Approved by the order of the Chairman of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan dated October 12, 2016

no. 238

**Methodology for the formation of primary indicators required to build an environmental account in the System of National Accounts**

**Chapter 1. General provisions**

1. Methodology for the formation of primary indicators required to build an environmental account in the System of National Accounts (hereinafter - SNA) (hereinafter - Methodology) refers to a statistical methodology, formed in accordance with international standards and approved in accordance with the Law of the Republic of Kazakhstan dated March 19, 2010 year "On State Statistics" (hereinafter - the Law).

2. This methodology defines the basic principles and procedure for the formation of a system of primary indicators for environmental statistics for the construction of an environmental account in the SNA.

3. The methodology is applied by the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan (hereinafter - the Committee) and its territorial bodies in the formation of environmental indicators.

4. The methodology was developed taking into account the principles and recommendations of the "System of Environmental and Economic Accounting (SEEA 2012)" (hereinafter - SEEA), published as an international standard by the United Nations, adapted to the characteristics of the economy of the Republic of Kazakhstan.

5. This Methodology uses concepts in the meanings defined in the Environmental Code of the Republic of Kazakhstan, in the Law, and the following main definitions:

1) emissions into the atmosphere - physical flows of gaseous or dispersed materials from economic entities of the economic system (as a result of production or consumption processes) into the atmosphere, which is an integral part of the ecological system. Air emissions include emissions of greenhouse gases as well as emissions of air pollutants;

2) flows in value terms - flows measured in monetary units;

3) stocks in value terms - the number of assets at a given time, measured in monetary units;

4) current costs for environmental protection - the costs of enterprises and organizations for carrying out activities, ensuring the current operation of technological processes and industries, as well as for the maintenance and operation of machinery and equipment that are designed and operate in order to prevent, reduce, clean (recycle) and /or elimination of pollutants (products) ;

5) establishment - an undertaking or part of an undertaking which is located in one place and which is engaged in only one type of production activity or in which the main type of activity accounts for the predominant share of value added;

6) system of national accounts - an internationally agreed standard set of recommendations for calculating indicators of economic activity in accordance with clear rules for maintaining accounts and accounting at the macro level, based on the principles of economic theory;

7) flows in physical terms - flows measured in natural units;

8) stocks in physical terms - the number of assets at a given time, measured in natural units;

9) the central framework of the environmental-economic   
accounting system - a multi-purpose conceptual framework that describes the interaction between the economy and the environment, as well as the presence and change of stocks of environmental assets.

**Chapter 2. Central framework and structure of the system of environmental-economic accounting**

6. SEEA provides a systematic approach to the organization of environmental and economic information, covering the stocks and flows of resources. The information is used to analyze environmental and economic performance. The data are presented in the form of tables in natural and value terms, as well as in a combined format.

7. The scheme of data flow in SEEA (from primary data to accounts) is given in Appendix 1 to this Methodology. Under this scheme, the environmental account consists of 12 accounts covering a wide range of environmental statistics. All environmental accounts are interconnected.

8. The environmental account consists of three groups of accounts:

1) Physical and hybrid flow accounts (Group 1) consist of five types of accounts:

air emission accounts;

accounts of discharges to water;

water flow accounts;

accounts of energy and material flows;

waste accounts.

2) Natural resource/asset accounts (group 2) consist of the following four types of accounts:

land cover accounts;

forest resource accounts;

water reserves accounts;

accounts of mineral and energy resources.

3) Environmental activity accounts (group 3) consist of three types of accounts:

environmental cost accounts;

environmental tax and subsidy accounts;

environmental goods and services sector accounts.

The modular and flexible approach to the implementation of SEEA allows National Statistical Offices, depending on their interests and as sources of primary data are available, to gradually implement environmental accounts. The structure of SEEA allows it to be used effectively both in part and in full.

**Chapter 3. Formation of primary indicators for building an environmental account at the national level**

9. The primary indicators used in the construction of environmental accounts of the SEEA Central Framework are formed in the process of maintaining environmental statistics. The system of environmental indicators of the Republic of Kazakhstan is formed on the basis of official statistical information and administrative data.

10. The system of indicators, classifications and accounting in the field of environmental statistics are based on the recommendations of the United Nations Economic Commission for Europe (UNECE), the Organization for Economic Co-operation and Development (OECD), the European Union Statistical Service (Eurostat) and the United Nations Statistics Division ( UNSD), which allowed to obtain comparable data at the international level.

11. In accordance with the SEEA implementation approaches, the following environmental accounts are being phased in at the national level:

emissions into the atmosphere;

waste;

total costs for environmental protection.

This methodology describes a step-by-step process of generating primary indicators for building these accounts.

**Paragraph 1. Formation of primary indicators of the account of emissions into the atmosphere**

12. Air Emissions Account (hereinafter – AEA) records the flows of gaseous and particulate materials from the economic entities of the economic system into the atmosphere.

13. The main primary indicators used to build the air emissions account and the algorithm for their calculation are determined in accordance with the WA air emissions account structure given in Annex 2 to this Methodology, taking into account national characteristics and data availability.

14. Air emissions are gases and solids released into the atmosphere by establishments and households as a result of production, consumption and accumulation processes.

15. Air emissions account contains information on the volume of emissions of pollutants into the atmosphere from stationary and mobile pollution sources.

16. Accounting in the air emissions account focuses on anthropogenic emissions, emissions into the atmosphere produced by man, and is carried out by the method of estimation (calculation) and not measurement. Air emissions from natural sources (eg volcanoes, forest fires) are not taken into account.

17. The air emissions account covers all sectors of the economy that are groups of production units, as well as households. Households are treated as consumers and are separated from industries when their consumption is directly related to air emissions. Households are major sources of direct air emissions, which fall into three sub-classes in terms of air emissions:

transport;

heating/cooling;

others.

