

Sharing and dissemination of environmental information

Country maturity report: Belarus Roadmap

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Implementation of the Shared Environmental Information System principles and practices in the Eastern Partnership countries (ENI SEIS II East)

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This report was produced by PricewaterhouseCoopers as part of the project 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. The report was built in 2018 and updated throughout 2019, including a review in March 2019 after the first regional meeting in Kiev, and the second review after the roundtable in June 2019. The report has been reviewed by public authorities in Belarus in December 2019.

This report contains information obtained or derived from a variety of publicly available sources described within the report in more detail and does not intend 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.



Roadmap¹

In general, it is recommended that Belarus 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:**
 - *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 public authorities 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.
 - *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.
 - *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:**
 - *Enforcement mechanisms* for the regular collection, sharing and dissemination of environmental information and for monitoring implementation.
- **Technical measures:**
 - *E-government, open data and geo-portals:* 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.
 - *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 Belarus (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.

¹ 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>



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 authorities 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 1. 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 a 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 the Belarus 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 2. 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^{2, 3}](#);
- [Development of an assessment framework on environmental governance in the EU Member States⁴](#).

Roadmap measures: Content

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

² https://www.europeandataportal.eu/sites/default/files/open_data_maturity_report_2019.pdf

³ https://www.europeandataportal.eu/sites/default/files/european_data_portal_-_open_data_goldbook.pdf

⁴ “Development of an assessment framework on environmental governance in the EU Member States” under the contract No 07.0203/2017/764990/SER/ENV.E.4 funded by the European Commission, Final report May 2019.



Table 3. Measures from the perspective of 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	<p>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 and the Protocol on PRTRs (as appropriate). This can include:</p> <ul style="list-style-type: none"> • Improving environmental information system by defining themes, sources (lists, registers, databases, funds, etc.), formats, metadata, licencing and interoperability requirements; • Improving procedures for environmental data collection in machine-readable format and its accessibility as open data; • Improving procedures for managing environmental data flows and regular updating, quality assurance and quality control, reporting, inter-institutional sharing and exchange, 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); considering ways to take on board citizen science and the public engagement initiatives; • Streamlining the responsibilities of public authorities at all levels and across sectors to ensure 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). <p><i>As discussed during the national roundtable, improvements regarding the regulatory framework, especially environmental information management, are being continually implemented and are continuously required. However, full enforcement of the Aarhus Convention requires that the legal framework be amended and complemented.</i></p> <p><i>Belarus has adopted the 'State Programme for the Development of the Digital Economy and Information Society for the period 2016-2020', which partially covers areas related to open data. However, the strategy does</i></p>



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Measure	Priority	Description
		<p><i>not specify concrete measures to be implemented in order to facilitate environment data sharing.</i></p> <p><i>For guidance, consult the section ‘Designing an open data legal framework and provision of enforcement mechanism’ of Good Practices Report.</i></p> <p><i>This measure is closely linked with ‘Establish a collaborative institutional framework for the implementation of open data’ in the Cooperation (Network) section.</i></p>
2. Adopt guidelines defining the practical arrangements for environmental information management, sharing and dissemination	High	<p>Adopt guidelines defining the practical arrangements for environmental information management, sharing and dissemination, specifying:</p> <ul style="list-style-type: none"> • 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 and 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); • Separation of non-confidential information as appropriate; • Gradually improve data quality assurance mechanisms.
3. Develop and adopt an environmental data policy	High	<p>Adoption of an environmental data policy by the authorities in charge with environment protection, to include:</p> <ul style="list-style-type: none"> • 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. <p><i>For an example of data policy, consult the European Environment Agency’s website at:</i></p>



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Measure	Priority	Description
		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	Medium	<p>This measure will involve defining or updating the licencing terms and conditions used on the different portals for accessing and using the environmental data.</p> <p><i>At present, the licencing mechanisms for re-using the data published by public authorities are not harmonised. Some public authorities indicate that the information can be reused if the source is acknowledged. However, this differs among the various public authorities that publish environmental information.</i></p> <p><i>According to the PSI Directive, it is recommended to use open licences as they are available online and provide clear licencing conditions⁵.</i></p> <p><i>More information about licencing are available in the Good Practices Report in the section 'Adopt/update licencing terms and conditions of environmental data to promote its public use and reuse'.</i></p>
5. Regular collection and timely reporting of environmental data and information in accordance with national and international obligations	High	<p>This measure will:</p> <ul style="list-style-type: none"> • Ensure the effective implementation of the Aarhus Convention and its decisions and recommendations from the Meeting of the Parties on promoting effective access to information and electronic information tools. • Identify 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. • Belarus made significant progress towards the production of SOER indicator-based and its online availability. It is recommended to further concentrate on ensuring the traceability of assessments and indicators by linking them with the available data sources used. • Ensure the implementation of other international commitments related to the regular provision of environmental data and information. <p><i>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.</i></p>

