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UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Ulaanbaatar City Group on Statistics for Economies Based on Natural Resources

Proceedings of the Third Meeting of the Steering Committee

RESEARCH, STATISTICS AND INDUSTRIAL POLICY BRANCH

Ulaanbaatar City Group on Statistics for Economies Based on Natural Resources

Proceedings of the Third Meeting of the Steering Committee

6-8 August 2014
Vienna, Austria

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna, 2015

ACKNOWLEDGEMENT

This publication has been prepared by Valentin Todorov from the Statistics Unit at the United Nations Industrial Development Organization (UNIDO). Summaries of the presentations were drafted and the final editing was done by Ascha Pedersen, consultant to UNIDO. The graphical layout and cover design was done by Dina Dragoshinska with voluntary design contributions by Marta Todorova. The publication was reviewed and amended as necessary by the UNIDO publications committee chaired by Ludovico Alcorta.

Contributions to the publication were made by the meeting participants, i.e. national statistical offices, international agencies, namely the International Monetary Fund (IMF) and the Gulf Organization for Industrial Consulting (GOIC), as well as by UNIDO. A list of participants is included in the publication.

Special thanks go to Jürgen Muth, Raphaela Wirth, Kateryna Gumeniuk, Liliya Kirchberger, Regina McFerren, and Shohreh Mirzaei from the Statistics Unit who provided great support in organizing and conducting the meeting.

PREFACE

As the world's natural resources continue to decay and the environmental challenges deepen, the need to develop viable solutions for resource efficient industrial production becomes increasingly critical if the high and rising global demand for energy is to be met. Moreover, with the changing global geography, new or expanding centers of economic growth, trade and production are being formed. This necessitates the realization of smart infrastructure networks to easily and efficiently allocate energy where needed, while simultaneously securing decent work opportunities and safeguarding the environment.

Developing strong country-level statistical data and indicators to monitor trends in the mining industry are key to coping with these challenges. Standardized approaches to measuring activities and investments in the mining industry as well as assessing the industry's contribution to the overall economy and impact on society and the environment will be invaluable to the process towards sustainable global industrial consumption and production. The Ulaanbaatar City Group's work to establish guidelines on best statistical practices and methodologies for economies based on natural resources is an important step in this direction.

It is a key mandate of UNIDO to collect and disseminate general industrial statistics data covering activities within the mining and quarrying sector as well as the manufacturing and energy production (electricity, gas and water) sectors. In December 2013, at its General Conference in Lima and as part of the Lima Declaration, UNIDO was given the mandate to monitor the progress made in "inclusive and sustainable industrial development" (ISID). Within this context, UNIDO works together with Member States and international organizations to define and develop new statistical indicators.

The third meeting of the steering committee of the Ulaanbaatar City Group, from 6-8 August 2014 in Vienna, Austria, focused on the processes needed to produce the "Handbook for Compiling Statistics for Economies Based on Natural Resources" and the Group's forward work plan for 2015. The meeting coincided with the launch of the third edition of UNIDO's 'World's Statistics on Mining and Utilities', which provides key data from the mining sector across a large set of countries.

These proceedings present the organizational matters surrounding the Ulaanbaatar City Group meeting and summarize the presentations and papers presented during its course.

Dear colleagues,

On behalf of UNIDO, I welcome you all to the Third Meeting of Steering Committee of the Ulaanbaatar City Group on Statistics of economies based on natural resources. The Group was constituted by the UN Statistics Commission with the mandate to play a leading role in developing methodological and practical guidelines in order to rationally track mining industry activities and its impact on other social sectors and the environment.

In response to the increasing demand from data users on economic activities based on natural resources, UNIDO has started publishing the World Statistics on Mining and Utilities since 2010. This meeting has coincided with the release of the 2014 edition of this publication, which presents the data on such important sectors related to natural resources as production of coal and crude petroleum, iron and non-ferrous metal ores and extraction of other mineral resources.

Natural resources serve as major input to manufacturing. However, as you are aware, these resources are sparsely located over the world but the demand is high in all countries. Developing and emerging industrial economies have faced the challenges in supply chain of essential input to growing manufacturing industry. Production and supply of mineral resources requires costly network of infrastructures. It adds to the high cost of industrial production. Therefore, UNIDO promotes resource efficient production, which not only reduces the cost of production but also limits impact of industrial production on environment. Our Member States provided us with a new mandate for "Inclusive and Sustainable Industrial Development" in the Lima Declaration adopted last December in Lima. In this context, we help the Nations to sustainable development.

Statistics related to economies based on natural resources will provide us with important information to show the linkages between resources and final products. We will be able to measure the level and trend of resource efficiency and demonstrate the best practices.

To start this process we need a harmonized and internationally recognized set of indicators and recommendations for their compilation. Therefore, the work being carried out by this group is very important for further development of our statistical activities in this direction. UNIDO has been and continues to be an active participant in the work of the Ulaanbaatar City Group and it is our great pleasure to welcome you here in Vienna.

In closing, my sincere appreciation goes to two lead agencies namely- the Australian Bureau of Statistics and the National Statistics Office of Mongolia for accepting the proposal of UNIDO Statistics to host the third meeting of Steering Committee in Vienna. I sincerely hope that today's meeting turns out to be a fruitful one.

I wish you every success in your work and a pleasant stay in Vienna.

Taizo Nishikawa
Deputy to the Director General

PARTICIPANTS

Representatives of national statistical offices

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Paul Roberts, Director, National Accounts Branch, Australian Bureau of Statistics
Bruce Hockman, First Assistant Statistician, Business, Industry and Environment Statistics Division, Australian Bureau of Statistics

CHINA
Yingting Chen, Senior Program Officer, Department of Industrial Statistics, National Bureau of Statistics of China

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Dong Guo, Statistician, Technical Cooperation Programme, Statistics Unit
Rita Lang, Statistical Assistant, Statistics Unit

MEETING PROGRAM

Venue: Conference Room VI, C Building
UNIDO Headquarters, Vienna International Centre, Wagramerstrasse 5, P.O. Box 300,
A-1400 Vienna, Austria

WEDNESDAY, 6 AUGUST

09:00 – 09:30 REGISTRATION

09:30 – 10:30 OPENING OF THE CONFERENCE
session chaired by Ludovico Alcorta, UNIDO

Opening speech by: Taizo Nishikawa, UNIDO
Welcome remarks by: Shyam Upadhyaya, UNIDO
Badamtsetseg Batjargal, NSO, Mongolia
Bruce Hockman, ABS, Australia
Roundtable introductions

10:30 – 11:00 KEYNOTE ADDRESS: STATISTICAL INDICATORS AT UNIDO
Presentation by Shyam Upadhyaya and Valentin Todorov, UNIDO

11:00 – 11:30 Break

11:30 – 12:45 SESSION 1: COUNTRY PROGRESS REPORTS
session chaired by Bruce Hockman, Australian Bureau of Statistics
and Badamtsetseg Batjargal, National Statistical Office, Mongolia

Presentations by: Altantsetseg Sodnomtseren, National Statistical Office, Mongolia 'Progress Report of UBCG'
Raul Figueroa Díaz, National Institute of Statistics and Geography, Mexico
'Impact of Mining on the Economic, Social and Environmental Issues in Mexico'

12:45 – 14:00 Lunch

14:00 – 15:00 SESSION 1 (CONTINUED)
Presentations by: Dina Suleimanova, International Communications Division, Agency on Statistics of the Republic of Kazakhstan
'Influence of Mining on the Economy of Kazakhstan'
Yingting Chen, National Bureau of Statistics of China
'China's Statistical Work on the Mining Industry'

15:00 – 15:30 Break

15:30 – 16:00 SESSION 1 (CONTINUED)
Wrap-up and discussion of Session 1
Moderated by: Badamtsetseg Batjargal, National Statistical Office, Mongolia

16:00 – 17:00 SESSION 2: ECONOMIC STATISTICAL INDICATORS
session chaired by Bruce Hockman, Australian Bureau of Statistics
and Badamtsetseg Batjargal, National Statistical Office, Mongolia

Presentations by: ErdenesanEldev-Ochir, National Statistical Office, Mongolia
'Impacts of the Mining Industry on the Economy of Mongolia'
Duong Nguyen Thuy Duong, General Statistics Office, Vietnam
'Mining Industry in Vietnam'

17:30 Reception at the Vienna International Center

THURSDAY, 7 AUGUST

09:00 – 10:30 SESSION 2 (CONTINUED)
session chaired by Bruce Hockman, Australian Bureau of Statistics
and Badamtsetseg Batjargal, National Statistical Office, Mongolia

Presentations by: Florina Tanase, IMF
'Global Standard Template to Collect Data on Government Revenues from Natural Resources: IMF Projects, Accomplishments, and Next Steps'
Badamtsetseg Batjargal, National Statistical Office, Mongolia
'Artisanal and Small-Scale Mining: A Case of Mongolia'
Paul Roberts, Australian Bureau of Statistics
'Impact of Mining on the Australian Economy'

10:30 – 11:00 Break

11:00 – 11:30 SESSION 2 (CONTINUED)
Wrap-up and discussion of Session 2
Moderated by: Bruce Hockman, Australian Bureau of Statistics

11:30 – 12:30 SESSION 3:SOCIAL STATISTICAL INDICATORS
session chaired by Bruce Hockman, Australian Bureau of Statistics
and Shyam Upadhyaya, UNIDO

Presentations by: Oyunbileg Delgersaikhan,
National Statistical Office, Mongolia
'Impact of the Mining Industry on the Social Sector of Mongolia'
Dina Suleimanova, International Communications Division,
Agency on Statistics of the Republic of Kazakhstan
'Mining Industry of Kazakhstan: Impact on Labor Market and Wages'

12:30 – 14:00 Lunch

14:00 – 16:00 Guided tour of Vienna International Centre

16:00 – 17:00 SESSION 3 (CONTINUED)
Presentation by: Paul Roberts, Australian Bureau of Statistics
'Measuring Subsoil Assets in Australia'

Wrap-up and discussion of Session 3
Moderated by: Shyam Upadhyaya, UNIDO

17:00 – 17:30 SESSION 4: ENVIRONMENTAL STATISTICAL INDICATORS
session chaired by Paul Roberts, Australian Bureau of Statistics
and Shyam Upadhyaya, UNIDO

Presentation by: Bruce Hockman, Australian Bureau of Statistics
'Environmental-Economic Accounting in Australia'

19:30 Conference dinner
Sponsored by: UNIDO and the National Statistical Office of Mongolia

FRIDAY, 8 AUGUST

09:00 – 10:30 **SESSION 4 (CONTINUED)**

session chaired by Bruce Hockman, Australian Bureau of Statistics
and Badamtsetseg Batjargal, National Statistical Office, Mongolia

Presentation by: Dina Suleimanova, International Communications Division, Agency on Statistics of the Republic of Kazakhstan 'Statistics in the Field of Environmental Protection in Kazakhstan'
Badamtsetseg Batjargal, National Statistical Office, Mongolia
'Harmony Between Environmental Indicators of UBCG and SEEA, FDES and the Post-2015 Development Agenda'

Wrap-up and discussion of Session 4
Moderated by: Paul Roberts, Australian Bureau of Statistics

10:30 – 10:45 Break

10:45 – 12:00 **SESSION 5:DISCUSSION ON GLOSSARY**

session chaired by Raul Figueroa Diaz, National Institute of Statistics and Geography, Mexico

Discussion will go through inclusions and definitions. Participants are asked to read Mexico's submission and prepare any additional material.

12:00 – 12:45 **SESSION 6: DISCUSSION ON HANDBOOK**

session chaired by Paul Roberts, Australian Bureau of Statistics

Discussion will focus on structure and what should be included. Participants will be asked to nominate, which sections they would be responsible for preparing.

12:45 – 14:00 Farewell lunch

14:00 – 15:30 **CLOSING SESSION**

session chaired by Badamtsetseg Batjargal,
National Statistical Office, Mongolia
and Bruce Hockman, Australian Bureau of Statistics

Update the Work Plan, including election of chairs, discussion of report to the United Nations Statistics Division

Wrap-up of the meeting
Moderated by: Bruce Hockman, Australian Bureau of Statistics
Closing speech by: Shyam Upadhyaya, UNIDO

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INTRODUCTION

Background and objectives

Formed in 2012, in the course of the 43rd session of United Nations Statistical Commission and as a joint initiative between Mongolia and Australia, the Ulaanbaatar City Group (UBCG) works to develop an internationally applicable methodology, practical guidelines and recommendations for the effective monitoring of the impacts of the mining sector on economic, social and environmental progress in countries.

The primary goals of the UBCG are to:

- Play a leading role in developing methodological, practical guidelines and recommendations on statistical measurements for economies based on natural resources, especially mineral resources, and to track and measure activities in the sector quantitatively and qualitatively; the latter in terms of the sector's contribution to the economy and impacts on the society and the environment. This is to be based "on best practices that ensure coverage, reliability, accuracy and relevance of statistical data to support the efforts made by countries with large mining sectors to implement the System of National Accounts 2008, the System of Environmental-Economic Accounting and the revised Framework for the Development of Environmental Statistics". [1]

- Serve as a platform for the exchange of experiences and best practices in national statistical offices and organizations in UBCG's member states and in international statistical organizations.

- Collaborate with the United Nations and its specialized agencies, such as UNIDO, on developing and improving statistical methodologies and standards for statistics on natural resources, especially mineral resources, and provide support in this area.

The global importance of the mining sector is what gives credence to the work of the UBCG. According to UNIDO's 2014 release of 'World Statistics on Mining and Utilities', a biannual publication, the combined contribution of these sectors to the global economy was estimated at 5.6 percent in 2013 at the world level. The impact of the sector – on the economy, on society and on the environment – is part of the value chain and footprint of manufacturing to which it delivers material and energy input. As manufacturing continues to recover in many countries, the demand of such inputs worldwide will increase. Even though the depletion of mineral resources has reduced the current and potential production of mineral products, the sector still has a dominant role in several developing economies. Developing internationally harmonized methodologies and practices for monitoring and assessing the activities in the sector is crucial to secure a sustainable development within the sector.

[1] United Nations Economic and Social Council, 2011. Joint report of Mongolia and Australia on the establishment of an Ulaanbaatar group on statistics for economies based on natural resources. Statistical Commission. Forty-third session, 28 February-2 March 2012.

Third Steering Meeting of the UBCG

The UBCG has held two Steering Committee meetings, which set the framework of the UBCG and the course and formats of its work. They also defined a standard set of indicators for data collection, and made progress towards developing a methodology and practical recommendations for the assessment of the impact of the mining sector on the economy, the society and the environment using official national statistics.

Based on the outcomes of the preceding meetings, a key focus of the third meeting was on the progress made by member countries to implement the agreed upon methodologies as well as assessments of the contribution of the mining sector to the economy and its social and environmental impacts.

The meeting was divided into seven sessions during which the Steering Committee reviewed and discussed activities carried out by the UBCG till date. Topically, Session 1 focused on country practices related to measuring, monitoring and reporting economic, social and environmental impacts of the mining sector. Presentations by country representatives covered conceptual and methodological issues and particularly focused on defining, classifying and establishing a framework of indicators for mining sector statistics, as well as on developing estimation methodologies. Sessions 2-4 were devoted to country experiences in assessing the impact of the mining sector on the economy, the society and the environment using national (official) statistics, and to evaluating the methodologies applied to this end. A subject of discussion was also how to expand on current official estimates. In Session 5, a glossary of terms to be included in the Handbook was presented. Progress on the Handbook, one of the UBCG's key outcomes, was presented in Session 6, which till date includes agreement on the Handbook's structure and which countries are to take the lead in developing each chapter of the Handbook. Finally, during the Closing Session, participating countries would commit themselves to contributing to various chapters and other tasks related to the development of the Handbook.

UNIDOs contribution

At UNIDO, the Statistics Unit fulfills a number of tasks to facilitate the development of globally sound industrial statistics. Its collection, storage and processing of industrial statistics resulted not only in the establishment of comprehensive industrial databases available to the international community, but also led to the publication of the International Yearbook of Industrial Statistics, which for the last 20 years has provided economists, planners, policymakers and business people around the world with international statistics on current levels, structures and trends in the manufacturing sector. UNIDO's close contact with NSOs has led to an increased volume of industrial statistics, enhancing both the databases and the yearbook.

Following the good experience with the International Yearbook of Industrial Statistics, and in response to the increased interests from data users, UNIDO released its first biennial publication of the World Statistics on Mining and Utilities in 2010 which was followed by publications in 2012 and 2014. Today, users can obtain data on mining and utilities in electronic form through online access at http://stat.unido.org/ or by ordering the database on CD Rom. Similarly to the

databases on manufacturing, statistics on mining and utilities are compiled using data collected by UNIDO from national statistical offices as well as data obtained from the Organization for Economic Co-operation and Development covering its member countries. The main purpose of this publication is to provide internationally comparable statistics on major indicators in the mining and utilities sectors. Concepts and methods applied in this publication are fully compatible to those used in the International Yearbook of Industrial Statistics.

Furthermore, co-operation with other UN agencies and international organizations has resulted in a much wider use of industrial statistics such as increased connectivity between industrial and social development indicators. Similarly, work is ongoing to establish indicators that assist with the assessment of resource use by industry and its environmental impact with the objective to help countries reduce the negative influence on the environment. Finally, technical co-operation between UNIDO and its member countries contributes to an improved quality of data, additional information as well as enhancement of international comparability of data. Such statistical activities serve as essential tools for better policy-making.

By contributing to the UBCG, UNIDO saw an opportunity to learn from the practices and experiences of member states and international organizations to improve its statistical services as to continuously being able to contribute to defining the high-bar for international statistics.

Meeting outcomes

In the Closing Session, Mr. Roberts presented the first version of the handbook structure and allocation of leading country responsibilities for the handbook. The presentation was followed by discussions and the initial allocation of the Handbook chapters was agreed:

- Chapter 1: Australia
- Chapter 2: UNIDO, Russia
- Chapter 3: UNIDO, Mexico
- Chapter 4: UNIDO, Mexico
- Chapter 5: Mongolia Chapter 6: IMF, China
- Chapter 7: Kazakhstan, Vietnam, Madagascar
- Chapter 8: Kazakhstan, UNESCAP
- Chapter 9 & 10: Australia

Further in the Closing Session, based on discussions on the progress made till date and the various methodological challenges that the Group is likely to face in producing the Handbook (as suggested by the member state presentations), the Steering Committee agreed on the following tasks ahead:

- Prepare and submit the report of the third meeting of the Steering Committee to the UNSC;
- Finalization by end of August 2014 of a global standard template to collect data on government revenues
- Finalize the allocation of the Handbook's chapters to member countries, nominate a

lead country for each chapter and elaborate upon the details required for drafting the Handbook;
- Work on the glossary to be included in the Handbook, taking into consideration suggestions from members about additional terms that should be contained therein;
- Input provided to the Handbook by October 2014 with final deadline November 2014;
- Review and print all documents issued in respect of the meeting held in Vienna;
- Approve the 2015 plan of the Group and circulate it among members.

Moreover, the Steering Committee agreed on the date for its fourth meeting, which is to be held in Australia in September 2015. It also decided that the Expert Group is to have another videoconference on 9th or 10th of September at which the experts will discuss and exchange knowledge and experiences.

Finally, Bruce Hockman from the Australian Bureau of Statistics and Badamtsetseg Batjargal, from the National Statistical Office, Mongolia, were elected Chairs of the UBCG Steering Committee, and Paul Roberts, also from the Australian Bureau of Statistics, was elected Chair of the Expert Group.

3. MEETING SUMMARIES

OPENING

Welcoming Remarks and Keynote Address

Session chaired by Ludovico Alcorta, United Nations Industrial Development Organization

COMPILATION OF STATISTICAL INDICATORS FOR MINING AND QUARRYING: THE UNIDO EXPERIENCE

Shyam Upadhyaya, Chief Statistician
United Nations Industrial Development Organization
Austria, Vienna

Mining and quarrying within the scope of industrial statistics – IRIS 2008

The International Recommendations for Industrial Statistics, or IRIS 2008, refer to economic activities undertaken by all resident units in the reporting country that are engaged primarily in the following (ISIC) areas: a) Mining and quarrying, b) manufacturing, c) electricity, gas, steam and air conditioning supply, and d) water supply, sewerage, waste management and remediation activities.

Indicators compiled by UNIDO

UNIDO has produced statistical publications on manufacturing since 1995 and on mining and utilities since 2010. The primary source of data for these publications are annual or periodic industrial surveys, which are reported to UNIDO through general industrial statistics questionnaire. Most national statistical offices conduct industrial surveys in compliance with UN recommendations covering the above-mentioned ISIC areas. However, experience shows poor coverage for countries where mining industry data operation is separated from the national statistical system. Secondary sources (national or international) provide data on value added for mining and utilities.

Based hereupon, UNIDO compiles structural business statistics indicators at the 3-digit ISIC level for: number of establishments, number of employees, wages and salaries, gross output and value added. However, the following additional indicators, which are compiled for manufacturing, are not available for mining and utilities: gross fixed capital formation, share of female employees and annual production indices.

UNIDO also calculate a range of derived indicators for industrial production (e.g. value of total production), society (e.g. wage rates and women's participation in industrial activities), performance (e.g. productivity, structural change and competitiveness) and sustainable growth (e.g. energy intensity).

From the 2014 edition of UNIDO's 'Mining and Utilities', the following statistical figures on the state of the sector can be deducted. Figure 1 shows that the sector's value added growth was the highest in developing and emerging industrial economies, increasingly exceeding total world growth for the sector in the period 1990-2013. On the other hand, the growth rate for industrialized economies was less than the world total.

Despite the significant growth in production, the sector's share in the global economy is decreasing – also in developing and emerging industrial economies (see Figure 2).

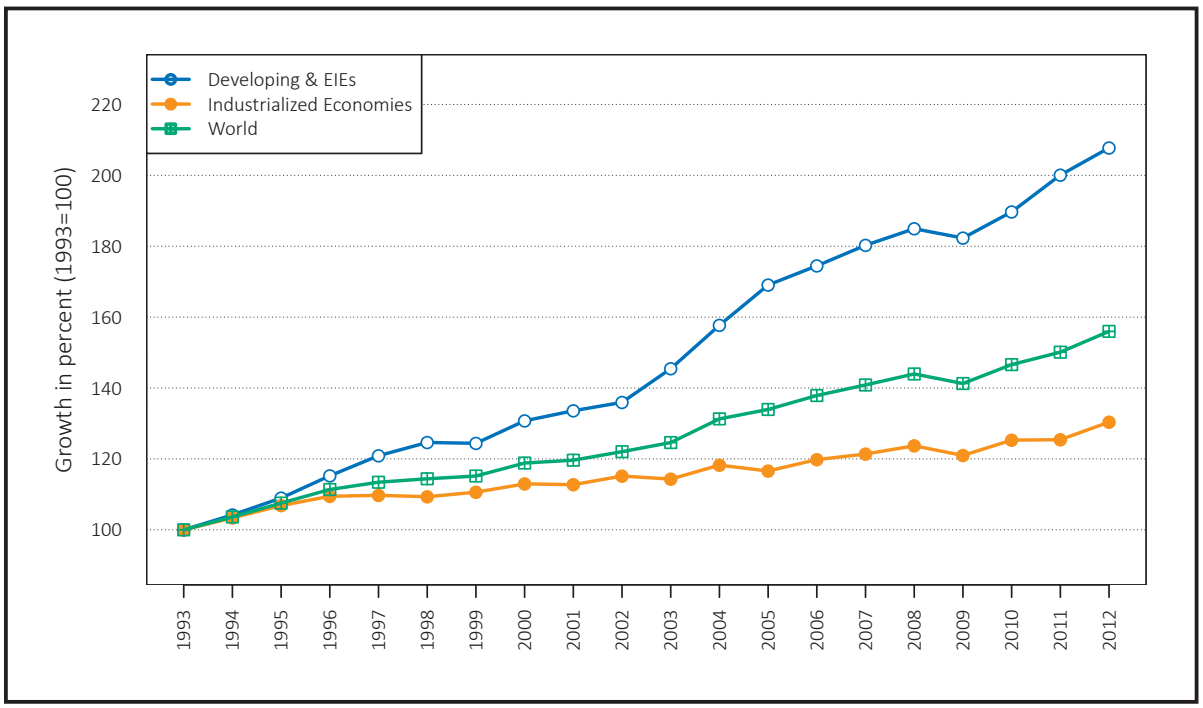


Fig. 1 | Growth of value added of mining and utility sectors at constant prices of 2005 (USD) since 1990

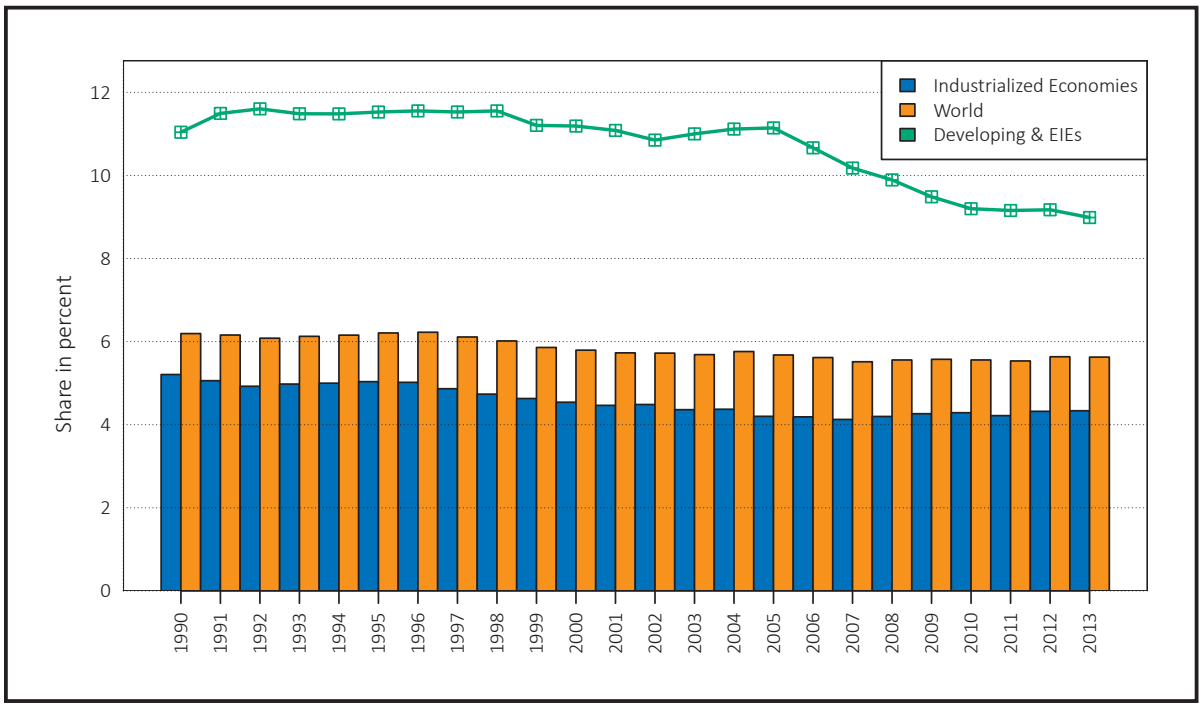


Fig. 2 | Share of value added of mining and utility sectors in GDP in percent

Limitations of the current UNIDO data collection program

Limitations of current international reporting mean that the above figures may not reflect sub-sector developments. UNIDO estimates indicate that the value added of mining and quarrying actually is in declining trend worldwide with some exceptions (CIS countries, Africa) due to depletion or phasing out policies. However, the demand for products in the utility sectors, especially electricity, gas and water supply, is growing everywhere as populations and businesses expand.

