical and financial support of the ENI SEIS II East project. The EcoPortal provides a single access point for data and information dissemination on water. It contains a number of reports and strategic documents in the field of water. In addition, it will serve as a common platform for exchanging water monitoring data and information among various water entities. An interactive map viewer offers very rich data and information on the water resources of the country.

Technically, the system addressed all three pillars of SEIS, namely:

- Content/data: datasets as well as the output/dissemination products (e.g. reports) are stored in the system. To ensure interoperability, a standard data dictionary was introduced.
- Cooperation: the content management system will be maintained by the National Hydrometeorology Department of MENR.
- Infrastructure: the technical part of the EcoPortal – the hardware and software (computer, database, files, web portal platform) supporting this dataflow are also maintained by the National Hydrometeorology Department of MENR.
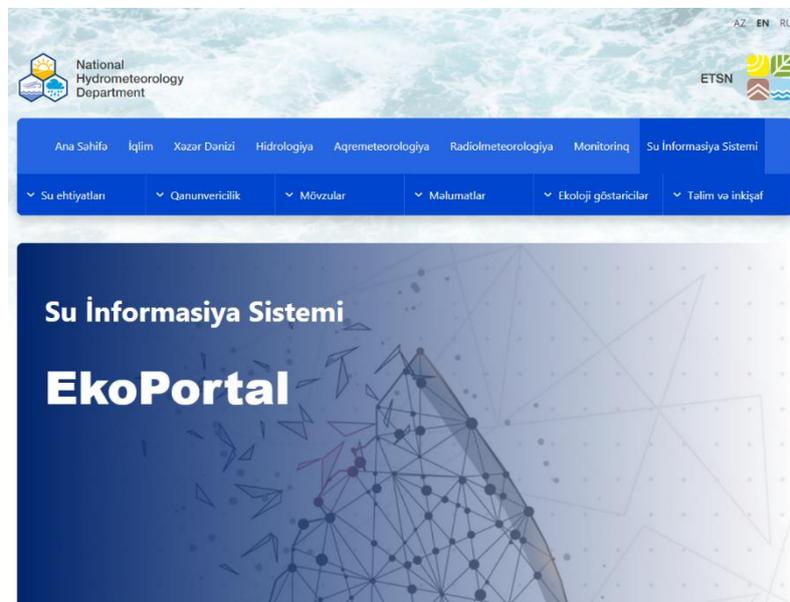

Figure 6. Screenshot of the EcoPortal (as of May 2020)

The portal has been developed based on the EEA experience and model and uses open source technology. It currently disseminates seven water quality and quantity indicators and provides standard data dictionaries for the Water Information System for Europe. In addition, it will support developing and making operational a data exchange protocol between related national institutions for online data collection and processing. The EcoPortal technical solution allow extension to other thematic areas of the environment.

EKO-RADAR[107]

EKO-RADAR is a new initiative by the Ministry of Ecology and Natural Resources which enables the public to share any environmental violation they witness with the Ministry. Information is

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[106] http://meteo.az/index.php?ln=az&pg=120
[107] http://eco.gov.az/az/eko-radar

received and processed by the ministry, and necessary and corrective e-actions are taken by the relevant departments.

Figure 7. Screenshot of the EKO-RADAR (as of May 2020)

Government cloud

Decree No. 718 of the President of the Republic of Azerbaijan of 3 June 2019[108] on the creation of the Government Cloud (G-Cloud) and necessary measures in the field of providing cloud services defines the measures for the implementation of the project, the responsibilities for public authorities and procedures for the implementation of the G-Cloud project. The Ministry of Transport, Communications and High Technologies of the Republic of Azerbaijan is responsible for implementing the project.

It is expected that the implementation of the Government Cloud project will enable public authorities to reduce their IT infrastructure costs. Thus, cloud technologies will allow more efficient use of resources and effective management of IT infrastructure. New data centres should be created following international standards for cloud and data centre services such as TIER III from Uptime Institute, ISO 20000, and ISO 27001.

In 2020, the Ministry of Transport, Communications and High Technologies developed the Government Cloud architecture. In accordance with the developed architecture, the services of the Government Cloud are planned to be implemented through four data centres (active, backup, archive, and test).[109]

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[108] http://e-qanun.az/framework/42560
[109] Based on an official article of the Ministry of Transport, Communications and High Technologies of Azerbaijan https://mincom.gov.az/en/view/pages/116/

3.3.2 International rankings

E-government development index (EGDI)[110]

As a composite indicator, the EGDI is used to measure the readiness and capacity of national institutions to use ICTs to deliver public services. Its components include the Online Service Index (OSI), Telecommunication Infrastructure Index (TII) and Human Capital Index (HCI).

In 2018, Azerbaijan scored 0.6574 and was ranked #70 out of 193 countries. The figure below shows the change of EGDI throughout the period 2008-2018.
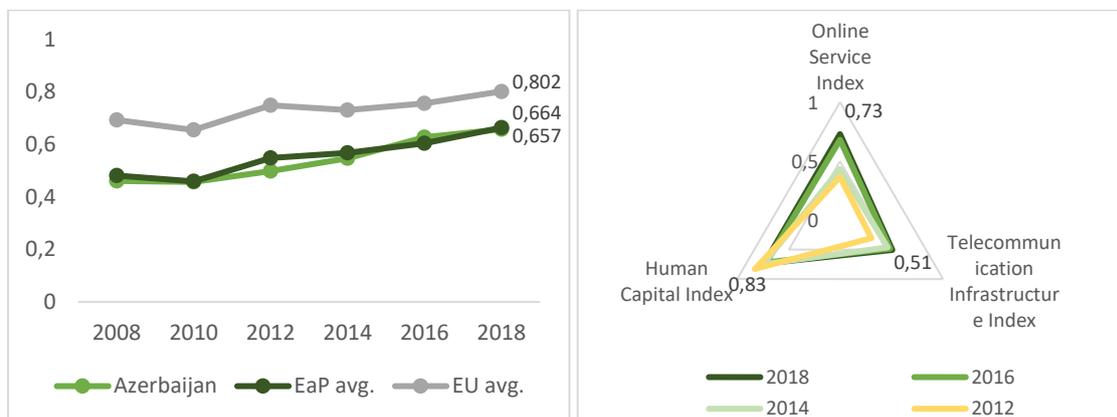

Figure 8. EGDI indicator for Azerbaijan (2008-2018) (developed by the report's authors based on EGDI data)

The figure above shows the change in value of EGDI components between 2012 and 2018. The values indicated in the graph show the highest value of a given indicator in 2012-2018. OSI has increased significantly in the last two years to the level of 0.73 (a 23.08% increase). HCI has seen a decrease between 2012 and 2014 (a 7.79% decrease) and has remained stable at around 0.72 since then. TII has the lowest score out of these three categories, but it has been experiencing steady growth in recent years and is currently at the level of 0.5062.

The increase in e-government is explained largely by:

- the development of AzDATACOM that aims to build high-speed connections and improve access to the internet;
- the development of an e-government portal that provides around 450 e-services from 50 institutions. In the 2nd quarter of 2017, the public applied for e-services 6.6 million times[111].

Regarding the development of ICT, Azerbaijan is one of the leaders in the EaP region in terms of mobile-broadband penetration and coverage[112]. The fixed-broadband market is also above the regional average. Prices for mobile and fixed telecommunication services are relatively low and continue to decline, which positively influences access to telecommunication services.

Open Data Barometer

The Open Data Barometer is produced by the World Wide Web Foundation with the support of the Omidyar Network, and aims to uncover the readiness, implementation status and impact of open data initiatives around the world. It analyses global trends and provides comparative data

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[110] https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/11-Azerbaijan/dataYear/2018
[111] Electronic government bulletin, 2017: https://www.e-gov.az/home/getfile/1890
[112] https://www.itu.int/en/ITU-D/LDCs/Documents/2017/Country%20Profiles/Country%20Profile_Azerbaijan.pdf

on governments and regions using an in-depth methodology that combines contextual data, technical assessments, and secondary indicators.

Azerbaijan is not evaluated in the Open Data Barometer as it was not advanced enough in a field of open data when Open Data Barometer evaluation was processed (in 2016 and 2017).

Global Open Data Index

The Global Open Data Index is the annual global benchmark for the publication of open government data run by the Open Knowledge Network. The survey is designed to assess the openness of specific government datasets according to the Open Definition. The survey assesses 16 different areas, including the government budget, spending and procurement, access to information about land ownership, election results at all levels and national statistics. The Global Open Data Index assessment was performed in 2013 – 2016 (the index has not been updated since) but it did not include an assessment of Azerbaijan.

Open Data Inventory (ODIN) score[113]

The Open Data Inventory (ODIN) assesses the coverage and openness of official statistics to help identify gaps, promote open data policies, improve access, and encourage dialogue between national statistical offices (NSOs) and data users. Azerbaijan ranks #64 in the ODIN 2018 with an overall score of 51%. The overall score is a combination of a data coverage sub-score of 60% and a data openness sub-score of 44%.

Table 10. ODIN Score for Azerbaijan between 2015-2018 (developed by the report's authors based on ODIN data)

ODIN scores	2015	2016	2017	2018
Coverage	61	56	59	60
Openness	34	41	43	44
All elements	47	48	51	51

Azerbaijan scores are higher than the regional median for social and environmental statistics. Within the country, the highest levels of coverage and openness are on environmental statistics, and the lowest levels are on social statistics[114]. The environment coverage sub-score is 75%, and the openness sub-score is 34%. The sub-scores are presented in the figure below.