18. In the AEA, data on air emissions from production, consumption and accumulation processes are taken into account for the reporting year. Atmospheric emissions from controlled landfills intended for disposal of municipal waste reflect emissions from production, consumption and accumulation for previous periods. The volume of emissions into the atmosphere from controlled landfills intended for disposal of municipal waste, in accordance with the algorithm for calculating emissions into the atmosphere, is not taken into account in the volume of emissions by sectors of the economy.

19. Total air emissions is calculated using the following formula:

V (total) = V (o) + V (d) + V (n) , (1)

Where;

V (total) - total emissions into the atmosphere ;

V (o) - the volume of emissions by sectors of the economy;

V (d) – volume of emissions from households;

V (n) - the volume of emissions from controlled landfills intended for disposal of municipal waste.

20. The volume of emissions of pollutants by sectors of the economy is determined as a set of emissions from all types of economic activities of production units:

V (o) = V (cx) + V (gp) + V (op) + V (from) + V (to) , (2)

Where;

V (o) - the volume of emissions by sectors of the economy;

V (сх) – volume of emissions from agriculture;

V (gp) - the volume of emissions from the mining industry;

V (op) - the volume of emissions from the manufacturing industry;

V (from) - the volume of emissions from the transport industry;

V (by) - the volume of emissions from other industries.

21. The main sources of information for the formation of air emission account indicators are official statistical information from national statistical observations of air emissions, households and energy statistics.

22. To form the indicator of emissions of pollutants into the atmosphere from stationary sources, the data of the annual national statistical observation on the protection of atmospheric air are used. E units of the nationwide statistical observation of emissions of pollutants into the atmosphere are economic entities with stationary sources of air pollution, regardless of the size of the gross emission of pollutants into the atmosphere and the presence of treatment plants.

23. Collection of data on emissions of pollutants into the atmosphere from stationary sources is carried out by type of substances in accordance with the WA “Specific Pollutant Handbook” in accordance with subparagraph 8 of Article 12 of the Law.

24. The Handbook of Specific Pollutants lists the following main air pollutants and particulate matter that are covered in the air emissions account ( particulate matter 10 µm in diameter (PM 10 ), particulate matter 2.5 µm in diameter (PM 2.5 ), sulfur dioxide (SO 2 ), hydrogen sulfide (H 2 S), carbon monoxide (CM), oxides of nitrogen (expressed as NO 2 ), ammonia, hydrocarbons (without volatile organic compounds, and methane (CH 4 )), volatile organic compounds (VOC) ).

25. Emissions of pollutants into the atmosphere are formed by types of economic activity that are sources of emissions into the atmosphere in accordance with the "Nomenclature of types of economic activity" (hereinafter - GCTEA Nomenclature). The detailing of the industry is carried out at the section level.

26. Information on air emissions from mobile sources is generated only for greenhouse gases.

27. Information on greenhouse gas emissions is generated annually on the basis of administrative data from administrative sources on greenhouse gases. The report is submitted by users of natural resources operating in the oil and gas, electric power, mining, metallurgical, chemical, manufacturing sectors in the production of building materials: cement, lime, gypsum and bricks, whose greenhouse gas emissions exceed the equivalent of twenty thousand tons of carbon dioxide per year.

28. Administrative data are generated for the six types of greenhouse gases ( CO 2 , N 2 O , CH 4 , HFCs, PFCs and SF 6 ) included in the air emissions account.

29. The volume of pollutant emissions from households is determined based on the results of household consumption activities using the following formula:

V (d) = V (td) + V (od) , (3)

Where;

V (d) **-**emissions from households;

V (td) - the volume of emissions from household vehicles;

V (od) - the volume of emissions from household heating.

30. The volume of emissions of pollutants from household vehicles is determined by calculation using the following formula:

V (td) = ( s transport / p average price )\*k , (4)

Where;

V (td) - the volume of emissions from household vehicles;

s transport - the volume of expenditures on fuel and lubricants for personal vehicles of households;

p average price – average annual retail price for a certain type of fuel; k is the emission factor.

31. The volume of household expenditures on fuels and lubricants for personal vehicles is determined on the basis of statistical information generated from the results of a quarterly nationwide statistical survey on accounting for daily expenses.

The price of a certain type of fuel is determined on the basis of monthly nationwide statistical monitoring of prices for consumer goods and paid services. The average annual retail price for a certain type of fuel is calculated using the arithmetic mean formula.

32. The algorithm for calculating air emissions from household vehicles is based on a general model for calculating emissions, which consists of several stages:

1) at the first stage, the volume of fuel used by households is determined separately for each type of fuel (in liters, tons or cubic meters);

2) at the second stage, the resulting volume of fuel is converted into terajoules, taking into account the calorific value of each type of fuel separately for compatibility with the applied emission factors. When converting the volume of fuel into terajoules, the data of the Department of Services and Energy Statistics on national conversion factors are used, calculated on the basis of international standards and adapted to the specifics of the energy industry of the Republic of Kazakhstan.

3) at the third stage, the amount of fuel used by households for a particular type of fuel, expressed in terajoules, is multiplied by the emission factor for this type of fuel.

33. Current calculations for GHG emissions from household vehicles use the emission factors given in the Guidelines for National Greenhouse Gas Inventories of the Intergovernmental Panel on Climate Change (hereinafter - IGPCC 2006). Default emission factors for CO ₂ , N ₂ O and CH4 for road transport are given in annex 3 to this Methodology.

34. The volume of emissions of pollutants from household heating is determined by calculation using the following formula :

V (od) = ( s heat / p average price )\*k , (5)

Where;

V (od) **-** volume of emissions from household heating;

s heat - the volume of expenditures on household heating ;

p average price – average annual retail price for a certain type of fuel;

k - the emission factor.