⁵ Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L1024&from=EN>



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	Measure	Priority	Description
	6. Improve and make publicly available the quality assurance/quality control mechanisms behind the published environmental data and information	High	<p>The results and methodology used for quality assurance and quality control of environmental data are to be published in a detailed manner in order to enable public and other stakeholders to assess the reliability of the data.</p> <p>This measure will:</p> <ul style="list-style-type: none"> • Assess the current quality control mechanisms from the collection of environmental data, to aggregation, manipulation, processing and publication across the whole MDIAR chain⁶; • 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 publication); • Further develop the legal framework to include clear responsibilities at different levels, regarding quality control of environmental data including penalties for non-compliance; • Fully implement the quality control measures and set up an annual reporting process for the evaluation of the quality of environmental data provided. <p><i>At present, quality control is the responsibility of the institution that collects data, however, there are no common quality control process that would ensure the uniform quality control procedures⁷ (see Section 3.1.3.3 Quality control).</i></p> <p><i>Belarus set up quality requirements for data management in a legal framework, and Belstat is also working in accordance with ISO Certificate 9001-2015 (see section 3.1.3.3 Quality control). However, there are no specific quality requirements for environmental data management.</i></p> <p><i>Example 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.</i></p> <p><i>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'.</i></p>
	7. Define, adopt and publish metadata	Medium	This measure will aim to define metadata standards to facilitate the dissemination and exchange of

⁶The monitoring/data/information/assessment/reporting (MDIAR) chain is the flow of data and information from national monitoring to European reporting.

⁷ As discussed in the national roundtable.



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Measure	Priority	Description
description standards for all environmental data and information in accordance with international standards using a one-stop access point		<p>environmental data and information (including dissemination of the available environmental reports). As a result, it will be easier for the public authorities to manage and share environmental data, while also making it easier for public to find the needed information.</p> <p><i>It is recommended that the international standards should be 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.</i></p> <p><i>Refer to the best practice report to get more information about metadata standards for open data.</i></p> <p><i>This measure is closely linked with the measures 'Enhance interoperability of geospatial, statistical, health and environment information systems' in the Infrastructure section.</i></p>
8. Expand collection, prepare and publish environmental data in a machine-readable format	Medium	<p>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.</p> <p>Consider moving the SOER towards an assessment-based and interactive report, preferably indicator-based.</p> <p><i>The Good Practices Report provides more details about machine-readable formats in the 'Transformation of data published to machine-readable format' section.</i></p> <p><i>This measure is closely linked with the 'Define, adopt and publish metadata description standards for all environmental data and information in accordance with the international standards using a one-stop access point' measures outlined in the Content section.</i></p>
9. Inventory, re-engineering and publication of public services as e-services	Medium	<p>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.</p> <p>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.</p> <p><i>Belarus has made significant progress regarding e-services, but the current portal lacks information on life</i></p>



	Measure	Priority	Description
			<p>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 the public services registered.</p> <p>For an example of implementation, consult the Good Practices Report's 'Publishing e-services on a dedicated e-service portal' section.</p>
	<p>10. Perform an open data impact analysis for the use/reuse of environment data</p>	<p>Continuous</p>	<p>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:</p> <ul style="list-style-type: none"> • Number of environmental datasets downloaded and reused; • User feedback 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). <p>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.</p> <p>This measure is closely linked with the "Strengthen the technical capability for environmental monitoring" measure in the Infrastructure section.</p>

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).

Roadmap measures: Infrastructure

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

Table 4. Measures from the perspective of SEIS pillar: Infrastructure

Measure	Priority	Description
11. Establish a single and user-friendly web-access point for environmental information	High	<p>The single access point can also be designed as an entry point for all environmental policy domains to support the implementation of decision VI/1 of the Meeting of the Parties to the Convention.</p> <p>In Belarus, National Environmental Monitoring System provides a web-access point to environmental information and could be further extended linking other types and sources of environmental information (e.g. dynamic environmental data, cadastres, etc.) to serve as environmental portal.</p> <p>The following suggestions are provided for the further development of the environmental portal (single access point for environmental information):</p> <ul style="list-style-type: none"> • Design main technological solutions, which will be used as single and user-friendly web-access point for environment information – technological solution should be based on technological platform; • Agree upon a single access point by linking various data sources of environmental information (e.g. the single access point should provide access to environmental datasets, indicators, links to environmental reports and various applications); • Provide web-services and commonly agreed external application programming interfaces (APIs) to the existing portals so the public authorities can easily share their (structured) data and have the possibility to download datasets (e.g. EEA public map services⁸, INSPIRE Directive); • Implement a tool for checking the quality of metadata provided by data providers;