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[113] http://odin.opendatawatch.com/Report/countryProfile/AZE?appConfigId=4
[114] http://odin.opendatawatch.com/ReportCreator/ExportCountryReport/AZE/2018
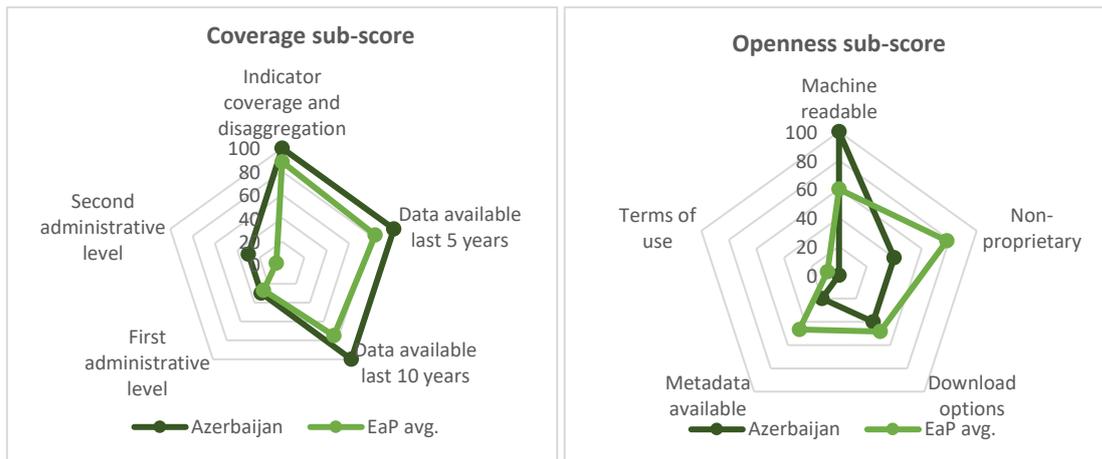
Figure 9. Coverage sub-score and openness sub-score of environment statistics, 2018 (developed by the report's authors based on ODIN data)

Environmental Performance Index[115]

The Environmental Performance Index (EPI) ranks countries on 24 performance indicators across 10 issue categories covering environmental health and ecosystem vitality. These metrics provide a gauge at a national scale of how close countries are to established environmental policy goals.

In 2018, Azerbaijan ranked #59 out of 180 countries with a score of 62.33 out of 100. The figure below shows the main sub-indicators of the Environmental Performance Index by Azerbaijan.
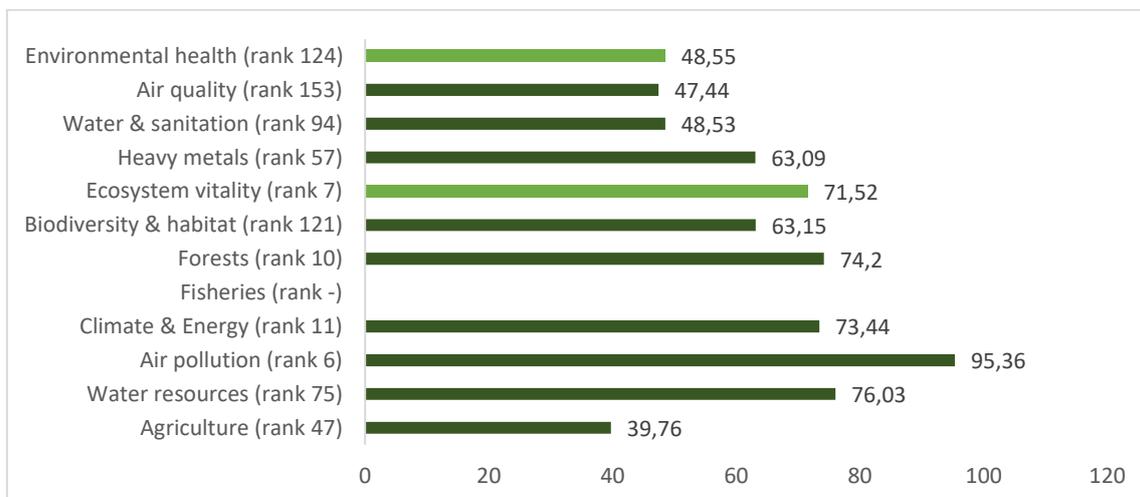
Figure 10. Indicators of EPI of Azerbaijan, 2018 (https://epi.envirocenter.yale.edu/epi-country-report/AZE)

3.3.3 ICT related statistics

Information and communications technology are one of the crucial areas for the further development of the economy and an integral part of the economic and political reforms which are currently being implemented in Azerbaijan. The ICT sector has intensively developed in the country in recent years. Creating and developing the e-government system, expanding

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[115] https://epi.envirocenter.yale.edu/epi-country-report/AZE

European Environment Agency

broadband internet services, and launching telecommunication and low-orbit satellites are all elements of ICT improvement.

According to the latest statistics from International Telecommunication Union providers, Azerbaijan has[116]:

- 17 fixed-telephone subscriptions per 100 inhabitants
- 104 mobile-cellular subscriptions per 100 inhabitants
- 18 fixed (wired)-broadband subscriptions per 100 inhabitants
- 60 mobile-broadband subscriptions per 100 inhabitants
- 64% of households with a computer
- 78% of households with internet access at home
- 80% of individuals using the internet

Public use of internet use[117]

The following figure illustrates the increase in internet users since 2005. This increase was influenced by the implementation of public policies regarding the development of the ICT sector in the country, the expansion of e-government projects and the increased role of the internet in rendering various public services.
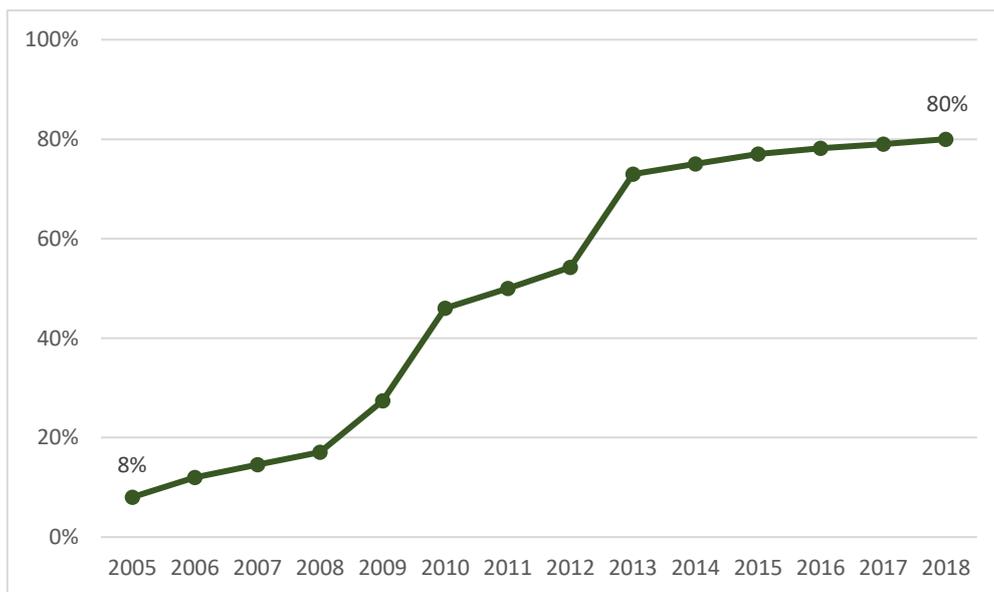

Figure 11. Internet usage in Azerbaijan (developed by report's authors based on State Statistical Committee data)

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4 Technology enablers for environmental information sharing

4.1 Portals

This section describes the platforms available in Azerbaijan for the dissemination of environmental information providing public access to data and information at national and international level.

4.1.1 Open Data Portal

The Open Data Portal[118] was developed in 2017 and maintained by the Ministry of Transport, Communications and High Technologies. The portal is a unified national platform for publishing open data owned by public authorities, allowing any interested person, group, or entity to process, use and reuse the data for various purposes. Data are available free of charge and can be reused without limitation but acknowledgement of the Open Data Portal as the source is required.

Figure 12. Screenshot of the Open Data Portal (as of May 2020, opendata.az)

The portal is available in national and English languages and the usability is good. The application programming interface (API) for data harvesting from the portal is described, though the description of metadata standard is lacking.

Currently, five datasets in the agriculture category are publicly available; other environmental datasets are not disseminated in the portal. In total, the portal has about 700 datasets published by nine institutions (out of 42 registered in the portal). The most recent datasets are from 2017 and as of May 2020, no update was identified.

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[118] opendata.az

4.1.2 E-government portal

The e-government portal[119] contains the public e-services available in Azerbaijan. The portal is available in national and English languages. The portal is connected to the State Register of Public Information Resources and Personal Data Information System. In general, the portal contains 454 services. The portal hosts around 20 e-services in the field of the environment.

Along with the portal, an e-government gateway was established in order to ensure information exchange between, and 42 state agencies are connected to this infrastructure. The e-government gateway

Figure 13. Screenshot of e-government portal (May 2020, www.e-gov.az)

enables efficient use of existing government information systems, ensuring secure contact between them when issuing queries and providing e-services. An additional benefit is the implementation of once only principle so that citizens would not have to submit the same request several times.

During the 2nd quarter of 2017, the Ministry of Communications and High Technologies reported[120]: 762,337 unique users who on average spent 5:35 min. on the portal and 6,674,558 applications for e-services. More recent information is not available.

Furthermore, the portal also uses e-signature services that are provided by the National certificate service centre[121]. MENR provides the e-service "Providing information on the environment and natural resources" through the portal.

4.1.3 Environmental portals

The table below presents the main national platforms that are used to publish environmental data.

Table 11. Main environmental information platforms and portals managed by national institutions (as of May 2020)

Institution	Description
Ministry of Ecology and Natural Resources – http://eco.gov.az	The MENR provides a variety of information on its website, such as: • weather forecasts; • air quality information (interactive data); • radar data from meteorological stations (map images); • information about hydrometeorological services; • environmental reports. However, most information is available in non-reusable formats, such as TXT, PDF, or various images. The ministry also provides information upon individual request.