35. The volume of household heating expenditures is determined on the basis of aggregated data generated from the results of a quarterly nationwide statistical survey on household expenditures and incomes. The price of a certain type of fuel is determined on the basis of monthly nationwide statistical monitoring of prices for consumer goods and paid services. The average annual retail price for a certain type of fuel is calculated as a simple arithmetic average of the actual prices for the months of the reporting year.

36. Current calculations use the emission factors given in the 2006 IGPCC National Greenhouse Gas Inventory Guidelines to determine pollutant emissions from household heating.

Default emission factors for CO₂, N₂O and CH4 for stationary combustion are given in Appendix 4 to this Methodology.

37. Information on the volume of greenhouse gas emissions into the atmosphere from landfills V (p) intended for disposal of municipal waste is formed by the Ministry of Energy of the Republic of Kazakhstan in accordance with the reporting of the Republic of Kazakhstan in accordance with the UN Framework Convention on Climate Change and the Kyoto Protocol. Information on this indicator is published in the National Inventory Report on Anthropogenic Emissions by Sources and Removals by Sinks of Greenhouse Gases Not Controlled by the Montreal Protocol.

38. After determining all the components by the method of their simple summation, the total amount of emissions into the atmospheric air is determined for each substance separately for the year in tons.

**Paragraph 2. Formation of primary indicators of the waste count**

39. The waste account (hereinafter - WA) records production and consumption waste at the time of its generation or handling.

At the same time, production waste includes waste, formed in the process of economic activity of enterprises. Consumption waste includes municipal waste generated in settlements as a result of human activity and other wastes similar to them in composition and nature of formation.

40. The main primary indicators needed to construct a waste account are determined in accordance with the WA Waste Account Structure given in Annex 5 to this Methodology, taking into account national circumstances and data availability.

41. Waste in WA includes materials in solid or liquid state, excluding sewage.

42. The waste account contains information on the generation and management of hazardous and non-hazardous waste.

43. Waste generation is the total weight or volume of residues of raw materials, materials and products entering the waste stream before processing, disposal and disposal.

44. To determine the total volume of educated waste the following formula is used:

V (total) = V (pro) + V (los) + V (imp) , (6)

Where;

V (total) **-** the total volume of educated waste ;

V (pro) - the volume of generated production waste by sectors of the economy;

V (los) – volume of generated consumption waste ;

V (imp) – volume of imports waste.

45. The main sources of information for the compilation of indicators for the waste generation account are data from nationwide statistical surveys on waste and trade.

46. Information on the volume of production waste by sectors of the economy is formed annually on the basis of a waste inventory report approved by order of the Acting Minister of Energy of the Republic of Kazakhstan dated July 29, 2016 No. 352. (registered in the Register of State Registration of Regulatory Legal Acts under No. 14234). The report is submitted by users of natural resources to the territorial subdivision of the authorized body in the field of environmental protection at the location of the respondent.

47. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal for the Purposes of Transportation, Recycling, Storage and Disposal establishes 3 levels of waste hazard:

1) green - index G ;

2) amber - index A ;

3) red - index R.

48. Information on production waste is formed according to the above 3 hazard levels and is grouped as follows: chemical and medical waste, radioactive waste, metal waste, non-metal, recyclable waste, recycled equipment and vehicles, waste of plant and animal origin, mixed household and commercial waste, mineral waste, combustion waste, other waste. When generating data on production waste The following classifiers apply:

GCTEA Nomenclature - to identify the type of economic activity in which they were formed ;

Waste classifier developed and approved by order of the Minister of Environmental Protection of the Republic of Kazakhstan dated May 31, 2007 No. 169-p, (registered in the Register of State Registration of Normative Legal Acts No. 4775) - to identify the level of danger and category of materials.

49. Information base for the formation of data on the volume consumption waste is an annual nationwide statistical observation on the collection and removal of municipal waste. The objects of the survey are business entities with the main and (or) secondary type of activity GCTEA - 38.

50. The collected and removed consumer waste is distributed according to the sources of generation: household waste, park waste, WA construction waste, production waste (equivalent to household waste), street garbage, waste from markets, other waste.

51. Information on consumer waste is grouped by material category as follows: metal waste, non-metal, recycled equipment and vehicles, mixed household and commercial waste, other waste.

Import and export data waste between the member countries of the Eurasian Economic Union are determined on the basis of monthly statistical observation on mutual trade in goods with the member states of the Eurasian Economic Union. Statistical observation units are economic entities that export and (or) import with the member states of the Eurasian Economic Union.

53. Statistical information on the volume of imports and exports waste between countries that are not members of the Eurasian Economic Union is determined on the basis of nationwide statistical observations on trade.

54. Grouping information on the volume of imports and exports waste is carried out in accordance with the " Commodity nomenclature of foreign economic activity of the EAEU " (hereinafter - CN FEA EAEU ).

55. After determining all the components, the method of their simple summation determines the total volume of formed waste. The total volume of educated waste is measured in tons.

56. Waste management is a type of activity related to waste, including the prevention and minimization of waste generation, accounting and control, accumulation of waste, as well as the collection, processing, recycling, neutralization, transportation, storage (warehousing) and disposal of waste.

industrial waste is the administrative data of administrative sources on hazardous waste. Information on the frequency and range of surveyed units is given in paragraph 46 of this Methodology.

58. Information on the handling of consumer waste is formed on the basis of nationwide statistical observation on sorting, recycling and depositing waste. Information on the frequency and range of surveyed units for this observation is given in paragraph 49 of this Methodology.

