

Radoslav Vukas, National consultant
Graduated Engineer of Geology
vukas@yahoo.com

Report of Baseline Review of Statistics of Fossil Energy and Mineral Reserves in the Republic of Serbia

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Executive summary

Statistical Office of the Republic of Serbia, from Belgrade, is the main producer and disseminator of official statistical data and responsible expert carrier, organizer and coordinator of the official statistics based on the Law of Official Statistics (“Off. Gazette RS” No. 104/2009). Statistical Office represents official statistics of the Republic of Serbia in the international statistical system. When it comes to the statistics of fossil fuels and reserves of mineral raw materials, Statistical Office of the Republic of Serbia processes data related to the industrial production, including import, export, etc., through the Energy and Mining Sector. The Law states that the business entities / public enterprises/ companies, via appropriate forms (electronic, too) deliver data monthly (therefore, also quarterly, semi-annually and annually). In accordance with this, Statistical Office publishes various publications (in Serbian and in English language), such as: monthly reports, annual calendar and statistical yearbook (www.stat.gov.rs).

However, this data does not include basic – original statistical data about the physical quantities (*in situ*) of energy and mineral resources. Physical quantities data are delivered by business associations / public enterprises / companies annually, on proper forms (and electronically) to the Ministry of Mining and Energy of the Republic of Serbia (www.mre.gov.rs), until March 15th current year, with the state of the reserves (and quality, exploited quantities and other parameters) on December 31st previous year. The Ministry, based on this data, and in accordance with the regulations of the Law of Mining and Geological Exploration (“Off. Gazette RS” No. 101/2015), makes the conjoint “Resources and Reserves of Mineral Raw Materials Balance” (in Serbian language), that is internally available from July 1st current year.

In a certain way, fossil fuels (energy resources) and mineral resources statistics is kept in Chamber of Commerce (www.pks.rs), that has it own software package for statistical data processing and for those purposes, with the business entities data, uses the official data from the Statistical Office.

Public enterprises and other business entities (“Elektroprivreda Srbije - JP EPS”; www.eps.rs; Public Enterprise for Underground Coal Exploitation “Resavica”; www.jppeu.rs; “Naftna industrija Srbije”; www.nis.rs and others) that use these resources, make (geological) documents on quantities of fossil fuels and mineral resources / reserves and from their own records deliver statistical data to the authorized institutions. They show quantities and industrial production data through their publications (Technical Yearbook JP EPS and other) or on their websites.

It is important to mention that the data is delivered to several places (2-3), for statistical purposes, and often, same business entities deliver different data (mostly by different and often unqualified persons), which is directly reflected on the total results in the statistical system, especially because statistical databases are not directly linked with Ministry’s initial database, i.e. with conjoint “Resources and Reserves of Mineral Raw Materials Balance”.

Other state authorities (Energy Agency, Electro-Energy Sector, and others), in accordance with their jurisdiction, use statistical data from “Resources and Reserves of Mineral Raw Materials Balance” as a basis for national strategic documents, such as Energy Strategy, Energy Balance, Mineral Resources Management Strategy and others. In the making of these documents, starting quantities (expressed in physical measuring units) are most often converted into the measuring units (by application of proper international standard formulae) tEN and TJ (ton of equivalent oil and terajoule). In this case, there will most certainly be some errors, because this is an issue of fossil fuels and mineral resources physical quantities (*in situ*) that depict, most often, a different degree of exploration (and the level of allowed errors in quantity and quality evaluation), quality, etc. Besides this, the persons converting them are most often not qualified for that work.

Industrial production based on fossil fuels (energy resources) is under the jurisdiction of Public Enterprise “Elektorprivreda Srbije” (JP EPS), Public Enterprise for Underground Coal Exploitation (JP PEU Resavica) and “Naftna industrija Srbije” (NIS). Industrial production based on metallic and non-metallic / industrial raw materials is under the jurisdiction of private businesses (metals: “Rudnik” – Rudnik, “Veliki Majdan”, “Lece” and “Grot”; non-metals: “Titan Kosjerić”, “Lafarge Beočin”, “Strabag Srbija” and others), except for copper, that is under the jurisdiction of the business entity “RTB Bor” (that is still 100% state owned).

Legal basis for fossil fuels (energy resources) and mineral resources statistics is under the regulations of the Law of Official Statistics of the Republic of Serbia and Law of Mining and Geological exploration. With these laws, very important role in the statistics belongs to other laws (Law of Energy, Law of Spatial Planning, Law of Planning and Building, and others), with their book regulations.

The official mineral policy of the Republic of Serbia is stated in the introductory provisions of the Law of Mining and Geological Exploration (“Off. Gazette RS” No. 101/2015), and it is the basis for the enforcement of previously made Mineral Resources Management Strategy (still in the phase of formal acceptance). With this strategy, of the most important interest is the National Strategy on Sustainable Usage of Natural Resources and Wealth from 2012, in which fossil fuels (energy resources) and mineral resources statistical data is shown in detail, in the form of an Annex with all current parameters. Subject strategies are available on the websites of the Government and Ministries (www.mre.gov.rs and others).

When it comes to basic database of energy and mineral resources of the Republic of Serbia, kept by Ministry of Mining and Energy, it is important to mention that this database is not directly, horizontally linked to national statistical database from Statistical Office, which is a significant fault or a gap. Besides this, the database is internal and not publicly available on the website, and data review can be ensured by special regulation. Just one qualified person, along with other tasks, is in charge of keeping the database, which is certainly not enough. It is similar with other databases (that are available), that is, not enough people are in charge of them. From the aspect of goal and statistical parameters requirements and its quality, as well as the need for formal

implementation into the international framework and systems, it is most necessary to employ more people in the statistics system, to give them a proper education and technical equipment, and this requires additional funding. In this state, statistics is timely, i.e. it meets the timeframes in accordance with the Law and it covers all segments of statistical processing, and it is available through Statistical Office and indirectly through statistical data in strategic documents (Strategies, etc.) on the authorized institutions' websites (www.mre.gov.rs and others).

When physical quantities of fossil fuels and mineral resources statistical data is considered within the UN-FC (United Nations Framework Classification) and UN-SEEA (United Nations System of Environmental Economic Accounting) systems framework (and their specificity), it is important to say that there is no available information that states there is a decision, in a formal sense, about the implementation of these systems into the national system. Data coherency can be observed only from the current, theoretical positioning of domestic source statistical data within these UN frameworks and to a lesser degree and indirectly, through final energy statistical data that is included into the Eurostat statistics (European statistics). The change of this situation requires a serious, expert, formal and legal approach to the problem (decision from the authorized institution, professional staff, law harmonization, education, technical equipment, case studies, funding, time, etc.) in order to connect the entire national statistical system data, within reasonable period and coherently, with UN-FC and UN-SEEA systems' framework. It is certain that the implementation has to proceed in stages, which is usual in these cases. During the implementation, current national state statistics, its capacities, human resources, technical equipment and mutual software connection of current, basic data and statistical databases, staff's qualification and education, requirements and goals, as well as economic and ecological accounting connection have to be taken into consideration.

While considering subject statistics regarding physical quantities of energy and mineral resources of the Republic of Serbia, certain faults – gaps were noted, based on which it is possible to evaluate their priority (high, medium, low) and recommend appropriate means for overcoming them. In that sense, it is said that there is no direct, horizontal legal connection between basic statistics and database of physical quantities of fossil fuels and reserves of mineral raw materials kept in the Ministry and Statistical Office, that there is no clear legal and formal procedure (through new book regulations) on mutual coherence of statistical data regarding physical quantities of energy and mineral resources from the basic database (“Resources and Reserves of Mineral Raw Materials Balance”) and Pan-European Reporting Standard (PERC). There is statistical data that shows the initial processing of gathered source data in public enterprises and other business entities wasn't done by qualified person. Physical quantities of fossil fuels and reserves of mineral raw materials statistical data are publicly available in a modified form through corresponding strategic national public documents (national strategies, energy balances, mineral policy...). Fossil fuels and reserves of mineral raw materials information and statistical data from the Statistical Office, due to a lack of direct mutual connection, are difficult to compare with source statistical data about their physical quantities kept in the Ministry of Mining and Energy, as initial. Means to overcome

this should be considered through additional institutional solutions, legal regulations, human resources, technical and additional financial means.

Through subject project within fossil fuels (energy resources), coal, oil and natural gas, and geothermal resources in a lesser degree (listed only through Statistical Office statistics), were considered. This statistical data are shown in detail in Annex A of this Report. According to the Statistical Office data, the largest part of the energy production in the Republic of Serbia, e.g. in 2015, was coal exploitation / production with 39,91%. In 2015, oil and oil derivatives import was 52,55%, while export was 52,79%. Electric energy import was 42,16%. Most coal was used in the Industry Sector – 50,96%; most electric energy in the Household Sector – 51,94%, and natural gas in the Industry Sector – 49,74%.

Within mineral resources, metals (Pb-Zn and Cu) and non-metals / industrial minerals (cement raw materials, quartz raw materials, sandstone, architectural-building stone, gravel and sand and technical-building stone, clay and kaolin, and other) were processed and shown in Annex B. Copper ore (Cu) production per year is 17 845 250 t, lead and zinc (Pb-Zn) 815 543 t/year. Non-metallic mineral raw materials / industrial minerals production total annual scope is around 13 497 264 t.

With presented fossil fuels and mineral resources statistical data, in this Report there are corresponding statistical data shown graphically. Included also is a Picture 1 – Geological Map of the Republic of Serbia with the position of ore deposits, taken from publicly available National Strategy on Sustainable Usage of Natural Resources and Wealth (“Off. Gazette RS” No. 33/2012).