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[119] https://www.e-gov.az/en
[120] Electronic government bulletin, 2017: https://www.e-gov.az/home/getfile/1890
[121] http://www.e-imza.az/index.php?lang=az

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Institution	Description
	None of the subordinate institutions of MENR publish information separately. However, in most cases, information published by MENR is limited to annual environmental reports.
EcoPortal http://meteo.az/index.php?ln=az&pg=120	The EcoPortal provides a single access point for data and information on water. It contains reports and strategic documents in relation to the national water policy of the country. In addition, it serves as a common platform for monitoring data and information exchange among the various water bodies..
State Statistical Committee website – www.stat.gov.az/index.php	The State Statistical Committee's website is now the main platform for disseminating statistics, including environmental statistics and for providing information on statistical activities.. All statistics are available for download in XLSX format.
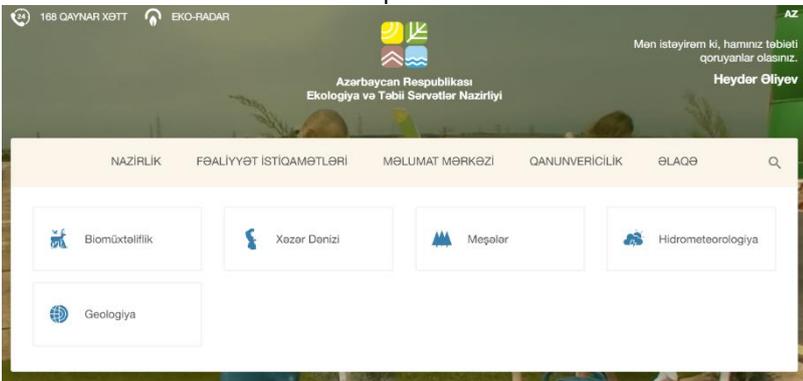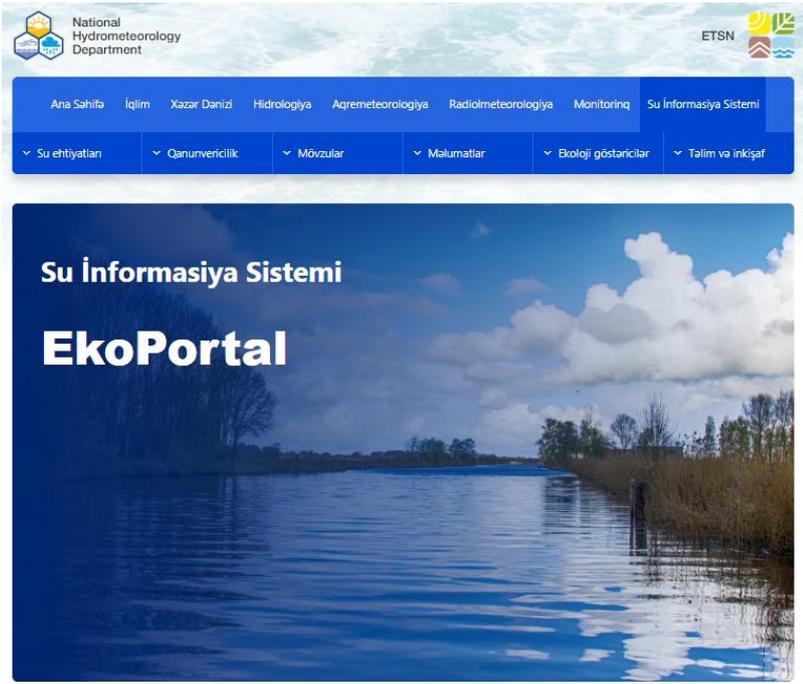
Institution	Description
ASIS portal – https://www.azstat.org/portal/	The ASIS portal is a new statistical portal managed by the Department of Information Technologies of the State Statistical Committee. It provides a user-friendly access point for visualising data. At the moment, the portal provides access to 11 environmental datasets, which can be visualised chronologically and exported in many machine-readable formats (XLS, CSV and TXT[122]).
Web Map Application for visualisation and dissemination of statistical data https://www.azstat.org/webmap/	The web mapping application (WMA) is an interactive tool for visualising regional statistical data through thematic maps. Users can change the geographical level, year, ranges, or colours of the map for the selected indicator. The application provides functionalities for an overview of official statistics. The first version of this application was developed between 2015 and 2017 by the State Statistical Committee in the framework of the EU-funded Twinning project "Support for the State Statistical Committee in harmonisation of the National Statistical System of Azerbaijan in line with EU standards".
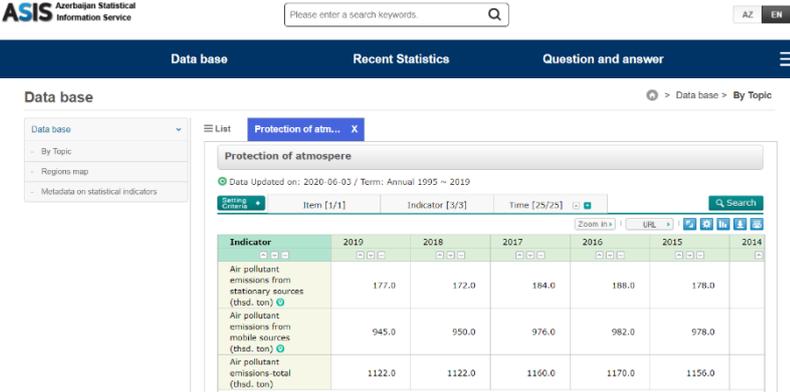
[122] https://www.azstat.org/portal/tblInfo/TblInfoList.do;JSESSIONID=90E774AB00A0E25A13A0F0F3087FF250#

Institution	Description
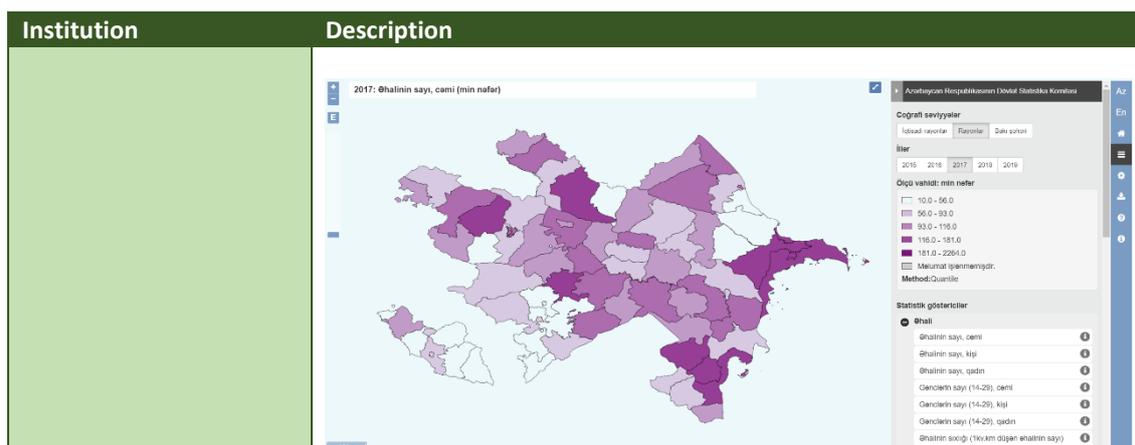
4.2 Environment open data availability and reuse

In Azerbaijan, environmental data are mostly concentrated on the Open Data Portal and State Statistical Committee websites. The table below presents a comparison of the Open Data Portal and the website of the State Statistical Committee in terms of data availability and reusability.

Table 12. Comparison of the Open Data Portal and the website of the State Statistical Committee (as of May 2020)

	Open Data Portal	State Statistical Committee website and Azerbaijan Statistical Information Service (ASIS)
Statistics referring to the availability of environmental data online	The Open Data Portal now has approximately 700 datasets. Nonetheless, there are no statistics on portal usage. Also, the search of datasets is complicated as there is no possibility to filter search results by criteria such as data format, date of upload, etc. Currently, there are five datasets related to agriculture; no datasets on the environment are available. The Open Data Maturity in Europe 2018 and 2019 reports group countries, according to their open data maturity, into Beginners, Followers, Fast Trackers and Trend Setters. Based on the scores and this report evaluation, Azerbaijan would most likely belong to the group of "Beginners". This group is characterised as a group of countries that "show an early stage of maturity on the four dimensions, with more prominent progress on the open data	Currently, 44 out of 49 UNECE environmental indicators[124] are available on the State Statistical Committee web page. All indicators are available as XLS files for download. All data from the State Statistical Committee is available on ASIS in the form of interactive tables that can be downloaded. Data can also be presented on the map, indicating differences between regions. The website currently provides access to 11 datasets under the topic "Ecology". It is necessary to give access to more environmental statistics on this portal as it will provide an advanced and user-friendly access point for environmental data.

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[124] https://www.unece.org/index.php?id=30331&L=0

	Open Data Portal	State Statistical Committee website and Azerbaijan Statistical Information Service (ASIS)
	portal dimension" but still with limitations in open data policy, availability, and use[123].	
Reusability of data	All datasets on the Open Data Portal are available in XML and JSON formats and thus are machine-readable and reusable. Datasets as well as metadata are mostly available in national language.. No translation is available for the metadata of the datasets. This could undermine international access and/or reuse of data. The portal also provides an API functionality which allows portal users to access data by requesting a direct link to the system. The most recent data in the portal is from 2017, thus the data needs to be updated.	All key UNECE environmental indicators, as well as other environmental statistics, are published in XLS format (machine-readable) and are available for download. The State Statistical Committee also provides metadata on statistical indicators and methodological explanations. All data are available on the ASIS platform. The State Statistical Committee website[125] provides a very good interface to select and visualise environmental information. Furthermore, the website enables downloading the data in machine-readable format. However, it lacks cross-analysis between environmental indicators as it is not possible to compare several indicators using ASIS functionalities (e.g. air and water pollution in a specific place). In addition, the State Statistical Committee publishes statistical yearbooks, including one on the environment. Yearbooks can be downloaded in *pdf* format. On ASIS, all datasets can be visualised in graphs (chronologically) and data can be exported in machine-readable format.