59. The amount of waste processed, disposed of and disposed of in landfills is measured in tons.

**Paragraph 3. Formation of primary indicators of the account of the total costs of environmental protection**

60. The main primary indicators used to build the account of the total costs of environmental protection are determined in accordance with WA with the structure of the account of the total costs of environmental protection ( conditional example in thousands of tenge) , given in Appendix 6 to this Methodology, taking into account national conditions and availability data.

61. Total environmental protection costs include investments in fixed assets aimed at environmental protection and current expenditures on environmental protection.

62. Environmental protection costs are classified in accordance with the departmental classifier of types of activities and costs for environmental protection and resource management (hereinafter - CACEPRM) , developed and approved in accordance with the legislation of the Republic of Kazakhstan on technical regulation and based on international classifiers: " Classifier of activities and costs for environmental protection "( The Classification of Environmental Protection Activities and Expenditure" ( SEPA 2000 )), " Classification of resource management activities" (Classification of Resource Management Activities (CReMA 2008)) and "Classification of environmental activities" ( Classification of environmental activities (CEA 2011)). This classifier is designed to classify activities that characterize environmental protection.

63. Environmental protection in accordance with CACEPRM includes all types of targeted activities to prevent, reduce and stop pollution or any other damage to the environment as a result of the production process or the use of goods and services and combines nine areas of environmental protection activities :

1) protection of atmospheric air and problems of climate change;

2) wastewater treatment;

3) waste management;

4) protection and rehabilitation of soil, underground and surface waters;

5) reduction of noise and vibration impact;

6) conservation of biodiversity and habitat;

7) protection from radiation exposure (excluding issues of external state security);

8) research work;

9) other areas of environmental protection activities.

64. Investments in fixed assets and current expenditures aimed at protecting the environment are grouped by type of economic activity according to the GCTEA Nomenclature and into nine areas of types of environmental activity according to CACEPRM.

65. To determine the total cost of environmental protection the following formula is used:

V (total) = V (inv) + V (current) ,(7)

Where;

V (total) - the total amount of costs for environmental protection ;

V (inv) - the volume of investments in fixed assets aimed at protecting the environment ;

V (current) - the volume of current expenditures aimed at protecting the environment.

66. Information on investments in fixed capital and current expenditures aimed at environmental protection in statistical surveys of enterprises is reflected on the basis of data from the primary accounting of actual expenditures on environmental protection.

67. Statistical information on the volume of investments aimed at protecting the environment is formed on the basis of the annual nationwide statistical observation on investment activity. The units of statistical observation are economic entities that carry out investment activities for environmental protection, regardless of the type of economic activity. Detailing of costs by types of environmental protection activities is carried out in accordance with CACEPRM.

68. Investments in fixed capital aimed at environmental protection include all investments made from all sources of financing. These include the costs of new construction, expansion, reconstruction, technical re-equipment and modernization of facilities, leading to an increase in the initial cost of the facility, the acquisition of machinery, equipment, vehicles, and so on.

69. Current expenditures on environmental protection are formed on the basis of data from the annual nationwide statistical survey on expenditures on environmental protection. The units of statistical observation are economic entities , regardless of the type of economic activity, using natural resources, having emissions and discharges of pollutants, production waste. Detailing of current costs by types of environmental activities is carried out in accordance with CACEPRM.

70. Current environmental protection costs include current (operational) costs of economic entities related to environmental protection activities.

The composition of current environmental protection costs includes:

maintenance and operation of fixed assets for environmental protection (excluding the costs of their modernization and reconstruction) - raw materials, materials and other products, fuel and electricity used in the operation of environmental funds, the cost of current repairs of these funds, the maintenance of personnel servicing these funds , insurance payments relating to environmental structures and equipment;

the costs of collection, storage/burial and processing or neutralization, destruction, disposal of production and consumption waste on their own;

organization of independent control over the harmful impact on the environment and monitoring activities, scientific and technical research, management of environmental activities in the organization;

current measures to preserve and restore the quality of the environment, disturbed as a result of previous economic activities;

other current measures to reduce the harmful impact on the environment.

71. Total environmental spending is grouped by type of economic activity according to the GCTEA Nomenclature and by nine areas of environmental activity according to CACEPRM.

72. After determining the volume of investments in fixed assets and current expenditures aimed at protecting the environment , the total amount of environmental expenditures for the year is determined by simply summing them up. in thousands of tenge.

**Chapter 4 Data editing**

73. In order to qualitatively form indicators of primary data for constructing an environmental account, the SNA uses a multi-level data control system (editing, correction and imputation). The implementation of a multi-level control system is an important measure aimed at identifying erroneous and missing data, since the information necessary to build an environmental account in the SNA is formed from various sources, such as national and departmental statistics, administrative data. Editing and imputation of data is carried out at the level of micro- and macro-editing.

74. Methods and methods of the control system are based on the "Methodology for editing data in production and environment statistics" , approved by the order of the Acting Chairman of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan dated March 29, 2016 No. 51, (registered in the Register of State Registration of Normative Legal Acts No. 13626) (hereinafter - Editing Methodology).

75. Ensuring full coverage of the circle of respondents in the accounts of air emissions and waste is carried out on the basis of general standard requirements for the quality of statistical information, at the level of micro-editing. according to the Editing Method. Ensuring the quality and reliability of primary indicators of current costs for environmental protection is carried out by editing the data, taking into account the specifics of data generation.

76. The source of possible errors in the formation of current environmental protection costs is the failure by specialists of territorial bodies, for certain reasons, to complete the coverage of the surveyed populations (respondents) for the nationwide statistical survey on environmental protection costs, since the individual catalog for statistical surveys includes all types of economic activities of economic entities.

To identify the missing respondents, control is carried out between nationwide statistical observations on environmental protection costs , timber harvesting and silvicultural and forestry work, and hunting and trapping. Control between nationwide statistical observations performed by matching individual directories. If incomplete coverage of the surveyed units is detected, errors are corrected based on the imputation rules by supplementing the individual catalog with the missing units of statistical observation. Data from missing survey units are included in current environmental protection expenditures by imputing the primary data from the above observations.