This Report was made in accordance with the goal, intention and framework of the “Baseline Review of Fossil Energy and Mineral Reserve Statistics of the Republic of Serbia” project, based on publicly available statistical data, available statistical data publications and discussions held at meetings with relevant representatives of institutions included in the national statistical system of the Republic of Serbia, for which I offer my gratitude.

Introduction

Law of Official Statistics of the Republic of Serbia (“Off. Gazette RS” No. 104/2009) states that the Statistical Office of the Republic of Serbia is the main producer and disseminator of official statistical data and responsible expert carrier, organizer and coordinator of the official statistical system in the Republic of Serbia, and it represents official statistics of the Republic of Serbia in the international statistical system. When it comes to the statistics of fossil fuels and reserves of mineral raw materials, Statistical Office of the Republic of Serbia processes data related to the industrial production (import, export, etc.) through the Energy and Mining Sector. Public enterprises and business associations – companies, deliver data monthly and annually, in print or in electronic form that does not contain baseline information about the physical quantities of fossil fuels and mineral reserves in certain area, *in situ*. Determined quantities of fossil fuel and mineral reserves *in situ* data is shown in special technical document “Resources and Reserves of Mineral Raw Materials Balance”. Namely, Geology and Mining Sector within the Ministry of Mining and Energy handles the physical quantities of energy resources and reserves of mineral raw materials (where “physical quantities of commercially relevant fossil fuels and mineral reserves are found within the borders of the Republic of Serbia”) and further statistical processing based on the provisions of the Law of Ministries (“Off. Gazette RS” No. 14/2014, 44/2015, and 96/2017) and Law of Mining and Geological Exploration (“Off. Gazette RS” No.101/2015).

Fossil fuel and reserves of mineral raw materials data from the “Resources and Reserves of Mineral Raw Materials Balance” is starting data for the making of documents (national strategy, action plans, energy balance, energy strategy, spatial plan, etc.) created and adopted by State authorities, and publicly available on the website of those authorities.

For the requirements of the “Resources and Reserves of Mineral Raw Materials Balance” and further statistical processing, public companies and other business associations-entities deliver physical quantities of energy and mineral resources data (production-mining, quality, losses, etc.) until March 15th current year, with the balance on the day of December 31st previous year, according to the provisions of the law.

Fossil fuels and mineral reserves statistics work (in Ministry, Statistical Office, Chamber of Commerce, public enterprises, Energy Agency) is performed by a very small number of experts (1-2), insufficiently interconnected, which is reflected on the quality of the statistical data. To bring the statistical review in a better condition and to a higher level, it is necessary to further educate existing professional staff, increase their number in the process of data gathering and processing in relation to the existing, which requires an increase in the funding, that is, the separation of the budget for that purpose. In this way, the entire process of the implementation of the statutory mineral policy concerning the strategy for fossil fuel / energy resources and mineral reserves management would be closed, and recognized within the international statistical framework.

The report is made based on publicly available data, printed and electronic, and discussions held with national consultant in the meetings with statistics supervisor, in accordance with set goal, scope and tasks within the “Baseline Review of Fossil Energy and Mineral Reserve Statistics of the Republic of Serbia” subproject, which is a part of regional project “Integrated Energy and Water Resource Management in support of sustainable in South-East Europe and Central Asia”.

1. Production of fossil energy and mineral reserves statistics

According to the provisions of the Law of Official Statistics of the Republic of Serbia (“Off. Gazette RS” No. 104/2009), Statistical Office of the Republic of Serbia (www.stat@stat.gov.rs) is the main producer and disseminator of official statistical data and the responsible expert carrier, organizer and coordinator of the official statistical system in the Republic of Serbia, and it represents official statistics of the Republic of Serbia in the international statistical system. Statistical Office publishes the Statistical yearbook in printed and electronic form, annually. This document contains industrial production statistical data, for the Energy and Mining Sector. Industrial statistics (mining and electricity / gas supply, etc.) provides data from the bookkeeping, staff and other records and documentation from the reporting units. Statistics gathers those through monthly and annual research. Based on this data, the industrial production index is calculated. Energy production and consumption balance data is gathered within special research performed by Energy Sector Statistics. Industrial monthly research encompasses the observational units that make at least 80% of the turnover value for each area of industrial production. According to the statistics, the largest part in the production of energy products in the Republic of Serbia in 2015 was coal exploitation / production – 39,91%. In 2015, there was an import of 52,55% for oil and oil derivatives, while oil derivatives were exported with 52,79%, and electricity with 42,16%. Within final consumption of energy products in 2015, the largest amount of coal was used in Industrial Sector – 50,96%; the most electricity was used in the Household Sector - 51,94%, and natural gas in Industrial Sector – 49,74%. Detailed data in physical measuring units and TJ (terajoule) can be found on the Statistical Office website: www.stat.gov.rs. Energy statistics processes Energy Balance that contains annual data regarding exploitation / production, transformation and distribution of electrical and heat energy, i.e. fossil fuels: all kinds of coal, oil and oil derivatives, natural gas, geothermal energy, biogas and other in the Republic of Serbia. Total annual energy balance of the Republic of Serbia contains all individual energy balances reduced to a common measuring unit, TJ (terajoule). For each energy product, i.e. energy resource, the data is given in natural measuring unit (t-ton, m³-meter cubic) and in TJ. Data necessary for compiling energy balance is gathered from regular annual energy statistics research (but also from civil engineering, traffic and foreign trade).

When it comes to statistics regarding reserves of mineral raw materials (mineral reserves), Statistical Office gathers those from business entities dealing with their exploitation / production, in previously described manner, in accordance with the law. Data regarding the group of basic metals such as Cu, Pb-Zn (+Au, Ag and accompanying elements) is shown separately, as well as for the technical building stones, brick clay raw materials, ceramic clay and other industrial materials shown through the Civil Engineering Sector.

1.1.Ministries/agencies/companies involved in the system and their rolls

Given that the Statistical Office of the Republic of Serbia, according to the provisions of the Law, does not process baseline – initial data about the physical quantities of fossil fuels and reserves of mineral raw materials (*in situ*) through statistics, that is, it is not directly connected with the “Resources and Reserves of Mineral Raw Materials Balance” within the Ministry of Mining and Energy, special attention will be given to the Ministry, as well as to the other

organizations that are acknowledged in the system of fossil fuel and reserves of mineral raw materials statistics.

Ministry of Mining and Energy of the Republic of Serbia, by Law of Ministries (“Off. Gazette RS” No. 44/2014, 14/2015, 54/2015, 96/2015, and 62/2017, etc.), is tasked, among other things, through its inner organizational units – sectors (Electro-Energy Sector, Oil and Gas Sector, Geology and Mining Sector), to compile and handle (1) annual conjoint mineral raw materials balance and coal energy balance, (2) oil and gas energy balance of the Republic of Serbia and (3) electrical energy balance.

Indirectly, by planning documents preparation, a part of the statistical system for fossil fuels (solid, liquid, natural gas, geothermal resources) and reserves of mineral raw materials (metallic and non-metallic) are Energy Agency (www.aers.rs), Public Enterprise “Elektroprivreda Srbije” (JP EPS; www.eps.rs), as well as business entity “RB Kolubara Lazarevac” (www.rbkolubara.rs), “Te-Ko Kostolac” (www.kostolac.rs), coal mine “Kovin” (www.rudnikkovin.rs/wp/; with underwater coal exploitation), and business association/group “Naftna Industrija Srbije” (www.nis.rs; the only company that deals with research and oil and gas production in Serbia). Also, there is Public Enterprise for Underground Coal Exploitation – “Resavica” (www.jppeu.rs).

Strategic documents from the area of energy of the Republic of Serbia are made in accordance with the Law of Energy (“Off. Gazette RS” No. 145/2014) and its accompanying book regulations and are publicly available on the website (www.pravno-informacioni-sistem.rs; www.mre.gov.rs).

In the statistical system, when it comes to physical quantities of mineral resources and reserves of metals (Cu-Au, Pb-Zn-Ag, etc.), i.e. keeping records of their reserves (and other parameters: production, quality, losses, etc.) following national public enterprises take part: “Rudnik” - Gornji Milanovac (www.contangorudnik.co.rs), “Rudnik Veliki Majdan” near Ljubovija (https://ciklomen.com/veliki_majdan_sr.html), “Rudnik Grot” near Vranje (<https://www.belex.rs/trgovanja/informator/Grot>), “Rudnik Lece” near Medveđa (wwwprivredni.imenik.com/Imenik/rudnik/Lece-12740) and “Bosilmetal” near Bosilegrad ([https://ciklomen.com\(bosil-metal_sr](https://ciklomen.com(bosil-metal_sr)) and others.

Identically, tens of other business entities (“Cementara Titan-Kosjerić”, “La farge-Beočin”, “Strabag-Beograd”, “Zorka Šabac” and others) through keeping records of the reserves of non-metallic mineral and industrial raw materials physically enter the conjoint data processing system through “Resources and Reserves of Mineral Raw Materials Balance”.

By making the appropriate projects for exploration, exploitation and processing of mineral raw materials, institutions “Geological Survey of Serbia” (gzs.gov.rs) “Mining Institute” Ltd Belgrade (ribeograd.ac.rs) and “MMI BOR Mining and Metallurgy” Bor (<https://irmbor.co.rs>) are a part of the statistical system in reviewing the physical quantities of fossil fuels and reserves of mineral raw materials initial data; but they are not directly connected to the abovementioned “Resources and Reserves of Mineral Raw Materials Balance”.