⁸ <https://www.eea.europa.eu/code/gis>



Measure	Priority	Description
		<ul style="list-style-type: none"> • Publish environmental information and data in accordance to the rules described in international metadata standards, such as DCAT-AP metadata vocabulary (this measure will also provide 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 as well as from the public consultations initiated by ministries and other governmental authorities. <p><i>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).</i></p> <p><i>The design of 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'.</i></p>
12. Enhance interoperability of geospatial, statistical, health and environmental information systems	High	<p>This measure will facilitate the implementation of the interoperability standards defined for environmental and other thematic data. This measure will:</p> <ul style="list-style-type: none"> • Assess the existing compatibility of various information systems with defined interoperability standards, in particular with the Open Data and geoportal; • 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. <p>These actions can also be included in the national interoperability framework.</p> <p>During the national roundtable, it was indicated that environmental information systems should leverage e-government solutions, such as NAIS and/or be integrated to foster interoperability.</p> <p><i>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.</i></p>



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Measure	Priority	Description
		<i>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.</i>
13. Establish an electronic registry of public environmental information	High	<p>This measure will aim to establish a registry of environmental information and data available in each public authority 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 officials to support the continuous development of environmental information systems and the dissemination of environmental information. Particularly, the registry will map the systems, databases, public authorities, datasets and reports published.</p> <p>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.</p> <p><i>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’, p. 25.</i></p>
14. Improve accessibility and usability of available environmental data and information by improving the multilingual aspect	Medium	<p>This measure will provide a full translation to Belarusian, Russian and English of public authorities’ websites, annual reports and environmental information metadata.</p> <p><i>An example of multilingual portal is the EEA GEMET⁹, which provides a thesaurus of environmental terms, currently translated into 37 languages.</i></p>
15. Develop e-services for the environment	Medium	<p>This initiative will aim to develop environmental e-services according to the national standards (service passports), and service interoperability standards (e.g. e-signature, e-payment).</p> <p><i>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’.</i></p>

⁹ <https://www.eionet.europa.eu/gemet/en/concept/4438>



	Measure	Priority	Description
			<p><i>This measure is connected to the measure 'Inventory, re-engineering and publication of public services as e-services' from the present roadmap.</i></p>
	<p>16. Strengthen the technical capability for environmental monitoring</p>	<p>Continuous</p>	<p>This measure aims to the strengthen the technical capability for environmental monitoring to other thematic areas such as water.</p> <p>The gradual provision of modernised monitoring equipment should be planned and gradually ensured. To do so, the following is recommended:</p> <ul style="list-style-type: none"> • Define monitoring objectives at national and local level for each thematic area. These objectives should include: <ul style="list-style-type: none"> ○ Frequency of observations (e.g. hourly, daily, monthly or yearly); ○ Granularity of data gathered (accuracy); ○ Space coverage (taking into consideration spatial requirements – urban vs rural areas, industrial areas); ○ Quality of data; ○ Compatibility with existing equipment and information systems and, as appropriate, implementation of the EU and international approaches. • 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 where gradually to complement the traditional environmental monitoring system with additional information coming from other sources (e.g. citizen science, earth observation).



Measure	Priority	Description
		<p>The acquisition of monitoring equipment requires consequent investments and should be well prioritised taking into consideration the local and national needs, and a long-time perspective.</p> <p><i>This measure is linked with the measures ‘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.</i></p>
17. 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	<p>This measure recommends the development of an integrated environmental management system, which will ensure the coordinated management and exchange of environmental data and information. To do so, this measure recommends:</p> <ul style="list-style-type: none"> • Making an inventory of all systems used for management of environmental information at national level; • Defining requirements for an integrated system for environmental information management. In particular, the system will provide functionalities, such as: <ul style="list-style-type: none"> ○ Workflow (e.g. quality management); ○ Environmental data collection; ○ Automatic dissemination and update of open data; ○ Document management; ○ Integration with external systems (open data, statistical, health, transport, energy, cadastral, etc. as needed); ○ Advanced visualisation tools and capability for integration with business intelligence tools. • Gradual implementation of the system; • Training of the potential users and public authorities involved on how to operate it, benefits and functionalities; • Regular assessment of performance and update of the system when needed. <p>This measure will foresee the development of an efficient system for integrating various types of environmental data and information at different levels (sub-national, national) by connecting various existing systems.</p> <p>Note: the system should provide a standard API and the possibility to upload data manually so that compatibility with legacy and external systems could be maintained.</p> <p><i>The document ‘Promotion of good practices for national environmental information systems and tools for data</i></p>



Measure	Priority	Description
		<p><i>harvesting at EU level' presents guidelines for the development of environmental information systems.</i></p> <p><i>This measure is linked to the measures 'Enhance interoperability of geospatial, statistical, health and environment information systems' from the present roadmap.</i></p>
18. Develop applications to engage the public in environmental monitoring and protection activities	Low	<p>This measure will aim to develop a series of software applications (e.g. mobile apps) that will expand the potential for e-government in order to create "environmental data ecosystem" and enable the public to access, consult and interact with environmental data.</p> <p>For instance, through the apps the public can:</p> <ul style="list-style-type: none"> • 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. <p><i>This measure is linked with the measures proposed in the Cooperation (Network) section of the present roadmap.</i></p>

In order to facilitate the implementation of the provided measures, the Good Practice 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.