**Chapter 5. Dissemination and publication of data**

77. The publication of data and the presentation of information on environmental accounts are envisaged separately in the form of tables in physical and monetary terms, as well as in a combined data presentation format (in the form of hybrid tables), where information is presented in a consistent format that combines complex physical and monetary data. The data presented covers a wide range of information on specific topics (eg emissions, waste and environmental costs), compares information on various topics, and derives indicators using both physical and cost data.

78. Information generated on the basis of nationwide statistical observations used in the construction of an environmental account in the SNA is published according to predetermined release dates. Information is posted simultaneously for all users on the Internet resource of the Committee in the form of statistical bulletins, express information, press releases and collections.

Statistical information generated from administrative data is distributed by the state body on the Internet resource.

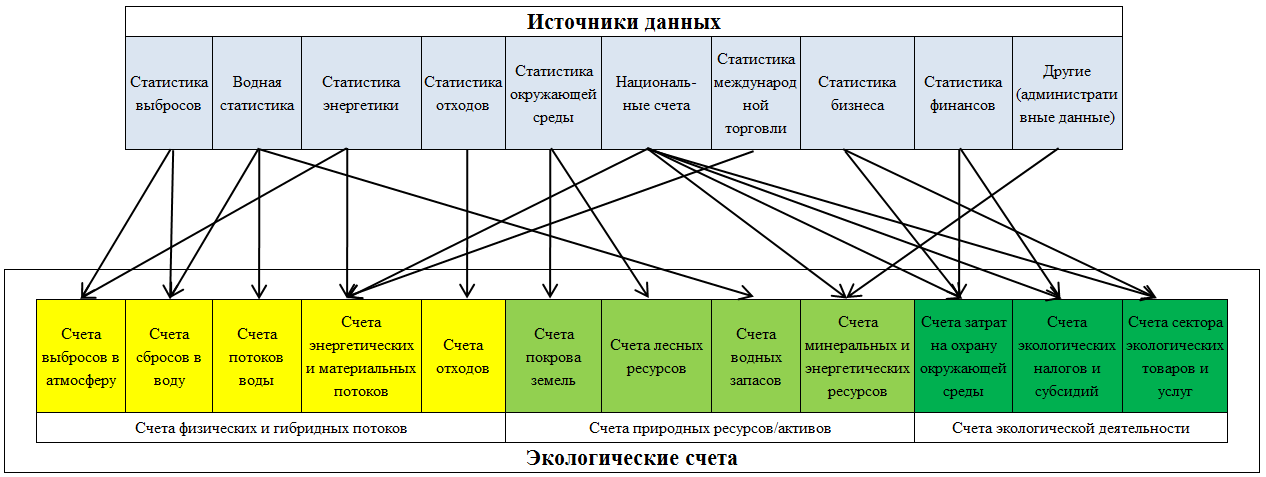
The publication for users is accompanied by brief methodological explanations.

Appendix 1

to the Methodology for the Formation of Primary Indicators Necessary for Building an Environmental Account in the System of National Accounts

**Data flow diagram in SEEA**

(from primary data to accounts)

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Source of information - monitoring of daily expenses, monitoring of expenses and incomes of households and monitoring of prices for consumer goods and paid services

Source of information - greenhouse gas inventory observation

Source of information - "National Inventory Report on Anthropogenic Emissions from Sources and Removals by Sinks of Greenhouse Gases Not Controlled by the Montreal Protocol"

Appendix 2

to the Methodology for the Formation of Primary Indicators Necessary for Building an Environmental Account in the System of National Accounts

**Structure with a couple of emissions into the atmosphere (conditional example in tons )**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Resource table for air emissions** | | | | | | | | | **Usage table for air emissions** | | | |
|  | **Outlier generation** | | | | | | | | **Accumulation** | **Total emission resources** | **Flows to the environment** | **Total resource usage** |
| Industries | | | | | households | | | Emissions from landfills | Emissions to the environment |
| Agriculture | Mining and quarrying | Manufacturing industry | Transport | Other | Transport | Heating | Other |
| **Substance type** |  |  |  |  |  |  |  |  |  |  |  |  |
| Carbon dioxide | 10610.3 | 2602.2 | 41,434.4 | 27,957.0 | 82,402.4 | 18,920.5 | 17,542.2 | 1949.1 | 701.6 | 204 119.6 | 204 119.6 | 204 119.6 |
| Methane | 492.0 | 34.1 | 15.8 | 0.8 | 21.9 | 2.4 | 15.5 | 1.7 | 222.0 | 806.3 | 806.3 | 806.3 |
| Nitrous oxide | 69.4 | 6.0 | 37.9 | 259.5 | 89.0 | 38.0 | 12.1 | 1.3 | 0.3 | 513.6 | 513.6 | 513.6 |
| Hydrofluorocarbons | - | - | 0.3 | - | 0.4 | - | - | - | - | 0.7 | 0.7 | 0.7 |
| Perfluorocarbons | - | - | - | - | - | - | - | - | - | - | - | - |
| Sulfur hexafluoride | - | - | - | - | - | - | - | - | - | - | - | - |
| Carbon monoxide | 41.0 | 2.5 | 123.8 | 46.2 | 66.2 | 329.1 | 51.2 | 5.7 | 1.1 | 666.9 | 666.9 | 666.9 |
| Volatile organic carbons of the non-methane series | 5.2 | 6.5 | 40.0 | 16.4 | 27.2 | 34.5 | 29.4 | 3.2 | 0.9 | 163.3 | 163.3 | 163.3 |
| Sulphur dioxide | 2.7 | 0.4 | 28.0 | 62.4 | 8.1 | 0.4 | 0.4 | 0.1 | 0.0 | 102.5 | 102.5 | 102.5 |
| Ammonia | 107.9 | - | 1.7 | 0.2 | 0.9 | 2.3 | 11.4 | 1.2 | 0.2 | 125.9 | 125.9 | 125.9 |
| Heavy metals | - | - | - | - | - | - | - | - | - | - | - | - |
| Persistent organic pollutants | - | - | - | - | - | - | - | - | - | - | - | - |
| Solid impurities (including 10 or less microns and dust)  Source of information - monitoring for the protection of atmospheric air | 7.0 | 0.1 | 8.5 | 9.3 | 4.4 | 6.0 | 2.8 | 0.5 | 0.0 | 38.5 | 38.5 | 38.5 |