Especially important role in statistics belongs to the Chamber of Commerce and industry of Serbia (www.pks.rs), which from the aspect of statistics processes Electro-Energy Sector, Oil and Gas Sector and Coal Sector, i.e. fossil fuels, as well as the Mining Sector. Through Mining Sector, the data regarding metal mines (with metallurgy) along with metal and electro-industry and building materials (with civil engineering and building materials industry and housing economy) is processed. Data is gathered monthly, quarterly, semi-annually and annually. Industrial production index parameters are given collectively for industry, or for energy, that is, for mining

that includes coal, crude oil and natural gas exploitation, metal ore exploitation, and other mining activities. Physical quantities of fossil fuels and mineral raw materials (per kind, quality and volume) included in the “Resources and Reserves of Mineral Raw Materials Balance” are not visible in this statistics.

1.2. Legal basis

It is stated that the statistics, on a national level, is defined by Law of Official Statistics of the Republic of Serbia (“Off. Gazette RS” No. 104/2009), according to which the Statistical Office of the Republic of Serbia is the main producer and disseminator of official statistical data for the Republic of Serbia. Fossil fuels and reserves of mineral raw materials statistics of this Office implies processing of data received from business entities regarding fossil fuel and reserves of mineral raw materials production (monthly, quarterly, semi-annually and annually), their import and export and other statistical parameters, and it is not directly connected with the “Resources and Reserves of Mineral Raw Materials Balance” produced by the Ministry of Mining and Energy.

Legal basis for gathering data regarding physical quantities of fossil fuels (solid and liquid, and natural gas) and reserves of mineral raw materials (natural resources owned by the Republic of Serbia) is contained in the Law of Mining and Geological Exploration of the Republic of Serbia (“Off. Gazette RS” No. 101/2015) through making of “Resources and Reserves of Mineral Raw Materials Balance”. Besides this Law, legal basis is set in the: “Book regulations on Classification and Categorization of Reserves of Solid Mineral Raw Materials” (“Off. Gazette SFRJ” No. 53/79) and “Book regulations on Classification and Categorization of Reserves of Oil, Condensates and Natural Gases and Their Record-keeping” (“Off. Gazette SFRJ” No. 80/1987) from the former SFR Yugoslavia.

On a national level, there are other regulations that come in touch with statistical data regarding physical quantities of fossil fuels and reserves of mineral raw materials from the “Resources and Reserves of Mineral Raw Materials Balance”. Those are: Law of Energy (“Off. Gazette RS” No. 57/2011 and others), Law of Efficient Energy Usage (“Off. Gazette RS” No. 25/2013), Law of Spatial Planning of the Republic of Serbia from 2010 to 2020 (“Off. Gazette RS” No. 88/2010) or “Spatial Planning” for short, Law of Environmental Protection (“Off. Gazette RS” No. 135/2004, 36/2009, 36/2009, 72/2009, 43/2011 and 14/2016), Law of Environment Impact Strategic Evaluation (“Off. Gazette RS” No. 135/2004), Law of Nature Protection (“Off. Gazette RS” No. 36/2009, 82/2010 and 14/2016), Law of Waters (“Off. Gazette RS” No. 30/2010 and 93/2012), Law of Forests (“Off. Gazette RS” No. 30/2010 and 93/2012), Law of Agricultural Land (“Off. Gazette RS” No. 62/2006 and 41/2009), Law of Planning and Construction (“Off. Gazette RS” No. 2/2009, 81/2009, 64/2010, 24/2011, 121/2012, 42/2013 and 50/2013) and Law of Access to Information of Public Importance (“Off. Gazette RS” No. 120/2004, 54/2007, 104/2009 and 36/2010) (www.parlament.gov.rs/upload/archive/files/cir/pdf/zakoni/2016/286-16.pdf).

Current *Geoportals of National Infrastructure of Geospatial Data* (<https://geosrbija.rs>) and Real Estate Cadastre (katastar.rgz.gov.rs) do not have visible information on statistical data regarding the physical quantities of fossil fuels and mineral reserves.

1.3. Relevant national energy policies/program

Fossil fuels and reserves of mineral raw materials statistic is contained in strategic documents, such as national strategies, strategic documents and law stated mineral policies of the Republic of Serbia. Primarily, there is the National Strategy for Sustainable Development of the Republic of Serbia that especially processes Mining and Energy Sectors, that is, the statistics regarding fossil fuels and reserves of mineral raw materials (www.zurbnis.rs/zakoni/Nacionalna). The following strategies are directly linked with this Strategy: National Strategy on Sustainable Usage of Natural Resources and Wealth (“Off. Gazette RS” No. 33/2012) and Mineral Resources Management Strategy of the Republic of Serbia until 2030 (in the process of passing); (www.gs.gov.rs/doc/strategije; and www.zzps.rs/novo/kontent/stranicy/propisi_strategije/s_mineralni_resursi.pdf). Both Strategies consider in detail the physical quantities of fossil fuels and reserves of mineral raw materials and all statistical parameters of their life cycle that are contained in the “Resources and Reserves of Mineral Raw Materials Balance”. National Strategy on Sustainable Usage of Natural Resources and Wealth has detailed statistical data regarding fossil fuels and mineral reserves (metals, non-metals and industrial minerals) in its Annex. Mineral Resources Management Strategy of the Republic of Serbia until 2030 incorporates data from the subject Annex and “Resources and Reserves of Mineral Raw Materials Balance”. Mineral policy and Plan for Development of Geological Exploration and Mineral Policy in the mining area are enforced, according to the Law of Mining and Geological Exploration (“Off. Gazette RS” No. 101/2015), by realization of the *Mineral Resources Management Strategy* of the Republic of Serbia, through the current *Program for Mineral Resources Management* implemented by Serbia Geological Institute www.gzs.rs).

1.4. Major national statistics databases/publications

Statistical Office of the Republic of Serbia publishes, in printed and electronic form, the “Statistical Yearbook”, annually. On the national level, data regarding the physical quantities of fossil fuels and mineral reserves is handled by Ministry of Mining and Energy (www.mre.gov.rs), through “Resources and Reserves of Mineral Raw Materials Balance” of the Republic of Serbia, that is printed during the year in a form of a book. It exists in the electronic form, also, but its character is internal, meaning the statistical data is not publicly visible on the Ministry’s website. Data regarding reserves of liquid and gaseous fossil fuels that the business entity delivers to the abovementioned Balance are proclaimed a trade secret (Law of Data Secrecy, “Off. Gazette RS” No.104/2009; www.paragraf.rs), while data regarding mineral reserves is publicly published by business entities at the website: (www.contangorudnik.co.rs, https://ciklomen.com/velikimajdan_sr.html; <https://www.belex.rs/trgovanja/informator/Grot> and others). In 2013, authorized Ministry published a paper, an annual statistical review “Geology and Mining in 2012”, in the form of a work report for the Geology and Mining Sector (Serbian-English language version). Work report is based on the data from the Geology and Mining Sector and from publicly available data regarding the industrial production from Statistical Office of the Republic of Serbia. The Work report does not contain data for Kosovo and Metohija. There is, also, a “Guide for Investors in the Geology and Mining Sector” (Belgrade, 2013) with statistical data regarding fossil fuels and reserves of mineral raw materials. These two documents are not available in the information system, or on the Ministry’s website, and there are no public information whether they were updated or supplemented with new data, statistically processed and published.

Statistical data regarding fossil fuels and reserves of mineral raw materials is publicly available through strategic documents: National Strategy on Sustainable Usage of Natural Resources and Wealth (www.gs.gov.rs/doc/strategije), Mineral Resources Management Strategy of the Republic of Serbia until 2030 (www.parlament.gov.rs), Energy Balance of the Republic of Serbia (www.mre.gov.rs) and Energy Development Strategy of the Republic of Serbia until 2025 with projections till 2030 (www.pravno-informacioni-sistem.rs).

1.5. Financial and human resources devoted to the collection of fossil energy and mineral reserve statistics

Geology and Mining Sector within Ministry of Mining and Energy gathers, systemizes and analyses data regarding physical quantities of fossil fuels and reserves of solid mineral raw materials, through the making of “Resources and Reserves of Mineral Raw Materials Balance”.

In Geology and Mining Sector there is only one qualified person who, along with other regular tasks, processes delivered data regarding physical quantities of fossil fuels and mineral reserves, which certainly is not enough. Physical quantities and mining / production of fossil fuels and mineral reserves data, and other statistical parameters, is delivered annually through mining plans and reports, recorded by one person from the mining profession, also along with other regular tasks. Practically, only two people from Ministry of Mining and Energy come in touch with original data regarding fossil fuels and reserves of solid mineral raw materials that are delivered to the Ministry and then statistically processed. On the territory of the autonomous province of Vojvodina, one person (occasionally two) deals with issues regarding this data statistics, and that along with other regular tasks.

Therefore, in the Ministry of Mining and Energy there are a very small number of persons (1-2) dealing with the issues of the physical quantities of fossil fuels and reserves of mineral raw materials statistics on the national level. There are no special financial (and technical) means allotted for these needs.

According to the available information, in the Statistical Office and Chamber of Commerce of the Republic of Serbia, as well as in Geological Survey of Serbia, a small number of persons (1-2) deal with this issue, with initial preparation, processing and delivering of data, which reflects modest and insufficient scope of funding for this kind of statistics.

1.6. Major statistical improvement underway or planned

In order to adequately gather complete information about the physical quantities of fossil fuels and reserves of mineral raw materials data, towards the improvement of statistics in near future, it is necessary to: fully implement CisGir information system in the Geology and Mining Sector, adequately enforce mineral policy based on current law, as well as educate persons / staff in the system of subject statistics.

Ministry of Mining and Energy established Geological Information System of Serbia (GeolISS) and Central Information System for Geology and Mining (CIS GIR), using ESRI GIS – ArcGIS software as platform.