Roadmap measures: Cooperation (Network)

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



Table 5. Measures from the perspective of SEIS pillar: Cooperation

Measure	Priority	Description
19. Establish a collaborative institutional framework for the implementation of open data	High	<p>This measure will strengthen the necessary institutional framework for managing open data, especially in relation to the environmental component.</p> <p>This measure will imply the need to develop strong cooperation links between public authorities in order to ensure the publication, sharing, dissemination and (re)using of the environmental data and information.</p> <p>An example of an approach to establishing a collaborative institutional framework for open data involves:</p> <ul style="list-style-type: none"> • Amendments/completion of the existing legal framework for better clarifying the roles and responsibilities of the different actors, and consequently ensure a proper division of responsibilities on open data at national and thematic levels (e.g. there should be general rules for governing 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-sectorial working group which will assist/advice in the establishment of the operational mechanisms for collaboration (i.e. processes, procedures and good practices); • Organisation of events/fora/ regular dialogues to foster collaboration between national stakeholders and various data users. <p><i>Currently, a draft version of the Resolution on the Functioning of the National Open Data Portal on the Basis of a Single Electronic Services Portal is being developed and planned to be adopted in 2020. This resolution would be a considerable advancement in establishing open data dissemination in Belarus and should be adopted as soon as possible.</i></p> <p><i>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 (cooperation section in the open data part of the document). In addition, 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' also provides good practices to establish an institutional framework for environmental governance.</i></p>



	Measure	Priority	Description
			<p><i>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.</i></p>
	<p>20. Develop and ensure increased capacity for handling environmental and open data</p>	<p>Medium</p>	<p>Components of this measure cover:</p> <ul style="list-style-type: none"> • 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 public officials and/or data stewards or data officers working with data. In this regard, it is possible to foresee official training programmes (mandatory) for staff responsible for data handling and to recognise these trainings through certificates. <p><i>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 ‘2. Administrative capacity (environmental inspectorates, police, customs, prosecution services and audit authorities)’ focuses strongly on the example of capacity-building in the EU.</i></p> <p><i>This measure is linked with the measures ‘Strengthen the technical capability 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.</i></p>
	<p>21. Promote international and regional cooperation to facilitate the implementation of the roadmap</p>	<p>High</p>	<p>This measure aims to support Belarus with international expertise and good practices to assist in the implementation of the present roadmap. To do so, it is recommended that:</p> <ul style="list-style-type: none"> • Fora and other platforms where experience can be shared to be identified; • Contacts with key stakeholders at the regional and international levels be established to share experience and good practices; • Built an inventory of international and regional initiatives in this area and assess their potential and usability.



	Measure	Priority	Description
			<p><i>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'.</i></p>
	<p>22. Raise awareness of open government and open data for the environment among citizens and economic operators</p>	<p>Continuous</p>	<p>This measure will focus on raising public awareness on the importance and role of environmental information, its accessibility, use and other related issues.</p> <p>This measure will boost the demand for open government and open data by raising awareness and conducting promotion campaigns at various levels.</p> <p>This measure will focus on raising public awareness on the role and impact of environmental information, its accessibility, usability and other related aspects, by pursuing ongoing activities and strengthening and expanding them where and when appropriate.</p> <p>Additionally, a series of activities for promoting the use/reuse and sharing of environmental information could be undertaken, such as:</p> <ul style="list-style-type: none"> • Hackathons; • Fora; • Promotion campaigns; • Development of incubators; • Development of public-private partnerships; • Facilitating dialogue and cooperation between national authorities, NGOs and the academic community. <p><i>The Good Practices Report provides examples of initiatives that can be undertaken to implement this measure, in the 'Increasing public administration, public and business awareness over open data and environmental data' section.</i></p>

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

- Increasing awareness and motivation among public authorities over e-government and digital solutions (example from the EU);
- Increasing awareness on e-government among the public and private sectors (example from the EU);
- Coordinating open data initiative(s) (example from Ireland);
- Establishing processes and procedures for managing open data (example from Lithuania);
- Increasing awareness of public administration, public and business on open data and environmental data (example from Belgium, Cyprus, the EU, Italy and Luxembourg);
- Promoting open data to organisations;



Implementation of the Shared Environmental Information System principles and practices in the Eastern Partnership countries (ENI SEIS II East)

- Collecting user feedback and providing new means of communication between open data providers and users (example from Spain).