Appendix 3

to the Methodology for the Formation of Primary Indicators Necessary for Building an Environmental Account in the System of National Accounts

**Default emission factors for CO ₂ , N ₂ O and CH 4 for road transport**

|  |  |  |  |
| --- | --- | --- | --- |
| **Default CO₂ emission factors for road**  **transport and uncertainty ranges** | | | |
| **Type of fuel** | **By**  **default**  **(kg/TJ)** | **Lower** | **Upper** |
| Automobile gasoline | 69 300 | 67 500 | 73 000 |
| Gasoline/Diesel fuel | 74 100 | 72 600 | 74 800 |
| LPG | 63 100 | 61 600 | 65 600 |
| Kerosene | 71 900 | 70 800 | 73 700 |
| Lubricants | 73 300 | 71 900 | 75 200 |
| Compressed natural gas | 56 100 | 54 300 | 58 300 |
| Liquefied natural gas | 56 100 | 54 300 | 58 300 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Default N₂O and CH4 emission factors for road transport** | | | | | | |
| **Fuel Type/Representative Vehicle Category** | **CH 4**  **(kg/TJ)** | | | **N₂O**  **(kg/TJ)** | | |
| **By**  **default** | **Lower** | **Upper** | **By**  **default** | **Lower** | **Upper** |
| Automotive Gasoline - Uncontrolled | 33 | 9.6 | 110 | 3.2 | 0.96 | eleven |
| Automotive Gasoline - Oxidation Catalyst | 25 | 7.5 | 86 | 8.0 | 2.6 | 24 |
| Automotive gasoline – Light duty vehicles with low mileage manufactured in 1995 or later | 3.8 | 1.1 | 13 | 5.7 | 1.9 | 17 |
| Gasoline/Diesel fuel | 3.9 | 1.6 | 9.5 | 3.9 | 1.3 | 12 |
| Natural gas | 92 | 50 | 1540 | 3 | 1 | 77 |
| LPG | 62 | nd | nd | 0.2 | nd | nd |
| Ethanol, trucks, USA | 260 | 77 | 880 | 41 | 13 | 123 |
| Ethanol, cars, Brazil | 18 | 13 | 84 | nd | nd | nd |

Appendix 4

to the Methodology for the Formation of Primary Indicators Necessary for Building an Environmental Account in the System of National Accounts