In Geology and Mining Sector, through “IMIS - Integrated Management Information System” project, Central Information System for Geology and Mining was developed and

implemented. Project was financed by European Union through IPA 2010. Contemporary information system was developed on ArcGIS software platform for the purposes of exploration, exploitation and concession fields' management on the territory of the Republic of Serbia and for working process management in the Sector. This is a complex system that consolidates a large amount of data from the Sector, makes everyday work easier for the employees and enables direct communication in working with representatives of local governments. It is very important to highlight the fact that public users have data access and search through WEB GIS application (<http://gis.mre.gov.rs/Srbija>) found on the Ministry's website, which makes the Sector work transparent.

Geological Information System of Serbia (GeolISS), as a strategic project, has been developed in the last ten or so years. GeolISS is formed as a separate ArcGIS extension, completely adjusted to users work, in the sense of system update with new data, as well as in timely gathering of necessary information about the geological resources of the Republic of Serbia.

The goal of creating the Geological Information System of Serbia is digital archiving of geological data and information, and creating a modern and efficient informational base for performing all the activities related to planning, projecting and decision-making in the geology field.

Through the web application (<http://geoliss.mre.gov.rs/>), online access to the certain geological and research results information has been enabled on the Internet. Continued development of the web application will take place through defining of public commercial or unlimited access to the global network, i.e. Internet, which will make it commercial, and thus raise Geological Information System of Serbia (GeolISS) use value.

Statistical data quality improvement can be expected in: (1) starting phase with processing and reviewing subject data (by qualified and educated persons authorised by law), that business entities / companies manage through the document "Mineral Resources and Reserves Report Book" and then deliver to the Ministry, Statistical Office and Chamber of Commerce; (2) increase in the current degree of regular data delivery to the Geology and Mining Sector, from approx. 55-60% to a higher degree; and (3) by directly inputting data into the established information system CisGir (by foreign business entities and public companies). Suggested approaches would contribute to the better statistics of fossil fuels and mineral raw materials in the Republic of Serbia, which would allow for adequate horizontal connecting of official databases, in due time, nationally and internationally.

2. The quality of fossil energy and mineral reserve statistics

The quality of statistics regarding physical quantities of fossil fuels and mineral reserves of the Republic of Serbia are shown in the "Statistical Yearbook" published by Statistical Office and in the "Resources and Reserves of Mineral Raw Materials Balance" of the Republic of Serbia, published by Ministry of Mining and Energy.

2.1. Summary of quality of fossil energy reserve statistics

Statistics regarding fossil fuels / energy resources can be found in the two abovementioned documents. Data is delivered to the Ministry once a year, until March 15th current year, and to the Statistical Office monthly and annually.

2.1.1. Timeliness: the delay between the reference period and the date of public release

Business entities, public enterprises dealing with exploitation / production of fossil fuels and mineral reserves have legal obligation to deliver the physical quantities and other quality and mining parameters data to the Ministry (and to the provincial secretariat of AP Vojvodina) until March 15th current year, with the state of the reserves on the day of December 31st previous year, which they do. However, it happens, for example, that the data reaches the Ministry after March 15th, so there is very little time for adequate database update, given that the “Balance” is printed on July 1st, and the later deliver data does not enter the report period (they are left for the following year). Timeliness rating: *acceptable*.

2.1.2. Frequency: the interval (months, quarters, years) between release

Law of Mining and Geological Exploration of the Republic of Serbia (2015) states that the physical quantities of fossil fuels (coal, oil and natural gas, geothermal resources) data are shown through “Resources and Reserves of Mineral Raw Materials Balance” once a year, until July 1st current year. Oil and gas quantities data are shown in the “Balance” within the Ministry and Oil and Gas Sector. In this case, business entity delivers the data in accordance with the special regulations until February 1st current year. In the national statistical organization, i.e. Statistical Office of the Republic of Serbia and Chamber of Commerce, fossil fuels / energy resources data are processed monthly and annually: this means that the necessary information and industrial production indexes of the Energy and Mining Sector are accessible in any given moment. Statistical data is publicly available monthly and annually, in the form of monthly announcements or statistical yearbooks. Frequency and manner of subject statistical data gathering and analysis, on abovementioned monthly and annual level are optimal, acceptable and with reasonable period of consideration. Frequency rating: *acceptable*.

2.1.3. Time series: the earliest and most recent dates for which statistics are available

Physical quantities of fossil fuels / energy resources (solid, liquid and gaseous) data, from the time aspect are available annually, in the Ministry they are available from July 1st current year. In the Statistical Office and Chamber of Commerce industrial production data are available (and accessible on the website) monthly, quarterly, semi-annually and annually. Time series rating: *favourable*.

2.1.4. Coverage: the completeness of the data in terms of periods; are there periods for which data were not collected?

Physical quantities of fossil fuels data on the territory of the Republic of Serbia are gathered in accordance with Serbian legislature and book regulations of former SFR and SR Yugoslavia (that are still applied), that are the basis for the compiling of the “Resources and Reserves of Mineral Raw Materials Balance”. In terms of completeness and wholeness of the data gathering process in current social movements in the Republic of Serbia, it can be stated that the data was and is gathered regularly, except during the period of NATO bombing of the SR Yugoslavia, i.e.

Serbia. Nowadays, Serbian statistics does not have new data regarding the fossil fuels / energy resources for the territory of Kosovo and Metohija, that is the integrated part of the Republic of Serbia and under the temporary civil and military management of the United Nations, based on the UN Security Council Resolution 1244 of June 10th 1999 (<http://www.srbija.gov.rs/pages/article.php?id=45630>). Coverage rating: *incomplete*.

2.1.5. Accessibility: the ease with which users can access the statistics

Interested users can access statistical data regarding fossil fuels directly and simply through information from publicly available national strategies, laws and other strategic documents (Law of Energy, Energy Strategy and Energy Balance of the Republic of Serbia) on the Ministry of Mining and Energy website (www.mre.gov.rs), given that the data from “Resources and Reserves of Mineral Raw Materials Balance” are not publicly available on the website. Fossil fuels and industrial production statistical data of the Energy and Mining Sector can be easily found in the Statistical Office and Chamber of Commerce’s websites. Accessibility rating: *less favourable*.

2.1.6. Interpretability: the availability of information, such as metadata, to help users understand the statistics

Industrial production of fossil fuels / energy resources (and electro-energy) data in the Statistical Yearbook are shown systematically and in accordance with regulations. In this way, in printed and electronic form, they are easy to understand and practical to interpret. Data from the “Resources and Reserves of Mineral Raw Materials Balance” are suitable for understanding and interpretation, though they are not available in their original scope now. While using this data, interested users can come across some ambiguities and doubts, mostly related to measuring units system used to show physical quantities of fossil fuels. It should be said that for the adequate understanding and interpretation of statistical data users should be educated and qualified for the subject matter, that is, they should have a good understanding of report standards and regulations of the Republic of Serbia. Interpretability rating: *favourable*.

2.1.7. Transparency: the availability of information regarding the methodology used to the gather the statistics

Information regarding methodology and manner of gathering fossil fuels data for statistical purposes come from available legislature. In that sense, subject methodology of gathering data is completely transparent. Legal acts proscribe the shape and content of the forms filled out for the statistical purposes. In print, forms are visible through legal acts, while in electronic they are public and available (to fill out) on the Statistical Office’s website (www.stat.gov.rs), Chamber of Commerce’s website (www.pks.rs) and Ministry’s website (www.mre.gov.rs). Public enterprises and other business entities included in the statistical system are in constant electronic communication with Statistical Office and Chamber of Commerce. Established electronic communication systems enable distribution of statistical data to other information systems (e.g. from Energy Balance to international statistics, Eurostat). Transparency rating: *less favourable*.

2.1.8. Accuracy: the availability of information regarding the degree to which the information correctly describes the phenomena it was designed to measure

Availability and accuracy of information, and therefore their validity, basically does not come into the question, because qualified and authorised persons gather starting data for statistical purposes properly. To a lesser degree (and within acceptable error) there are gaps related to the manner and scope of starting data review, which suggest that this data was, for some reason, processed by a person unqualified for the job. Information accuracy rating: *favourable*.

2.1.9. Consistency: the degree to which data are collected in a consistent manner across time

Physical quantities of fossil fuels data for the statistical purposes of the Ministry of Mining and Energy was gathered over time in a legally prescribed manner that is fixed, consistent, understandable and acceptable. Statistical data regarding fossil fuels / energy resources from the Statistical Office and Chamber of Commerce are complete, acceptable and consistent. Consistency rating: *fully favourable*.

2.1.10. Coherence with international frameworks: the degree to which the statistics are coherent with the concepts and definitions used in the UN-FC and UN-SEEA

Publicly available strategic documents of the Republic of Serbia, for Mining Sector (Mineral Resources Management Strategy of the Republic of Serbia until 2030) and for Energy Sector (Energy Strategy until 2030), prewise the implementation of EU legal solutions into the legislature of the Republic of Serbia (www.mre.gov.rs). However, when concept and definitions of UN-FC and UN-SEEA system are considered through statistical data about physical quantities of fossil fuels of the Republic of Serbia, regarding the mutual data coherence, the situation is as follows. Available, public information on current statistics about physical quantities of fossil fuels in Serbia, in Geology and Mining Sector of the Ministry, show a certain level of coherence of this data within the concept of UN-FC framework. In the generic system, UN-FC system implies three basic criteria: E-social-economic sustainability, F-project status and feasibility, and G-geological knowledge (with use of numeric and independent lingual codification pattern). The same can be recognized in the classification and report system of fossil fuels/energy resources of the Republic of Serbia, but formal mutual harmonization is not applied. Law of Mining and Geological Exploration from 2011 stated the same. Meanwhile, there was an initial observation (in theory and practise) of basic statistical data regarding physical quantities of fossil fuels in Serbia from the “Resources and Reserves of Mineral Raw Materials Balance” within the UN-FC system (and CRIRSCO family; Committee for Mineral Reserves International Reporting Standards), through realization of a pilot project. For the Ministry’s purposes, Geology Survey of Serbia started the pilot project in 2014. This project gave the initial incentive for the abovementioned harmonization of the fossil fuels (and mineral reserves) statistical data of the Republic of Serbia and UN-FC framework, but because of the lack of formal procedure and expressed intention for application and implementation of UN-FC framework, the project was not finished. When it comes to statistics of physical quantities of fossil fuels and its coherency with UN-SEEA system, as a framework that integrates economic and ecological data, there are no available information about the existence of

formal-legal procedure for mutual harmonization of data based on set criteria and treaties. It is necessary to mention here, that in the last twenty or so years, Faculty of Mining and Geology of the University of Belgrade, realized corresponding scientific studies and projects in order to create valid basis for mutual harmonization of genetic-industrial classification of solid fossil fuels (coal) in Serbia, within international framework, i.e. within the European Commission classification (www.rgf.bg.ac.rs).