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[123] Only 7 apps have been built as of May 2020.
[125] https://www.azstat.org/portal/

5 Achieving a high level of maturity for environmental information management

5.1 Main challenges

5.1.1 E-government

The main challenges related to e-government in Azerbaijan are presented in the table below and are structured according to SEIS pillars: content, infrastructure, and cooperation (network).

Table 13. Major challenges related to e-governance

Content	**Lack of digitalisation of public administration**. Despite the programme on e-transformation, public administrations in Azerbaijan still use a lot of paper documents, while this work can be simplified by using e-documents or granting access to the database directly. In this context, data exchange and sharing is hampered by the lack of digitalisation. **Descriptions of public services do not follow international standards** (e.g. Core Public Service Vocabulary[126]) and are not categorised into life events (e.g. birth of a child, change in employment status), though they are categorised by institution. This can lead to difficulties for the public to find e-services on the public service portal. **Need for interoperability standards for building public authorities' information systems**. Many public authorities still have difficulties in exchanging data due to the lack of common standards and metadata.
Infrastructure	**State institutions have limited access to the e-government gateway** (electronic information exchange function), especially when providing e-services to the public.[127] **Lack of telecommunications infrastructure and broadband coverage in regions**. Access to the internet is difficult in regions with relatively poor coverage by telecommunications and internet networks. The development of broadband infrastructure will be instrumental for the dissemination of environmental information[128].
Cooperation	**Reluctance to implement e-services and resistance to change.** Public authorities and public servants find e-government initiatives difficult to implement as they do not expect high usage of e-services or clearly understand their benefits and potential.

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[126] https://joinup.ec.europa.eu/solution/core-public-service-vocabulary

[127] http://transparency.az/alac/files/Progress_Report_on_E-Government_EN.pdf

[128] https://reg.e-gov.az/upload/meqalefiles/qalib/135.doc

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5.1.2 Open data

The major challenges related to electronic access to information and open data are presented in the table below, structured along the SEIS pillars.

Table 14. Major challenges related to open data[129]

Content	
	• **There are very few datasets published on the Open Data Portal.** Currently, there are approx. 700 datasets on the Open Data Portal and the last was published in 2017 with no updates made. Thus, the availability and reusability of open data is limited. • **No licencing terms are specified.** The terms of use of datasets are not defined, which could jeopardise/limit the reuse of datasets. • **Lack of practical arrangements for publishing open data.** There is a need to prepare guidelines and methodologies to define how public authorities should organise the dissemination of open data. In addition, there is a need to set up clear requirements and procedures for open data dissemination and update. • **Lack of metadata standards.** Open data are not described in a standard, unified way that corresponds to international open data standards. The lack of metadata description leads to lower availability to find and reuse datasets.
Infrastructure	• **The Open Data Portal standards are not published.** Some efforts were made to document the API, but more detailed guidelines are required. In addition, using international standards such as DCAT would enable integration in terms of metadata with the European Data portal.
Cooperation	• **Lack of clear definition of responsibilities and obligations for public authorities to publish data on the Open Data Portal.** There is no clear institutional framework guiding public authorities on how to publish open data. Not having clear responsibilities leads to slower progress in publishing open data. • **Lack of awareness about open data both among public authorities and users.** The low number of datasets published indicates that public authorities lack awareness about the benefits of open data and tools for publishing open data. Furthermore, the limited number of reused datasets shows that the public also lacks awareness about open data benefits and potential use.

5.1.3 Environmental information sharing

The main challenges related to environmental information management are presented in the table below, structured along the SEIS pillars.

Table 15. Major challenges related to environmental information management

Content	
	• **Need for timely availability of environmental data and information.** In particular, the annual state of the environment report from the MENR is considered as a key piece of information to be made accessible to the public. As of May 2020, the latest state of the environment report is from 2013. A more frequent environmental data and information update rate could increase the potential for data and information analysis and reuse.

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[129] http://ogp.org.az/wp-content/uploads/2017/11/Report-summary.pdf

	• **Need to revise the official statistic reporting forms to align them with international requirements.** Currently, most data are provided by companies that complete statistical forms in paper form. These forms should be aligned with international standards in order to collect data relevant for fulfilling international obligations. In addition, there is a need to introduce digital statistical information collection processes instead of paper-based processes that could greatly reduce effort needed for data collection and improve the quality of data and information. • **No clear licencing or copyrights are provided**. This leads to limited potential use/reuse of environmental data and information since the extent and modalities for further use and reuse are not clear. • **Need to revise the legal framework for environmental data and information access and dissemination**. In order to effectively make data and information available, methodologies, standards and quality control mechanisms should be put in place and applied consistently by all public authorities handling this information.
Infrastructure	• **Lack of environmental data and information available in a machine-readable, reusable format.** The Ministry of Ecology and Natural Resources website provides most information in non-reusable formats (textual information, images). This limits the value of environmental data and information that could be further used in analysis or in the development of new products. • **Need for tools to ensure an effective environmental data exchange**. Currently, there are no automatic mechanisms for exchanging environmental data and information between institutions as it is currently based on xlsx files or paper documents.
Cooperation	• **Inconsistencies in providing environmental information**. Sometimes, data providers, especially enterprises, do not provide complete information on activities related to the environment to the State Statistical Committee and Ministry of Ecology and Natural Resources. There is a need to establish mechanisms to enforce minimum requirements for environmental data sharing. • **Need for specific regulation and data-sharing agreements for exchange of environmental information between public authorities.** Currently, there is no official environment information system that would define the main actors and responsibilities when exchanging environmental information.

5.2 Roadmap[130]

In general, it is recommended that Azerbaijan should focus on some key elements for ensuring coherent and effective open data and environmental information management and for addressing the common challenges presented above. In brief, the focus should be on the following:

• **Policy measures:**

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[130] The proposed roadmap has been updated taking into consideration the presentation made during the 4th ENI SEIS II East Project Steering Committee Meeting on 12 November 2019 in Copenhagen. Presentations are available here: https://eni-seis.eionet.europa.eu/east/areas-of-work/communication/events/project-related-events/4th-eni-seis-ii-east-project-steering-committee-meeting

- o *Long-term digital action plan*: an action plan for e-government and open data should be in place. It should ensure scoping, management and funding of the national e-government and open data portals, as well as digital awareness-raising activities for both governmental institutions and the public. In doing so, all available results and good practices acquired from previous activities and projects across the whole economy spectrum should be assessed and put in motion.
  - o *General interoperability framework*: the country should have in place an interoperability framework or at least its foundation. This is especially required for building an integrated environmental information system(s) and ensuring the smooth integration/exchange/sharing of environmental data.
  - o *Roadmap in the field of open data and environmental information*: this roadmap should contain key objectives for fostering sharing and dissemination of environmental information.
- **Legal measures:**
  - o *Enforcement mechanisms* for the regular collection, sharing and dissemination of environmental information and for monitoring implementation.
- **Technical measures:**
  - o *E-government, open data, and geoportals*: the country should have effective e-government, open data, and environmental portals on which environmental data and information can be shared/disseminated with spatial attributes, and where services can be built.
  - o *Implementation of international standards*: standards developed by the EU, the International Organisation for Standardisation (ISO), the World Meteorological Organisation, the Open Geospatial Consortium, the World Wide Web Consortium, the National Institute of Standards and Technology and other international organisations which are responsible for standards development could be adjusted and introduced in the areas of designing an information system, metadata standards and interoperability standards.

Some of these elements are already in place in Azerbaijan (e.g. the Open Data Portal) and other portals containing environmental data and information. Nonetheless, it is advised to look at these aspects from an integrated perspective of environmental information sharing and dissemination and to update them where appropriate. These elements are under continuous development; hence a periodic review is necessary.

Guidance for the implementation of the roadmap

The roadmap provided in the following section outlines key areas for further development in the field of open data and environmental information. It also provides recommendations and suggested actions for improvement that are organised according to the following SEIS pillars: content, infrastructure, and cooperation.

The success and rapid advancement of the country in this challenging domain is strongly dependent on clear prioritisation, multidisciplinary teamwork and regular monitoring and adjustment of results. Furthermore, as progress is gradually made in one or several areas proposed for consideration, improvements, readjustments, or amendments to the roadmap will be needed to keep it relevant and focused on the key priorities of the country.

To support the implementation process of the proposed measures at the national level, it is recommended to start by establishing an interdisciplinary team that would be responsible for

driving and overseeing the overall process. The measures should be prioritised and implemented to support and enhance the e-government, open data, and environment strategies of the country. Furthermore, this process should not be carried out in isolation. On the contrary, it should also be undertaken by taking into account the extensive experience already gained in this area by other countries and organisations and in the context of broad regional exchange and international collaboration.

The proposed measures are to be implemented by specific bodies at various levels of decision-making and across disciplines. In this respect, the measures are grouped in three major categories, namely: policy, legal and technical measures. These categories are indicated by the colour scheme (provided in the table below). They aim to signal the leading expertise or decision-making level required for the implementation of each measure, while being considered in an interdisciplinary setting.

Table 16. Legend for the colour scheme of the roadmap measures

Colour	Type of measure	Description
	Policy	The measures in this category cover the development of specific strategies and policies and their integration into the overall policy framework at the national level. They include establishing clear and measurable targets as well as monitoring the implementation of the strategies and policies. Furthermore, they imply supervision, coordination, and other practical arrangements in terms of interdisciplinary work on open data and e-governance across various areas, including the environment.
	Legal	The measures in this category cover the development and adoption of new or revision of existing legislation followed by the development of secondary legislation, guidelines, and methodologies in the area of open data and e-governance across various domains, including the environment. Legal measures include governance set-up, ensuring clear division of responsibilities and proposing enforcement mechanisms for obligations provided in the legislation.
	Technical	The measures in this category cover the adoption and/or development of technical tools, methodologies, and procedures, as well as the introduction and adoption of international standards, where appropriate, at national level. These measures also embrace developing new competences and training specialists to ensure the successful implementation and sustainability of technology initiatives.