**Emission factors for CO ₂ , N ₂ O and CH 4 default for stationary combustion**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Default emission factors for stationary combustion in the utilities/agriculture/forestry/fisheries and fish farming categories**  **(kg GHG per TJ based on net calorific value)** | | | | | | | | | | | | | |
| **Fuel** | | | | **CO2** | | | **CH 4** | | | **N₂O** | | | |
| **Coeff. emissions**  **by default** | **lower limit** | **Upper limit** | **Coeff. emissions**  **by default** | **lower limit** | **Upper limit** | **Coeff. emissions**  **by default** | **lower limit** | **Upper limit** | |
| Raw oil | | | | 73 300 | 71 100 | 75 500 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Orimulsion | | | | **r** 77 000 | 69 300 | 85 400 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Liquefied  natural gas | | | | **r** 64 200 | 58 300 | 70 400 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Petrol | | | gasoline | **r** 69 300 | 67 500 | 73 000 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Aviation Gasoline | **r** 70 000 | 67 500 | 73 000 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Jet Gasoline | **r** 70 000 | 67 500 | 73 000 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Kerosene for jet engines | | | | **r** 71 500 | 69 700 | 74 400 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Other types of kerosene | | | | 71 900 | 70 800 | 73 700 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Shale oil | | | | 73 300 | 67 800 | 79 200 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Gas oil/ Diesel  fuel | | | | 74 100 | 72 600 | 74 800 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| heating oil | | | | 77 400 | 75 500 | 78 800 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Liquefied  petroleum gas | | | | 63 100 | 61 600 | 65 600 | 5 | 1.5 | 15 | 0.1 | 0.03 | 0.3 | |
| Ethane | | | | 61 600 | 56 500 | 68 600 | 5 | 1.5 | 15 | 0.1 | 0.03 | 0.3 | |
| Naphtha | | | | 73 300 | 69 300 | 76 300 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Bitumen | | | | 80 700 | 73 000 | 89 900 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Lubricants | | | | 73 300 | 71 900 | 75 200 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Petroleum coke | | | | **r** 97 500 | 82 900 | 115 000 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Raw material of oil refining | | | | 73 300 | 68 900 | 76 600 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Other petroleum products | | | refinery gas | **n** 57 600 | 48 200 | 69 000 | 5 | 1.5 | 15 | 0.1 | 0.03 | 0.3 | |
| Solid  paraffins | 73 300 | 72 200 | 74 400 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| White Spirit and SOTK | 73 300 | 72 200 | 74 400 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Other petroleum products | 73 300 | 72 200 | 74 400 | 10 | 3 | thirty | 0.6 | 0.2 | 2 | |
| Anthracite | | | | 98 300 | 94 600 | 101 000 | 300 | 100 | 900 | 1.5 | 0.5 | 5 | |
| coke coal | | | | 94 600 | 87 300 | 101 000 | 300 | 100 | 900 | 1.5 | 0.5 | 5 | |
| Other types of bituminous coal | | | | 94 600 | 89 500 | 99 700 | 300 | 100 | 900 | 1.5 | 0.5 | 5 | |
| Sub-bituminous coal | | | | 96 100 | 92 800 | 100,000 | 300 | 100 | 900 | 1.5 | 0.5 | 5 | |
| Lignite | | | | 101 000 | 90 900 | 115 000 | 300 | 100 | 900 | 1.5 | 0.5 | 5 | |
| oil shale and  Bituminous  sands | | | | 107 000 | 90 200 | 125 000 | 300 | 100 | 900 | 1.5 | 0.5 | 5 | |
| briquetted  brown coal | | | | **n** 97 500 | 87 300 | 109 000 | **n** 300 | 100 | 900 | 1.5 | 0.5 | | 5 |
| Patented  Fuel | | | | 97 500 | 87 300 | 109 000 | 300 | 100 | 900 | 1.5 | 0.5 | | 5 |
| Coke | | Furnace and  lignite coke | | **r** 107 000 | 95 700 | 119 000 | 300 | 100 | 900 | **n** 1.5 | 0.5 | | 5 |
| Gas  coke | | **r** 107 000 | 95 700 | 119 000 | **r** 5 | 1.5 | 15 | 0.1 | 0.03 | | 0.3 |
| coal tar | | | | **n** 80 700 | 68 200 | 95 300 | **n** 300 | 100 | 900 | **r** 1.5 | 0.5 | | 5 |
| Derived gases | Factory  gas | | | **n** 44 400 | 37 300 | 54 100 | 5 | 1.5 | 15 | 0.1 | 0.03 | | 0.3 |
| coke oven gas | | | **n** 44 400 | 37 300 | 54 100 | 5 | 1.5 | 15 | 0.1 | 0.03 | | 0.3 |
| Domain  gas | | | **n** 260 000 | 219 000 | 308 000 | 5 | 1.5 | 15 | 0.1 | 0.03 | | 0.3 |
| Gas oxygen alone  melting ovens | | | **n** 82 000 | 145 000 | 202 000 | 5 | 1.5 | 15 | 0.1 | 0.03 | | 0.3 |
| Natural gas | | | | 56 100 | 54 300 | 58 300 | 5 | 1.5 | 15 | 0.1 | 0.03 | | 0.3 |
| Household waste  (non-biological  factions) | | | | **n** 91 700 | 73 300 | 121 000 | 300 | 100 | 900 | 4 | 1.5 | | 15 |
| Industrial  waste | | | | **n** 143 000 | 110 000 | 183 000 | 300 | 100 | 900 | 4 | 1.5 | | 15 |
| Oil waste | | | | **n** 73 300 | 72 200 | 74 400 | 300 | 100 | 900 | 4 | 1.5 | | 15 |
| Peat | | | | 106 000 | 100,000 | 108 000 | **n** 300 | 100 | 900 | **n** 1.4 | 0.5 | | 5 |
| solid fuel | Wood  / woody  waste | | | **n** 112 000 | 95 000 | 132 000 | 300 | 100 | 900 | 4 | 1.5 | | 15 |
| Liquor  (Black  liquor) | | | **n** 95 300 | 80 700 | 110 000 | **n** 3 | 1 | 18 | **n** 2 | 1 | | 21 |
| Other types  primary  solid  biomass | | | **n** 100 000 | 84 700 | 117 000 | 300 | 100 | 900 | 4 | 1.5 | | 15 |
| Woody  coal | | | **n** 112 000 | 95 000 | 132 000 | 200 | 70 | 600 | 1 | 0.3 | | 3 |
| Liquid fuel | biogasoline | | | **n** 70 800 | 59 800 | 84 300 | 10 | 3 | thirty | 0.6 | 0.2 | | 2 |
| bio-diesel fuel | | | **n** 70 800 | 59 800 | 84 300 | 10 | 3 | thirty | 0.6 | 0.2 | | 2 |
| Other  types of liquid biofuels | | | **n** 79 600 | 67 100 | 95 300 | 10 | 3 | thirty | 0.6 | 0.2 | | 2 |
| Biogas | Gas from organic waste | | | **n** 54 600 | 46 200 | 66 000 | 5 | 1.5 | 15 | 0.1 | 0.03 | | 0.3 |
| sewer gas | | | **n** 54 600 | 46 200 | 66 000 | 5 | 1.5 | 15 | 0.1 | 0.03 | | 0.3 |
| Other biogases | | | **n** 54 600 | 46 200 | 66 000 | 5 | 1.5 | 15 | 0.1 | 0.03 | | 0.3 |
| Dr. fossil fuels | household  waste  (fraction  biomass) | | | **n** 100 000 | 84 700 | 117 000 | 300 | 100 | 900 | 4 | 1.5 | | 15 |

Appendix 5

Source of information - observation on the collection and removal of municipal waste

Source of information - Hazardous Waste Watch

Source of information - observation on mutual trade in goods with the member states of the Eurasian Economic Union and aggregated data of trade statistics.

to the Methodology for the Formation of Primary Indicators Necessary for Building an Environmental Account in the System of National Accounts