The limitations to data collection mainly has to do with the fact that value added for mining and utility sectors are combined in national accounts data, and that the UNIDO's current data collection program does not cover indicators related to other natural resources than mineral resources.

Table 1 | Scope of natural resources (SEEA-12) and UNIDO databases

Timber and aquatic resources	Mineral and energy resources	Soil resources	Water resources
Manufacture of wood products Manufacture of rubber products Processing and preserving of fish	Mining and quarrying; Refined petroleum products Electricity power generation Manufacture of gas; Distribution of gaseous fuels; Energy use data for all sectors	Land preparation for industrial works	Collection, purification and distribution of water

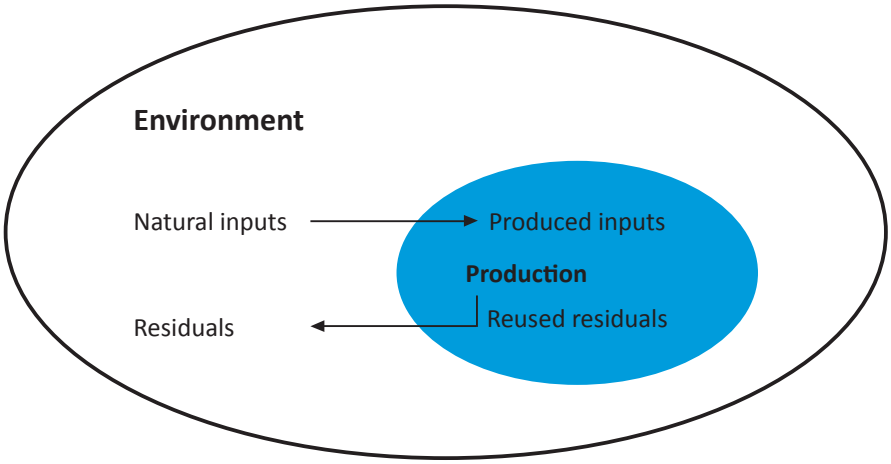


Fig. 3 | Physical flows in SEEA context

Table 1 captures the current scope of the international system of environmental economic accounting (SEEA-2012) and UNIDO's databases.

UNIDO's data captures the physical flow from material and energy input, through the production process, and towards the end product. In context of the SEEA, the physical flows can be illustrated as in Figure 3.

The figure reflects the new priorities to data collection, which are currently not included in UNIDO's program. In the SEEA, natural inputs are part of physical flows from environment to production, and are taken from the stock of natural assets. Thus, the physical flows to production have direct bearing on the change in stock of natural assets. Indicators related to such natural assets are increasingly used in concepts for the "green economy".

UNIDO's vision for SDG indicators

UNIDO's commitment to promoting a global green economy through inclusive and sustainable industrial development (ISID) is reflected in its effort to contribute to indicators that will measure the progress towards achieving the global sustainable development goals (SDG). Table 2 shows, which indicators UNIDO aims to contribute with.

Expectations from the UBCG

Progress towards more sustainable methods and processes in the mining and utilities sector is a key to achieving the SDGs. UNIDO hopes that the UBCG will result in:

- A comprehensive set of statistical indicators with underlying definitions that covers the different aspects of natural resources;
- Definition of the necessary data sources by aligning to the existing survey program as much as possible with concrete recommendations to the UN Statistics Commission;
- Agricultural statistics, industrial statistics and other statistical programs, especially SEEA;
- Implementation period with recommendations to raise awareness and undertake technical assistance program (seminars etc.).

Table 2 | UNIDO's vision for ISID and related statistical indicators

Economic growth	Increase value added of industrial sectors per capita
	Increase the share of developing countries in global industrial production
Social inclusiveness	Increase number of jobs in industry
	Reduce the gender gap in employment
	Reduce gender gap in wages
Environment	Reduce CO_2 emission from industrial processing
	Decrease resource intensity per unit of output
	Increase the share of renewables in energy mix used in industrial production

WORLD STATISTICS ON MINING AND UTILITIES 2014: AN ILLUSTRATIVE OVERVIEW

Valentin Todorov, Senior Management Information Officer
United Nations Industrial Development Organization
Austria, Vienna

Shyam Upadhyaya, Chief Statistician
United Nations Industrial Development Organization
Austria, Vienna

In recent years, the output of mining and utilities activities has grown at a modest rate, even in member countries of the Gulf Cooperation Council, who have been the major suppliers of petroleum products in the world market for many years. By contrast, the mining and utilities sector has gained growth momentum in CIS countries.

Figure 1 depicts the development of value added growth for country groups in the period 2000-2013. The booming years for developing countries and emerging industrial economies in 2002-2007 with an average growth rate of almost 6 percent was replaced with a more modest rate of 2.9 percent in 2008-2013. In the same period, the average growth rate for industrialized countries was 1.3 percent.

In parallel, the growth rate of value added in the mining and utilities sectors has been low. This can be explained by

1. a gradual depletion of mineral resources, which has reduced the growth potential of mineral products in many countries,
2. the value added in mining and quarrying sectors is declining in most industrialized countries.

Figure 2 shows how the share of mining and utilities in total GDP has been declining in developing as well as in industrialized countries between 1990 and 2013.
The bulk of value added in the mining and utilities sector is concentrated in a number of countries, especially the US and, in

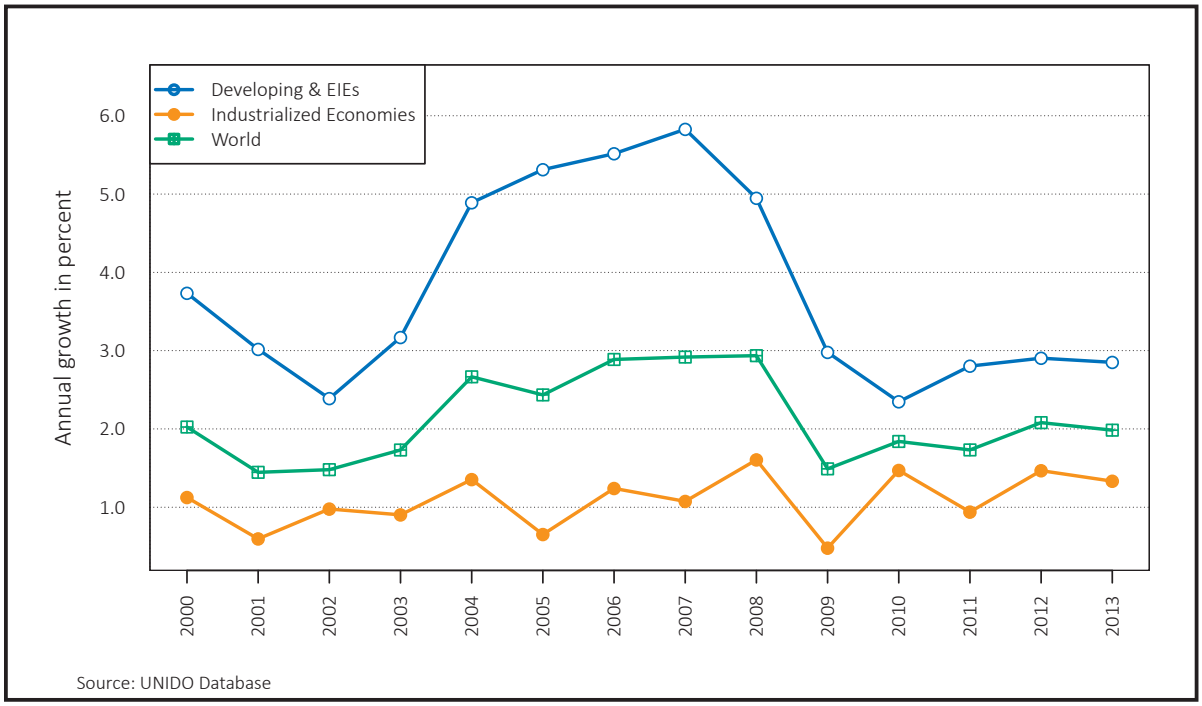


Fig. 1 | Average annual growth of value added in the mining and utilities sector, constant 2005 USD

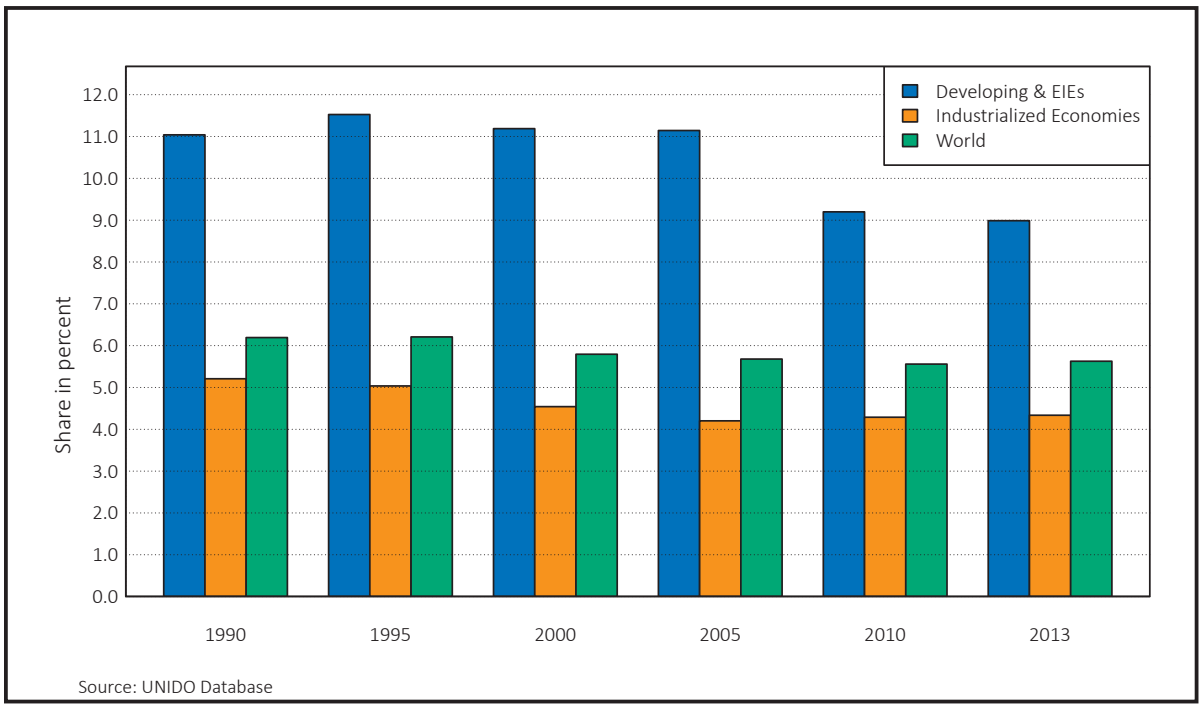


Fig. 2 | Share of valued added in the mining and utilities sectors in GDP, constant 2005 USD

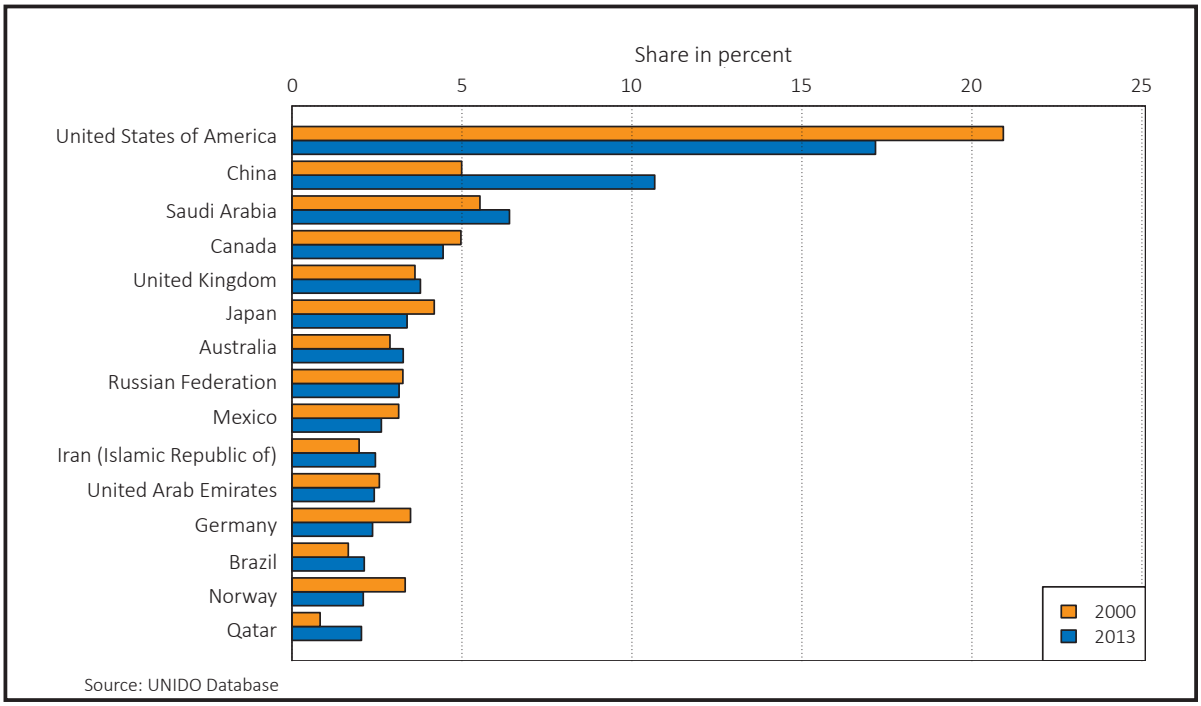


Fig. 3 | Share of major economies in world total value added in the mining and utilities sector, constant 2005 USD

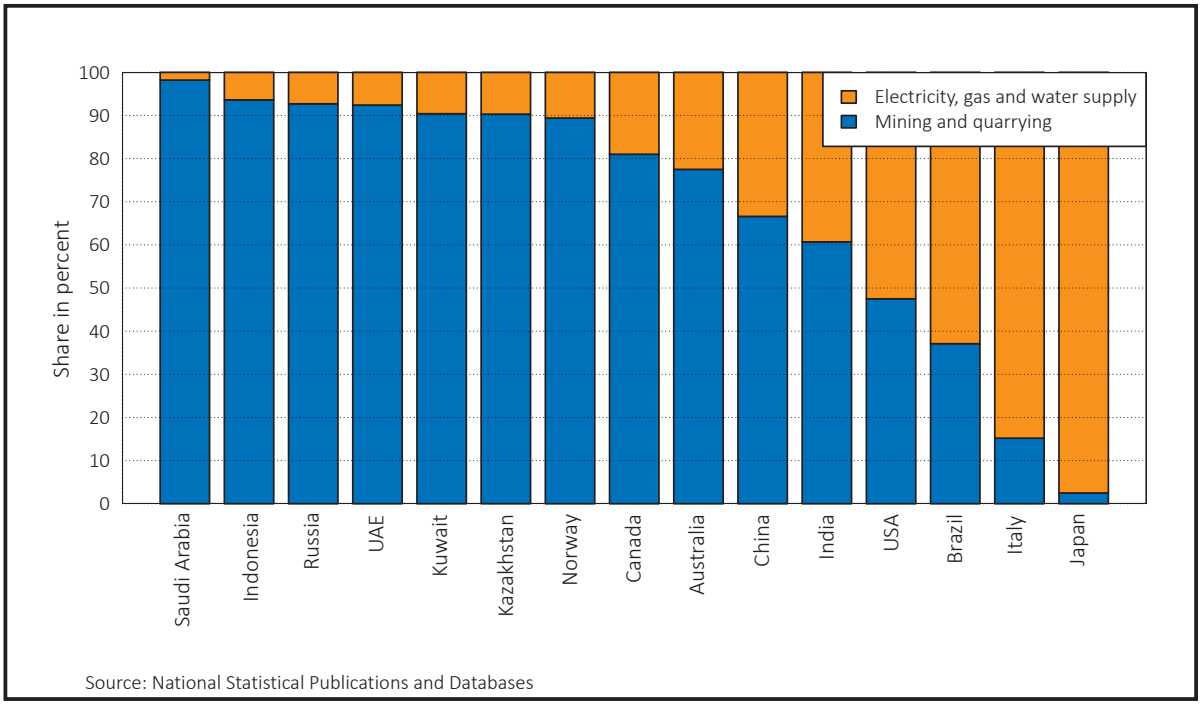


Fig. 4 | Share of value added generated from mining and quarrying and the supply of electricity, gas and water, current 2010 prices

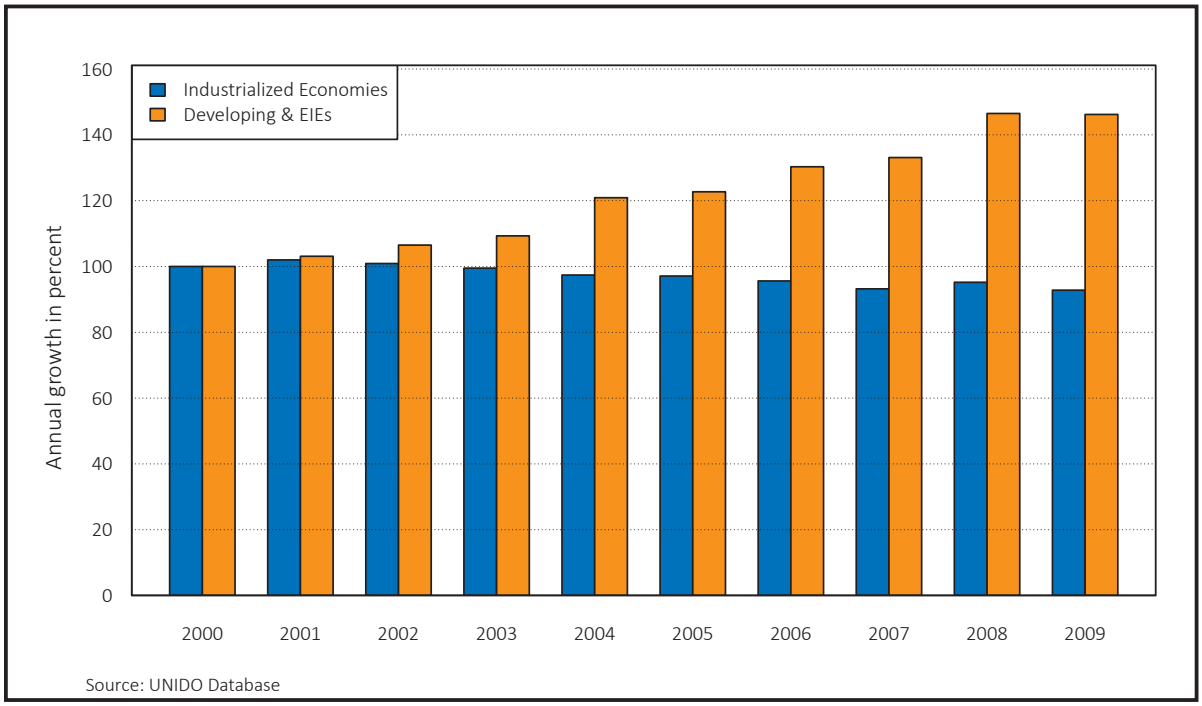


Fig. 5 | Growth of the number of employees in mining and quarrying by country group, 2000 = 100

recent years, China (see Figure 3). While the share of the US and other countries, such as Germany, Japan, Canada and Norway, in which the mining and utilities sector traditionally has been substantive, is declining, Saudi Arabia and other countries of the Gulf region are leaping forward. Today, Qatar, Kuwait, the United Arab Emirates, Norway and Brunei Darussalam top the ranks in terms of value added in the mining and utilities sector per capita.

Figure 4 provides some further insight into the relative weight of, respectively, mining and quarrying activities, and electricity, gas and water supply activities in these countries. The latter dominates the value added created in the mining and utilities sector in Japan, Italy, Brazil and the US.

The trends in value added of the mining and quarrying sector are reflected in the employment numbers (see Figure 5). In developing and emerging economies, the number of employees has grown by more than 40 percent between 2000 and 2009, while it has dropped in industrialized economies.

Similarly for the utilities sector, the demand for energy goods is rising in developing countries to support the fast growing manufacturing production. Together these developments are causing a shift in the distribution of world value added in the mining and utilities sector. As reflected in Figure 6, approximately 55 percent of all value adding in the sector took place in industrialized economies in 2013 again 70 percent in 1990.

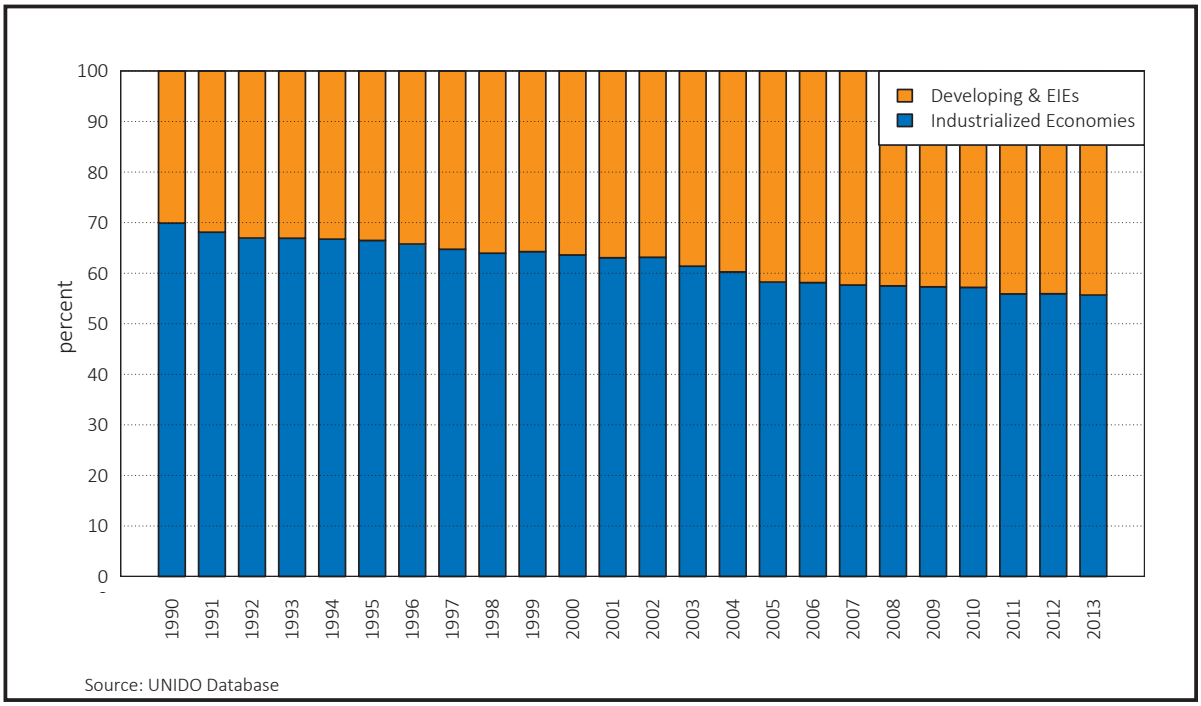


Fig. 6 | Distribution of world value added in the mining and utilities sector, by country group, constant 2005 USD

The mining and utilities sector is less sensitive to economic trends than other key sectors. Figure 7 shows the differences in value added fluctuations between 2005 and 2013, especially highlighting the growth-gap during the years of the global economic and financial crisis.

Access to UNIDO's data mining and utilities through the databases MINSTAT 2014- ISIC Revisions 3 and 4, is available for purchase online at http://stat.unido.org/. Figure 8 is a screenshot of the website on which data can be selected.