It is recommended for Azerbaijan to implement measures proposed in the roadmap after consideration of the latest policy, legal and technology changes happening in the country. The table below suggests a recommended timeframe to implement measures with different priorities assigned. Considering that this domain is very dynamic these suggested time perspectives could be shortened.

Table 17. The recommended timeframe for measures implementation

Priority	Recommended timeframe for the measure implementation
High	In the next 1-3 years
Medium	In the next 3-5 years
Low	Over the next 5 years

Priorities proposed in this roadmap were based on information received and aggregated from 2018 to 2020. Depending on the measure implementation, changes in the policy, legislation, or technology the suggested priorities might change. To ensure effective implementation of proposed measures and their relevance regular measure monitoring is essential.

"Open data and e-government good practices for fostering environmental information sharing and dissemination" report

The implementation of the proposed measures in the roadmap is assisted by the Good Practices Report "Open data and e-government good practices for fostering environmental information sharing and dissemination" (in brief, the Good Practices Report). This report is an integral part of the present project and provides relevant examples from other countries and organisations on the practical implementation of the roadmap measures.

The Good Practices Report is organised into two sections – e-government and open data – each part following the SEIS pillars "Content", "Infrastructure", and "Cooperation (network)". In addition to this, the following resources can also be used to support the implementation of the measures proposed in this roadmap:

- Report on the "Promotion of good practices for national environment information systems and tools for data harvesting at EU level";

- Streamlining Environmental Reporting – Action Plan;

- Open Data Maturity in Europe 2019[131, 132];

- Development of an assessment framework on environmental governance in the EU Member States[133].

5.2.1 Roadmap measures: Content

The measures proposed to Azerbaijan from the perspective of SEIS pillar Content are presented in the table below.

Table 18. Measures from the perspective of the SEIS pillar Content

	Measure	Priority	Description
1.	Revision of the legal framework to promote and regulate the online accessibility and reuse of public sector information (PSI)	High	Adopt or amend as needed, the legal acts referring to data management and accessibility related to environmental domain (monitoring, assessment and reporting, management and control of natural resources, ecosystems, and pollution), in accordance with the Aarhus Convention, the Protocol on PRTRs (as appropriate). This can include: • Improving environmental information system(s) by defining themes, sources (lists, registers, databases, funds, etc.), formats, metadata, licencing, and interoperability requirements;

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[131] https://www.europeandataportal.eu/sites/default/files/open_data_maturity_report_2019.pdf

[132] https://www.europeandataportal.eu/sites/default/files/european_data_portal_-_open_data_goldbook.pdf

[133] Under the contract No 07.0203/2017/764990/SER/ENV.E.4 funded by the European Commission, https://ec.europa.eu/environment/environmental_governance/pdf/development_assessment_framework_environmental_governance.pdf.

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	Measure	Priority	Description
			• Improving procedures for environmental data collection in machine-readable formats and its accessibility as open data;
			• Improving procedures for managing environmental data flows and regular updates, quality assurance and quality control, for reporting, inter-institutional exchange, for online dissemination and other means of dissemination;
			• Setting up the public participation procedures for involving public at large in the design, use and update of the environmental information system(s) consider ways to taking on board citizen science and the public engagement initiatives;
			• Streamlining the division of responsibilities of the public authorities at all levels and across the sectors to ensure their clear competences and coordination;
			• Reviewing periodically the application of the exceptions in the disclosure of environmental information;
			• Monitoring the legitimate application of these exceptions and the disclosure of information on emissions in accordance with the Aarhus Convention – (in particular clarify the practical rules to separate non-confidential information of public importance for its further disclosure).
			For guidance, consult the section "Designing an open data legal framework and provision of enforcement mechanism" of Good Practices Report.
			This measure is closely linked with "Establish a collaborative institutional framework for the implementation of open data" in the section Cooperation (Network).
2.	Adopt guidelines defining the practical arrangements for environmental information management, sharing and dissemination	High	Adopt guidelines defining the practical arrangements for environmental information management, sharing and dissemination, specifying:
			• The scope of environmental information system(s) with metadata description and registry;
			• The environmental data management structure (including data architecture, data stewardship, system administration, data privacy, data security, data quality);
			• Decision-making procedures for sharing and making available online on relevant portals of non-confidential information and datasets (e.g. websites of public authorities, environmental portals-one web access point for environmental information, geospatial portals, statistical, open data, and other portals);

	Measure	Priority	Description
			• Separation of non-confidential information as appropriate; • Gradually improve data quality assurance mechanisms.
3.	Develop and adopt an environmental data policy	High	Adoption of an environmental data policy by the authorities in charge of environmental protection to include: • List of varied environmental information available and the scope thereof; • Basic terms of availability and accessibility, including open access and data-sharing aspects; • Data holder support for availability and accessibility by third parties; • Rights and obligations of data and information holders/providers in terms of maintenance, update, quality assurance and reliability of data and information about their responsibility; • Licencing terms and conditions; • Contact point for access to environmental information. *For an example of data policy, consult the European Environment Agency's website: https://www.eea.europa.eu/legal/eea-data-policy/data-policy*
4.	Develop/update licencing terms and conditions to promote open data access, use and reuse of environmental information using an open licence	High	This measure will involve defining the licencing terms and conditions used on the different portals for publishing and accessing environment data. *At present, there are no official and clear licencing mechanisms for reuse of the data available by public authorities.* *According to the PSI Directive, it is recommended to use open licences as they are available online and provide clear licencing conditions[134].* *More information about licencing is available in the Good Practices Report in the section "Harmonise licencing terms and conditions of environmental data to promote its public use and reuse".*
5.	Adopt/update interoperability standards for environmental systems	High	Currently, the interoperability of information systems is mostly restricted due to an insufficiently developed legal framework and the lack of interoperability standards. This measure will review the existing standards for exchanging environmental data and information with the aim of standardising these exchanges.

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[134] Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the reuse of public sector information: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L1024&from=EN

Measure	Priority	Description
		Based on the completed inventory, this measure will harmonise the use of standards and develop common guidelines for the automated exchange of environmental data and information. Specifically, these standards will include standards of metadata for data and information exchange between environmental information systems (e.g. interfaces could be built using web services). The e-government gateway could be further used as the main data exchange platform in Azerbaijan to ensure the integration of environmental information systems. The prerequisite condition is to build integration technologies for data exchange compliance with international standards. *Cooperation with Estonia on implementation of an e-government gateway could be extended to ensure continuity and reuse of best practices from Estonia.* *It is important to note that this measure is a prerequisite for building an effective integrated environmental information system.* *This measure is closely linked with the measures "Enhance interoperability of geospatial, statistical, health and environmental information systems" and "Establish an electronic registry of public environmental information" in the Infrastructure section.*
6. Regular collection and timely reporting of environmental data and information in accordance with national and international obligations	High	This measure will: • Ensure the effective implementation of the Aarhus Convention and its decisions and recommendations by the Meeting of the Parties on promoting effective access to information and electronic information tools.[135] • Consider the possibility of ratifying the Protocol on PRTRs; • Identify the practical arrangements for establishing the Pollutant Release and Transfer Register and for its incorporation within the integrated environmental information system(s) by using good international working practices; • Ensure traceability of assessments and indicators by linking them with the available data sources used; • Consider becoming a Party to other UNECE MEAs (e.g. Protocols related to the Air Convention) to improve environmental governance, monitoring and data management;

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[135] http://www.unece.org/environmental-policy/conventions/public-participation/aarhus-convention/tfwg/task-force-on-access-to-information/consultations-on-the-recommendation-on-electronic-information-tools.html

	Measure	Priority	Description
			• Ensure the implementation of other international commitments related to the regular provision of environmental data and information. *This measure is closely linked with the measures "Enhance interoperability of geospatial, statistical, health and environment information systems" and "Establish an electronic registry of public environmental information" in the Infrastructure section.*
	7. Improve and make publicly available the quality assurance/quality control mechanisms behind the published environmental data and information	High	This measure will: • Assess the current quality control mechanisms from the collection of environmental data, to aggregation, manipulation, processing, and publication across the whole MDIAR chain[136]; • Publish the current procedures in place and set minimum standards to respect all stages of the data flow (data collection, data preparation and control, aggregation, and data dissemination); • Further develop/amend the legal framework by adding provisions setting up obligations at different levels, regarding the quality control of environmental data, including penalties for non-compliance; • Monitor the implementation of the quality control measures and set up an annual reporting process for the evaluation of the quality of environmental data provided. *At present, quality control is the responsibility of the institution that collects data; however, there is no common quality control process that would ensure a uniform quality control procedure (see Section 3.1.3.3 Quality control of environmental data).* *The examples of criteria for assessing quality control mechanisms are depicted in the document "Promotion of good practices for national environmental information systems and tools for data harvesting at EU level", p. 165.* *Examples of standards, mechanisms and measures for quality control are also presented in the Good Practices Report, in the section "Develop and publish quality control mechanisms for environmental data".*
	8. Define/adopt and publish metadata description standards for all environmental data and information in accordance with	High	This measure will aim to define metadata standards to facilitate the dissemination/exchange of environmental data and information (including dissemination of environmental reports). As a result, it will be easier for institutions to manage and exchange environmental data, while also making it easier for the public to find information.

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[136] The monitoring/data/information/assessment/reporting (MDIAR) chain is the flow of data and information from national monitoring to European reporting.