When it comes to fossil fuels public statistics based on industrial production under the authority of Electro-Energy Sector, coherence of this data is somewhat different. Energy Strategy (www.mre.gov.rs) states that: “It is necessary, in the coordination between Ministry in charge of energy, Statistical Office and energy subjects and energy users in the Republic of Serbia, to establish an united system of gathering, processing and verification of data regarding production and usage of energy (per energy subfield) in accordance with EUROSTAT/IEA system of establishing and reviewing of national energy data and indicators”. It also states that: “Special attention should be given to standards and conventions created during the active years of United Nation Economic Commission for Europe.” According to the publicly available information from the statistics authority institutions, the communication was established between statistical data in the domain of fossil fuels energy of the Republic of Serbia (production, etc.) with EUROSTAT/IEA statistics (European statistics/International Energy Agency).

However, there is no determined legal form or procedure in the Ministry for evaluating mutual harmonization of statistical data regarding physical quantities of fossil fuels through formal implementation of UN-FC framework and its principles (Note: according to the current Law provisions, from 2015, the new Legal Regulation about mineral resources and reserves is being made, based on PERC (Pan European Reporting Code), whose application would revoke current manner of reporting on fossil fuels (in categories A, B, C and D; Book regulations,1979) and ensure formal coherence and harmonization of fossil fuels statistical data within international framework (indirectly and within UN-FC and UN-SEEA framework).

2.2.Summary of quality of mineral reserve statistics

Statistics (physical quantities) of mineral reserves (metal, non-metal and industrial minerals), same as for fossil fuels statistics, is being considered in two previously mentioned documents, “Statistical Yearbook” by Statistical Office and “Resources and Reserves of Mineral Raw Materials Balance” by Ministry of Mining and Energy. Statistical Office gathers data about industrial production monthly and annually, while data is delivered to the Ministry once a year, till March 15th current year.

2.2.1. Timeliness: the delay between the reference period and the date of public release

Public enterprises and other business entities have legal obligation to deliver the physical quantities of mineral reserves (Cu+Au, Pb-Zn +Ag...) data, and other parameters (quality, losses, dilutions, etc.) to the Ministry (and to the provincial secretariat of AP Vojvodina) for the

“Resources and Reserves of Mineral Raw Materials Balance” until March 15th current year, with the state of the reserves on the day of December 31st previous year, which they do. However, it happens that the data reaches the Ministry after March 15th, which directly reflects on the adequate database update, given that the “Balance” is printed on July 1st. Later deliver data does not enter the report period (they are left for the following year). Timeliness rating: *acceptable*.

2.2.2. Frequency: the interval (months, quarters, years) between release

Law of Mining and Geological Exploration of the Republic of Serbia (2015) states that the physical quantities of mineral raw materials data have to be updated annually, on July 1st current year. In Statistical Office of the Republic of Serbia and in Chamber of Commerce, industrial production data and its parameters are processed monthly and annually. This means that the necessary information and industrial production indexes of the Mining Sector are accessible in any given moment. Statistical data are publicly available monthly and annually, in the form of monthly announcements or statistical yearbooks. Frequency and manner of subject statistical data gathering and analysis, on abovementioned monthly and annual level, are optimal, acceptable and with reasonable period of consideration. Frequency rating: *acceptable*.

2.2.3. Time series: the earliest and most recent dates for which statistics are available

Physical quantities of mineral reserves data that are delivered annually into the Ministry of Mining and Energy database are available to the state authorities, at the earliest, from July 1st current year. In the Statistical Office and Chamber of Commerce industrial production of solid mineral raw materials, metals and non-metals data are available (on the website) monthly, quarterly, semi-annually and annually, i.e. constantly. Time series rating: *favourable*.

2.2.4. Coverage: the completeness of the data in terms of periods; are there periods for which data were not collected?

Physical quantities of mineral reserves data on the territory of the Republic of Serbia is gathered in accordance with Serbian legislature and still applicable book regulations of former SFR and SR Yugoslavia. This data is the basis for the compiling of the “Resources and Reserves of Mineral Raw Materials Balance”. In terms of completeness and wholeness of the data gathering process in current social movements in the Republic of Serbia, it can be stated that the data was and is gathered regularly. The exception to this is the period of NATO bombing of SR Yugoslavia, i.e. Republic of Serbia. In that sense, Serbian statistics does not have new data regarding the mineral reserves for the territory of AP Kosovo and Metohija, that is under the temporary civil and military management of the United Nations based on the UN Security Council Resolution 1244 of June 10th 1999 (<http://www.srbija.gov.rs/pages/article.php?id=45630>). Coverage rating: *incomplete, less favourable*.

2.2.5. Accessibility: the ease with which users can access the statistics

Interested users can access physical quantities of mineral reserves statistical data simply, but indirectly through information from publicly available national strategies, laws and other

strategic documents (National Strategy on Sustainable Usage of Natural Resources and Wealth, Mineral Resources Management Strategy, Energy Strategy and Energy Balance of the Republic of Serbia) that can be found on the Ministry of Mining and Energy website (www.mre.gov.rs). The data from “Resources and Reserves of Mineral Raw Materials Balance” is not publicly available on the website. Statistical data regarding industrial production of metal and non-metal ore and industrial minerals can be easily found in the Statistical Office and Chamber of Commerce’s databases. Accessibility rating: *less favourable*.

2.2.6. Interpretability: the availability of information, such as metadata, to help users understand the statistics

Data in the Statistical Yearbook are shown systematically and in accordance with regulations. They can be found in printed and electronic form, and are easy to understand and practical to interpret. Data from the “Resources and Reserves of Mineral Raw Materials Balance” are suitable for understanding and interpretation. While interpreting this data, interested users can come across some ambiguities and doubts, mostly related to measuring units system. It should be said that for the adequate understanding and interpretation of statistical data users should be educated and qualified for the subject matter, that is, they should have a good understanding of international reporting standards and regulations of the Republic of Serbia, as well as subject statistic. Interpretability rating: *favourable*.

2.2.7. Transparency: the availability of information regarding the methodology used to the gather the statistics

Information regarding methodology and manner of gathering data about physical quantities and other parameters for mineral reserves come from available legislature. In that sense, methodology of data gathering is completely transparent. Legal acts proscribe the shape and content of the forms filled out for the statistical purposes. In print, forms can be found legal acts, while in electronic form they are public and available (to fill out) on the Statistical Office’s website (www.stat.gov.rs), Chamber of Commerce’s website (www.pks.rs) and Ministry’s website (www.mre.gov.rs). Public enterprises and companies included in the statistical system are in constant electronic communication with Statistical Office. Transparency rating: *less favourable*.

2.2.8. Accuracy: the availability of information regarding the degree to which the information correctly describes the phenomena it was designed to measure

Availability and accuracy of information, and therefore their validity, basically does not come into the question. That is, qualified and authorised persons gather, process and distribute starting data for statistical purposes in accordance with the law. It happens rarely, and to a lesser and acceptable degree, that there are gaps directly related to the manner and scope of starting data review. This fact suggests that the starting data was, for some reason, processed by a person unqualified for the work. Information accuracy rating: *favourable – less favourable*.

2.2.9. Consistency: the degree to which data are collected in a consistent manner across time

Physical quantities of mineral reserves data for the statistical purposes of the Ministry of Mining and Energy was and is gathered over time in a legally prescribed manner. That is a fixed, consistent, understandable and acceptable principle. Statistical data regarding industrial production of metals, non-metals and industrial minerals from the Statistical Office (and Chamber of Commerce) are complete, respectable and consistent. Consistency rating: *fully favourable*.