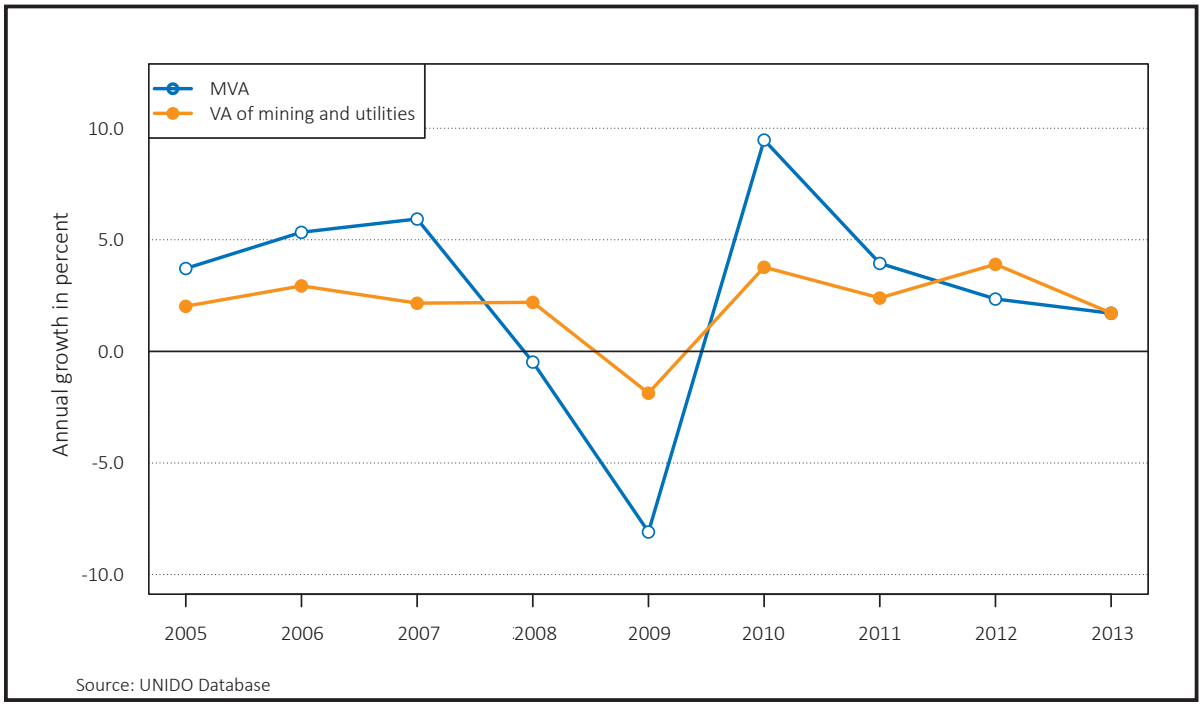
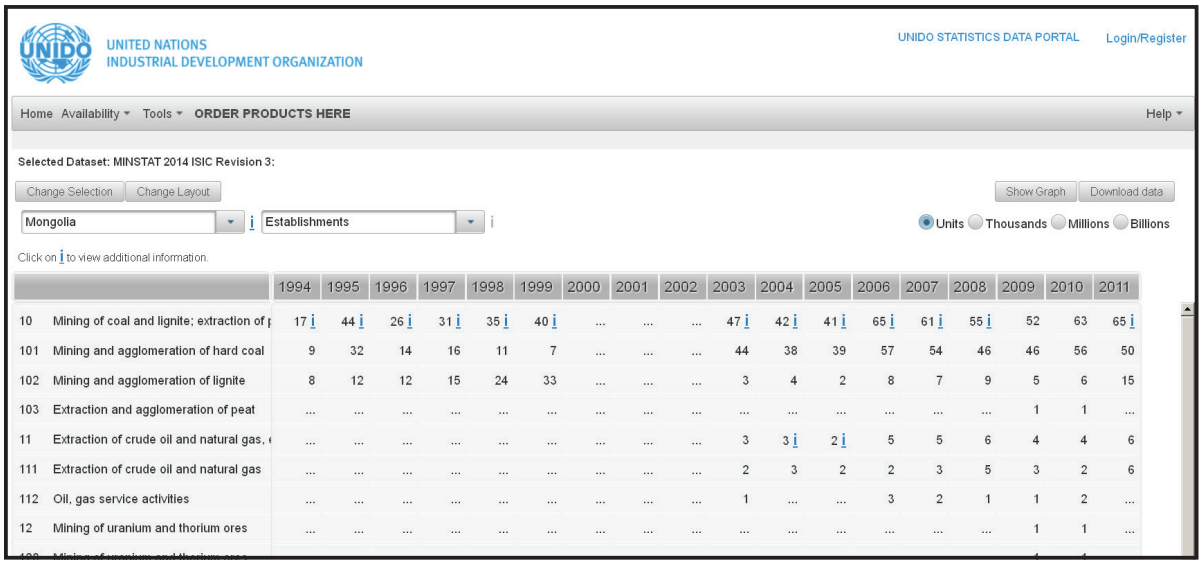


Fig. 7 | Annual growth of global value added of the mining and utilities sector and of manufacturing, constant 2005 USD



		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
10	Mining of coal and lignite; extraction of p	17 i	44 i	26 i	31 i	35 i	40 i	...	...	...	47 i	42 i	41 i	65 i	61 i	55 i	52	63	65 i
101	Mining and agglomeration of hard coal	9	32	14	16	11	7	...	...	...	44	38	39	57	54	46	46	56	50
102	Mining and agglomeration of lignite	8	12	12	15	24	33	...	...	...	3	4	2	8	7	9	5	6	15
103	Extraction and agglomeration of peat	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...
11	Extraction of crude oil and natural gas,	...	...	...	...	...	...	...	...	...	3	3 i	2 i	5	5	6	4	4	6
111	Extraction of crude oil and natural gas	...	...	...	...	...	...	...	...	...	2	3	2	2	3	5	3	2	6
112	Oil, gas service activities	...	...	...	...	...	...	...	...	...	1	...	...	3	2	1	1	2	...
12	Mining of uranium and thorium ores	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...

Fig. 8 | Screenshot of UNIDO's mining and utilities database 'MINSTAT 2014, ISIC Revision 3 and 4'

SESSION 1

Country Progress Reports

Session chaired by Bruce Hockman, Australian Bureau of Statistics
Badamtsetseg Batjargal, National Statistical Office, Mongolia

PROGRESS REPORT OF THE ULAANBAATAR CITY GROUP

Altantsetseg Sodnomtseren, Project Coordinator
National Statistical Office
Ulaanbaatar, Mongolia

Main activities of the UBCG since establishment

The UBCG was formed in New York in 2012 in the course of the 43rd session of United Nations Statistical Commission, and has had a dedicated side-event at each session in the subsequent years.

Since the Steering Committee and Export Group was established at the UBCG's first meeting in June 2013, several meetings have taken place. The Steering Committee has met three times (in Mongolia, Moscow and Vienna) and a fourth meeting is planned to take place in Australia in September 2015. While the Expert Group has only had one physical meeting, it has had six videoconferences.

The objectives of the last Steering Committee meeting in Moscow were to:

1. Develop a harmonized system of standard indicators for data collection;
2. Assess the impact of mining industry on the economy, the society and the environment;
3. Discuss indicator-related definitions and methodological issues;
4. Discuss the manual and work plan related issues. A key decision made on at the meeting was for the Committee to prepare a manual and decide on chapters to be included in it.

More details about the UBCG's work and progress can be found on its website http://web.nso.mn/ub_city_group/.

Activities by member countries and international organizations

Based on the decisions made and guidelines provided at the Moscow meeting, member countries and international organizations have undertaken various activities:

Mongolia
- Drafted a set of statistical indicators to measure mining impacts;
- Prioritized and elaborated certain definitions;
- Assessed indicators according to priority and data availability;
- Assessed the impacts of mining – particularly artisanal and small – scale mining – on the society and the economy while ensuring harmonization of UBCG-indicators with the SEEA.

Australia
- Taken on a leading role in the UBCG;
- Worked on the indicators and incorporated the country's activities on subsoil assets;
- Measured subsoil assets;
- Asses the impacts of mining on the economy;
- Improved on its environmental accounts.

Russia
- Shared work on definitions for natural resources and focused on specific classifications (CPC and classifications used in Russian energy statistics);
- Hosted Steering Committee meeting in Moscow.

Mexico
- Assessed indicators according to priority and data availability;
- Presented experiences of the country in terms of employment and environmental data compilation;
- Developed technical sheets for the reporting of the UBCG – defined indicators;
- Formulated a proposal on a glossary of terms to be included in the Handbook;
- Produced a country progress report (on the impact of mining on the economic, social and environmental sectors in Mexico).

India
- Elaborated the definitions of certain indicators;
- Assessed indicators according to priority and data availability.

Vietnam
Produced a country progress report (on the impacts of the mining industry in Vietnam).

China
Produced a country progress report (on the reform of and progress in China's statistical work on the mining industry).

Kazakhstan
- Produced a country progress report (development of the mining sector);
- Assessed the impact of mining on the country's economic development;
- Assessed the impact of mining on labor market and wages;
- Statistics in the field of environmental protection in the Kazakhstan.

UNIDO
- Contributed to the UBCG definition of indicators for mining and quarrying;
- Published the 2014 edition of 'Mining and Utilities' publication;
- Hosted the 3rd Steering Committee Meeting in Vienna, Austria.

UNESCAP
- Demonstrated extensive efforts to support the work of the UBCG;
- Interpreted the guidelines and definitions from the SNA 2008 and SEEA 2012 to use for the UBCG indicators.

IMF
work on Taxes on Natural Resources report.

Progress of Mongolia's national statistical office

In total, 232 indicators have been defined by the UBCG to measure the economic, social and environmental impacts of the mining sector. Table 1 shows the number of indicators defined for each dimension and their priority. The UBCG's commitment to reducing the environmental footprint of the sector is reflected by the fact that all environmental indicators have been given a high priority level.

Following a self-assessment, Mongolia has found that it currently is capable of producing 154 out of the 232 UBCG-defined indicators. Of these, 107 are economic indicators, 43 are social indicators and 4 are environmental indicators.

To estimate these indicators, Mongolia is using the following data sources: (Table 2) Data is also collected from the 'Extractive Industries Transparency Initiative'.

Table 1 | UBCG indicators, by priority level

	High priority	Medium priority	Low priority	Grand total
Economic	59	73	23	155
Social	25	22	8	55
Environment	22			22
Grand total	**106**	**95**	**31**	**232**

Conclusion

The National Statistical Office identifies the following tasks ahead:

- Definitions and estimation methodologies should be further elaborated and finalized;
- More data sources should be identified and developed;
- Need to conduct surveys to supplement data sources (e.g. a national wealth survey, and a special survey on occupational health);
- Accuracy and quality of data should be maintained;
- Ongoing mining site surveys should be completed in the near future;
- Selected papers should be further elaborated and completed according to the chosen format and design for the Handbook.

Table 2 | Data sources

Official statistics	Administrative data
National Accounts statistics	Customs' statistics (monthly, quarterly, annual)
GDP estimation (quarterly, annual)	Taxation
GNI	Mineral Resource Authority
Gross fixed capital formation	Ministry of Road and Transportation
SUT, IOT results	Ministry of Environment and Green Development
BOP statistics (annual, monthly)	Ministry of Economic Development
General government statistics (quarterly, annual)	Bureau of Standardization
Productivity statistics (monthly, annual)	Ministry of Health
Consumer price index statistics	Ministry of Education and Science
Housing price index	
Foreign investment registration statistics	
Vital statistics (annual report)	
Annual report of population and internal migration	
Surveys ◦ Enterprise survey in mining and quarrying, construction, transportation ◦ Investment survey (quarterly, annual) ◦ Enterprise survey in trade statistics (monthly, annual) ◦ Labour force survey ◦ Wage and salary survey ◦ Artisanal and small scale mining ◦ Mining site surveys	

IMPACT OF MINING ON THE ECONOMIC, SOCIAL AND ENVIRONMENTAL ISSUES IN MEXICO

Raul Figueroa Díaz, Accounts Director
National Institute of Statistics and Geography
Aguascalientes, Mexico

Participation of Mexico in the UBCG

The National Institute of Statistics and Geography (INEGI) has more than 20 years of experience in environmental accounting and has developed a consolidated system of national accounts. This will benefit the Steering Committee's work on developing economic, social and environmental indicators to assess the impact of the mining sector.

Structure of INEGI's progress report

The report delivered by INEGI on the progress of Mexico in adopting the indicators identified by the UBCG. Besides background information and a summary of the progress achieved (listing and classification of 32 indicators – see Table 1), the report includes a proposal for the build-up of methodological sheets that contains elements such as: definition and objective of the particular indicator; an algorithm that shows how each indicator is constructed; a graph illustrating their trends; and a possible interpretation of results (see Figure 1).

INEGI adopts international statistical standards, such as the 2008 SNA and SEEA, when developing national economic and

Table 1 | Summary of progress

Issue	Number of identified indicators	Priority	Developed by INEGI	
Economic	142	57	9	10
		66	1	
		19	-	
Social	54	25	6	12
		21	6	
		8	-	
Environmental	27	27	10	10
		-	-	
		-	-	
Total	**223**	**109**	**25**	**32**
		87	**7**	
		27	**-**	
Priority by color	High	Medium	Low	

environmental accounts, mining indicators (SEEA-Mexico) or other statistical tools such as population and economic censuses, and household surveys. These are the key sources information used for estimating the UBCG-defined indicators.

Examples

The progress report provides two examples of high-priority indicators that have been described using the proposed methodological sheet. Figure 1 depicts the development in labor productivity in selected mining activities for the period 2003-2012. Labor productivity in the mining sector (LPSM) is defined as the gross value added divided by the number of paid jobs, according to the classification of economic activities.

The indicator shows how the extraction of oil and gas makes up the bulk of value added in the mining sector. In 2012, the labor productivity of each employee generated 19.3 million pesos. In the same year, the extraction of metal ores and non-metallic minerals generated 1.5 million pesos per employee and mining related services generated 1.4 million pesos per employee.

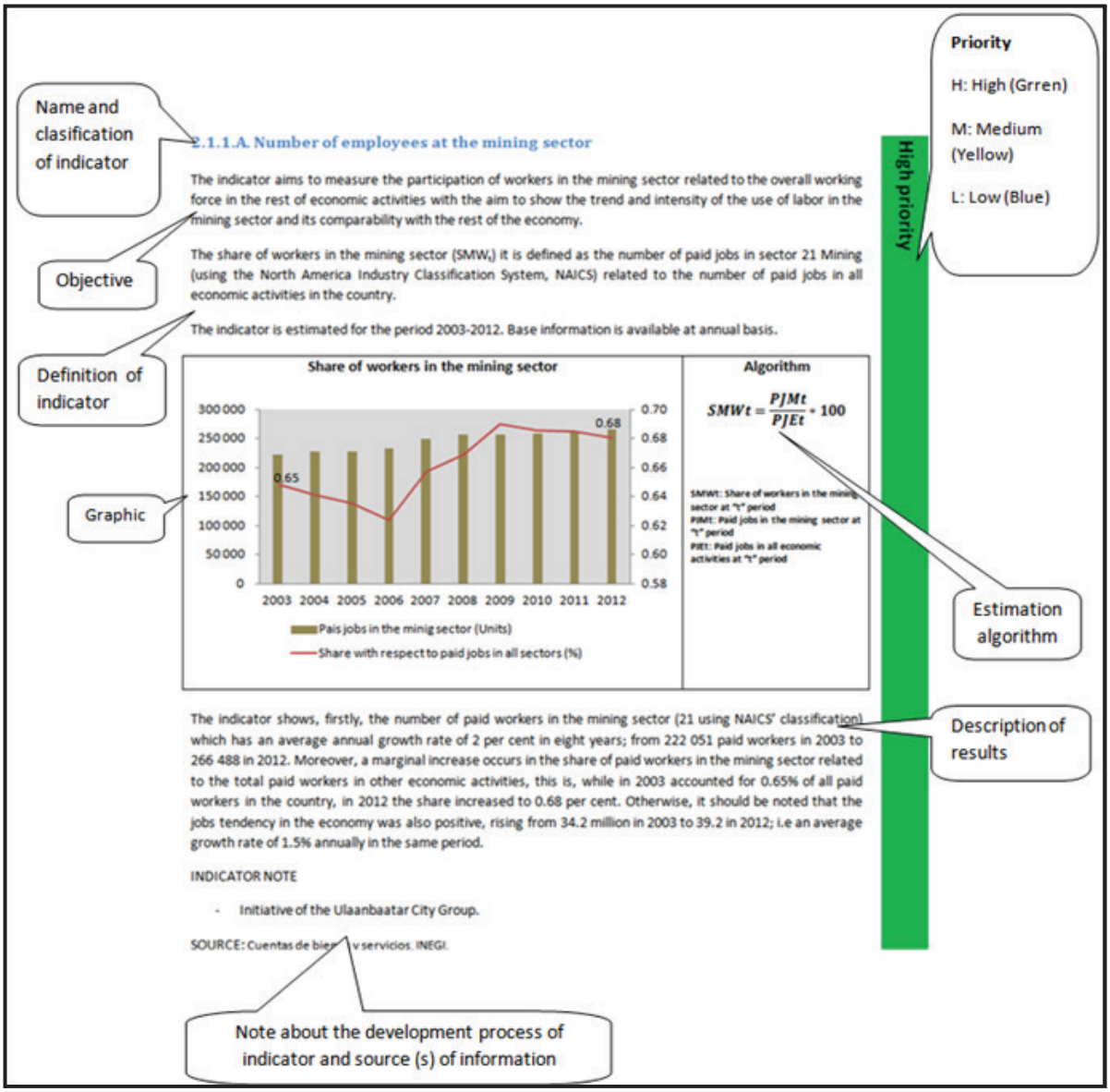


Fig. 1 | Schematic of methodological sheets

Figure 3 depicts the depletion of selected hydrocarbons types, defined as subsoil resource extraction, in the period 2003-2012. The indicator particularly aims to measure the depletion of hydrocarbons (specifically oil and natural gas) occurring through extraction (production) of the resources.

In 2012, the extraction of hydrocarbons amounted to 1,353 million barrels of oil equivalent, while total reserves were 44,530 million barrels of oil equivalent. Between 2003 and 2012 resource depletion accounted for 3 percent of total reserves, which is estimated to correspond to an annual average decrease of 1.8 percent.

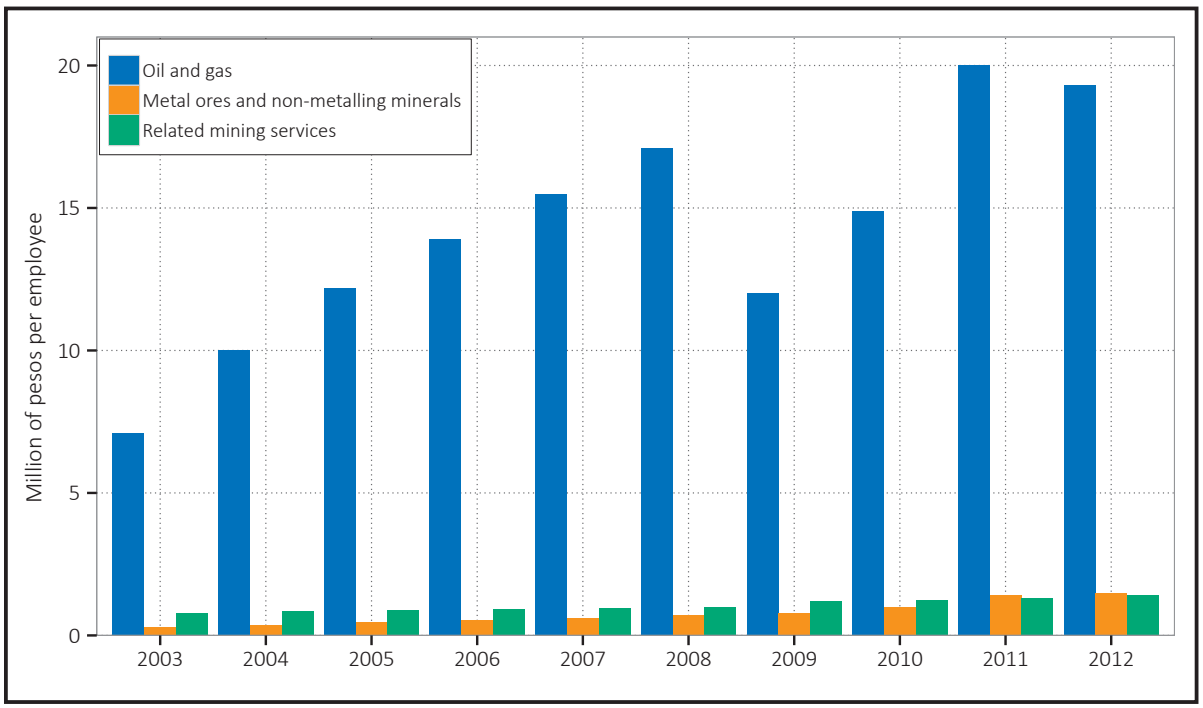


Fig. 2 | Labor productivity, by classification of economic activities

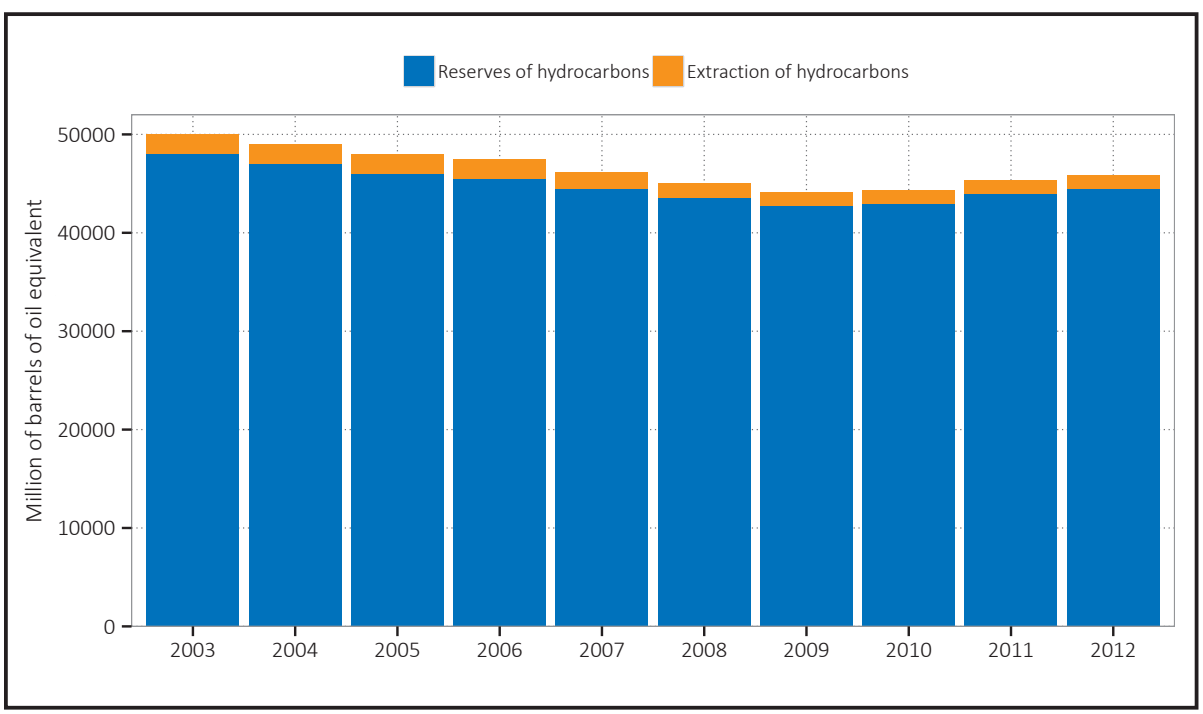


Fig. 3 | Depletion of hydrocarbons by resource type

Glossary proposal

The UBCG proposes the inclusion of a glossary of terms with internationally accepted definitions that offers conceptual guidance and enables countries to determine what type of information they ought to employ in order to construct national indicators. In harmony with the preceding ideas, the glossary is mainly based on the conceptual content of the 2008 SNA and SEEA-CF standards. The glossary is developed based on the UBCG-defined indicators and the member countries' progress reports.

What's next?

INEGI recommends for the UBCG to develop a document that integrates the work done by member countries so far to identify similarities and differences, and to share it with other groups working on environmental indicators (UNCEEA, London Group, Oslo Group). Moreover, the UBCG will need to elaborate on how the indicators can be used, for example in a foreword or introduction to the document.

The following points of action are also identified by INEGI:

- General process: After reviewing the context of the indicators, they must be aligned with SEEA and SNA. A reporting scheme for the indicators must then be developed. Once a joint report of the UBCG has been published, indicators can be chosen based on their link to public policy and country planning. These indicators will then be clearly defined, which will result in a core and mining set of indicators. The supportive documentation will need to be systematized.
- Information process: Starting by identifying relevant and necessary sources of information (such as economic censuses, environmental accounts and SNA), their formats will need to be standardized. This will result in some standard tables, which will undergo information analysis. The data will be made consistent, standardized and sorted according to defined classifications with the end-result being a database of sources for economic, social and environmental information. Once processed in the so-called INFORMATICA system, which includes integration of the source database and the indicator catalogue, the final database of economic, social and environmental indicators will be ready.
- Documentation: Detailed documentation will need to be carefully prepared for the above processes. Figure 3 shows what needs to be recovered.

For discussion of UBCG

Finally, INEGI urges the Steering Committee to discuss a number of essential issues during its third meeting. The key question is how many of the identified indicators should be developed, i.e. if they are all relevant and whether the final set of indicators should be limited to only a basic set of 50-60?

INEGI also has a number of technical questions and comments on some of the identified indicators:

Economic impact indicators

2. Measurement of prices of mineral commodities and the impact of mineral prices on the terms of trade, as well as mining-induced terms of trade impacts on the rest of the economy

What is the purpose of calculating a general price index of exports and imports, since the previous indicator (Export and import price index of mining products *) makes reference to mining products? In the description of the results from the indicator, a brief reference regarding the overall national rate can be included. It is assumed that it refers to the index of mining products.

4. Measurement of mining gross operating surplus

According to SNA, the method of calculating the EBO (GOS) is gross value added less compensations of employees and net taxes on production. This differs from the calculation method given in the UBCG document.

8. Measurement of impact of mining on trade statistics, including coherency with production statistics

What is the purpose of calculating a general price index of exports and imports, since the previous indicator (Export and import price index of mining products *) makes reference to mining products? In the description of the results from the indicator, a brief reference regarding the national total can be included.

9. Measurement of mineral exploration, discoveries and sub-soil reserves

It is not clear what the indicator is referring to.

14. Measurement of other economic activity to support the mining industry, including role of input-output analysis

It is assumed that the supply-use analysis refers only to the mining industry.

16. Measurement of infrastructure to support mining activity

In general, it is unclear what unit of measurement should be used. In the case of telephone lines, TV broadcast stations, Internet, etc. It is not clear how the subject should be addressed, if by business, by worker, etc.

17. Measurement of mining impact on national income, including balance of payments incomes associated with mining and measures of real gross

What is the purpose of incorporating the Gross National Income (at current and constant prices); annual change and; per capita, since the above indicators refer to the mining sector compared to GDP?