	Measure	Priority	Description
	international standards using a one-stop access point		*It is recommended that the international standards be gradually and consistently adopted, as the standard development requires both technical expertise and resources. The adaptation of the standard to the EU standard DCAT-AP would require capturing additional metadata, which would also enable integration with other open data portals in Europe.* *Refer to the Good Practices Report and forthcoming Aarhus Convention Recommendations on Electronic Information Tools to get more information about metadata standards for environmental data and information.* *This measure is closely linked with the measure "Enhance interoperability of geospatial, statistical, health and environmental information systems" in the Infrastructure section.*
9.	Expand collection, prepare, and publish environmental data in a machine-readable format	Medium	Azerbaijan currently publishes most of the data in machine-readable format. Nonetheless, many data are kept in public institutions and available upon request that increases the burden on the administration to deal with the respective effects and limits environmental, social, and economic benefits of its reuse. it is important to ensure their publication and accessibility. Secondly, all datasets should be available in machine-readable formats so that they can be further reused. This measure aims to ensure the publication of environmental data in machine-readable format. Such a measure can be driven by the establishment of the open data legal framework, setting up the obligation to publish, as a rule, all datasets in machine-readable formats, unless data are not available in such a format and requires processing beforehand. It is recommended that the state of the environment assessment report be regularly produced and made available online as an interactive product in accordance to the Aarhus convention, preferably indicator-based. *To improve openness, is recommended Azerbaijan 1) to collect and publish more disaggregated data across all data categories, 2) to publish more data in non-proprietary formats such as CSV or JSON .* *The Good Practices Report provides more details about machine-readable formats in the "Transformation of data published to machine-readable format" section.* *This measure is closely linked with the "Define and publish metadata description standard for all environmental information" measures outlined in the Content section.*

	Measure	Priority	Description
10.	Inventory, re-engineering, and publication of public services as e-services	Medium	This measure will define metadata standards and ensure that environmental services are described and accessible through the electronic service portal, in accordance with national standards.
			For the description of public services, it is recommended that the European Core Vocabularies, such as Core Public Service, Core Person, Core Location and Core Public Organisation, be adapted. This would allow a coherent and standardised description of e-services and improved interoperability to be ensured.
			Azerbaijan has made significant progress regarding e-services, nonetheless the current portal lacks the introduction of life events and environment e-services are still available on a range of public websites. To achieve this, it is important to ensure a standard description of public services registered.
			Environmental public service delivery would benefit if ASAN service public service portfolio could be extended by environmental public services, which could be delivered in ASAN service centres and e-government portal.
			For an example of implementation, consult the Good Practices Report's "Publishing e-services on a dedicated e-service portal" section.
11.	Perform an open data impact analysis for the use/reuse of environment data	Continuous	This measure will support raising awareness through regular assessment of the impact of the use/reuse of environmental data, as part of the open data impact assessment framework, and will drive further developments. For example, performance can be evaluated against the following criteria:
			• Number of environmental datasets downloaded and reused; • User feedback received/collected; • Number of applications developed using environmental data and having an impact on the environment (including reuse of environmental data by other sectors, such as transport).
			Azerbaijan can benefit for stepping up the public engagement in open data, which is reflected in the small number of apps built and shared on the Open Data Portal.
			More information about the general open data impact assessment can be found in the Good Practices Report in the "European Data Portal Impact maturity" section. The section provides an example of the European Open Data Portal relevant for this area.
			This measure is closely linked with the "Strengthen the technical capability for environmental monitoring" measure in the Infrastructure section.

In order to facilitate the implementation of the provided measures, the Good Practices Report provides the following examples and recommendations:

- Building a digital strategy which includes the environment (example from Lithuania);
- Building e-services and public information systems according to national and international standards (examples from Estonia and the EU);
- Publishing e-services on a dedicated e-service portal (examples from the Lithuania, Romania, and the UK);
- Develop a national strategy for open data and a measure plan to implement it for specific types of information (example from Ireland);
- Adopt an action plan based on the open data strategy and the digital strategy (example from the OGP);
- Adopt an open data policy, and extend it to environmental data (example from the EU);
- Designing an open data legal framework and provision of enforcement mechanisms (example from the EU);
- Definition of metadata description standard for all environmental information (examples from the EU and the UK);
- Transformation of data published to machine-readable format;
- Develop and publish quality control mechanisms for environmental data (example from the European Open Data Portal);
- Adopt/update licencing terms and conditions of environmental data to promote its public use and reuse (example from the European Open Data Portal);
- Evaluate the impact of open data (examples from the European Open Data Portal);
- Improve accessibility and use of available environmental data and information by improving the multilingual aspect of portals (example from the EEA).

5.2.2 Roadmap measures: Infrastructure

The measures proposed to Azerbaijan from the perspective of SEIS pillar: Infrastructure are presented in the table below.

Table 19. Measures from the perspective of SEIS pillar: Infrastructure

Measure	Priority	Description
12. Establish a single and user-friendly web access point for environmental information	High	In Azerbaijan, environmental data and information is disseminated via the website eco.gov.az, the State Statistical Committee and other websites. To support the implementation of Decision VI/1 of the Meeting of the Parties of the Aarhus Convention, it is recommended that a single access point for environmental information be established. In this regard, Azerbaijan recently developed the EcoPortal covering UNECE water indicators and a few indicators of biodiversity. It is recommended that the EcoPortal should be further populated with other thematic areas of the environmental domain and to establish the EcoPortal as a single access point for environmental data and information. The following suggestions are provided for further development of the EcoPortal:

Measure	Priority	Description
		• Further integrate various data sources of environmental information (e.g. a single access point should provide access to environmental datasets, indicators and links to environmental reports and various applications); • Provide web services and commonly agreed external application programming interfaces (APIs) to existing portals so institutions can easily share their (structured) data and have the possibility to download datasets (e.g. EEA public map services[137], provisions of the INSPIRE Directive); • Implement a uniform tool for checking the quality of metadata provided by data providers; • Publish environmental data in accordance with the rules described in international metadata standards, such as DCAT-AP metadata vocabulary (this measure will also allow automatic synchronisation with other EU open data portals); • Develop search functionality to allow the user to apply multiple field search and filter options (e.g. file format) to refine a search; combining keywords with classifiers; • Maintain and enhance the portal by including feedback gathering from the public through public consultation organised by ministries and governmental bodies. *At this moment very few environmental data are available for the public. Single access point would ensure effective data and information dissemination process.* *More information about single access points can be found in the Good Practices Report in the "Establish a single and user-friendly web access point for environmental information" section (examples from the EU, EEA, and Ireland).* *The design of the environmental information system is also widely described in the document "Promotion of good practices for national environmental information systems and tools for data harvesting at EU level".* *This measure is closely linked with the measure "Revision of the legal framework to promote and regulate the online accessibility and reuse of public sector information (PSI)", in the Content section, and measure "Establish a collaborative institutional framework for the implementation of open data", in the Cooperation (Network) section.*

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[137] https://www.eea.europa.eu/code/gis

	Measure	Priority	Description
	13. Enhance interoperability of geospatial, statistical, health and environmental information systems	High	This measure will facilitate the implementation of the interoperability standards defined for environmental and other thematic data. This measure will: • Assess the existing compatibility of various information systems with defined interoperability standards, in particular with the geoportal; • Adopt/update and implement standards for metadata and data interoperability in accordance with international standards and good practices; • Develop APIs for external users; • Provide automated mechanisms for sharing time-series data. These actions can also be included in the national interoperability framework. *Azerbaijan has developed the web mapping application (WMA) portal (cf. section "Portals" of this document) which provides advanced geospatial visualisation of statistical data. Nonetheless, interoperability between information systems and data still require improvement.* *Refer to the Good Practices Report for more details about the development of interoperability in Lithuania and the EU in the "Establishing an interoperability framework" section.* *This measure is linked with the measure "Develop and/or continue to enhance an integrated system for the management of environmental information in accordance with the Aarhus Convention and the Protocol on PRTRs" from the present roadmap.*
	14. Establish an electronic registry of public environmental information	Medium	This measure will aim to establish a registry of environmental information and data available in each institution and system (i.e. the metadata management system), as well as data that is publishable taking into consideration the legal framework in place. The registry will be used by public servants to support the continuous development of environmental information systems and the dissemination of environmental information. Particularly, the registry should map the systems, databases, institutions, datasets, and reports published. This measure could be coupled with the standardisation of metadata for environmental information and with the development of a single web access point for environmental information, which would be automatically refreshed based on the registry of environmental information. *Azerbaijan recently developed an EcoPortal for the water component and making significant steps in other environmental components (i.e. air, biodiversity, land). This action would support other ongoing initiatives.*

Measure	Priority	Description
		The inventory of environmental information systems is widely described in the document "Promotion of good practices for national environmental information systems and tools for data harvesting at EU level", in the section "Inventory of the environmental information system".
15. Improve accessibility and usability of available environmental data and information by improving the multilingual aspect	Medium	This measure will provide a full translation into Azerbaijani and English of public institutions' websites, yearly reports, and environmental information metadata. Ensure the translation into Azerbaijani and English of the national state of environment report available on the MEPA website as well as of other relevant products for their increased accessibility and use. To provide qualified translation and relevant terminology, a machine-driven translation process using the EEA GEMET thesaurus could be implemented with an additional quality assurance procedure. High-quality translation is fundamental to unlocking the potential of open data in the area of the environment and should be carried out by qualified professionals performing a review of translated information. *An example of a multilingual portal is the EEA GEMET[138], which provides a thesaurus of environmental terms, currently translated into 37 languages.*
16. Develop e-services for the environment	Medium	At present, few e-services are available for the environment. This initiative will aim to develop environmental e-services according to the national standards (service passports) service interoperability standards (e.g. e-signature, e-payment). *More information about the description of public services can be found in the Good Practices Report in the section "Building e-services and public information systems according to national and international standards".* *This measure is connected to the measure "Inventory, re-engineering and publication of public services as e-services" from the present roadmap.*
17. Strengthen the technical capability for environmental monitoring	Continuous	Azerbaijan is already upgrading its monitoring equipment, in particular for air quality monitoring. This measure aims to strengthen the technical capacity for environmental monitoring to other thematic areas such as water.