2.2.10. Coherence with international framework: the degree to which the statistics are coherent with the concepts and definitions used in the UNFC and UN-SEEA

Physical quantities of mineral reserves (metal and non-metal reserves) data and their statistics on the territory of the Republic of Serbia can be viewed in a sense of coherence with the concept and definition of the UNFC and UN-SEEA system. This can be seen through publicly available information on current statistics about the physical quantities of mineral reserves, from the Ministry of Mining and Energy, which can be coherently recognized within the concept of UN-FC framework. In generic system, this framework system implies three basic criteria: E-social-economic sustainability, F-project status and feasibility, and G-geological knowledge (with use of numeric and independent lingual codification pattern), which can be recognized in the legislature of the Republic of Serbia, in classification and reporting on mineral reserves. However, the formal harmonization of data and implementation of UN-FC framework has not started yet in the Republic of Serbia. Law of Mining and Geological Exploration from 2011 stated the implementation of this system. In the meantime, there were initial theoretical and practical deliberations about mineral reserves statistical data of the Republic of Serbia within UN-FC system, through publications and realization of one pilot program. For the Ministry's purposes, Geological Survey of Serbia started the pilot project in 2014, with the goal of mutual recognition and abovementioned harmonization of statistical data regarding physical quantities of mineral reserves. Due to a lack of formal procedure for application and implementation of UN-FC framework, the pilot project was never finished. When it comes to the statistics of physical quantities of mineral reserves and its coherency with UN-SEEA system, as a framework that integrates economic and ecological data, there are no available public information whether a formal-legal procedure for mutual data harmonization based on set criteria has been implemented. Therefore, coherence of the statistical data regarding mineral reserves in the concept and definitions of UN-FC framework and UN-SEEA system and principles is possible, but with the precondition, from the appropriate instance (Geology and Mining Sector, Ministry, Government and other institutions), of formally stating the intention and raising the question of mutual harmonization and full implementation of UN-FC framework and UN-SEEA system through direct mutual communication with relevant UNECE institutions, for the general benefit of the Mineral Reserves Sector of the Republic of Serbia. (Note: According to the provisions of the current Law from 2015, the new Legal Regulation about mineral resources and reserves is being made, based on PERC (Pan European Reporting Code), the enforcement of which will formally revoke the current manner of reporting about mineral reserves (in categories A, B, C and D; Book regulations,1979).

3. Recommendations for the improvement of fossil energy and mineral reserve statistics

After the completion of processing and analysis of statistical data regarding the physical quantities of fossil fuels and reserves of mineral raw materials in the Republic of Serbia, it is necessary to show (adequately) certain recommendations in order to overcome noted gaps (and shortcomings) during the project realization, and then to state the means necessary for overcoming the main obstacles-gaps.

3.1. Prioritized list of gaps in fossil energy and mineral reserve statistics

Prioritized list of gaps, from the aspect of priority, is in this case shown through the following Table 1, where the priority degree (high, medium, low) reflects belonging list of gaps, in a following manner:

Table 1 - Priority degree of noted gaps

PRIORITY	GAPS
High	<ul style="list-style-type: none"> - There is no direct, horizontal legal connection between basic statistic and database of physical quantities of fossil fuels and reserves of mineral raw materials kept in the Ministry with Statistical Office, as official national statistical institution of the Republic of Serbia - There is no established, clear, legal and formal procedure for mutual harmonization of statistical data regarding physical quantities of fossil fuels and reserves of mineral raw materials from the basic database (Resources and Reserves of Mineral Raw Materials Balance) and European reporting standard (PERC, etc.) - Book regulations of the Law of Mining and Geological Exploration ("Off. Gazette RS" No. 101/2015) has not yet been passed –new Classification and Reporting Book Regulations... (based on PERC), which would bridge the current gap in reviewing data and reporting on mineral resources and reserves and their statistical data
Medium	<ul style="list-style-type: none"> - There are statistical data showing that the initial processing of gathered data in public enterprises and other business entities was not done by qualified professional - Statistical data about physical quantities of fossil fuels and reserves of mineral raw materials of the Republic of Serbia are publicly available in modified form through Government strategic public documents (national strategies, mineral policy...) - Information and statistical data about fossil fuels and reserves of solid mineral raw materials from the Statistical Office are often hard to compare with statistical data about their physical quantities kept in the Ministry of Mining and Energy

	<ul style="list-style-type: none"> - There is not enough information about the qualifications of persons processing the basic statistical data for the database and strategic documents creation purposes
Low	<ul style="list-style-type: none"> - There is a smaller scope of information that show that the basic statistical data reached the Ministry after the lawfully stated deadline

3.2. Means to overcome the main obstacles standing in the way of improving fossil energy and mineral reserve statistics

Means to overcome the main obstacles are divided into five (5) groups, and they include: institutional, legal, technical, human resources and financial means (Table 2).

Table 2 –Necessary means to overcome the main obstacles

MEANS to overcome the main obstacles	
Institutional	<ul style="list-style-type: none"> - Horizontal connection of authorities and institutions dealing with statistics of physical quantities of fossil fuels and reserves of mineral raw materials in the Republic of Serbia and data gathering
Legal	<ul style="list-style-type: none"> - Mutual harmonization of existing legal regulations of the Republic of Serbia that encompass fossil fuels and reserves of mineral raw materials, in order to achieve compatibility with EU Directives and international reporting norms, and have adequate review of statistical data regarding fossil fuels and reserves of mineral raw materials in the international statistical system
Technical	<ul style="list-style-type: none"> - Introduction of known program and software packets into the initial data processing within business entities for the creation of the basic database kept in the Ministry (Resources and Reserves of Mineral Raw Materials Balance) - Formal, mutual, electronic and software connection between authorized institutions that process and use statistical data regarding physical quantities of fossil fuels and reserves of mineral raw materials in the Republic of Serbia, for the public reporting purposes
Human resources	<ul style="list-style-type: none"> - Rise in the existing level of statistical knowledge to a higher degree (professionalism, statistical and IT literacy, necessary communicativeness) - Employment of a new number of expertly qualified and educated people for the process of basic database creation, statistical database through making of Resources and Reserves of Mineral Raw Materials Balance and for further statistical review and rating of received data in the process of data gathering, processing and public reporting

	<ul style="list-style-type: none"> - Rise in the level of IT literacy of the existing human resources, regarding the lawfully proscribed regulations dealing with statistics of physical quantities of fossil fuels and reserves of mineral raw materials in the Republic of Serbia
Financial	<ul style="list-style-type: none"> - IT – software system that would enable horizontal institutional connection for the purposes of the public data review (in accordance with the law) - Additional education of existing human resources in direct contact with physical quantities of fossil fuels and reserves of mineral raw materials in the Republic of Serbia - The process of complete harmonization of national legislature and international statistical standards for the purposes of the public data review - Employment of a certain number of professionally educated people into the statistical work, on positions where there are gaps / lacks (such as source/initial part of data gathering, processing and sending to the Ministry, for the subject statistics; in the process of communication between authority and other sectors using the subject data for the creation of national strategic documents; with receiving and processing of the feedback regarding statistical data within the statistical institutions, etc.)

3.3. List of changes in the statistics of fossil fuels and mineral reserves in the Republic of Serbia, necessary to achieve compatibility with UN-FC and UN-SEEA

In order to get the statistics of energy and mineral resources of the Republic of Serbia recognized formally within the UN-FC and UN-SEEA system, Table 3 states 9 (nine) main, necessary activities that have to be adopted in the following period, in order to mutually harmonize statistical data.

Table 3 – Activities for adoption and application of necessary changes (in the subject statistics)

		CHANGES
		In the fossil fuels and reserves of mineral raw materials statistics of the Republic of Serbia
UN-FC	HARMONIZATION	<ul style="list-style-type: none"> (1) Formal decision on implementation or application of UN-FC system into the national reporting system (2) Memorandum of understanding between the UNECE and the Government of the Republic of Serbia (3) Order on establishing of national experts group (4) Education of domestic professional staff on implementation or application of UN-FC system, (5) Serbian Case study-Country Profile on the application of

UN-SEEA		<p>UN-FC system</p> <ul style="list-style-type: none"> (6) Domestic professional staff training (government, academy, public company, etc.) for implementation or application of UN-FC system (7) Creation of basic statistical database (Resources and Reserves of Mineral Raw Materials Balance) according to the adopted rules and regulations, Case study on main example (8) Inclusion of domestic public statistical data into international statistical data in generally recognizable manner (9) Development of the fossil fuels and resources of mineral raw materials Sector of the Republic of Serbia, in current marketing and business conditions within UN-FC and UN-ECE framework
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Annex A – Detailed review of quality of fossil energy reserve statistics

Statistic	Availability	Source	Quality assessment	Comment
Coal	Available	<p>(1)Statistical Office of the Republic of Serbia (www.stat.gov.rs)-- Statistical yearbook (Serbian/English)</p> <p>(2)Ministry of Mining and Energy (www.mre.gov.rs)-Resources and Reserves of Mineral Raw Materials Balance (Serbian)</p> <p>(3)Elektroprivreda Srbije (www.eps.rs)-Technical report (Serbian/English)</p>	<p>Timeliness: No delays. Frequency: Month, 6 months, year. Time series: permanent, from 1st quarter and from July 1st current year. Coverage: Significant gaps (during NATO bombing of Serbia, 1999) Accessibility: High and medium. Interpretability: No. Transparency: Yes. Accuracy: Yes. Consistency: Medium degree. Coherence with international framework: Low or non-existent degree of coherence with concept and definitions used in UN-FC and UN-SEEA</p>	<p>Statistics regarding physical quantities of solid fossil fuels (coal) is kept at the Ministry of Mining and Energy (Resources and Reserves of Mineral Raw Materials Balance), while production statistics is kept in Statistical Office of the Republic of Serbia(Statistical Yearbook). There are no data for AP Kosovo and Metohija since 1999.</p>
Hard coal Reserves (balanced): 11 692 480 t	Available	<p>(1) Public Enterprise for Underground Coal Exploitation - Resavica (www.jppeu.rs) Book of reserves (in Serbian)</p>		
Brown coal Reserves (balanced): 76 743 120 t	Available	<p>(1) Public Enterprise for Underground Coal Exploitation- Resavica (www.jppeu.rs) Book of reserves (in Serbian)</p>		
Brown coal-lignite Reserves (balanced): 259 956 869 t	Available	<p>(1) Public Enterprise for Underground Coal Exploitation- Resavica (www.jppeu.rs) Book of reserves(Serbian)</p>		
Lignite	Available	<p>(1) RB Kolubara Lazarevac (www.rbkolubara.rs)</p>		