18. Measurement of national wealth

- What is the purpose of incorporating produced assets, since the indicator 6 of this section (Measurement of mining equity fixed investment) refers to fixed capital of the mining sector? In any case, in the description of the results of the indicator 6 can be included a brief reference regarding the national total.
- What is the purpose of incorporating the number of employees of total economy? Indicator 1 (from the social indicators group) refers to the number of employees in the mining sector. In any case, it can be done in the description of the results of Indicator 1 (from the social indicators group), and in fact INEGI did so, a brief reference of the national total.

19. Measurement of impact of mining on regional economies (including regional prices and regional housing markets)
It is not very clear from the objective, how to approach the indicators and the direct relationship with the mining sector.

Social impact indicators

1.3 Measuring employment in mining related activities + 3.2 Measuring mining skills and capabilities, including job vacancies skill shortages
The difference between these two indicators is not clear.

4.3 Measuring the impact of mining on poverty
The link to the mining sector is not clear.

4.4 Measuring social impacts of population dislocation associated with mining activity
The link to the mining sector and how the indicator should be addressed is not clear.

4.5 Measuring the impact of mining on education and training
The descriptive paper argues that "Since the activities of mining companies are growing, and therefore increasing the state budget through taxes, we need to define the changes in public spending for education (according to the government budget). This indicator could present one of the impacts of mining on education." However, it seems that this is an indirect effect of mining in society; therefore an immediate link with the sector wouldn't be clearly observed. Moreover, it may be that the change in education spending also depends on other variables (not necessarily associated with mining).

Environmental impact indicators

7. Measurement of the impact of mining on green growth and the green economy.
The inclusion of an indicator for GDP is not clear. The "Green GDP" indicator can be included as a brief references to the national total in the description of the results.

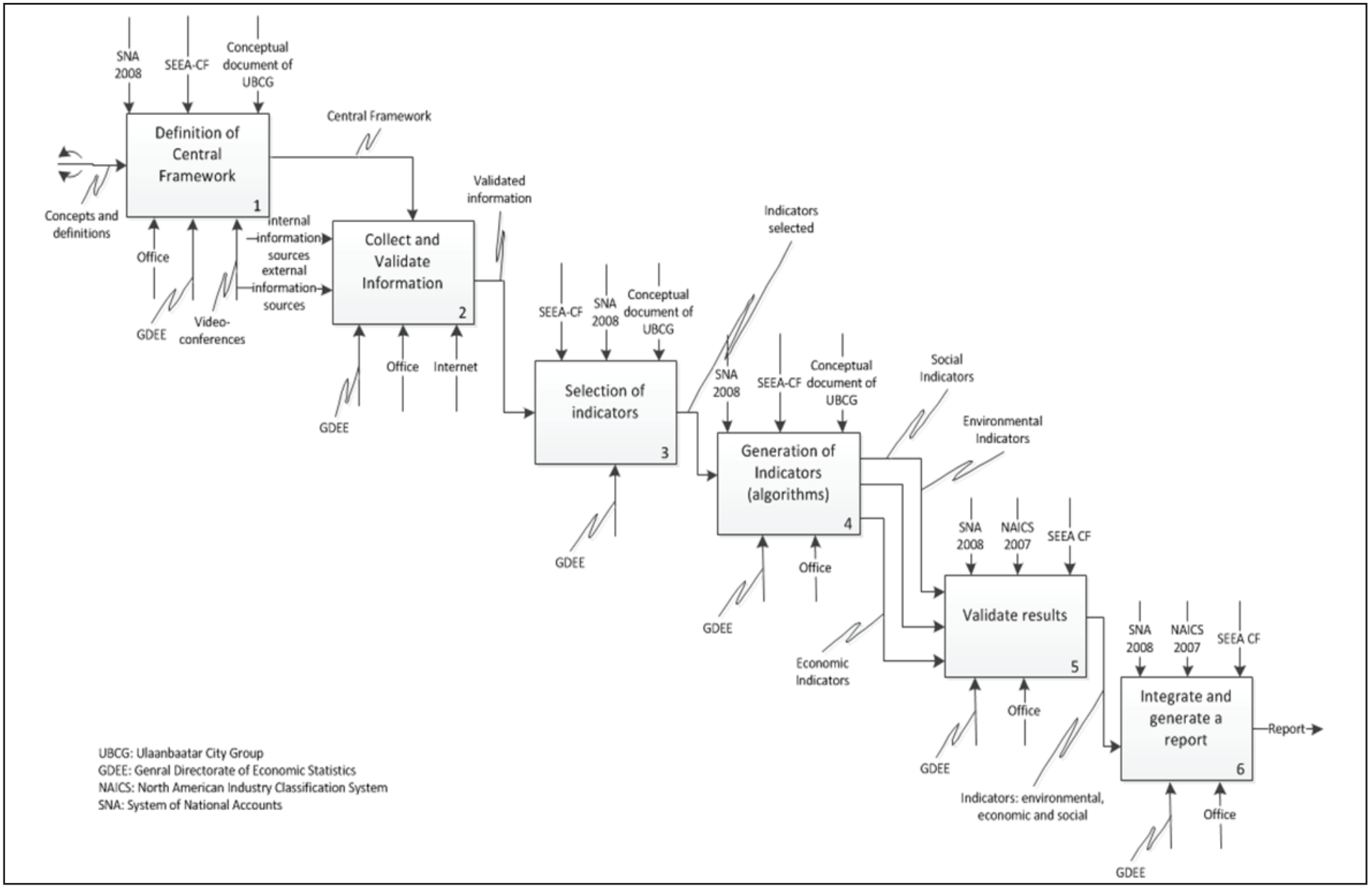


Fig. 4 | Workflow of the UBCG – from definition of central framework to production of the final report

INFLUENCE OF MINING ON THE ECONOMY OF KAZAKHSTAN

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Impact assessment of mining on Kazakhstan's economic development

Kazakhstan is one of the richest mineral countries in the world with large reserves of natural resources ranging from coal to uranium. These abundant resources contribute significantly to the overall economy. Between 2009 and 2013, the share of gross value added (GVA) of mining in GDP averaged 17.9 percent (see Figure 1). The share dropped slightly from 19.5 percent in 2010 to 16.5 in 2013.

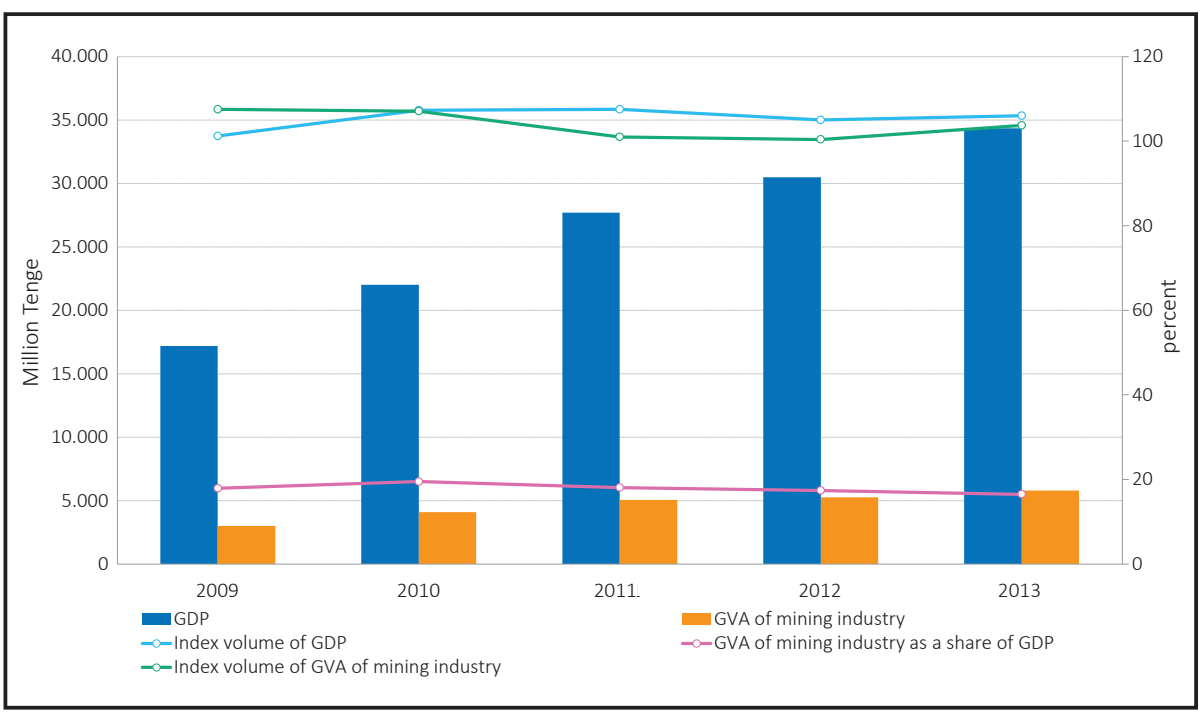

Fig. 1 | Change in GDP and gross value added of mining, 2009-2013

The regional contribution to GDP varies substantially. It is found that those with the highest gross regional product (GRP) in 2013 also contributed the most to GDP: Almaty, Atyrau and Astana with 19 percent, 10.6 percent and 9.5 percent, respectively. Of these regions, Atyrau had the largest share (51.3 percent) of the mining industry in terms of GRP. The shares of the remaining regions varied between 2.2 and 7.9 percent, averaging 4.7 percent.

A general rise took place in the production of major mining products between 2009 and 2013, reflecting a steady increase in the production of industrial products. Oil and gas takes precedence to other mineral resource in Kazakhstan in terms of both volume and contribution to GDP. As illustrated in Figure 2, oil and gas made up 84.5 percent of the total mining production in 2013, while coal mining and other mining comprise just 3.1 percent of total production. Service support to the mining industry has a noteworthy share of 5.3 percent.

The value and GDP-contribution of the oil and gas sector has increased since 2009 but suffered a substantial dip in 2013. This development was reflected in the increasing tax revenues generated from the sector in the same period (Figure 3). With 52.5 percent corporate income tax revenues were the largest source of tax revenue.

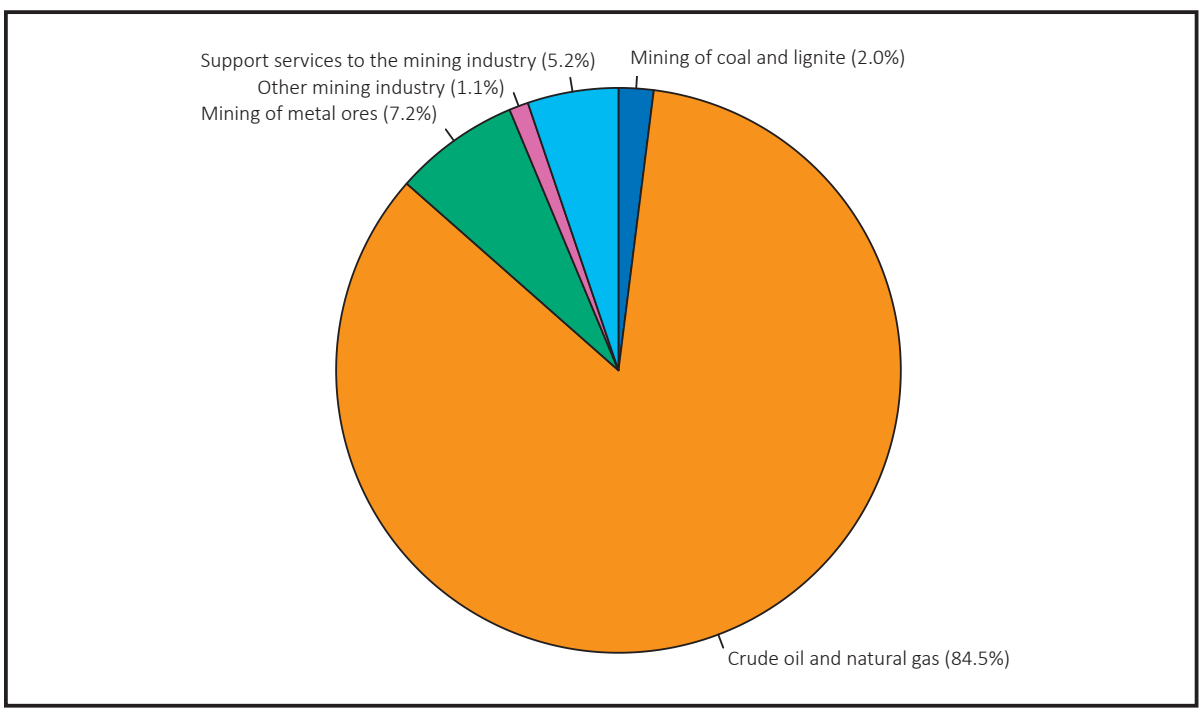

Fig. 2 | Structure of production volumes in mining, 2013

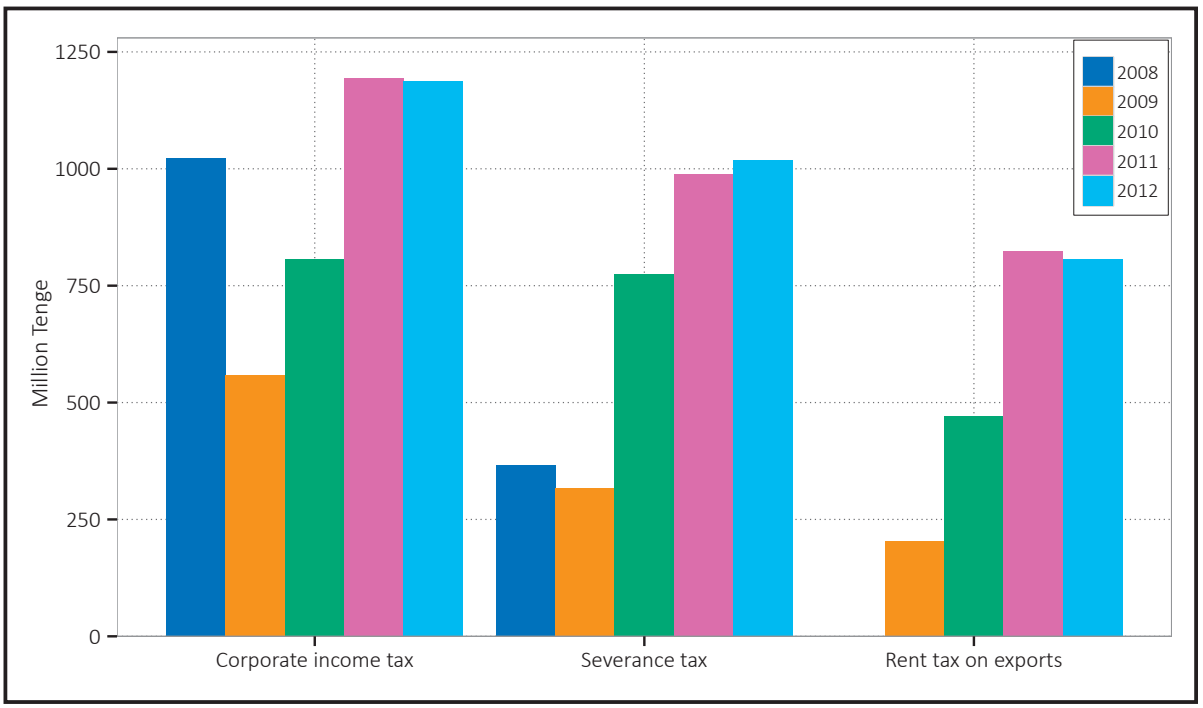

Fig. 3 | Tax revenues from the oil sector, 2008-2012

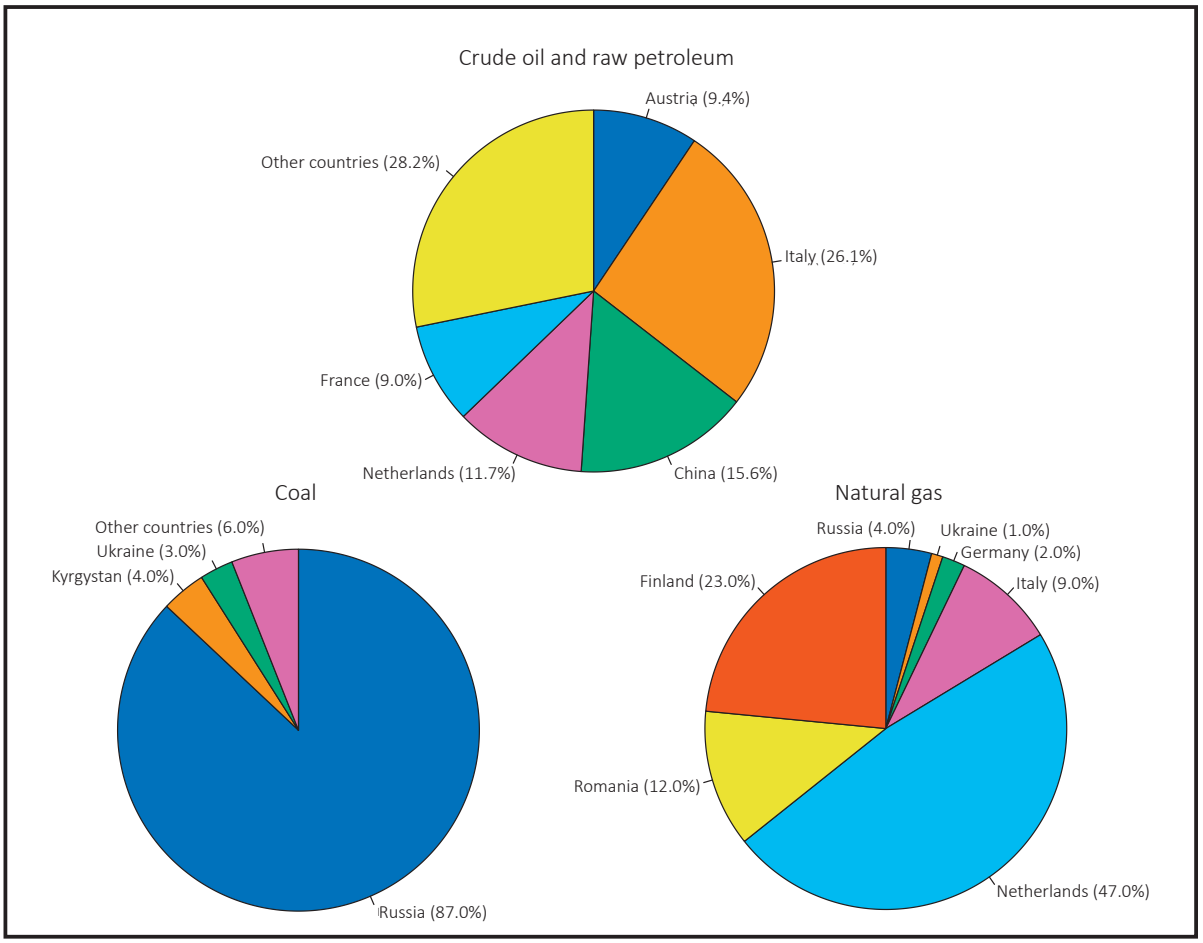

 Fig. 4 | Major mineral export groups and key markets, 2012

Kazakhstan's position in the global economy has improved due to its increased participation in global trade, primarily due to export specialization focused on mineral resources. Figure 4 shows Kazakhstan's major trade partners, which account for a large share in the exports of major mineral resources. Italy and the Netherlands absorb great shares of Kazakhstan's oil and gas production; however, the group of recipient is quite diverse. On the other hand, Russia is the key recipient of coal (87 percent).

Moreover, as part of the country's diversification strategy, Kazakhstan has opened its economy up for foreign direct investments. As seen from Figure 5, which shows how the gross inflow of foreign direct investments is distributed across industries, especially professional, scientific and technical activities and mining and quarrying activities dominate. Between 2009 and 2013, the gross inflow of direct investments in the mining industry increased by 220 percent.

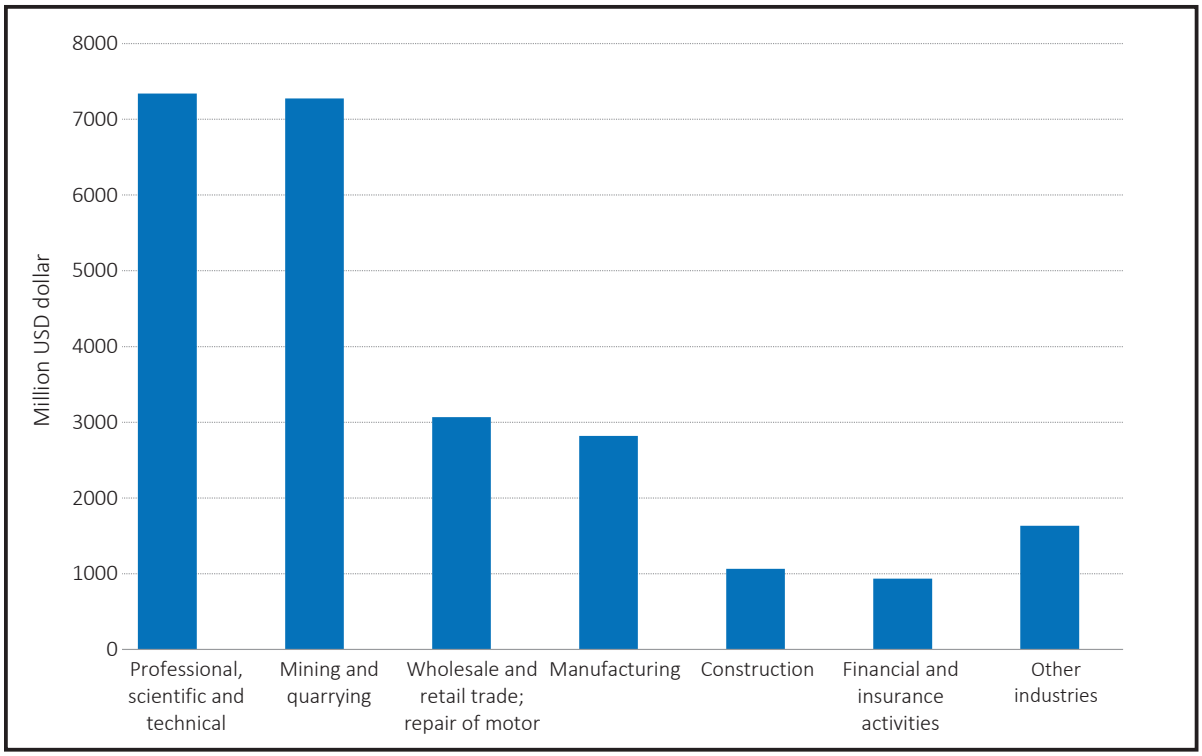

Fig. 5 | Gross inflow of foreign direct investments in Kazakhstan, 2013

CHINA'S STATISTICAL WORK ON THE MINING INDUSTRY

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Beijing, China

China's statistical work on the mining industry

Information is collected from more than 16,000 enterprises with annual revenue above 20 million RMB – annually through the 'Refreshing of Business Register' (for existing enterprises) and monthly through the 'Renewing of Business Register' (for newly created enterprises).

Four statistical departments are involved in the data collection process. Each is responsible for the collection of different indicators for the mining sector:

- Department of National Account: Input-output table data including data on intermediate use, final use, direct input coefficients and total input coefficient;
- Department of Industry Statistics: value added, production, export value and accounting indicators (asset, debt, revenue, profit, sales, turnover, VAT, etc.);
- Department of Investment and Construction Statistics: Investment in fixed asset;
- Department of Energy Statistics: Total energy consumption (coal, coke, crude oil, gasoline, kerosene, diesel oil, fuel oil, natural gas, electricity consumption).

Contribution of the mining sector on the economy

Figures 1 and 2 illustrate the mining sector on the Chinese economy. The growth rate of the sector's value added follows-with some delay-the development of 'industrial enterprises above designated size', i.e. enterprises with an annual sales revenue exceeding 5 million Yuan prior to 2011 and exceeding 20 million Yuan after 2011. In the period 2005-2014, the sector's value added growth rate has declined from approximately 14 percent to approximately 5 percent. Over the same period, the sector's share of total value added has fluctuated between 10-15 percent.

Publications

Among the key publications of the National Bureau of Statistics of China are "China Statistical Yearbook", "China Statistical Yearbook on Environment" and the online database "China Statistical Database" available at http://data.stats.gov.cn/.