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[138] https://www.eionet.europa.eu/gemet/en/concept/4438

Measure	Priority	Description
		The gradual provision of modernised monitoring equipment should be planned and gradually ensured. To do so, the following is recommended: • Define monitoring parameters at national and local levels for each thematic area. These objectives should include: o Frequency of observations (e.g. hourly, daily, monthly, or yearly); o Granularity of data gathered (accuracy); o Space coverage (taking into consideration the spatial requirements – urban vs rural areas, industrial areas); o Quality of data; o Compatibility with existing equipment and information systems and, where possible, compliance with EU requirements as part of the approximation process. • Conduct critical assessment in relation to the needs of the status and performance capabilities of the current monitoring infrastructure (for each thematic area, starting with priority areas such as, for example, water). This can be achieved through the establishment of a cross-sectional team of experts that could reflect on the existing equipment and provide a complete assessment of the needs aligned with the objectives defined above. • Develop a long-term and realistic national plan for gradual modernisation, taking into consideration all financial possibilities and options; • Follow this process by developing a coherent and stepwise implementation plan to gradually integrate new equipment into the existing system. This point is crucial as a lack of integration of the monitoring process in information systems: 1) renders the exchange of data cumbersome, 2) increases the need for human resources and 3) undermines the quality and availability of data. • Identify potential environmental areas to gradually complement the traditional environmental monitoring system with additional information coming from alternative sources (e.g. citizen science[139] earth observation[140],[141]). The acquisition of monitoring equipment requires consequent investments and should be well prioritised, bearing in mind the national needs, a long-term

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[139] https://data.jrc.ec.europa.eu/dataset/jrc-citsci-10004
[140] https://ec-jrc.github.io/citsci-explorer/
[141] https://www.copernicus.eu/en/services

Measure	Priority	Description
		perspective, and the approximation of the respective EU legislation. *This measure is linked with the measure "Develop and/or continue to enhance an integrated system for the management of environmental information in accordance with the Aarhus Convention and the Protocol on PRTRs" from the present roadmap.*
18. Develop and/or continue to enhance an integrated system for the management of environmental information in accordance with the Aarhus Convention and the Protocol on PRTRs	Medium	At present, Azerbaijan has a range of information systems that are managed independently. There are very few points of integration between existing information systems and the exchange of data is mostly done by using Excel files in environmental domain. This measure recommends the development of an integrated environmental management system, which will ensure the coordinated management and exchange of environmental data and information. E-government Gateway could serve as an integration platform for data exchange between various environmental information systems. To do so, this measure recommends: • Making an inventory of all systems used for the management of environmental data and information, in particular that which is not publicly available, at the national level; • Establishing a pollutant release and transfer register as an integral module of the system. • Defining the requirements for an integrated system for environmental information management. In particular, the system should provide functionalities such as: o Workflow (e.g. quality management); o Environmental data collection; o Automatic dissemination and update of open data; o Document management; o Integration with external systems (statistical, health, open data, transport, energy, and land cadastral, etc., as needed); o Advanced visualisation tools and capabilities for integration with business intelligence tools; • Gradual implementation of the system; • Training of potential users and institutions involved on the benefits, functionalities, and usability of the integrated system; • Regular assessment of the performance and update of the system when needed. This measure will foresee the development of an efficient system for integrating various types of environmental information at different levels (sub-

	Measure	Priority	Description
			national, national) by connecting various existing systems.
			The document "Promotion of good practices for national environmental information systems and tools for data harvesting at EU level" presents guidelines for the development of environmental information systems.
			This measure is linked to the measures "Enhance Interoperability of geospatial, statistical, health and environmental information systems" and "Adopt/update interoperability standards for environmental systems" from the present roadmap.
	19. Develop applications to engage the public in environmental monitoring and protection activities	Low	Azerbaijan currently has few software applications (e.g. mobile apps) developed for the public/civil society.
			This measure will aim to develop a series of software applications (e.g. mobile apps) that will expand the potential for e-government to create an "environmental data ecosystem" and enable the public to access, consult and interact with environmental data.
			For instance, through the apps the public can:
			• access and consult environmental information in real time according to their location;
			• report poaching, and mark and signal polluted areas, etc.;
			• participate in environmentally friendly events in their neighbourhood;
			• integrate environmental data they have collected with government apps, where possible;
			• use crowdsourcing (citizen-generated data) to capture environment monitoring data throughout the territory of Azerbaijan.
			This measure is linked with the measures proposed in the Cooperation (Network) section in the present roadmap.

In order to facilitate the implementation of the provided measures, the Good Practices Report provides the following examples and recommendations:

- Establishing an interoperability framework (examples from the EU and Lithuania);
- Building an integrated environmental monitoring system at national level (example from Ukraine);
- Building an Open Data Portal and foster publication of public sector information (examples from Ireland, the Netherlands and Spain);
- Establishing a single and user-friendly web access point for environmental information (examples from Ireland and the EEA);
- Developing infrastructure on the most advanced platforms based on geospatial data and GIS technologies (examples from the EU and Lithuania);
- Providing technological support for sharing environmental data at the regional level.

5.2.3 Roadmap measures: Cooperation (Network)

The measures proposed to Azerbaijan from the perspective of SEIS pillar: Cooperation are presented in the table below.

Table 20. Measures from the perspective of SEIS pillar: Cooperation

	Measure	Priority	Description
	20. Establish a collaborative institutional framework for the implementation of open data	High	Azerbaijan currently lacks coordination mechanisms at a national level for the development of open data. Consequently, this measure will strengthen the necessary institutional framework for managing open data, especially in relation to the environmental component.
			This measure will focus on the need to develop a stronger cooperation between institutions in order to ensure the sharing, (re)using and publication of the environmental data and information. An example of approach to establish a collaborative institutional framework for open data implies:
			• Amendment to the existing legal framework or additional secondary new regulations to foresee clear responsibilities of the various actors and ensure the clear division of responsibilities on open data at national and thematic levels (e.g. there should be general rules for governing the open data framework and specific rules for individual environmental data providers on how to organise an open data publishing process internally); • Establishment of a cross-sectoral working group which will assist/support and facilitate in the establishment of the operational mechanisms of collaboration (i.e. processes, procedures and good practices); • Organisation of events/fora/regular dialogues to foster collaboration between national stakeholders and various data users.
			The Good Practices Report provides examples of initiatives undertaken in the EU to foster inter-institutional and international cooperation in the field of open data. The open data maturity report 2019 provides criteria to assess the maturity of the institutional framework in a country. The document "Development of an assessment framework on environmental governance in the EU Member States"[142] also provides good practices to establish an institutional framework for environmental governance.

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[142]

https://ec.europa.eu/environment/environmental_governance/pdf/development_assessment_framework_environmental_governance.pdf

Measure	Priority	Description
		This measure is linked with the recommendations presented in the Content section of the present roadmap and the targeting of the revision of the legal framework.
21. Develop and ensure increased capacity for handling environmental and open data	High	During the period of ENI SEIS II East project implementation, the lack of human resource capacity and technical capabilities of employees currently working for public authorities in the area of environmental data/information management and dissemination was identified as one of the key gaps in Azerbaijan. Components of this measure cover: • Assessment of the capacities needed (human resources and tools) for managing and making available environmental data and information at national and local levels; • Recruitment of specialised staff and gradual acquisition of necessary tools for open data and environmental data management; • Development and integration of procedures and processes for preparing and disseminating environmental data and information; • Professional development/training plans for civil servants and/or data stewards or data officers working with data. In this regard, it is possible to foresee official training programmes (mandatory) for staff in charge of data handling and to recognise these trainings through certificates. *The document "Development of an assessment framework on environmental governance in the EU Member States" provides multiple examples of initiatives undertaken to build capacity in this area. The section "3.5.2. Administrative capacity (environmental inspectorates, police, customs, prosecution services and audit bodies)" focuses strongly on the example of capacity-building in the EU.* *This measure is linked with the measures "Strengthen the technical capacity for environmental monitoring" and "Develop and/or continue to enhance an integrated system for the management of environmental information in accordance with the Aarhus Convention and the Protocol on PRTRs" of the present roadmap.*
22. Promote international and regional cooperation to facilitate the implementation of the roadmap	High	This measure aims to support Azerbaijan with international expertise and good practices to assist in the implementation of the present roadmap. To do so, it is recommended that: • Fora and other platforms where experience can be shared be identified;

Measure	Priority	Description
		• Contacts with key stakeholders at the regional and international level be established to share experience and good practices; • An inventory of international and regional initiatives be built and their potential assessed. *The Good Practices Report provides examples of initiatives that can be undertaken to implement this measure, in the section "Increasing public administration, public and business awareness over open data and environmental data".*
23. Raise awareness of open government and open data for the environment among citizens and economic operators	High	In Azerbaijan, public awareness of open data and environmental information need to be significantly raised. The presentations in Baku featured good promotion campaigns and were good examples to further replicate and continue. Also, the app "EKO-RADAR" is an interesting concept that is supported for wider promotion and further development. This measure will focus on raising public awareness of the role and impact of environmental information, its accessibility, usability, and other related aspects, by pursuing ongoing activities, strengthening, and expanding them where and when appropriate. The focus of above-mentioned activities could be directed to promotion of environmental applications and enhancement of their usage. Additionally, a series of activities for promoting the use/reuse and sharing of environmental information could be undertaken, such as: • Hackathons; • Fora; • Promotion campaigns; • Development of incubators; • Development of public-private partnerships; • Facilitating dialogue and cooperation between national bodies, NGOs, and the academic community. *The Good Practices Report provides examples of initiatives that can be undertaken to implement this measure, in the section "Increasing public administration, citizens and business awareness over open data and environmental data".*

In order to facilitate the implementation of the provided measures, the Good Practices Report provides examples and recommendations on the following topics:

- Increasing awareness and motivation among public institutions over e-government and digital solutions (example from the EU);
- Increasing awareness of e-government among the public and businesses (example from the EU);

- Coordinating open data initiative(s) (example from Ireland);
- Establishing processes and procedures for managing open data (example from Lithuania);
- Increasing public administration, public and business awareness of open data and environmental data (example from Belgium, Cyprus, the EU, Italy, and Luxembourg);
- Promoting open data to organisations;
- Collecting user feedback and providing new means of communication between open data providers and users (example from Spain).