**Structure with a couple of wastes ( conditional example in tons)**

**Physical resource table for waste**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Waste generation** | | | The rest of the world | Flows from  environmental  environments | Total resources |
| Waste collection, processing and disposal industry | Other industries | households | Import  waste | Extracted  waste |
| **Waste generation** |  |  |  |  |  |  |
| Chemical and medical waste | 160 | 1830 | 20 | 140 | - | 2150 |
| radioactive waste |  | 5 | - |  | - | 5 |
| Metal waste | 40 | 320 | 70 | 10 | - | 440 |
| Non-metallic, recyclable  waste | thirty | 2720 | 2 100 | 130 | - | 4 980 |
| Recycled equipment and  vehicles | - | 140 | 280 | 50 | - | 470 |
| Waste of plant and animal origin | - | 10 330 | 1700 | 80 | - | 12 110 |
| Mixed household and commercial waste | 40 | 4 170 | 4660 | 100 | 10 | 8 980 |
| Mineral and ground waste | 300 | 29 100 | 570 | 170 | - | 30 140 |
| combustion waste | 4050 | 1550 | - | 240 | - | 5 840 |
| Other waste | - | 460 | - | 40 | - | 500 |

Source of information - observation on mutual trade in goods with the member states of the Eurasian Economic Union and aggregated data of trade statistics.

Source of information - monitoring of hazardous waste and monitoring of sorting, recycling and depositing of waste

**Physical table of use for waste**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **intermediate consumption; waste collection** | | | | | | final  consumption | rest of  the world | Flows to  the environment | Total  use |
| Waste collection, processing and disposal industry | | | | | Other  industries | households | Waste export |  |
| polygons, intended for disposal of municipal waste | waste incineration | | Recycling  and reuse | Other  processing |
| Total | Including  combustion for power generation |
| **Collection and disposal of waste** |  |  |  |  |  |  |  |  |  |  |
| Chemical and medical waste | 290 | 570 | - | 910 | - | - |  | 380 | - | 1 290 |
| radioactive waste |  | - | - |  | 5 |  | - | - | 5 |
| Metal waste | 10 | - | - | 200 | - | 200 | thirty | - | 230 |
| Non-metallic, recyclable  waste | - | 550 | 500 | 2930 | - | 1 340 | 160 | - | 3090 |
| Recycled equipment and  vehicles | thirty | 10 | - | 370 | - | - | 60 | - | 430 |
| Waste of plant and animal origin | thirty | 830 | 630 | 8 310 | 150 | 2 180 | 610 | - | 9070 |
| Mixed household and commercial waste | 730 | 6 450 | 2300 | 1070 | - | 10 | 630 | 90 | 1790 |
| Mineral and ground waste | 1010 | 720 | - | 22 630 | - | 5 170 | 610 | - | 23 240 |
| combustion waste | 50 | - | - | 400 | - | 5 190 | 200 | - | 600 |
| Other waste | 20 | 120 | - | 40 | - | - | 320 | - | 360 |

Appendix 6

Source of information - observation on investment activity and observation on environmental protection costs

to the Methodology for the Formation of Primary Indicators Necessary for Building an Environmental Account in the System of National Accounts

**The structure of the account of the total costs of environmental protection ( conditional example in thousands of tenge)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CACEPRM | Code #1 | Code #2 | Code #3 | Code #4 | Code #5 | Code #6 | Code #7 | Code #8 | Code #9 |
| Agriculture, forestry and fisheries | 41 715 | 32 843 | 189 164 | 55 720 | - | - | 80 | 3 151 | 225 786 |
| Mining and quarrying | 13 071 191 | 22 181 834 | 28 871 723 | 7 228 041 | 7 726 | 177 050 | 1 117 991 | 2 534 339 | 15 709 069 |
| Manufacturing industry | 38 688 755 | 19 270 178 | 14 460 376 | 1 256 969 | 9 501 | 82 961 | 156 682 | 351 886 | 1 015 958 |
| Electricity, gas, steam and air conditioning | 82 45 899 | 3 203 236 | 8 405 218 | 2 513 333 | 4 833 | 1732 | 2292 | 109 577 | 6 542 087 |
| Water supply; sewerage system, control over the collection and distribution of waste | 221 869 | 8 805 229 | 2 718 544 | 501 993 | 316 | - | 2121 | 41 412 | 134 550 |
| Construction | 385 676 | 818 370 | 899 706 | 188 211 |  |  | 1 255 | 34 880 | 63 108 |
| Wholesale and retail trade; car and motorcycle repair | 121 422 | 131 184 | 300 584 | 6 371 | - | - | 1310 | 9 263 | 22 343 |
| Transport and warehousing | 840 067 | 629 706 | 744 556 | 334 895 | 7073 | 53 847 | 19 103 | 24 666 | 169 943 |
| Accommodation and food services | 5 180 | 118 719 | 92 561 | 5 373 | - | - | - | - | 3 556 |
| Information and communication | 50 509 | 13 746 | 26 947 | - | - | - | - | - | 1 297 |
| Financial and insurance activities | 6 715 | 20 331 | 44 378 | - | - | - | - | - | 68 |
| Operations with real estate | 38 875 | 166 872 | 286 055 | 1 996 | - | - | - | - | 6 151 |
| Professional, scientific and technical activities | 10 606 478 | 4 081 518 | 6 391 648 | 6 010 906 | 1084 | 1 274 589 | 11 015 | 159 072 | 1 136 131 |
| Activities in the area of administration and support services | 5 303 | 29 791 | 201 942 | 6404 | - | - | - | - | 2939 |
| Public administration and defense; compulsory social security | 31 52 549 | 1 509 397 | 1 953 732 | 3 336 433 | - | - | - | - | 715 689 |
| Education | 28 354 | 231 505 | 132 306 | - | - | - | - | - | 673 |
| Healthcare and social services | 27 650 | 126 316 | 263 693 | - | - | - | - | - | 286 |
| Arts, entertainment and recreation | 4 577 | 11 949 | 17 620 | - | - | 794 | - | - | 3020 |
| Provision of other types of services | 6 707 | 23 607 | 13 332 | - | - | - | - | - | - |