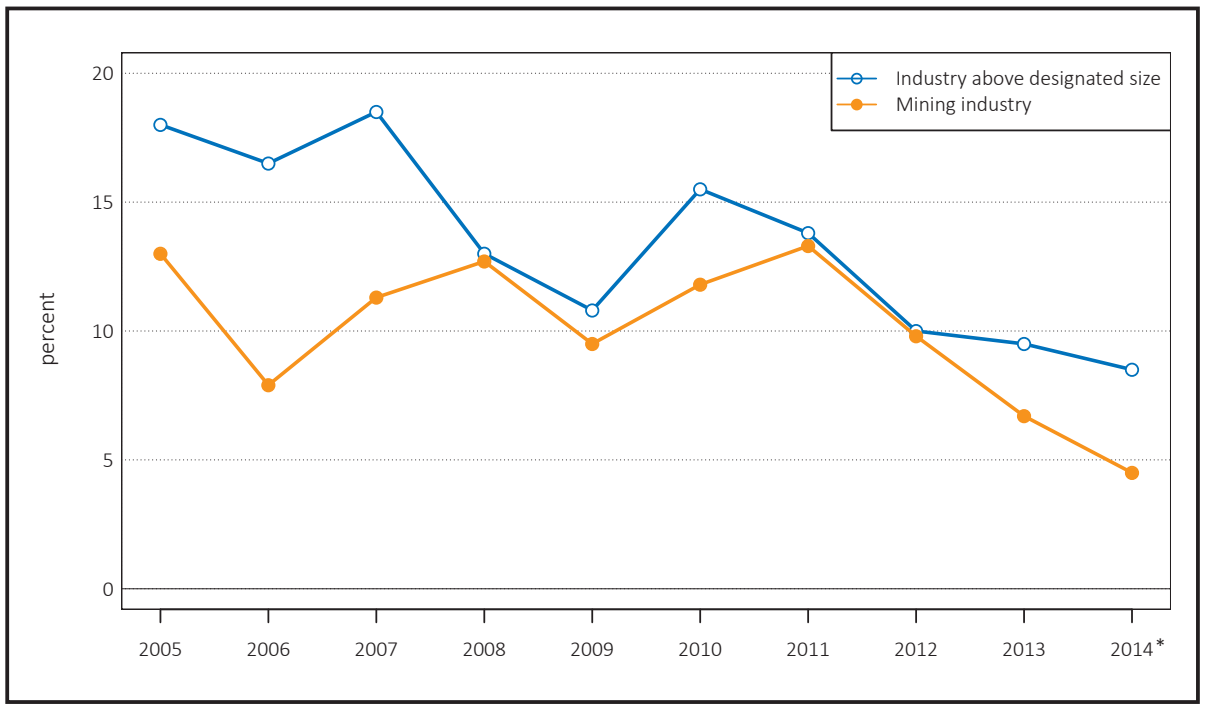

Fig. 1 | Growth rate of value added of mining industry

Notes: 2014 covers only January to June

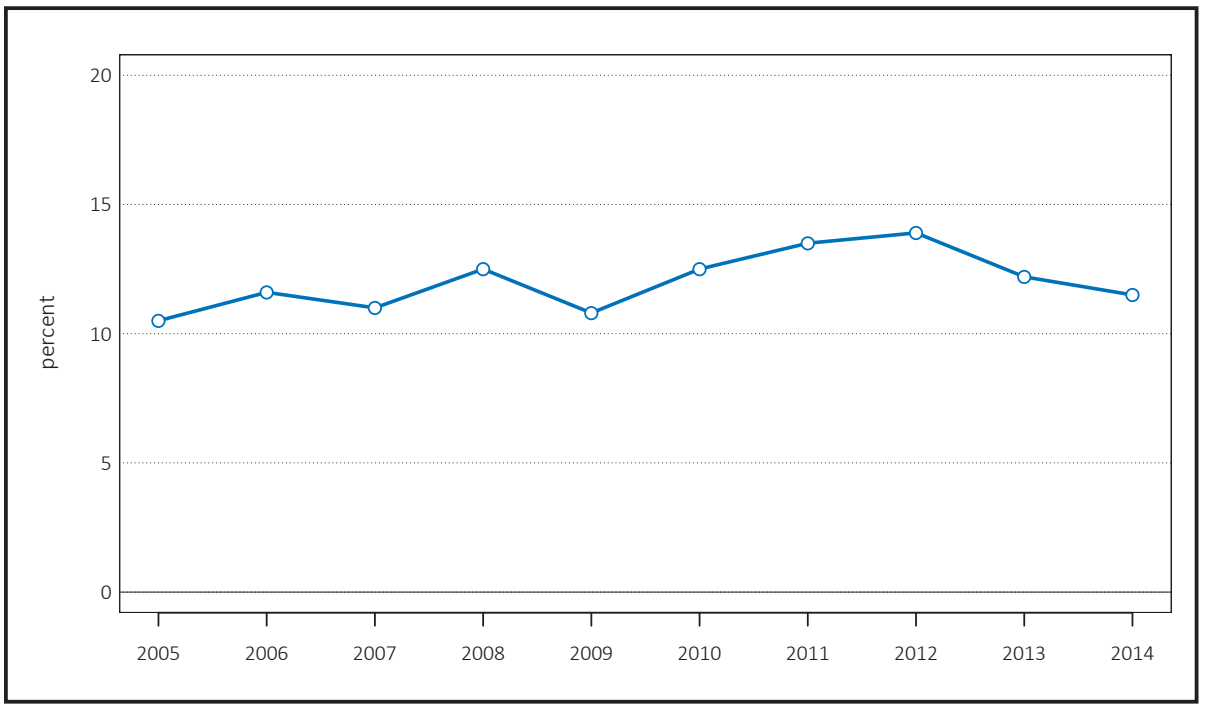

Fig. 2 | Share of mining sector in total value added

WRAP-UP AND DISCUSSION OF SESSION 1

Badamtsetseg Batjargal, Senior Vice Chairperson
National Statistical Office
Ulaanbaatar, Mongolia

Session 1 of the third Steering Committee meeting of the UBCG focused on the progress by UNIDO and member countries in developing indicators within the framework of the UBCG to measure the economic, social and environmental impact of the mining sector.

A number of common issues are highlighted for the member countries:

- A common country paper structure should be considered. Mexico offers a good suggestion;
- With regard to the definition of a conceptual framework, international standards and recommendations such as SNA and SEEA-CF should be considered – as should surveys and censuses;
- The country papers should include background information of the national mining industry in the beginning;
- The writing style should be harmonized.

Country specific recommendations and observations include:

- Kazakhstan: Is recommended to provide more detailed information on the adopted conceptual framework, methodology and data sources;
- China: A further elaboration on the contribution of the country's mining sector to economy could create valuable information to users. The country presentation underlined the importance of strategic data dissemination and of clearly describing the role of agencies in producing mining-related statistics. China has also made excellent progress in the development of environmental statistics, which is exemplified in the publication "China Statistical Yearbook on Environment".

SESSION 2

Economic Statistical Indicators

Session chaired by Bruce Hockman, Australian Bureau of Statistics
Badamtsetseg Batjargal, National Statistical Office, Mongolia

IMPACTS OF THE MINING INDUSTRY ON THE ECONOMY OF MONGOLIA

Erdenesan Eldev-Ochir, Department Director
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Economic indicators

The UBCG has identified 155 indicators to measure the economic impacts of the mining sector. In comparison, 55 and 22, respectively, have been identified for social and environmental impacts. Figure 1 disaggregates these indicators according to the priority given to the measurement issues they cover.

Figure 2 provides an overview of how the indicators have been classified. The main categories are: production, stock and investment statistical indicators, expenditure statistical indicators, trade and price statistical indicators and analytical statistics and transformations.

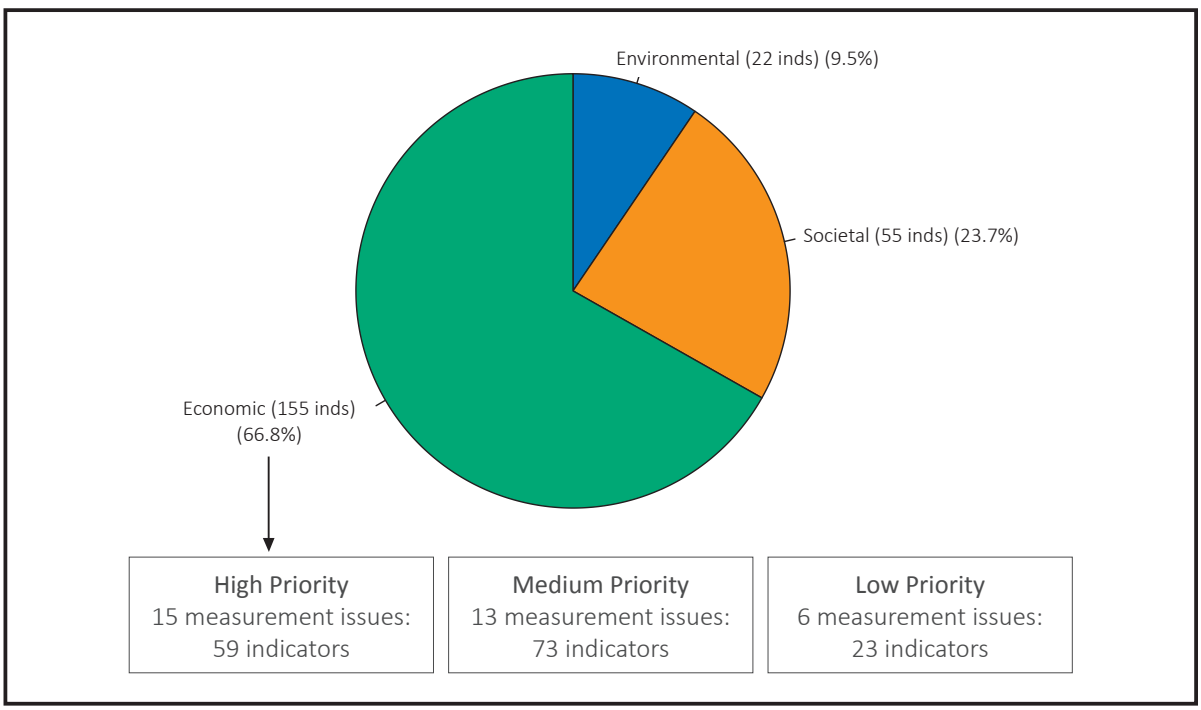

 Fig. 1 | Indicators for measurement of the impacts of mining

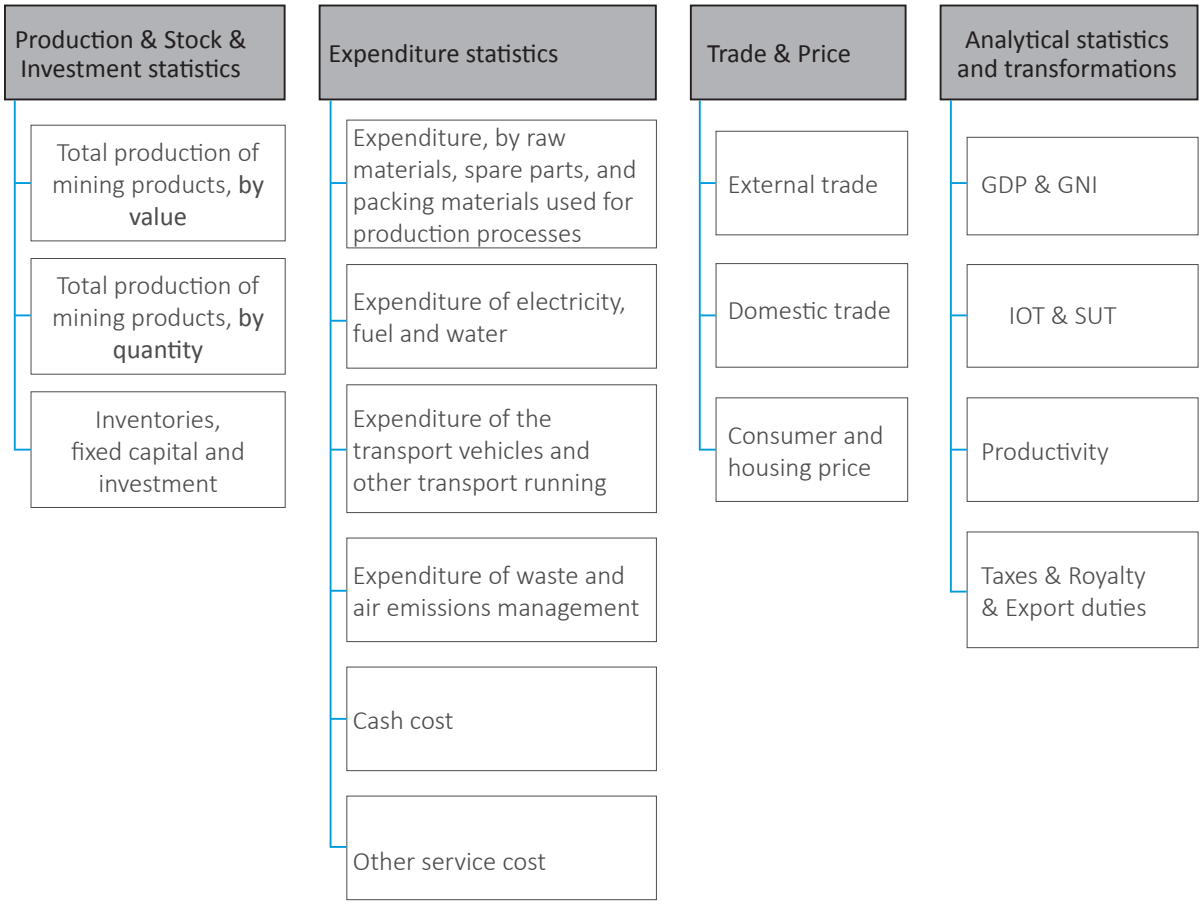

Fig. 2 | Classification of economic indiators

Data sources, availability and harmony between UBCG and SNA indicators

The data used to derive the USBG-defined indicators come from various sources including national accounts and surveys as illustrated in Figure 3.

An assessment of data sources shows that Mongolia's National Statistical Office can estimate 107 indicators out of the total 155 indicators, while for the remaining indicators there is a need to identify possible data sources, assess the quality of data and create a comprehensive database. This is particularly urgent for indicators relating to production, stock and investment statistics as only 36 out of 71 indicators currently are covered. Progress is also needed for the remaining measurement groups: expenditure statistics (24 out of 30), trade

and price statistics (8 out of 10), analytical statistics and transformations (36 out of 39) and other (3 out of 5).

Figure 4 shows the consistency of the UBCG indicators to measure economic impacts of mining with those of the Mongolian system of national accounts (SNA). The figure depicts which national indicators matches the ones defined by the UBCG as well as any differences there may be in the estimation methodology.

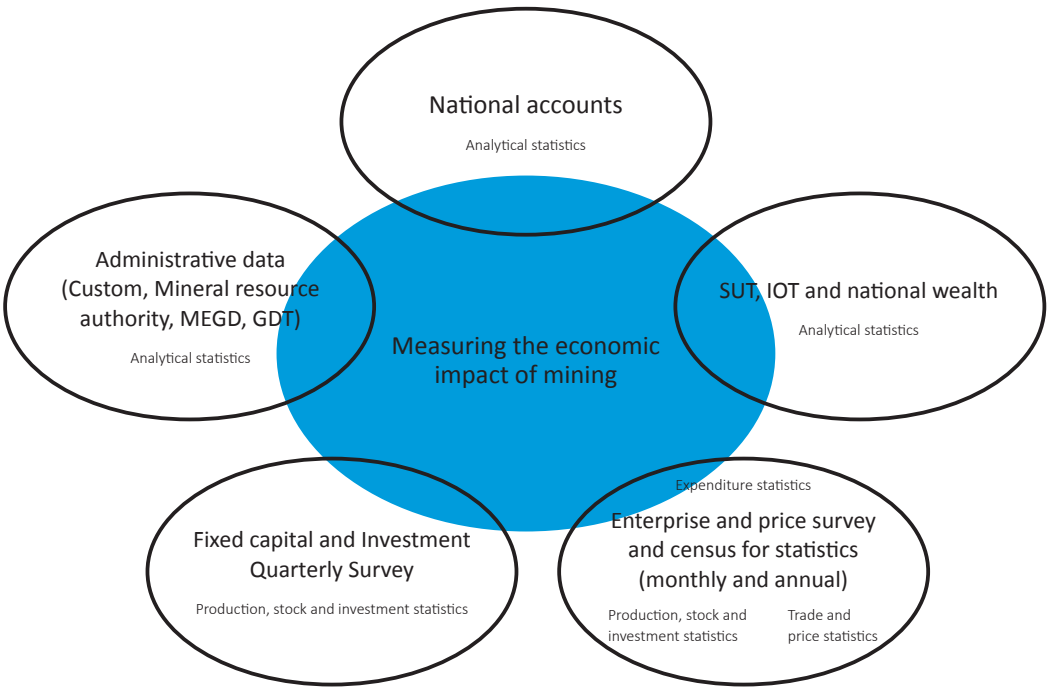

Fig. 3 | Data sources for economic impact indicators

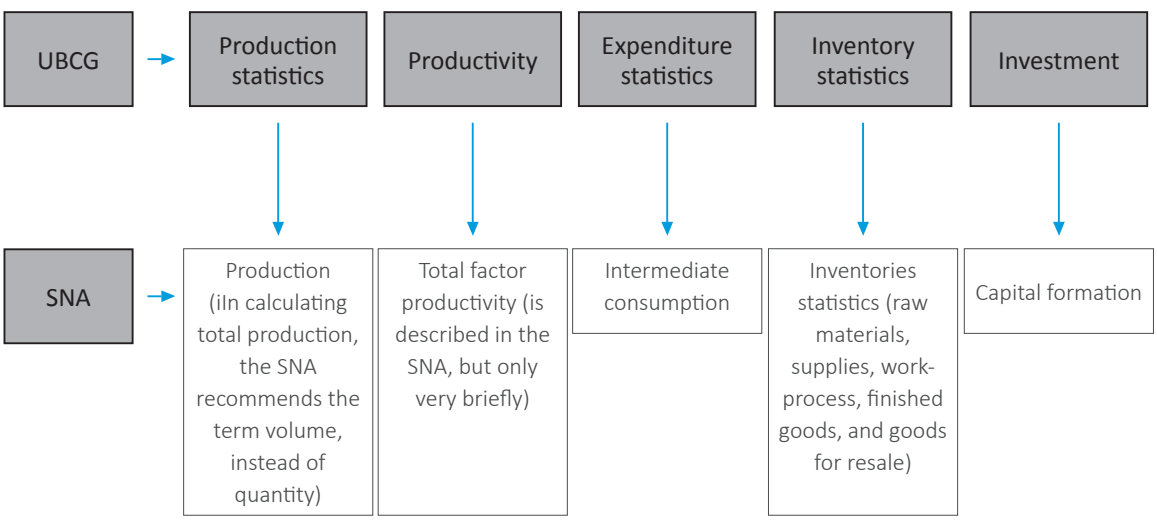

Fig. 4 | Connection between indicators of the UBCG and the SNA

Mining site survey and impact analysis

Survey organization and procedure

Measures undertaken by the National Statistical Office to acquire the needed statistical data includes surveying of mining sites. To this end, it has developed questionnaire, sent preparatory letters to mining companies prior to the survey in order to improve cooperation, organized a meeting with managers of these companies, established a working group within the companies, visited mine sites and collected data from the companies. Based on these efforts and other official statistics, the National Statistical Office has been able to generate dynamic data to measure the impact of the mining sector.

Data collection through survey

The data collected through the above mentioned mine site surveys comprise the information summarized in Table 1.

Table 1 | Possible data gathering from the survey on the mining sites of Oyu Tolgoi

Production, stock, revenue and investment statistics	Expenditure statistics
Products of main activity, by level of production process, characteristics, and the content	Expenditure, by main and supplementary raw materials, spare part, and packing materials, in volume and value
Income, by type of activity	Expenditure of electricity, fuel and water
Total capital and accumulated depreciation, by type of capital	Transportation cost
Carried freight, by goods, ths.tn	Other related costs
Freight turnover, by goods, mln.tn.km	

Impacts of mining sector

The mining sector has been found to have a significant contribution on the Mongolian economy, which can be summarized as follows:

- Gross industrial output: The mining sector's share of total gross industrial output is the largest in the economy with 58.7 percent. Especially metal ores extraction contributes to this share. At the expense of metal ore extraction, coal extraction rose substantially between 2000 and 2010 and was in 2013 the second largest mineral resource. Crude oil output has grown from an insignificant level in 2000 to the third largest resource in 2013.
- GDP: The contribution of the mining sector to GDP has remained more or less constant in the period 2009-2013, averaging 21.5 percent.
- Export revenue: Up till 2012, changes in the export revenue of the mining sector harmonized with those in the country's GDP. However, in 2013, the sector's export revenue grew

substantially unlike GDP, which slightly declined. While the export of coal declined considerably between 2012 and 2013, the rise in export revenue is due to a large increase in the export value of copper concentrate, crude oil, iron ores, gold and other mineral resources.

- Government revenue: Mining constitutes 32.9 percent of government revenue. Of this contribution, 93.3 percent goes to the central government's revenue and 5.8 percent to the local government's revenue.

Conclusion

The National Statistics Office recognizes the efforts needed to ensure consistency of national statistics with prevailing international statistical standards and definitions, e.g. the SNA, for indicators such as total factor productivity, water consumption and valuation of inventory items.

It will also work to ensure the coherence between national and UBCG-defined indicators and elaborate on their concepts. To this end, it will identify more relevant data sources, collect the necessary data, and in general improve data quality.

From an analytic dimension, the National Statistics Office will assess the contribution of mining on local development, economic diversification and employment. An important element in this regard is to complete and expand on the mining site surveys as to supplement existing data with information on products, revenues, local investment, efficiency of using natural resource inputs, commercial activities of mining firms etc.

Finally, the National Statistics Office will prepare a chapter for the handbook and share its experiences with the UBCG's member countries.

MINING INDUSTRY IN VIETNAM

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Status of the mining and quarrying industry in Vietnam

Mineral resources in Vietnam

Vietnam is vastly abundant in mineral resources, which are spread all over the country. Figure 1 depicts the geographical location for various mineral groups, suggesting not only that the northern region is more endowed with resources but also that these resources are more diverse. Overall, the country's mineral resources include: offshore oil and gas, coal and uranium (energy minerals); iron, manganese, titanium and bauxite

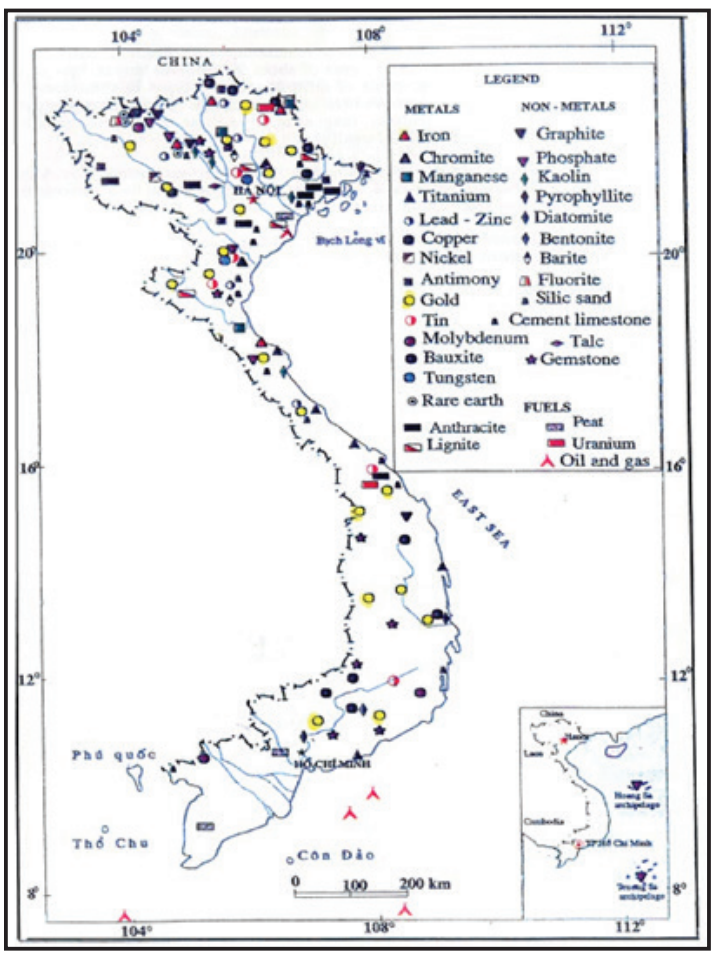

Fig. 1 | Mineral mapping of Vietnam

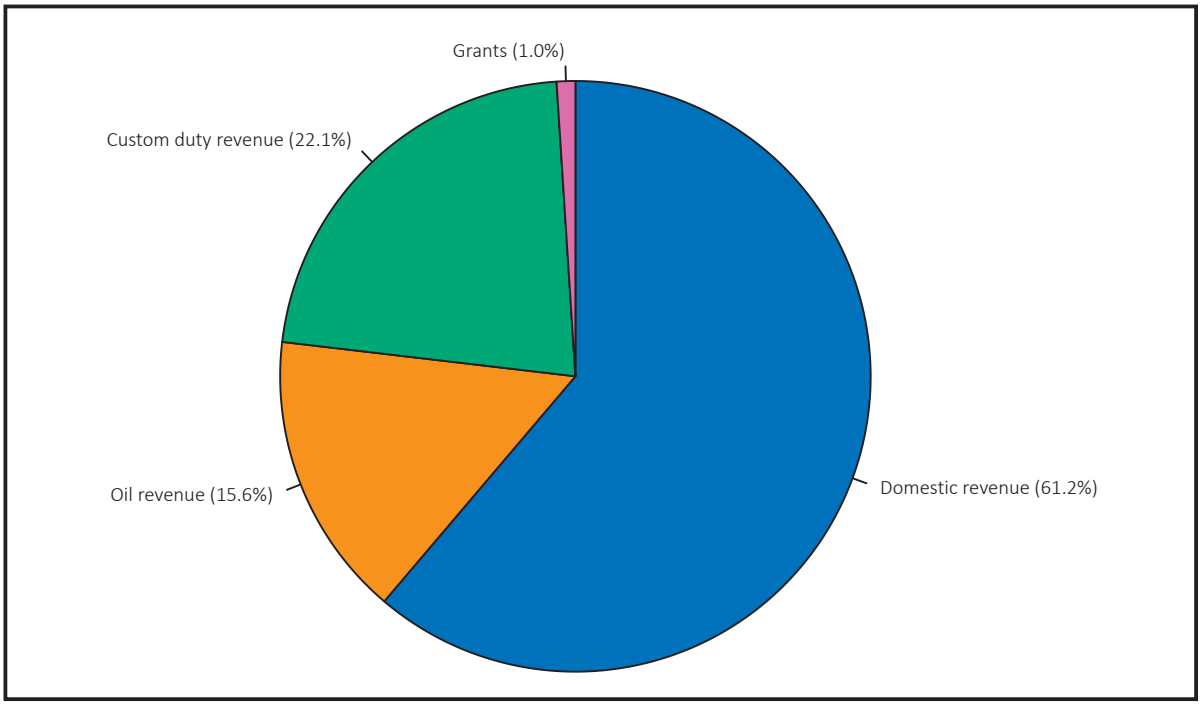

Fig. 2 | Structure of state budget revenue

(metaling minerals); apatite (non-metallic minerals); and sand and cement limestone (construction material minerals).

The number of mining and quarrying enterprises has increased steadily between 2005 and 2012 from 1,277 to 2,642. Growth was the slowest in 2010 with 1.5 percent, compared to an average annual growth of 11.2 percent.