Annex A - the list of conventions and protocols ratified by Azerbaijan (as of May 2020)

The list of the conventions and protocols that Azerbaijan is a part of.

Table 21. Multilateral international environmental conventions ratified by Azerbaijan

No.	International environmental agreements	Year of ratification
1.	Convention concerning the Protection of the World Cultural and Natural Heritage	1993
2.	Convention of the World Meteorological Organisation	1993
3.	United Nations Framework Convention on Climate Change	1995
4.	Convention for the Protection of the Ozone Layer	1996
5.	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	1998
6.	United Nations Convention to Combat Desertification	1998
7.	UNECE Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)	1999
8.	Bern Convention on the Conservation of European Wildlife and Natural Habitats	2000
9.	The Montreal Protocol on Substances that Deplete the Ozone Layer	1996
10.	United Nations Convention on Biological Diversity	2000
11.	UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes	2000
12.	A Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes	2003
13.	UNECE Convention on Access to Information, Public Participation in Decision-making, and Access to Justice in Environmental Matters (Aarhus Convention)	2000
14.	Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)	2001
15.	Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention)	2001
16.	UNECE Convention on Long-Range Transboundary Air Pollution	2002
17.	The Stockholm Convention on Persistent Organic Pollutants	2004
18.	UNECE Convention on the Transboundary Effects of Industrial Accidents	2004
19.	Framework Convention for the Protection of the Marine Environment of the Caspian Sea (Teheran Convention)	2006
20.	European Landscape Convention	2011

Annex B - overview of ENI SEIS II East project deliverables

This annex provides a summary of the main deliverables of the ENI SEIS II East project per component that are to be released by project's end (31 July 2020).

Air Quality

#	Deliverable	Comments
1	**Deployment of the IT platform RAVEN for air quality data management and data reporting**	The full working software of RAVEN can be found at and downloaded from the open source repository GitLab. RAVEN Software requirements, installation and user documentation can also be found here. A demonstration version can be found here.
2	**Technical country visits – deployment of RAVEN, training, and follow-up**	Technical country visits to six Eastern Partnership countries (Belarus tele-conference due to Covid-19). Deployment of RAVEN, training, and follow-up • Georgia, Moldova and Ukraine • Decision on use of RAVEN in Armenia, Belarus and Azerbaijan is pending. Reporting to EEA: • Georgia: Up-to-date (UTD) data transmitted since April 2019 • Ukraine: Up-to-date (UTD) data transmitted since June 2020) • Moldova: Up-to-date data transmission is pending
3	**Six country factsheets on air quality monitoring and data management**	Six Eastern Partnership countries factsheets available in English and Russian https://eni-seis.eionet.europa.eu/east/areas-of-work/data/air
4	**Regional Air Quality workshops**	Copenhagen 2018 Tbilisi 2019

Assessment and Accounting

#	Deliverable	Comments

1	Regional report	Brochure "Environment in Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine-Facts and figures" available in English.
2	Six national leaflets	Six Eastern Partnership country leaflets with infographics in English and national languages available.
3	Assessment of availability of the UNECE indicators online	Six Eastern Partnership country assessments on environmental indicators with links to national web pages.
4	Assessment of availability of the environmental reports online	Six Eastern Partnership country assessments on environmental assessments and SOER with links to national web pages.
5	Methodological paper on the national state of the environment report	Methodological guidance on the national state of the environment report.
6	SOER country briefings	Six Eastern Partnership country briefings on the national state of the environment reports.
7	Assessment of the SEEA progress	Six Eastern Partnership country assessments on SEEA implementation linked with the modules of accounts at national web pages.

Biodiversity

#	Deliverable	Comments
1	Biodiversity Briefing	EEA briefing on Protected areas in the six Eastern Partnership Countries. Currently being finalised and will soon be available in English and Russian at this link.
2	Indicator-D1-Protected areas	The indicators have been developed in line with the EEA methodology and comparable with the EEA SEBI 007 indicator. The purpose was to build expert capacity on the assessment of biodiversity data and information. Armenia, Azerbaijan, Belarus, Georgia, Moldova, Ukraine.

European Environment Agency

3	Council of Europe – Emerald Network Reference Portal	The portal hosts conclusions of the biogeographical evaluation seminars supported by the ENI East project together with candidate and adopted sites to the Emerald Network. [Emerald Network Reference Portal](#)

CLC – Corine Land Cover

#	Deliverable	Comments
1	**CLC2018 status layer (link to country database where the data are stored)**	Five Eastern Partnership Countries, except Belarus ([on selected pilot area around capital region](#)).
2	**CLC-Changes layer (link to country database where data are stored)**	Five Eastern Partnership Countries, except Belarus ([on selected pilot area around capital region](#)).
3	**CLC status layer from 2000's (link to country database where data are stored)**	Five Eastern Partnership Countries, except Belarus ([on selected pilot area around capital region](#)).
4	**A brief analysis of changes**	Five Eastern Partnership Countries, except Belarus (made by EEA/ETC/ULS to ensure [consistent analysis across countries](#)).
5	**Final CLC national reports**	[Five national reports](#) summarising the work, challenges and results covering the Eastern Partnership countries except Belarus.

Open data and access to environmental information

#	Deliverable	Comments
1	**Six open data maturity reports on e-government and access to environment information**	Following the EU model applied for EU Member States, in English. [Access to environmental information and maturity reports](#) [UNECE environmental policy capacity building.](#) [Joint UNECE-EEA Workshop on Open Data for the Environment](#)

#	Deliverable	Comments
2	**Six road maps for implementing the e-government for environment and improving the access to environment information**	In English and in national languages. Access to environmental information and road maps UNECE environmental policy capacity building Joint UNECE-EEA Workshop on Open Data for the Environment
3	**Six executive summaries of the open maturity reports**	In English and in national languages. Access to environmental information and executive summaries UNECE environmental policy capacity building Joint UNECE-EEA Workshop on Open Data for the Environment
4	**A good practices report harvesting examples of e-government and access to env. information in EU MS, other advanced countries, international organisations, and the ENI East countries**	In English. Access to environmental information and good practices UNECE environmental policy capacity building Joint UNECE-EEA Workshop on Open Data for the Environment

Water

#	Deliverable	Comments
1	**Regional report on State of water resources in Eastern Partnership Countries**	An indicator-based assessment. Currently being finalised and will soon be available in English and Russian at this link.
2	**Support the development of IT structure for the data management**	**As a thematic onset, EcoPortal have been developed for Armenia, and Azerbaijan; and Water information system for Georgia. The activity covered the EEA expert and technical support in developing both the IT and Content management systems in line with the Water Information System for Europe (WISE).** **EcoPortal Armenia** **EcoPortal Azerbaijan** **Water Information System for Georgia**
3	**Water quantity and water quality indicators**	5 selected indicators have been developed jointly with the national water experts to support the knowledge-based policy making. The indicators are comparable with the EEA respective water indicators.

4	Development of water accounts for Azerbaijan	Physical water asset and PSUT (Physical Supply and Use Tables), including computation algorithms and IT programming. Azerbaijan training.
5	Developing water accounts for Belarus	This pilot activity has resulted with developing the component of physical water supply and use accounts.

Communication and Visibility

#	Deliverable	Comments
1	Website	Ensure that project results will be posted at the EEA corporate web site.
2	Newsletter	Final issue of the newsletter before the project end.
3	Final publication	Final publication (online).

Events

#	Deliverable	Comments
1	Regional workshop on SOE report	This workshop was planned for 18-19 March 2020 in Bratislava and due to COVID-19 pandemic it was delivered online on 18 June 2020 by EEA and the Slovak Environment Agency (SEA).
2	EEAcademy ENI Summer School on Integrated Environmental Assessments, SOER	Event was initially planned for early June, cancelled due to COVID-19 pandemic.
3	EcoPortal launch event- Armenia	Event was planned for May and for the moment it is postponed due to COVID-19 pandemic.
4	EcoPortal launch event - Azerbaijan	Event was planned for May and for the moment it is postponed due to COVID-19 pandemic.
5	Water Information System launch event - Georgia	Event was planned for May and for the moment it is postponed due to COVID-19 pandemic.
6	Training experts on further maintenance of the EcoPortal in Armenia	Due to COVID-19 pandemic, the hands-on training was been provided virtually.

7	**Training on further maintenance of the EcoPortal in Azerbaijan**	Due to COVID-19 pandemic, the hands-on training was been provided virtually.
8	**Training on further maintenance of the Water Information System in Georgia**	Due to COVID-19 pandemic, the hands-on training was been provided virtually.
9	**Regional CLC event**	Digital package available. USB stick disseminated to all EaP countries, EU, and international partners.
10	**Training on the IT platform RAVEN**	Armenia Belarus Georgia Moldova Ukraine
11	**Emerald Network biogeographical evaluation seminars**	Seminar conclusions
12	**Capacity building in biodiversity**	Training of national experts on the SDF, European spatial 10 km grid, indicator development.
13	**Capacity building on indicator calculation and assessment in the area of water**	Hands-on training for national water experts of all ENI six countries in calculating the indices and undertaking the assessment for developing the water indicators.
14	**Regional Water Workshop - Istanbul**	For sharing knowledge and experiences on developing the indicator and indicator-based assessment in Eastern Europe and the Caucasus Region. Regional water workshop
14	**Final ENI East event**	Concluding event 25 June 2020