Reserves (balanced) 2 614 812 412 t		(2) Te-Ko Kostolac (www.kostolac.rs) Book of reserves (in Serbian)		
Oil and natural gas Total (geological) reserves of oil and gas in AP Vojvodina are 186,36 10 ⁶ t EN, of which balanced reserves make 40,54 x10 ⁶ t EN. (t EN= ton of equivalent oil that has caloric power of 41 660 kJ).	Available	(1) Statistical Office of the Republic of Serbia (www.stat.gov.rs)--Statistical yearbook (Serbian/English) (2) Energy Secretariat AP Vojvodina; Ministry of Mining and Energy (www.mre.gov.rs)--Resources and Reserves of Mineral Raw Materials Balance (in Serbian) (3) Business entity: (1) „Naftna industrija Srbije” a.d. (www.nis.rs) Book of reserves (in Serbian)	Timeliness: No delays. Frequency: Month, 6 months, year. Time series: permanent, from 1 st quarter and from July 1 st current year. Coverage: Significant gaps (during NATO bombing of Serbia, 1999) Accessibility: High and medium. Interpretability: No. Transparency: Yes. Accuracy: Yes. Consistency: Medium degree. Coherence with international framework: Low or non-existent degree of coherence with concept and definitions used in UN-FC and UN-SEEA	Statistics regarding physical quantities of oil and natural gas is kept at the Ministry of Mining and Energy (Resources and Reserves of Mineral Raw Materials Balance), while production statistics is kept in Statistical Office of the Republic of Serbia (Statistical Yearbook). “Naftna industrija Srbije” a.d. Novi Sad is the only company that has research and production of oil and gas in Serbia.
Geothermal energy (1) Total output of all natural geothermal sources is: 4000 l/s (2)110 Geothermal well = 158 MW (3) Geothermal energy 215 TJ	Available	(1) Statistical Office of the Republic of Serbia (www.stat.gov.rs)--Statistical yearbook (Serbian/English) (2) Ministry of Mining and Energy (www.mre.gov.rs) Resources and Reserves of Mineral Raw Materials Balance(Serbian)	Timeliness: No delays. Frequency: Month, 6 months, year. Time series: permanent, from 1 st quarter and from July 1 st current year. Coverage: Significant gaps (during NATO bombing of Serbia, 1999) Accessibility: High and medium. Interpretability: No. Transparency: Yes. Accuracy: Yes. Consistency: Medium degree. Coherence with international framework: Low or non-existent degree of coherence with concept and definitions used in UN-FC and UN-SEEA	Statistics regarding physical parameters of geothermal resources / energy is kept at the Ministry of Mining and Energy (Resources and Reserves of Mineral Raw Materials Balance), while production statistics is kept in Statistical Office of the Republic of Serbia (Statistical Yearbook).Availability is 215 TJ, while there are no production data (0%)

Geological reserves of energy resources (Million tEN)

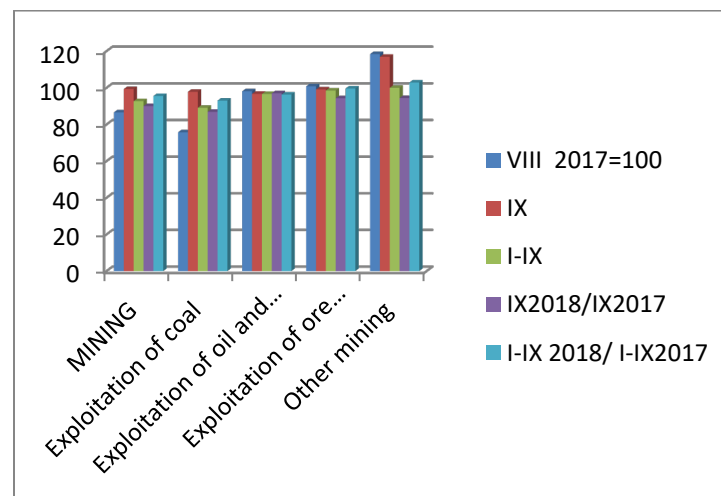
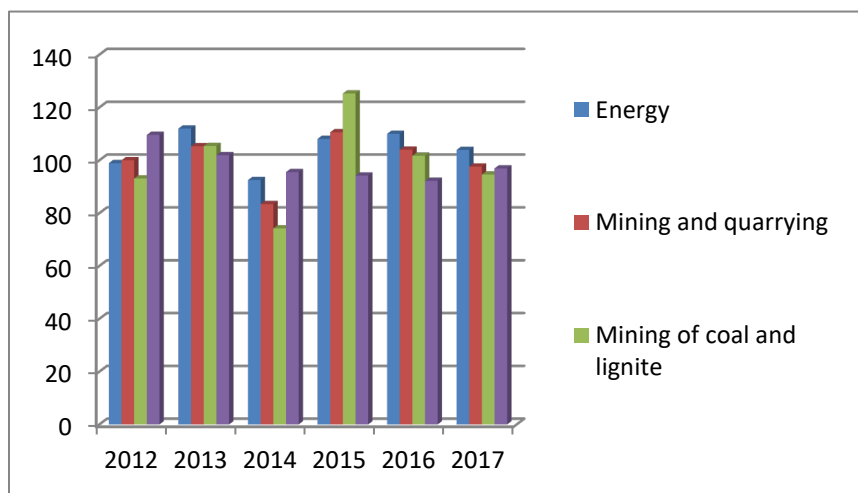
(Source: Energy Strategy of the Republic of Serbia to 2025 with the projections by 2030; Official gazette of the Republic of Serbia, No 101/2015).

Energy resources	Balanced and Out-balanced reserves	Total geological reserves
Hard coal	2.77	4.02
Brown coal	37.7	45.17
Brown-lignite	134.25	193
Lignite	1.583 (780*)	3.698
Oil	10.14	50
Natural gas	3.37	50

* There are no data for AP Kosovo and Metohija

Base indices of industrial production in 2012–2016; 2010 = 100; I-IX 2018/I-IX2017.

(Source: Statistical Yearbook, 2017/2018)



Annex B - Detailed review of quality of mineral reserve statistics

Statistic	Availability	Source	Quality assessment	Comment
Metals				
Lead–zinc ore, Reserves (balanced) 9 525 926 t	Available	<p>(1) Statistical Office of the Republic of Serbia (www.stat.gov.rs)--Statistical yearbook (Serbian/English)</p> <p>(2) Ministry of Mining and Energy (www.mre.gov.rs) Resources and Reserves of Mineral Raw Materials Balance (in Serbian)</p> <p>(3) Company:</p> <p>(1) Rudnik - Gornji Milanovac (www.contangorudnik.co.rs), Rudnik</p> <p>(2) Veliki Majdan near Ljubovija (https://ciklomen.com/veliki_majdan_sr.html),</p> <p>(3) Rudnik Grot, near Vranje (https://www.belex.rs/trgovanja/informato r/Grot),</p> <p>(4) Rudnik Lece near Medveđa (www.privredni.imenik.com/Imenik/rudnik_Lece-12740)</p> <p>(5) Bosilmetal near Bosilegrad (https://ciklomen.com(bosil-metal_sr) i dr. Book of reserves (In Serbian)</p>	<p>Timeliness: No delays.</p> <p>Frequency: Month, 6 months, year.</p> <p>Time series: permanent, from 1st quarter and from July 1st current year.</p> <p>Coverage: Significant gaps (during NATO bombing of Serbia, 1999)</p> <p>Accessibility: High and medium.</p> <p>Interpretability: No.</p> <p>Transparency: Yes.</p> <p>Accuracy: Yes.</p> <p>Consistency: Medium degree.</p> <p>Coherence with international framework: Low or non-existent degree of coherence with concept and definitions used in UN-FC and UN-SEEA</p>	There are no data for AP Kosovo and Metohija since 1999.
Copper ore, Reserves (Balanced) 1 343 870 901 t	Available	<p>(1) Statistical Office of the Republic of Serbia(www.stat.gov.rs)--Statistical yearbook (Serbian/English)</p> <p>(2) Ministry of Mining and Energy (www.mre.gov.rs) Resources and Reserves of Mineral Raw Materials Balance(in Serbian)</p> <p>(3) Business entities / companies:</p> <p>(1) Copper mines Bor (RBB) and Majdanpek Mine(https://rtb.rs), Book of reserves (in Serbian)</p>	<p>Timeliness: No delays.</p> <p>Frequency: Month, 6 months, year.</p> <p>Time series: permanent, from 1st quarter and from July 1st current year.</p> <p>Coverage: Significant gaps (during NATO bombing of Serbia, 1999)</p> <p>Accessibility: High and medium.</p> <p>Interpretability: No.</p> <p>Transparency: Yes.</p> <p>Accuracy: Yes.</p> <p>Consistency: Medium degree.</p> <p>Coherence with international framework: Low or non-existent degree of</p>	