Impact on the economy

Every year, Vietnam's mining and quarrying industry contributes with about 10-12 percent to the country's GDP and with about 10 percent to its total export revenue. The oil revenue alone contributes with about 15-19 percent to the state budget revenue. Preliminary estimates for 2011, sets this share to 15.7 percent (as illustrated in Figure 2). The mining and quarrying industry also provides input to other economic activities.

Impact on the society

The mining and quarrying industry contributes to job creation in Vietnam; in 2011, the industry had approximately 300,000 employees, corresponding to 0.6 percent of total employment. Figure 3 shows the average monthly compensation per employee in the mining industry, which is nearly 1.5 times of the average monthly compensation per employee in the total economy.

Occupational accidents are a key negative social impact of the mining and quarrying industry.

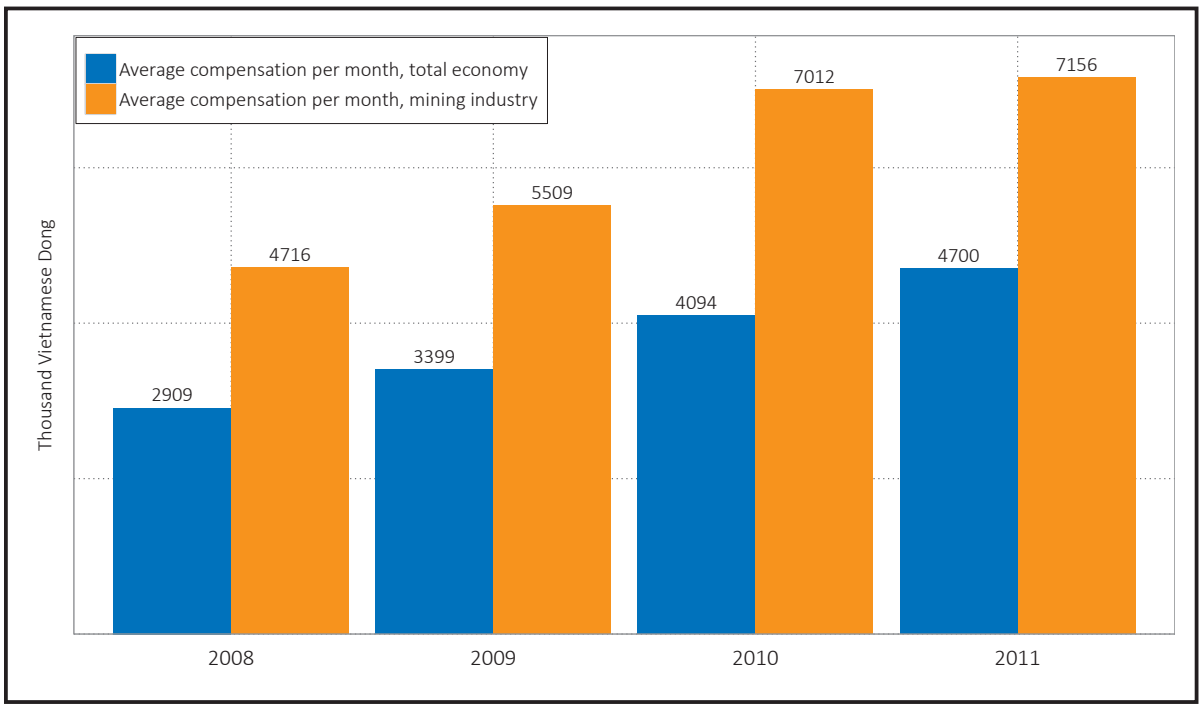

Fig. 3 | Average monthly compensation per employee in the mining industry, 2008-2011

Impact on the environment

The mining and quarrying industry has negative impacts on the environment and ecosystems due to pollution. However, due to limited data, it is not yet possible to consider these impacts in their fullest.

The implementation of indicators to assess the impacts of the mining and quarrying industry in Vietnam

Research group

A research group has been established to develop statistical methodologies for indicators to assess the economic, social and environment impacts of the mining industry. The group has six members, who are appointed from various departments at Vietnam's General Statistics Office.

Work of the research group

So far, the research group has taken upon itself to carry out the following work:

- Attending all online conferences of the UBCG;
- Updating all information related to experiences and results from the UBCG meetings;
- Reviewing the implementation of indicators to assess the impacts of the mining and quarrying industry in Vietnam.

The outcomes of reviewing the implementation of indicators in Vietnam is summarized in Table 1 and compared to the indicators identified by the UBCG.

Table 1 | Summary of indicators identified by the UBCG and by the research group in Vietnam

	UBCG		Vietnam	
	Number of identified indicators	**Priority**	**Number of available indicators**	**Priority**
1. Impact of the mining industry on the economy	139	54 of high priority 66 of medium priority 19 of low priority	27	19 of high priority 8 of medium priority 0 of low priority
2.Impact of the mining industry on the sector social	54	25 of high priority 21 of medium priority 8 of low priority	19	11 of high priority 5 of medium priority 3 of low priority
3. Impact of the mining industry on the environment	27	27 of high priority - of medium priority - of low priority	2	2 of high priority - of medium priority - of low priority
Total	**220**	**106 of high priority** **87 of medium priority** **27 of low priority**	**48**	**32 of high priority** **13 of medium priority** **3 of low priority**

Indicators for measuring the impacts of the mining and quarrying industry on the environment

All UBCG-defined indicators can be explained through

1. Concepts, content and calculation method;
2. Key disaggregation;
3. Data sources.

Example of indicator

For example, the indicator 'Cost of environment protection' can be conceptualized as environmental protection expenditures, which is calculated as all expenditures from all sources to cleaning and protection environment in a given period. It includes expenditures from the state budget, international funding, enterprises and establishments, and other organizations and individuals. It also includes revenues obtained from units and individuals.

These expenditures are disaggregated according to the source of environment protection expenditures, type of ownership and the province and city in which they are encountered. Relevant data is found via reports from national ministries and national surveys.

GLOBAL STANDARD TEMPLATE TO COLLECT DATA ON GOVERNMENT REVENUES FROM NATURAL RESOURCES: IMF PROJECTS, ACCOMPLISHMENTS, AND NEXT STEPS

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Washington DC, US

Background

Information on natural resources and their depletion is crucial to economies whose government budget is heavily reliant on revenues from natural resources. In such countries, it is advisable to identify the latter separately from the rest of the budget, as it will allow for a better understanding of its magnitude and enable the design of adequate fiscal policies. Two recent IMF papers provide guidance on how to identify appropriate fiscal regimes to generate and manage revenues from natural resources, i.e. "Fiscal Regimes for Extractive Industries - Design and Implementation" and "Macroeconomic Frameworks for Resource-Rich Developing Countries".

Since 2011, the IMF's Topical Trust Fund on Managing Natural Resource Wealth (MNRW-TTF) has assisted countries in developing the capacity to effectively manage natural resources. Its effort is focused on capacity building in five areas of which one is dedicated to statistics. The trust fund complements the implementation of the Extractive Industries Transparency Initiative (EITI) and coordinates closely with other stakeholders.

Then, in 2012, the IMF's Statistics Department launched Projects 1 and 2 to develop and field-test, respectively, a standard template to collect data on government revenues from natural resources.

Project 1: Develop a standard template to collect data on government revenues from natural resources

The main objectives of Project 1 is to address the IMF's needs to obtain more information on government revenues from natural resources and design adequate fiscal policies. Moreover, it is a response to the EITI Secretariat's request for assistance to make EITI reports comparable across countries.

So far, Project 1 has resulted in a paper, which has been sent to the IMF Executive Board in January 2014 and posted on the IMF's website for comments from the

international community in February 2014 (including EITI Secretariat, Revenue Watch, Statistics Canada, Rio Tinto Corp. and worldwide experts). At the time of the Third Steering Committee Meeting, the final version of the paper was being prepared.

A key challenge to the process is the lack of an internationally agreed definition of government revenues from natural resources, natural resource products and natural resource enterprises.

The template collects data under categories such as taxes (i.e. on income and on extraordinary profits payable by natural resource enterprises) and dividends (i.e. from government participation in and government owned natural resource enterprises).

The template's design is consistent with other economic datasets, and meets the needs of other data collection initiatives, including those of the EITI and the UBCG (see Figure 1). It is also harmonized with the classifications of the Government Finance Statistics Manual 2014 (GFSM 2014), and hereby, to the extent possible, with the System of National Accounts. Hence, the template allows for consistency checks of the data reported for revenues from natural resources under each GFSM 2014 category with the data reported for total revenues for each corresponding category.

Crucially, the template is universal in nature, as users can analyze the data from the template based on their own needs (due to linkages with national descriptors), and hence facilitates the collection of data in an analytically relevant and cross-country comparable format.

Project 2: Field-test the standard template

The template has been evaluated by, among others, the British-Australian multinational metals and mining corporation Rio Tinto, who – after a worldwide consultation within its company – concluded that it

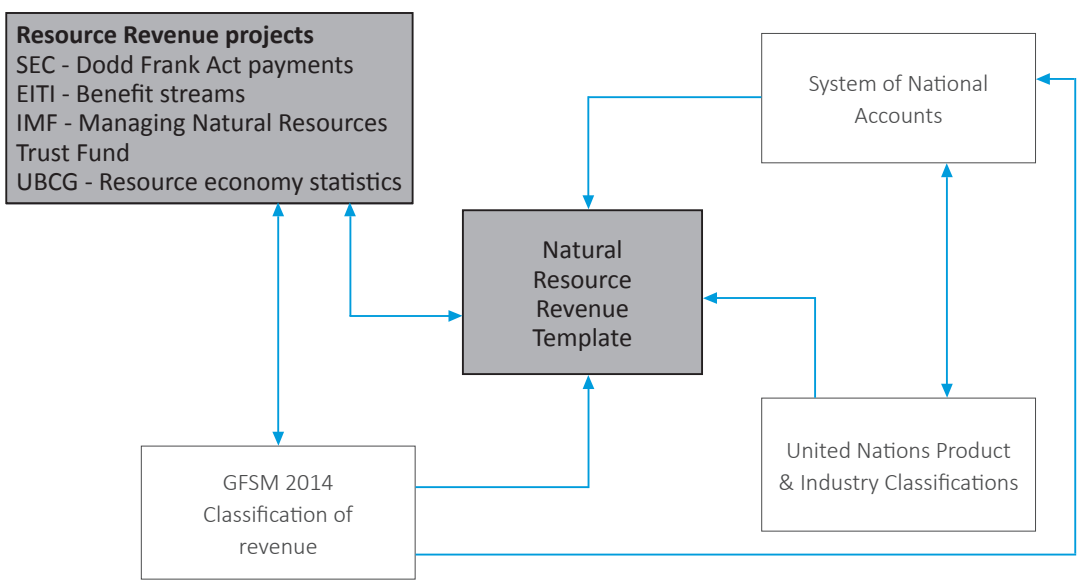

Fig. 1 | Consistency of template with international classifications and data collection initiatives

performs well in capturing payments made by the company to governments. In June 2012, the Steering Committee of the TTF approved Project 2 (a two-year project) to field-test the template.

The World Bank has also become engaged in a project to explore the possibility of generating the information needed to prepare the EITI reports directly from government information systems by embedding the IMF template into the systems.

The main objectives of Project 2 are to undertake pilots with several countries to assess the suitability of the template to collect data on government revenues from natural resources. Initially, it sets to develop some data and short time series for five countries. To enhance the quality of the data collection using the template, Project 2 will further link the terminology of the template (GFSM 2014 revenue classifications) to the industry terminology.

These five countries will be selected from six resource rich countries, mainly those that currently report data to the EITI Secretariat, who have been invited to participate in the pilots. The criteria with which these countries will be selected will focus on broad geographic representation, different levels of statistical development, and willingness of the authorities to participate in the exercise. Australia, Guatemala, Mongolia, Nigeria, Norway, Peru, and Timor-Leste are potential countries.

The implementation of Project 2 will consist of visits to each of the six selected countries in which expertise will be developed through the use of regional experts. This process will rely significantly on EITI support and its current infrastructure, and will be closely coordinated with the previously mentioned World Bank project (possible joint missions are also currently being considered).

Key operational issues are concerned with the identification of specific enterprises from which information is to be requested. This will take place on a country-by-country basis, depending on the natural resource products most relevant to that particular country. Also, it should cover the majority of revenues received by government from natural resource enterprises in the respective country. The identification process will depend on the availability of a business register through which a unit's main activity can be identified, its industry of origin, and its products.

For each country, data on government revenues from natural resources could be collected for the general government sector, on an annual basis preferably, with a three to five year time series. Scope of revenues to be collected/confidentiality issues

Finally, data will be consolidated and its accuracy will be verified. The former is important for the collection of data for broad levels of government. For example, data collected from the general government would include revenues of both the central government and local governments. Similarly, data collected for the nonfinancial public sector would include revenues of both the general government and public enterprises.

Next steps

The next steps to be taken for the projects include finalizing the selection of the six above-mentioned countries through

mission-work. Based on lessons learned from field-tests conducted on these missions, the standard template is to be revised as needed, and data on government revenues from natural resources is to be compiled. Then, together with the EITI, IMF is to discuss how the pilot data can be used as input to launch globally coordinated data for all EITI countries. The IMF does, however, not plan to collect data but will support the EITI's coordinated data collection exercise.

ARTISANAL AND SMALL-SCALE MINING: THE CASE OF MONGOLIA

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National Statistical Office
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Mining and quarrying industry in Mongolia

Mongolia's abundant natural resources have allowed the country to develop a large mining and quarrying industry. In 2013, the industry constituted 20.2 percent of GDP, comprised 81.9 percent of total exports and occupied 4.6 percent of the labor force. 13.400 people or 13.4 percent of mining workers were self-employed in 2012.

Objectives and activities of the UBCG and its relevance to artisanal and small-scale mining

The key objectives of the UBCG are to play a leading role in the development of methodological and practical guidelines and recommendations to track mining industry activities and to accurately measure the industry's contribution to the economy and its impacts on other social sectors and environment within the framework of the SNA.

Table 1 shows the data available for the artisanal and small-scale mining in Mongolia (through the ASMiners' Survey) and how it goes together with the activities of the UBCG.

Artisanal and Small Scale Miners' Survey 2012

The design of the survey of informal employment in the mining has changed over the time. In 2006, although the coverage was larger, an establishment census only focused on self-employed in the mining industry. The 2012 ASMiners' Survey captures a more diverse mining industry and has been developed within the framework of sustainable mining together with the Swiss International Development Agency. See Figure 1 for further details.

Table 1 | Relationship between the UBCG's activities and the ASMiners' Survey of Mongolia

Scope of activities of the UBCG	ASMiners' Survey
Economy	**Impact on the economy**
Develop methodologies and recommendations for determining the size and economic contribution of the informal mining sector.	Contribution of the artisanal and small-scale mining industry in terms of: • Size and gross output • Value added • Intermediate consumption • Estimated surplus
Society	**Impact on the society**
To measure the impacts from the benefits and income generated by the mining sector on the living standards and poverty level of the population.	Benefits for mining workers • Household livelihood • Income • Employment • Health • Education
Environment	**Impact on the environment**
To measure the impacts of the mining sector on the environment, to improve indicators used to estimate the sustainable development of the country, and to develop data sources.	Areas of the artisanal and small-scale mining industry: • Total • Affected areas • Rehabilitated areas

Survey organization

The ASMiners' Survey had three phases: In August 2012, the survey was carried out in provinces where mining is dependent on seasons. Then, in the period October-November 2012, the survey was carried out among those artisanal and small-scale miners whose activities intensify during the cold seasons of the year. Finally, in April 2013, the dissemination of the survey results was organized and the survey data were linked to the database to GIS. The database has 74 indicators across seven datasets. Figure 2 summarizes the three phases.

The 2012 ASMiners' Survey covered 238 deposits and mining sites located in 76 counties of 20 provinces and one district of Ulaanbaatar, the capital city of Mongolia (see Figure 3).

Background information on miners

In 2012, 13,375 artisanal and small-scale miners participated in the ASMiners' Survey. According to the 14.4 percent hereof were leaders or members of partnerships, 14.7 percent ran businesses supporting small-scale mining, 20.3 percent were unpaid workers in family businesses, and 50.6 percent were artisanal miners.

Impacts on the economy

Table 2 provides a statistical overview of Mongolia's mining of mineral resources, specifically coal, fluorspar, limestone and gold.

The sector contributes greatly to the economy through the taxes it pays to the government. In 2011, 25 percent of the artisanal and small-scale miners paid tax, which accumulated to195.5 million Tugrugs.

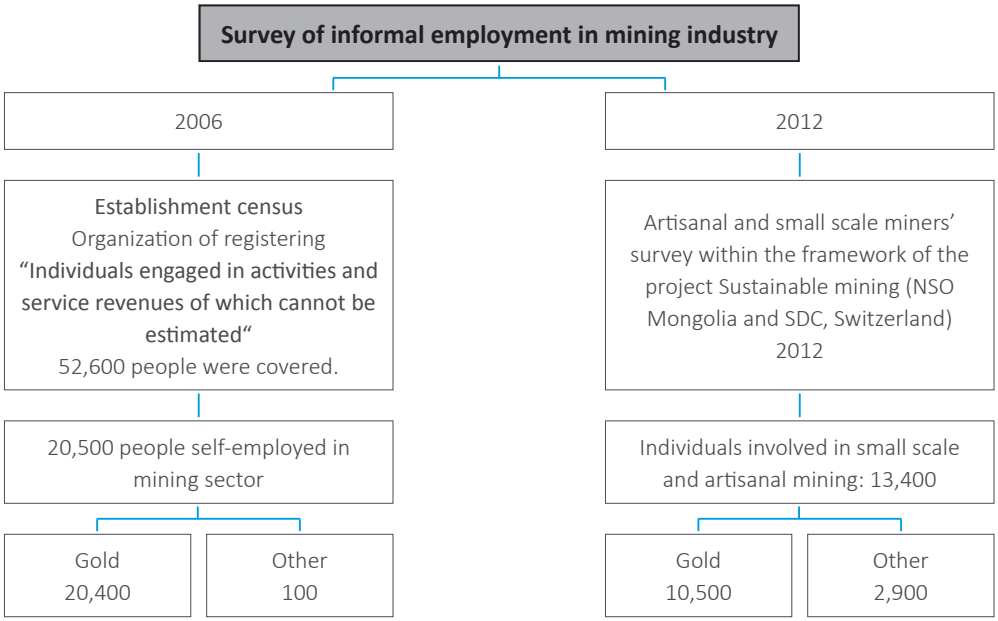

Fig. 1 | Survey of informal employment in the mining industry

Moreover, they created annual value added of 19.8 billion Tugrugs and spent 5.6 billion Tugrugs on in-between consumption. In total, they had an estimated surplus of 16.7 billion Tugrugs and a gross output of 25.4 billion Tugrugs. Table 3 shows these values according to resource group:

Impact on the society

The artisanal and small-scale mining industry has had positive implication for its employees. Most significantly, to 55 percent of mining workers, the job serves as a regular source of income. Of these workers, 16.6 percent are women. For 16 percent, the job is a permanent position. Moreover, 12 percent of mining workers have been able to purchase a car and another 12 percent have financed tuition fees for education. Finally, 4 percent have been able to purchase a dwelling.

Fig. 2 | Survey organization

Fig. 3 | Geographical distribution of artisanal and small-scale miners in Mongolia

In general, workers in the artisanal and small-scale mining suffer from a high occurrence of diseases and illnesses. In 2011, 30 percent of all workers had their health affected in one way or the other. Of these, the two major incidents had to do with back pains (48.2 percent) and respiratory system diseases (23.9 percent). Also noticeable diseases were bone and muscle structure and connecting tissue diseases (7.3 percent), digestion diseases (6.2 percent) and cardiovascular diseases (4.9 percent). A smaller portion of 6.2 percent of mining workers had accidents in the same year. While 78.9 percent of these cases led to damages on health, 21.1 percent had material implications. The accidents mainly occurred due to workers falling into holes (32 percent), being buried under matter (29.3 percent), and being exposed to airlessness (28 percent).

Given the risks associated with the line of work in the artisanal and small-scale

Table 2 | Mining of main mineral resources, 2011

Mineral resources	Unit of measurement	Official statistics	Artisanal and small scale mining, output	Artisanal and small scale mining, share	Per small scale miner
Coal	Thousand tons	30,940.1	142.0	0.5	103.8 tons
Gold	Kilograms	5,702.6	354.6	6.2	33.9 grams
Fluorspar	Thousand tons	659.0	38.5	5.8	38.1 tons
Limestone	Tons	64,900.0	66.6	0.1	6.7 tons

Table 3 | Value creation in key mineral resource groups, 2011

Type of minerals	Gross output	Intermediate consumption	Value added
Gold	18.7	4.2	14.5
Coal	3.1	0.3	2.8
Fluorspar	2.1	0.8	1.2
Other	1.4	0.2	1.2

mining industry, it is crucial to have proper insurance. In 2011, 67.5 percent of all the industry's workers had insurance. Of those insured, 76.8 percent had health insurance, 20.8 percent had social insurance, 1.4 percent had unemployment insurance and 0.9 percent had other forms of insurance.

Impacts on the environment

The impact of the artisanal and small-scale mining industry on the environment is best grasped by considering the area on which such activities take place. In 2011 the industry covered 8,319.3 hectares and affected 8,287.9 hectares. Of the latter, 7,693.6 hectares were not rehabilitated area.

Conclusions and future plans

To date, Mongolia's national statistical office has succeeded in defining the framework for the artisanal and small-scale mining statistics, and registered all relevant companies. It has hereby created a data source for official statistics. Moreover, the results have been incorporated into the GDP estimates of the full economy.

In the future, it is planned that a survey will be conducted every third year in order to update the database, and that intermediate years will be estimated based on the results of the preceding survey.

IMPACT OF MINING ON THE AUSTRALIAN ECONOMY

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Although temporarily affected by the global economic and financial crisis, Australia's terms of trade – the relative price paid for a country's import versus the price it received for its exports – rose significantly between 2005 and 2011, reflecting Australia's high economic performance of the past decade. In the September 2011 quarter, the index peaked at approximately 105 percent above the 2001 level. This development can largely be explained by a high international demand for mining products (particularly for coal, iron ore and gas), which pushed up global prices. Since 2012, however, the index has dropped significantly.

The Australian economy, although dominated by its service sector, is dependent on trade of its abundant agricultural and mining resources. A comparison of Figures 1 and 2 suggests that the economy measured in real gross domestic income is highly affected by changes to its trade balance. The same trends are seen in GDP but with loss volatility. Falling global commodity prices have caused the slowdown of the Australian economy.

The spectacular economic performance of Australia for almost two decades is explained by a mining boom, which has occurred due to a soaring global demand for resources, especially in China. High commodity prices – for iron ore and coal in particular – fueled investments in the mining industry. In 12 years, the mining sector's share of the total economy increased from a little more than 5 percent to about 10 percent in 2011.

Figure 3 shows how that gross value added increased moderately for almost all mining groups but rose exponentially for iron ore mining from approximately 3 billion AUD in September 2000 to approximately 18 billion AUD.

Even though it appears that supply finally has caught up with China's demand for resources, meaning the mining investment-boom is likely to come to an end, the

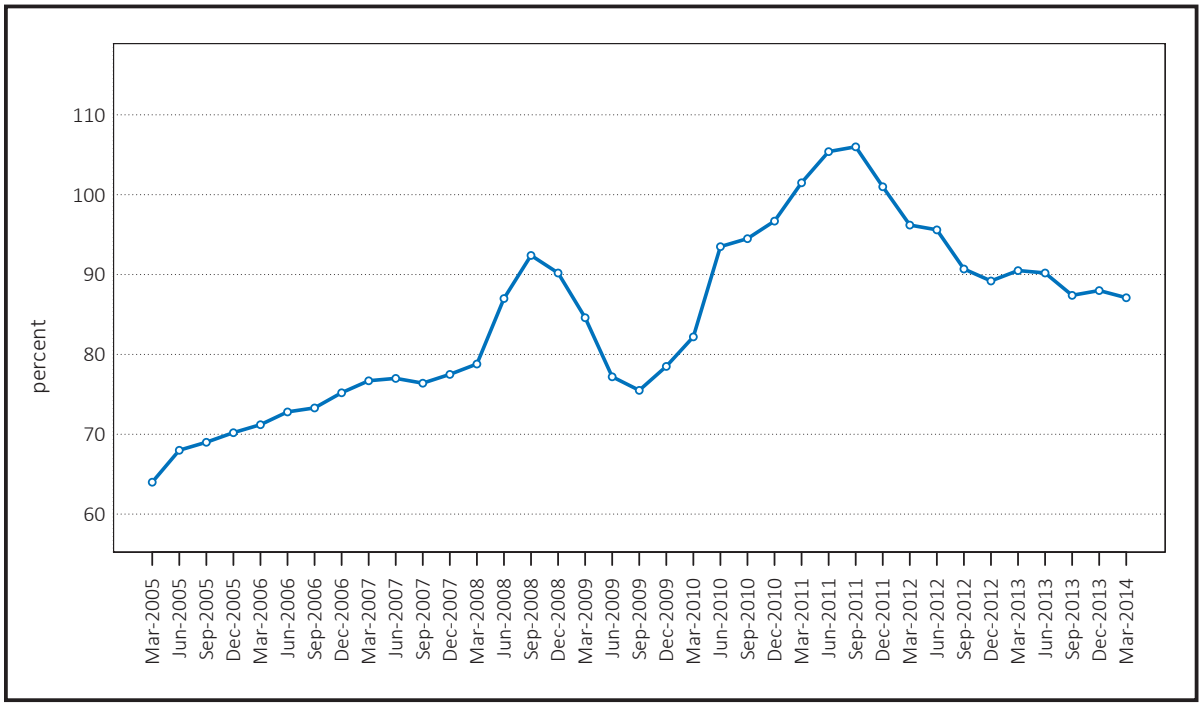

Fig. 1 | Terms of trade index, seasonally adjusted

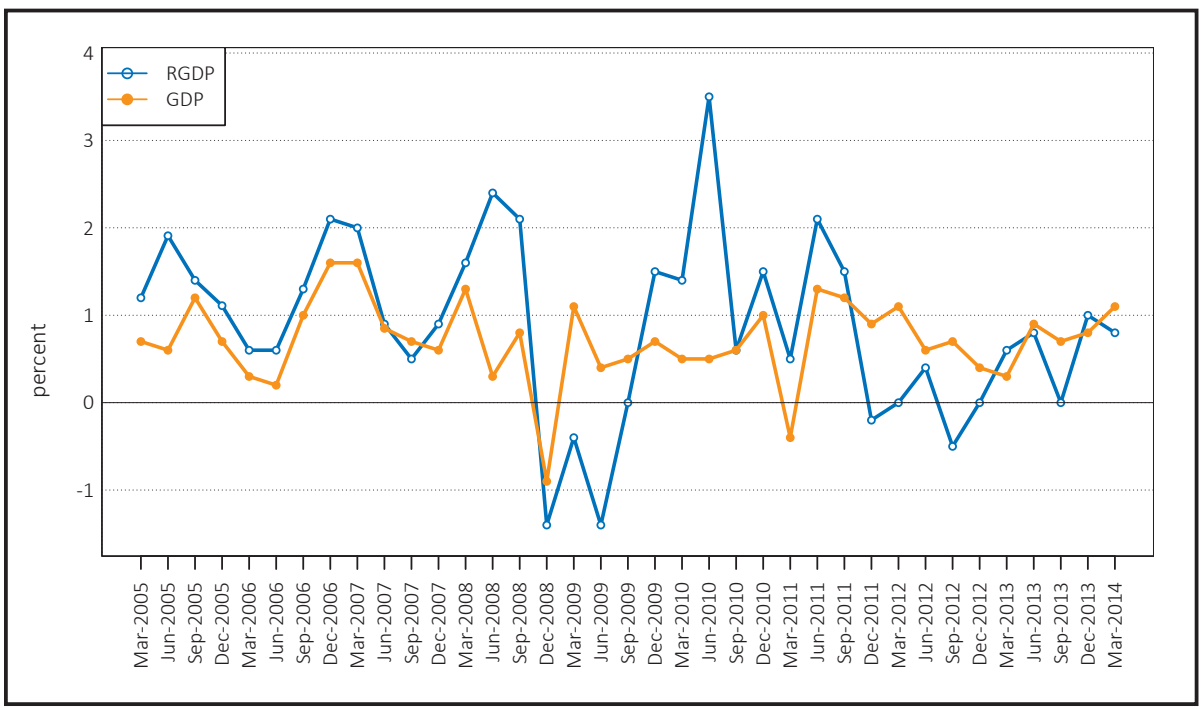

Fig. 2 | GDP and real gross domestic income, percentage change

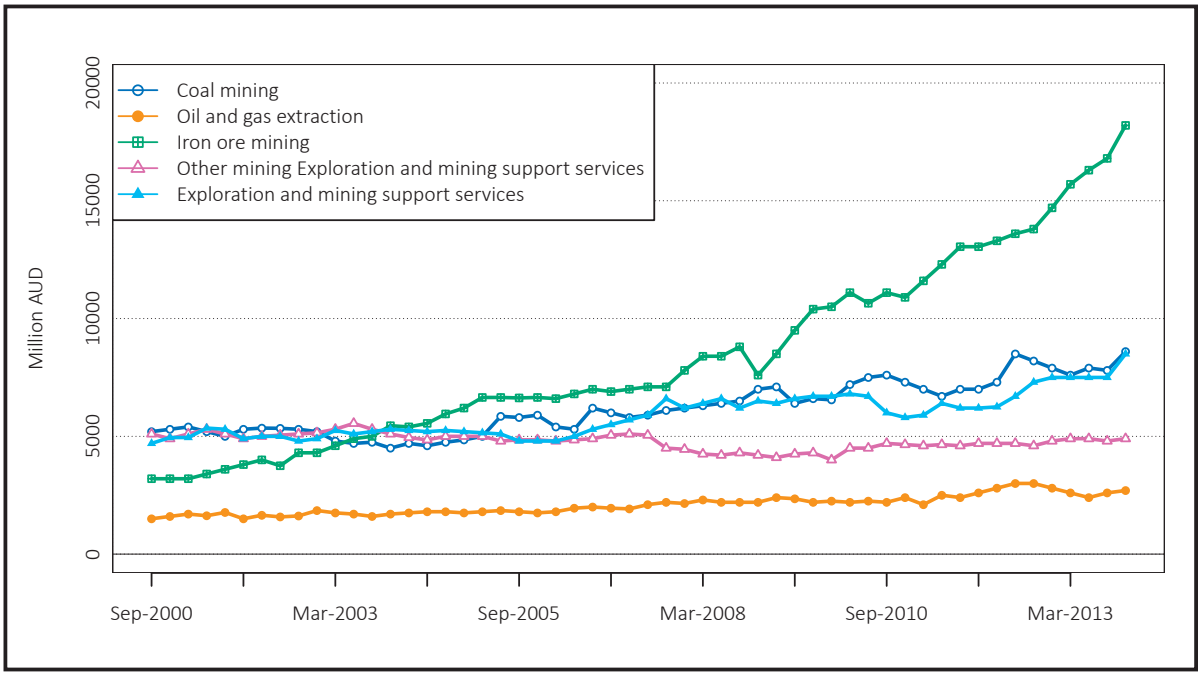

Fig. 3 | Gross value added

Australian mining industry has continued growing. Table 1 shows that the industry gained momentum in 2014 both in terms of value added and in contribution to GDP. Although investments may have peaked, the production phase of the mining-boom is still ongoing. This is reflected in the continued export growth of mining resources (see Figure 4). The exports of metal ores and minerals have especially increased. Following two years of running up its inventories – a healthy indicator for the economy as it reflects companies' anticipation to future sales – the mining industry reduced them in 2013.

The significant impact of the industry on the overall economy is reflected in the employment statistics. Between August 2000 and August 2012, mining employment increased from approximately 75.000 persons to approximately 275.000 persons and appears to have stabilized since then (see Figure 5).

Quickly after the mining boom occurred, it became clear that the capacity of Australia's supporting infrastructure to the mining supply chain was inadequate. Therefore, its ports, rail systems, utilities and roads had to be upgraded in order to keep up with the large foreign demand for mining resources. Figure 6 shows how gross fixed capital formation in non-dwelling construction in the mining industry between 2005 and 2013 grew with more than a factor of 8

Table 1 | Seasonal analysis of the mining industry

Mining gross value added				
	March 2011	March 2012	March 2013	March 2014
Original	-11.7	-8.3	-8.1	-1.6
Seasonally adjusted	-2.2	1.4	1.4	8.6

Mining contribution to GDP growth, seasonally adjusted			
	September 2013	December 2013	March 2014
GDP %	0.6	0.8	1.1
Contribution to growth from mining, percentage points	0.2	0.1	0.9

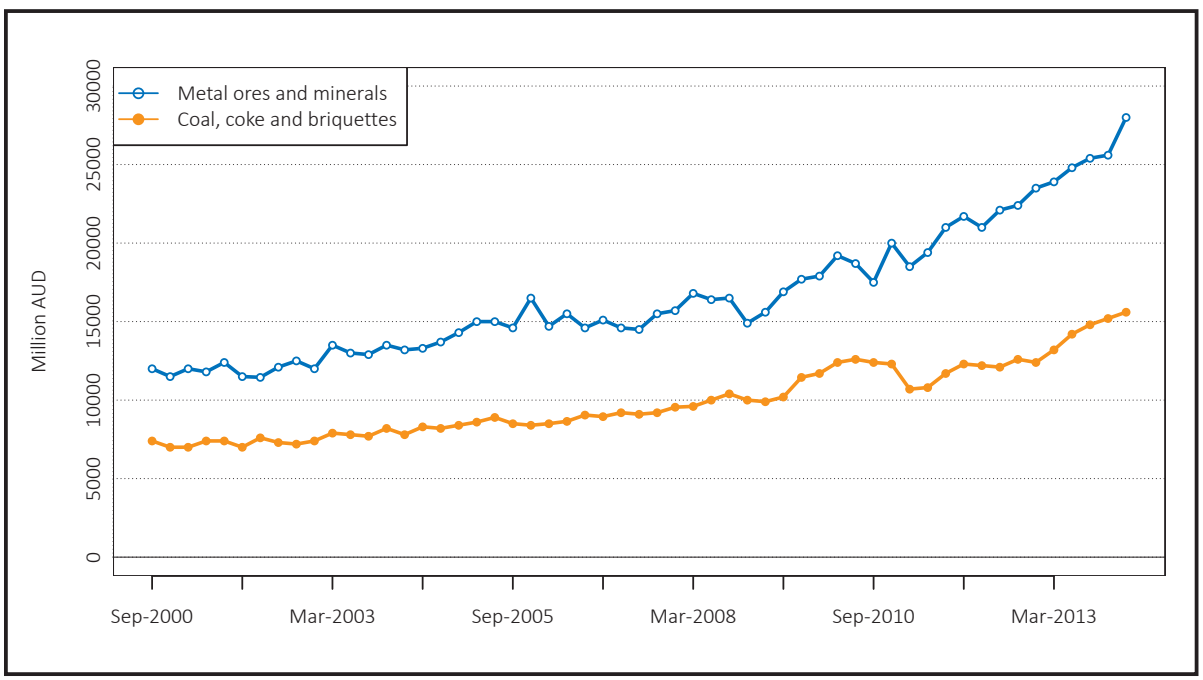

Fig. 4 | Mining exports

from less than 1 billion Australian dollars to approximately 8.5 billion Australian dollars. In this period, the value of the net capital stock of non-dwelling construction increased from approximately 100 billion Australian dollars to approximately 325 billion Australian dollars.

The investment flow to the mining industry can be fully grasped when considering its share of total gross fixed capital formation. In June 2012, a little more than 25 percent of all capital formation in the Australian economy took place in the industry. In comparison, dwellings made up approximately 16 percent.

Australia's combined minerals and petroleum exploration expenditures have experienced considerable growth since 2004. Figure 7 illustrates how expenditures reached more than 2 billion Australian dollars in September 2012, which is four times higher than a decade ago.

Not only has the expanding mining industry created jobs for thousands of people but the expanding industry has also offered a continuously increasing level of the compensation of employees (COE) (see Figure 8). In June 2012, the share of the mining in the total COE reached 4 percent. However, while the number of working

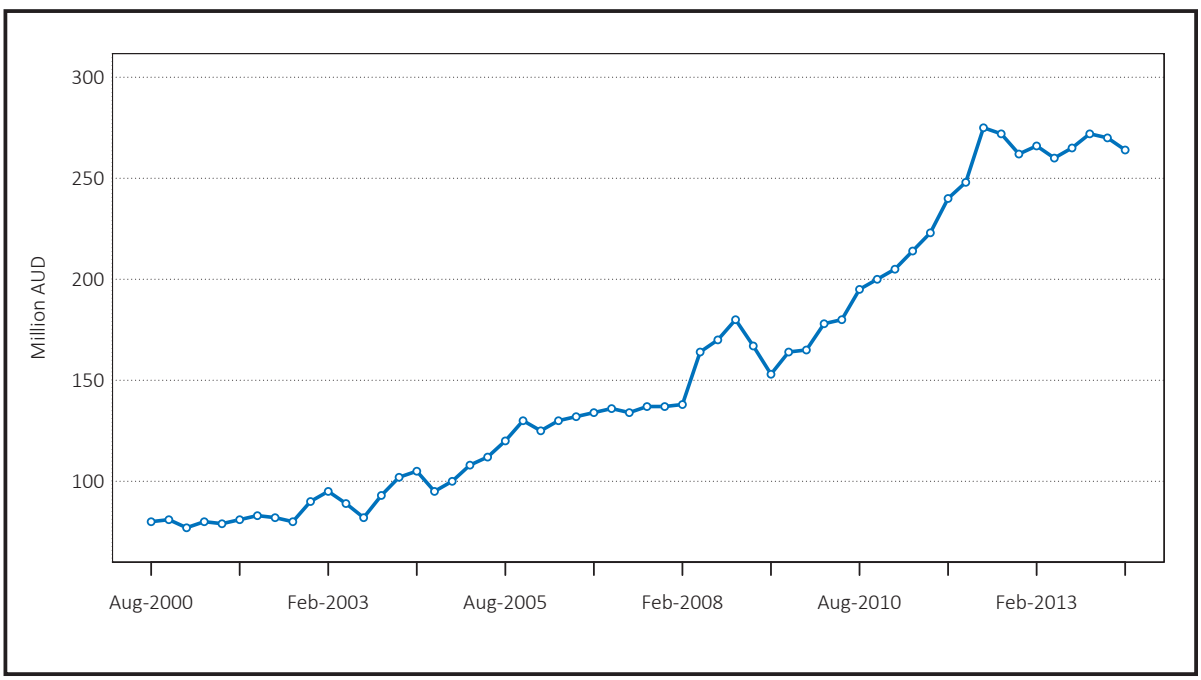

 Fig. 5 | Mining employment

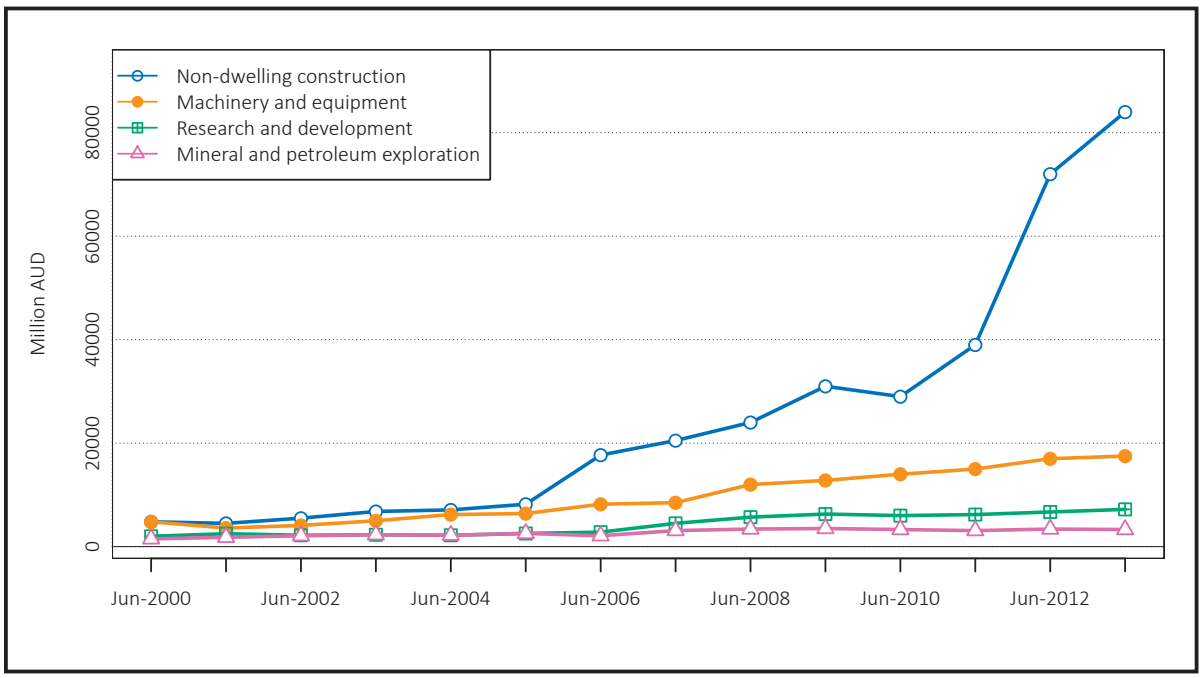

Fig. 6 | Mining gross fixed capital formation

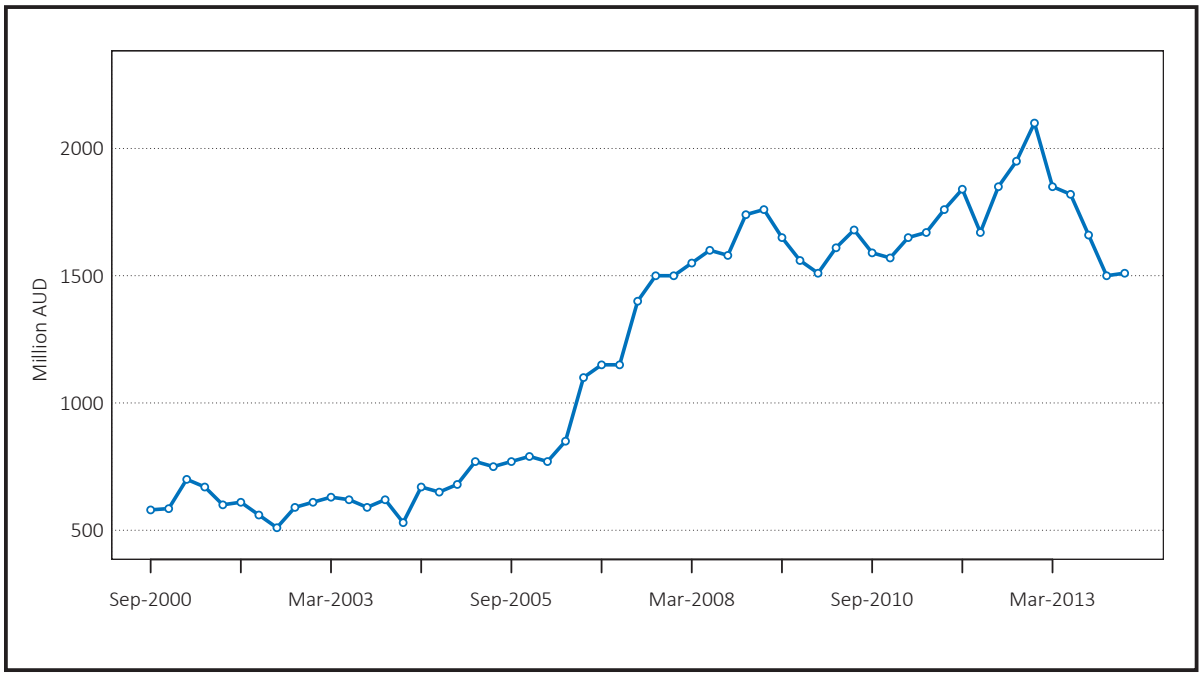

Fig. 7 | Total expenditure in mineral and petroleum exploration

hours has increased in the period, the gross value added for each working hour has fallen, reflecting a declining productivity level in the industry.

Despite hereof, the industry's gross operating surplus has been increasing more or less constantly between 2004 and 2011 (see Figure 9). When decomposing this surplus, it is seen that resource rents (to the general government of the in-situ resources) only make up a small share of the surplus. In September 2011, resource rents were approximately 3 billion Australian dollars against a total gross operating surplus of approximately 110 billion Australian dollars in June 2011.

Overall, the productivity of the mining industry (expressed as multifactor productivity in Figure 10) has declined since the early 2000s. This is due to the above-highlighted rising costs, low worker productivity, and other factors such as falling foreign demand (China in particular), price development of mining commodities and strength of the Australian dollar.

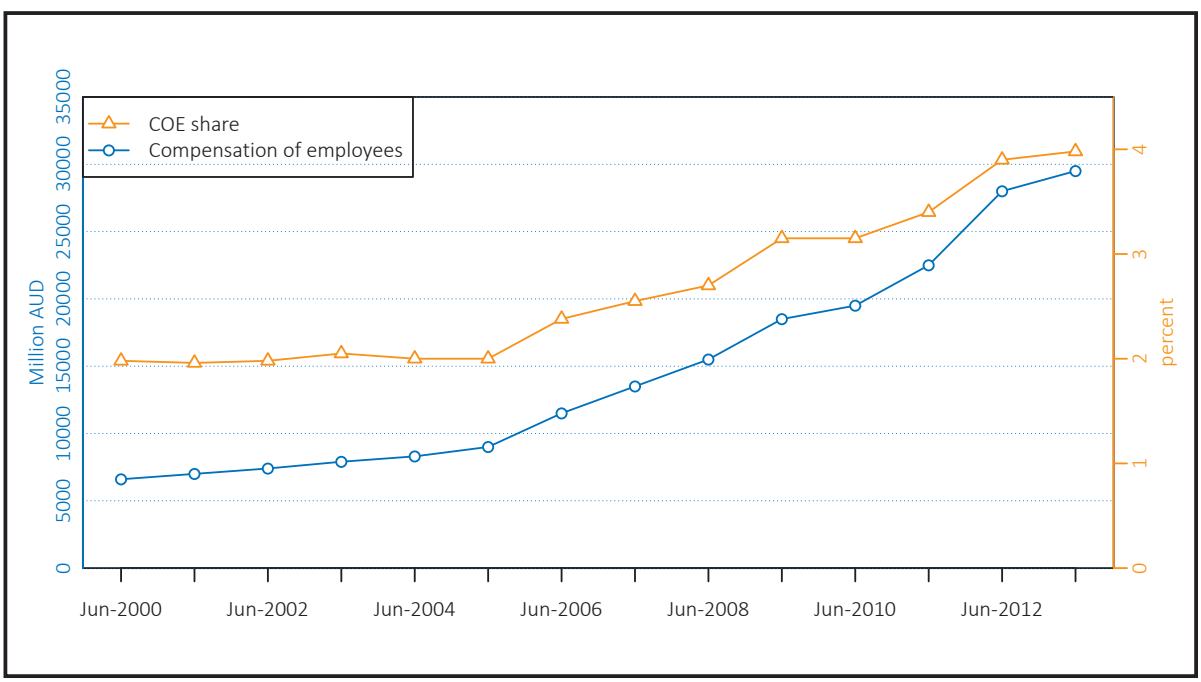

 Fig. 8 | Compensation of employees

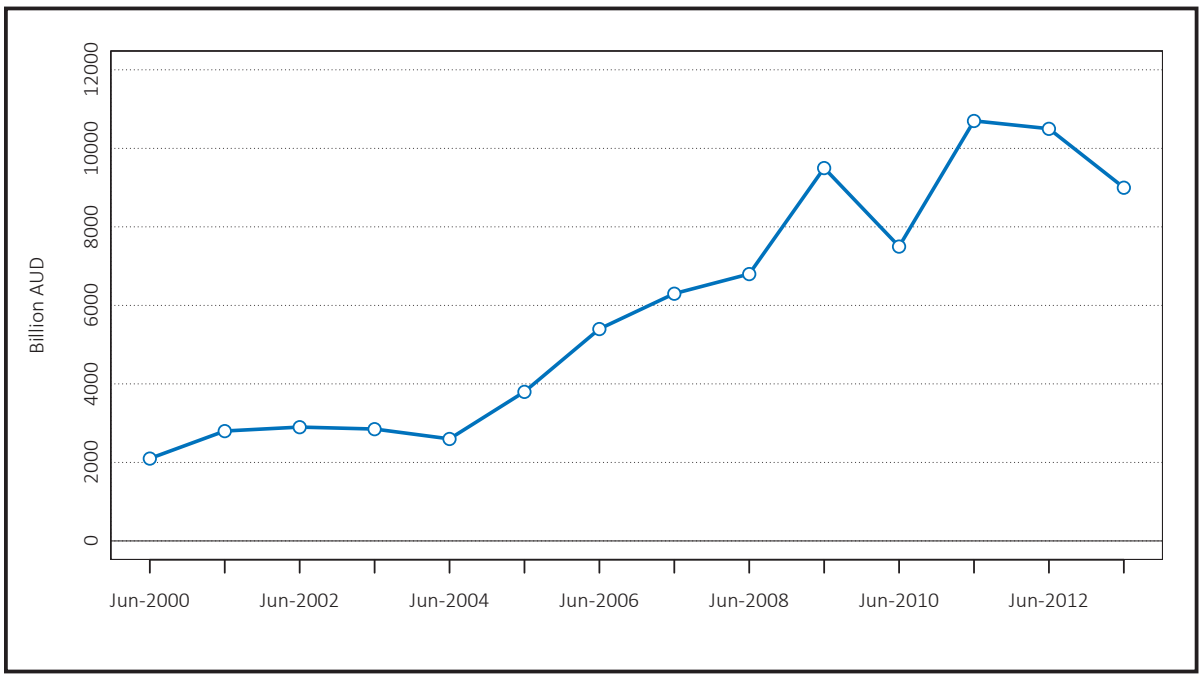

Fig. 9 | Gross operating surplus

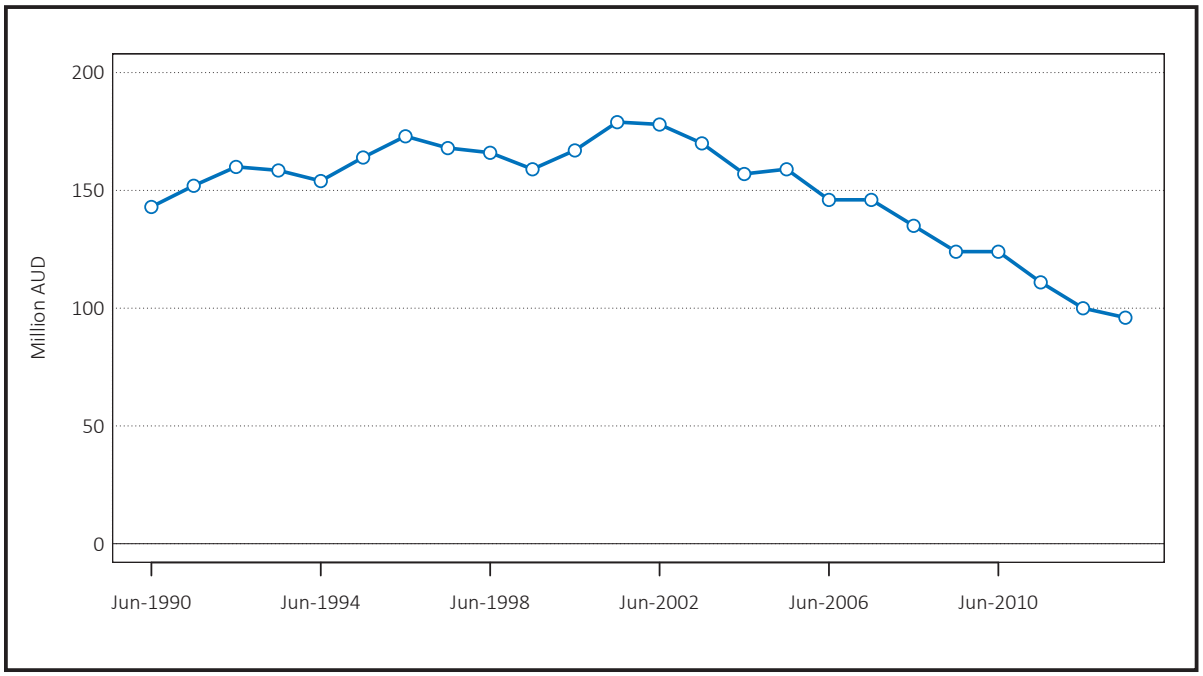

Fig. 10 | Multifactor productivity

MEASURING SUBSOIL ASSETS IN AUSTRALIA

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Defining subsoil assets

Subsoil assets are defined as in the 2008 System of National Accounts as "… those proven subsoil resources of coal, oil and natural gas, metallic minerals or non-metallic minerals that are economically exploitable given current technology and relative prices." (2008SNA, paragraph 12.17)

Valuation principles

Assets should be valued on the basis on current, observable market prices. However, in the absence of observable market prices, current prices can be approximated by either accumulating and revaluing acquisitions less disposals of the asset in question over its lifetime, or by calculating the present, or discounted, value of future economic benefits.