			coherence with concept and definitions used in UN-FC and UN-SEEA	
Non-metals/Industrial minerals				
Formed marble and granite blocks, Total reserves 837 169 272 m ³	Available	<p>(1) Statistical Office of the Republic of Serbia (www.stat.gov.rs)--Statistical yearbook (Serbian/English)</p> <p>(2) Energy Secretariat AP Vojvodina; Ministry of Mining and Energy (www.mre.gov.rs) Resources and Reserves of Mineral Raw Materials Balance(in Serbian)</p> <p>(3) Business entities / companies: (1) "Omya Venčac" Aranđelovac (www.omya.com/rs-sr) (2) "Aranđelovac Granit Bukovik" Aranđelovac (https://www.poslovnivodvic.com) (3) AD "Ukras" Novi Pazar (info@adukras.com.) (www.adukras.com/) (4) "Granitpeščar" Ljig (www.granit.rs/) (5) "Ploče" doo Aranđelovac (www.plocedoo.rs/o_nama.html)</p> <p>Book of reserves (in Serbian)</p>	<p>Timeliness: No delays. Frequency: Month, 6 months, year. Time series: permanent, from 1st quarter and from July 1st current year. Coverage: Significant gaps (during NATO bombing of Serbia, 1999) Accessibility: High and medium. Interpretability: No. Transparency: Yes. Accuracy: Yes. Consistency: Medium degree. Coherence with international framework: Low or non-existent degree of coherence with concept and definitions used in UN-FC and UN-SEEA</p>	There are no data for AP Kosovo and Metohija since 1999.
Natural sand, Reserves (balanced) 167 871 m ³	Available	<p>(1) Statistical Office of the Republic of Serbia (www.stat.gov.rs)--Statistical yearbook (Serbian/English)</p> <p>(2) Energy Secretariat AP Vojvodina; Ministry of Mining and Energy (www.mre.gov.rs) Resources and Reserves of Mineral Raw Materials Balance(in Serbian)</p> <p>(3) Business entity / company: (1) "Geoinženjering" Niš (https://geoinzenjering-nis.ls.rs)</p>	<p>Timeliness: No delays. Frequency: Month, 6 months, year. Time series: permanent, from 1st quarter and from July 1st current year. Coverage: Significant gaps (during NATO bombing of Serbia, 1999) Accessibility: High and medium. Interpretability: No. Transparency: Yes. Accuracy: Yes. Consistency: Medium degree.</p>	There are no data for AP Kosovo and Metohija since 1999.

		Book of reserves (in Serbian)	Coherence with international framework: Low or non-existent degree of coherence with concept and definitions used in UN-FC and UN-SEEA	
Round pebbles, gravel, crushed and broken stone, Total reserves 1 763 017 888 t	Available	(1) Statistical Office of the Republic of Serbia (www.stat.gov.rs)--Statistical yearbook (Serbian/English) (2) Energy Secretariat AP Vojvodina; Ministry of Mining and Energy (www.mre.gov.rs)Resources and Reserves of Mineral Raw Materials Balance(in Serbian) (3) Business entities: (1) (1) “USSB-Kučevo” Kučevo (https://www.ekapija.com/company/65064/osnovni-podaci) (2) Strabag Se –Strabag Serbia, Beograd (www.strabag.com/.) (3) JP Surcin – Surcin, Beograd (www.jpsurcin.org.rs/) (4) Zorka alas kamen doo. Novi Sad (www.kompanije.net/Srbija/zorkaalaskamen/117288) (5) (6) Borverkdoo Lajkovac (https://search.bisnode.rs/rs/86211/borverk-doo-lajkovac) (7) Putevi Užice (www.puteviuzice.com) (8) Kamenolom Kijevo Beograd (www.kijevo.rs) (9) Beaz Plus Arandelovac (www.beazplus.rs/sr/) (10) Ingrap Omni Beograd (www.ingrapomni.rs/kontakt) (10)(11) Teko Mining Batočina (https://www.tekomining.com/)	Timeliness: No delays. Frequency: Month, 6 months, year. Time series: permanent, from 1 st quarter and from July 1 st current year. Coverage: Significant gaps (during NATO bombing of Serbia, 1999) Accessibility: High and medium. Interpretability: No. Transparency: Yes. Accuracy: Yes. Consistency: Medium degree. Coherence with international framework: Low or non-existent degree of coherence with concept and definitions used in UN-FC and UN-SEEA	There are no data for AP Kosovo and Metohija since 1999
		Book of reserves (in Serbian)		
Clay and kaolin,	Available	(1) Statistical Office of the Republic of Serbia	Timeliness: No delays.	

132 956 138 t		<p>(www.stat.gov.rs)--Statistical yearbook (Serbian/English)</p> <p>(2) Energy Secretariat AP Vojvodina; Ministry of Mining and Energy (www.mre.gov.rs) Resources and Reserves of Mineral Raw Materials Balance (in Serbian)</p> <p>(3) Business entities / companies:</p> <p>(1) AD “Kaolin” Valjevo (www.kaolin.co.rs/index-5.html)</p> <p>(2) “Alas holding” ad Novi Sad (https://www.ekapija.com/en/company/vie w?id=101202)</p> <p>(3) “SlogaIGM”, Novi Pazar (www.slogaigm.rs/)</p> <p>(4) (5) IGM Mladost Leskovac (https://mladost.co.rs/sr/kontakt/)</p> <p>(6) Novovic doo Bukovik, Arandjelovac (www.novovic.rs/)</p> <p>(6) (7) AD “Kopovi” Ub (“Belorečki pešćar”, “Srbokvarc”) (https://www.ekapija.com/.../nemacki-kvarcverke-preuzeo-akcije-kompanije-jugo-kaol...)</p> <p>Book of reserves (in Serbian)</p>	<p>Frequency: Month, 6 months, year. Time series: permanent, from 1st quarter and from July 1st current year. Coverage: Significant gaps (during NATO bombing of Serbia, 1999) Accessibility: High and medium. Interpretability: No. Transparency: Yes. Accuracy: Yes. Consistency: Medium degree. Coherence with international framework: Low or non-existent degree of coherence with concept and definitions used in UN-FC and UN-SEEA</p>	
Cement raw materials 454 581 727 t	Available	<p>(1) Statistical Office of the Republic of Serbia (www.stat.gov.rs)--Statistical yearbook (Serbian/English)</p> <p>(2) Energy Secretariat AP Vojvodina; Ministry of Mining and Energy (www.mre.gov.rs) Resources and Reserves of Mineral Raw Materials Balance (in Serbian)</p> <p>(3) Business entities / companies:</p> <p>(1) “Titan Cementara” Kosjerić (www.titan.rs)</p>	<p>Timeliness: No delays. Frequency: Month, 6 months, year. Time series: permanent, from 1st quarter and from July 1st current year. Coverage: Significant gaps (during NATO bombing of Serbia, 1999) Accessibility: High and medium. Interpretability: No. Transparency: Yes. Accuracy: Yes. Consistency: Medium degree. Coherence with international framework: Low or non-existent degree of</p>	There are no data for AP Kosovo and Metohija since 1999.

		<p>(2) “CRH” Popovac (www.crhserbia.com/kontakt)</p> <p>(3) “Lafarge Srbija” Beočin (www.lafarge.rs)</p> <p>Book of reserves (in Serbian)</p>	coherence with concept and definitions used in UN-FC and UN-SEEA	
Quartz raw materials Reserves(balanced) 112 928 654 t	Available	<p>(1) Statistical Office of the Republic of Serbia (www.stat.gov.rs)--Statistical yearbook (Serbian/English)</p> <p>(2)Ministry of Mining and Energy (www.mre.gov.rs) Resources and Reserves of Mineral Raw Materials Balance (in Serbian)</p> <p>(3) Business entities / companies:</p> <p>(1) (1) AD “Kopovi” Ub (“Belorečki pešćar”, “Srbokvarc”) (https://www.ekapija.com/.../nemacki-kvarcverke-preuzeo-akcije-kompanije-jugo-kaol...)</p> <p>(2) AD “Kaolin” Valjevo (www.kaolin.co.rs/index-5.html)</p> <p>(3) (3) “Leon” doo Ub (https://www.ekapija.com/company/view?id=1113)</p> <p>(4) (4) “USSB-Kučevo” Kučevo (https://www.ekapija.com/company/65064/osnovni-podaci)</p> <p>(5) “Kolubara Građevinar” d.o.o. info@kglgrad.com</p> <p>(6) AD Rudnik Nemetala Valjevo (www.mojakompanija.com/rudnik-nemetala/)</p> <p>(7) “Onjeg Brajkovac” (https://www.ekapija.com/company/65064/osnovni-podaci)</p> <p>Book of reserves (in Serbian)</p>	<p>Timeliness: No delays.</p> <p>Frequency: Month, 6 months, year.</p> <p>Time series: permanent, from 1st quarter and from July 1st current year.</p> <p>Coverage: Significant gaps (during NATO bombing of Serbia, 1999)</p> <p>Accessibility: High and medium.</p> <p>Interpretability: No.</p> <p>Transparency: Yes.</p> <p>Accuracy: Yes.</p> <p>Consistency: Medium degree.</p> <p>Coherence with international framework: Low or non-existent degree of coherence with concept and definitions used in UN-FC and UN-SEEA</p>	There are no data for AP Kosovo and Metohija since 1999
Ecological minerals (zeolite, sepiolite) Reserves	Available	<p>(1) Statistical Office of the Republic of Serbia (www.stat.gov.rs)--Statistical yearbook (Serbian/English)</p>	<p>Timeliness: No delays.</p> <p>Frequency: Month, 6 months, year.</p>	

730 219 t		<p>(2) Ministry of Mining and Energy (www.mre.gov.rs) Resources and Reserves of Mineral Raw Materials Balance (in Serbian)</p> <p>(3) Business entities/ companies: (1) Geological Survey of Serbia (ww.gzs.rs) (2) Zeo World d.o.o. Beograd www.11811.rs/.../ZEO-WORLD-DOO-BEOGRAD/.../F426A7D9922CB1B39F90434. (3) Intercer doo Beograd https://www.ekapija.com/company/145414/osnovni-podaci</p>	<p>Time series: permanent, from 1st quarter and from July 1st current year. Coverage: Significant gaps (during NATO bombing of Serbia, 1999) Accessibility: High and medium. Interpretability: No. Transparency: Yes. Accuracy: Yes. Consistency: Medium degree. Coherence with international framework: Low or non-existent degree of coherence with concept and definitions used in UN-FC and UN-SEEA</p>	
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Industrial products in the Republic of Serbia (Source: Statistical Yearbook, 2017)