When valuing natural resources, the SNA 2008 adopts the following concept for economic rents: "Suppose that a mining company knows the size of the deposit being mined, the average rate of extraction and the costs of extraction of one unit. After allowing for all intermediate costs, labor and the cost of fixed assets used, what is left must represent the economic rent of the natural resource. By applying this to the expected future extractions, a stream of future income can be estimated and from this, using the techniques already

described, a figure for the value of the stock of the resource at any point in time." (SNA 2008, paragraph 20.47)

In the SEEA 2012, when taking environmental assets into account, "resource rent is thus derived from standard SNA measures of gross operating surplus by deducting specific subsidies, adding back specific taxes and deducting the user costs of produced assets (itself composed of consumption of fixed capital and the return to produced assets). As noted above, resource rent is composed of depletion and the net return to environmental assets." (SEEA 2012, paragraph 5.120)

ABS's calculation of subsoil assets differs slightly from the SNA definition. It uses the net present value approach to value the stock of subsoil assets, which involves calculating the value of net income then discounting this value by an appropriate interest rate over the expected life of the asset. Normal returns to produced capital are included to cover the cost of risk and uncertainty, and the discount rate chosen has been aimed at reflecting the cost of capital, or the cost of borrowing, to the mining industry.

Hence, the net present value calculation for individual minerals looks as follow:

$$NPV = \frac{(\$P - \$C)/N}{r/(1-(1+r)^{-RL})}$$

Where $P = price/unit, $C = cost/unit (incl. normal return to capital), N= production, r = discount rate, RL = resource life = economically demonstrated reserves / N.

The return to capital, which is also the gross operating surplus, can be allocated to both capital (produced assets) and subsoil natural resources. The return to produced assets is based on a mark up of costs using cost of extraction data, mining industry capital stock and an appropriate discount rate.

The calculations are based on:

- Economically demonstrated reserves (EDRs) and production of mineral resources in Australia are published annually by Geoscience Australia in Australia's Identified Mineral Resources;
- Mineral extraction costs, which reflects a variety of factors such as ore grade (metal per ton of ore), ore quality and mine depth, are provided by a private consulting firm;
- Prices are obtained from a number of publically available resources, including the Australian Financial Review and the Bureau of Resources and Energy Economics' quarterly publication Resources and Energy Statistics;
- The Australian System of National Accounts uses a five-year lagged average to smooth prices, costs and production.

Adoption of the net present value approach is not without problems, as it does not take into account the future price of products, technological developments that will occur during the life of the facility, true size of the field and any nearby fields, and the performance of the reservoirs to be developed.

Australian experience

Figure 1 presents estimates of the net present value of Australia's mining resources. The total value has been increasing since 1999 but has risen substantially from 2005 onwards. All resources suffered a setback in 2009 due to the global financial and economic crisis. While the value of black coal has been declining since then, the global demand for iron ore has pushed up the net present value of the resource.

Trends in EDR can undergo dramatic changes over time, which can be attributable to events such as discoveries of new deposits, depletion of the resource, technological advances, commodity price changes and reclassification of resources. Figure 2 shows trends for iron ore and black coal in the period 1989 to 2013.

Since 1998, EDR for black coal has been declining partly due to increased rates of mine production. The subsequent increase in 2009 was a result of high levels of exploration, which led to new discoveries and delineation of additional resources. Both events were impacted by reclassification of resources to comply with the so-called Joint Ore Reserve Committee (JORC) Code.

The EDR of iron ore declined between 1994 and 2003 due to increasing production levels and reassessments of reserves and resources required to comply with the JORC Code. In the period 2003-2013, EDR increased rapidly to due to large increases in deposits.[2]

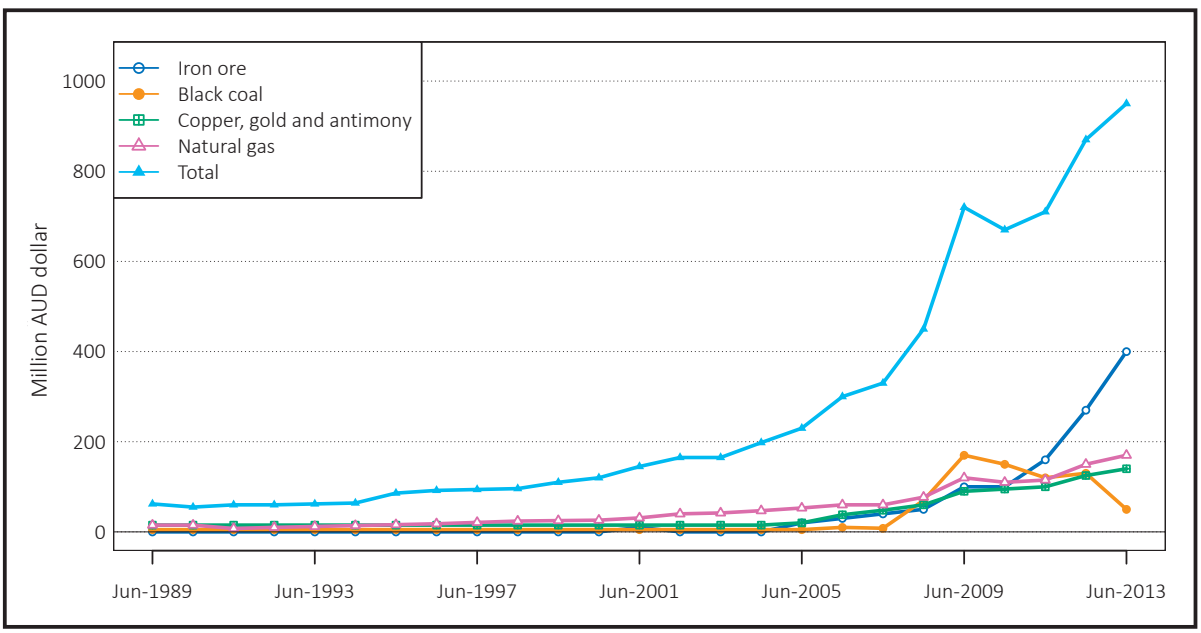

Fig. 1 | Net present values of mining resources, 1999-2013

[2] These trends have been described with input from http://www.ga.gov.au/data-pubs/data-and-publications-search/publications/aimr/trends.

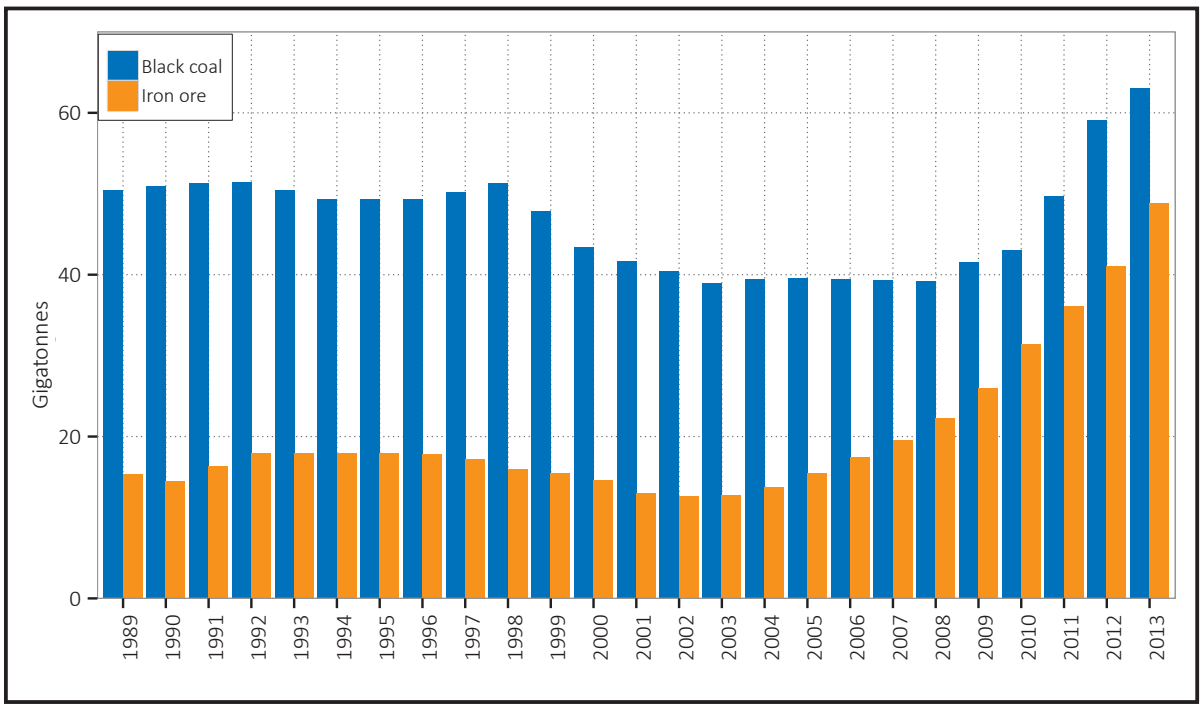

Fig. 2 | Economic demonstrated resources, 1989-2013

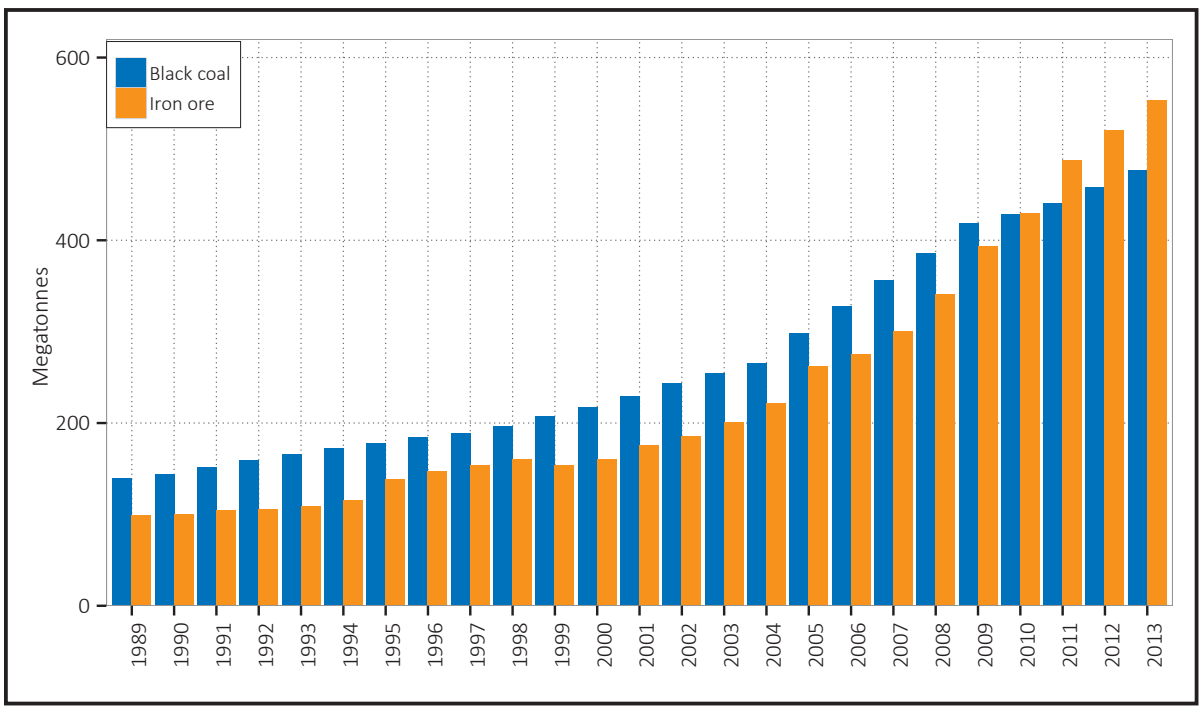

Fig. 3 | Annual production of black coal and iron ore, 1989-2013

The annual production of both mining resources has been increasing throughout the period (see Figure 3). Black coal production dominated up to 2009, but has been exceeded by iron ore production in the subsequent years.

In terms of resource life, Figure 4 shows that black coal has dropped noticeable from more than 350 years to approximately 140 years in the period 1989-2013. That of iron has also declined from approximately 175 years to 100 years. Estimated resource life was close to 50 years for both natural gas and gold in 2013.

Finally, Table 1 shows a breakdown of the national balance sheets for total assets in the Australian economy including natural resources.

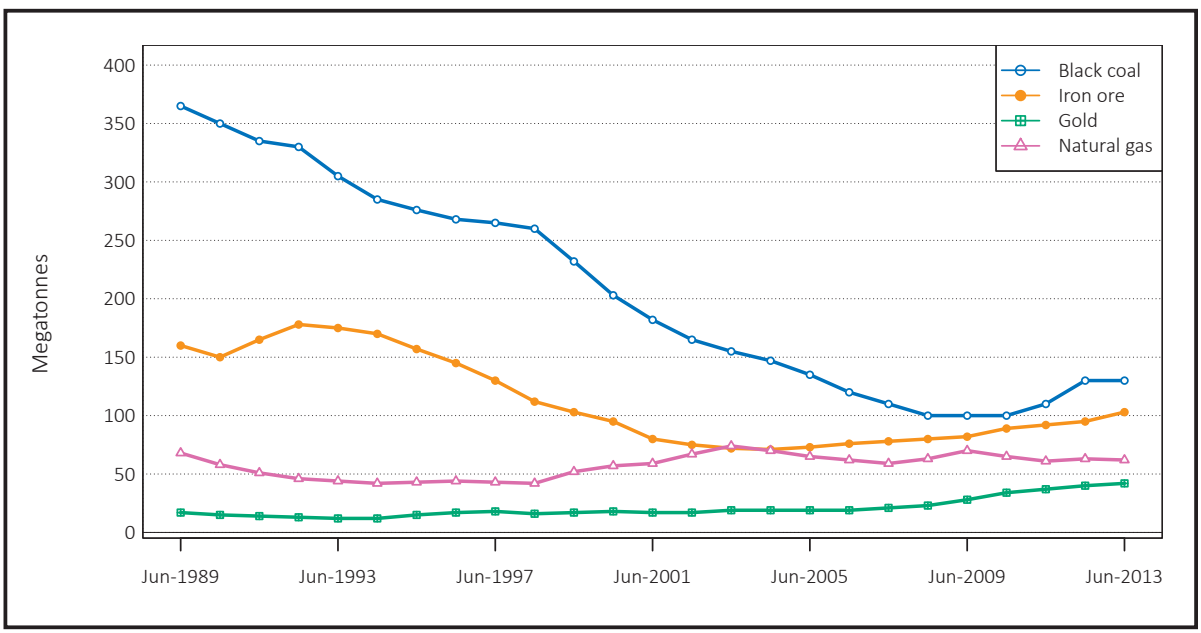

 Fig. 3 | Average life of selected resources, 1989-2013

Alternative methods

Alternative valuation methods for assets include assessing transaction prices, replacement value, user cost of capital and the net price method. However, many issues associated with these.

Ownership issues

An additional issue when assessing the value of subsoil assets has to do with ownership. For example, it is the same business that owns the asset who derives the capital services in the productive process. Capital hired on operational leases is recorded as intermediate inputs of the lessee and the lessor retains the asset. Moreover, government owns the stock of subsoil recorded on the balance sheet. Miners have long term permits issued by the government to whom they pay royalties, which are recorded in the government's income account as rent on natural assets.

Table 1 | National balance sheet, current prices, 2003-2012

	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Total assets	6,021.7	6,466.9	7,250.6	8,133.0	8,791.1	9,148.4	10,048.4	10,298.4	10,488.1
Non-financial assets	5,373.3	5,801.7	6,394.0	7,083.2	7,707.9	8,059.1	8,851.1	9,062.5	9,247.0
Produced assets	2,763.8	3,011.6	3,278.6	3,561.9	3,853.2	4,059.0	4,240.4	4,458.5	4,686.7
Non-produced assets (c)	2,609.6	2,790.2	3,115.4	3,521.3	3,854.6	4,000.1	6,410.7	4,603.9	4,560.2
Natural resources	2,606.1	2,786.8	3,112.1	3,518.3	3,851.7	3,997.4	4,608.3	4,601.8	4,558.4
Land	2,400.8	2,555.2	2,816.0	3,178.9	3,399.1	3,266.9	3,928.9	3,886.7	3,684.1
Suboil assets	197.4	223.4	287.6	330.3	443.0	720.6	669.1	704.2	862.7
Native standing timber	2.3	2.2	2.1	2.1	2.1	1.9	1.8	1.8	1.9
Spectrum	5.7	6.1	7.0	7.0	7.5	8.1	8.6	9.1	9.7
Permissions to use natural resources	3.5	3.4	3.1	3.1	2.9	2.7	2.4	2.1	1.8
Spectrum licenses	3.5	3.4	3.1	3.1	2.9	2.7	2.4	2.1	1.8
Financial assets with the rest of the world	648.4	665.2	1,049.8	1,049.8	1,089.3	1,089.2	1,197.3	1,236.0	1,241.1
Liabilities to the rest of the world	1,095.7	1,162.7	1,663.0	1,663.0	1,740.8	1,792.8	1,975.2	2,038.4	2,120.6
Net worth	**4,926.0**	**5,304.2**	**6,470.0**	**6,470.0**	**7,050.3**	**7,355.6**	**8,073.2**	**8,260.0**	**8,367.4**

All units in $b

Note: (c) Experimental estimates

SESSION 3

Social Statistical Indicators

Session chaired by Bruce Hockman, Australian Bureau of Statistics
Shyam Upadhyaya, United Nations Industrial Development Organization

IMPACT OF THE MINING INDUSTRY ON THE SOCIAL SECTOR OF MONGOLIA

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National Statistical Office
Ulaanbaatar, Mongolia

Indicators related to the social sector

The UBCG has identified 55 indicators to measure the social impacts of mining, which have been categorized according to:

- Labor statistics: Number of national and foreign employees, labor productivity, employment elasticity;
- Health statistics: Occupational safety, life expectancy at birth and death rate of employees;
- Income statistics: Compensation, average wages and salaries and real wage index;
- Other statistics: Migration flows, impact of mining on poverty, education and training, etc.

Data sources and availability

Figure 1 shows the sources and availability of data necessary to compile the UBCG-defined indicators for Mongolia. As depicted, 43 out of the 55 indicators can be derived from various sources such as household socio-economic surveys (HSES), labor force surveys (LFS), wage and salary surveys and other special surveys. Other official statistics includes gender statistics, population and annual reports of vital statistics. The administrative data used for measuring impacts on social sectors include data from the Ministry of Health and Ministry of Education and Science. Relevant data sources are needed to generate the 7 lacking indicators under 'other statistics' and the 5 lacking under 'health statistics'.

Mining site survey and impact analysis

Data collection through survey

The surveys mentioned above compile essential social statistics:

- Labor statistics: Number of national and foreign employees, education level, marital status, number of family members, training type, occupation,

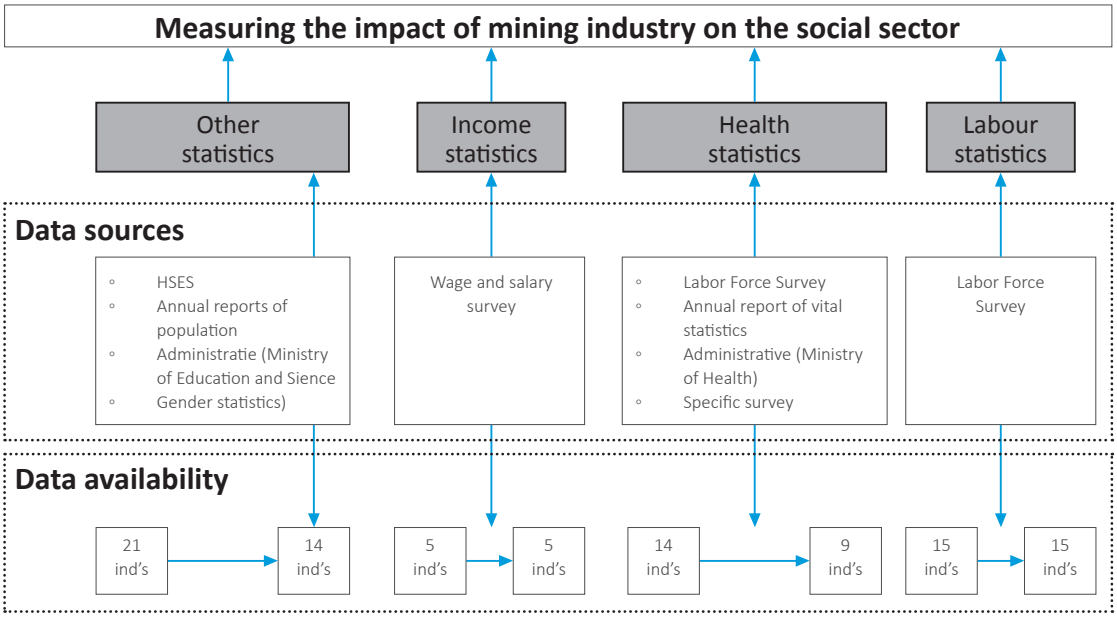

Fig. 1 | Data sources for measuring the social impacts of the mining industry

and number of years worked in the mining sector;

- Health statistics: Number of sick workers by type of disease, number of patients by disease, accidents occurring in the mining industry by type of accident.
- Education statistics: Trainings and courses for employees in mining companies, number of qualified drivers working in mining transportation, and number of operators of heavy vehicles and mechanisms;
- Income statistics: Total and average wages and salaries.

Impacts of the mining industry on the social sector

As seen from the Figure 2, monthly average wages and salaries of employees in the total economy is 1.46 times lower than that of employees in mining sector. The average growth of wages and salaries between 2009 and 2012 has also been higher in the mining sector (27 percent compared to 23 percent of the total economy). Female wages and salaries are lower than that of men in both the total economy and in the mining sector, but the gap is smaller in the latter.

Men largely dominate the mining and quarrying sector. In 2012, approximately 80 percent of all employees were male. This is to be compared with a share of 54.3 percent at the national level. Figure 3 shows the sex ratio in the total economy and in the mining and quarrying sector by age group. It suggests that the typical profile for a worker in the mining and quarrying sector is a man between 25 and 44 years old. The age profile for female workers in the sector is very even.

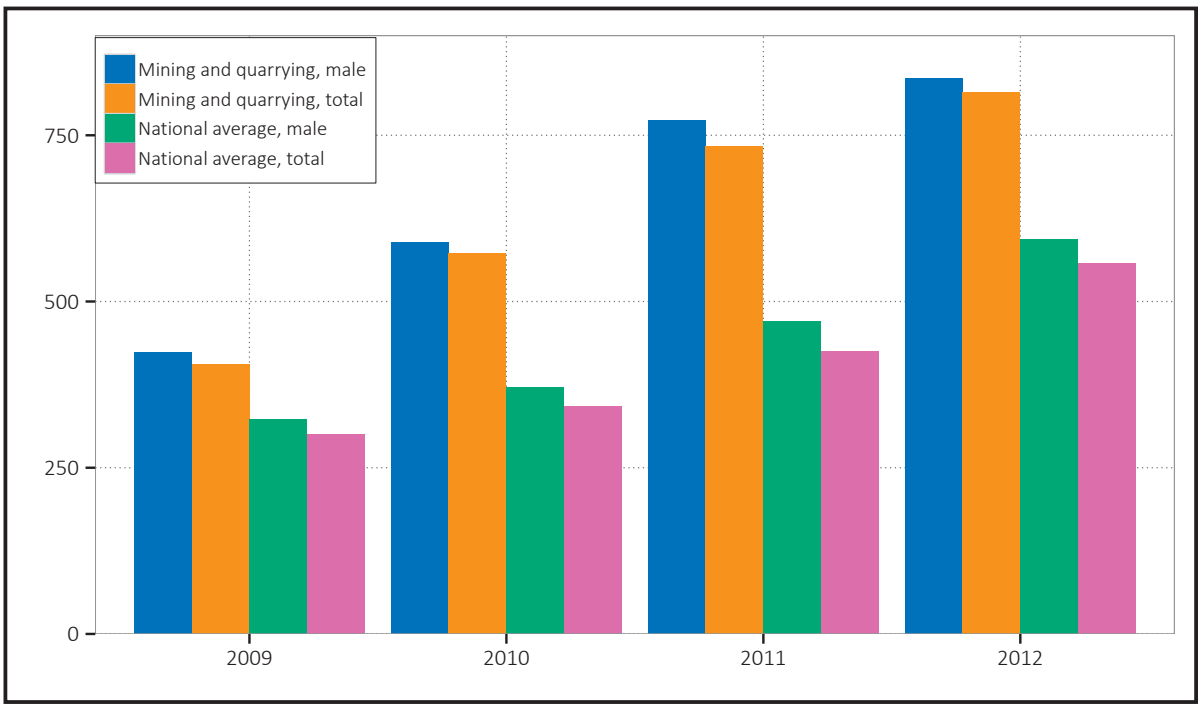

Fig. 2 | Monthly average wages and salaries of employees, 2009-2012

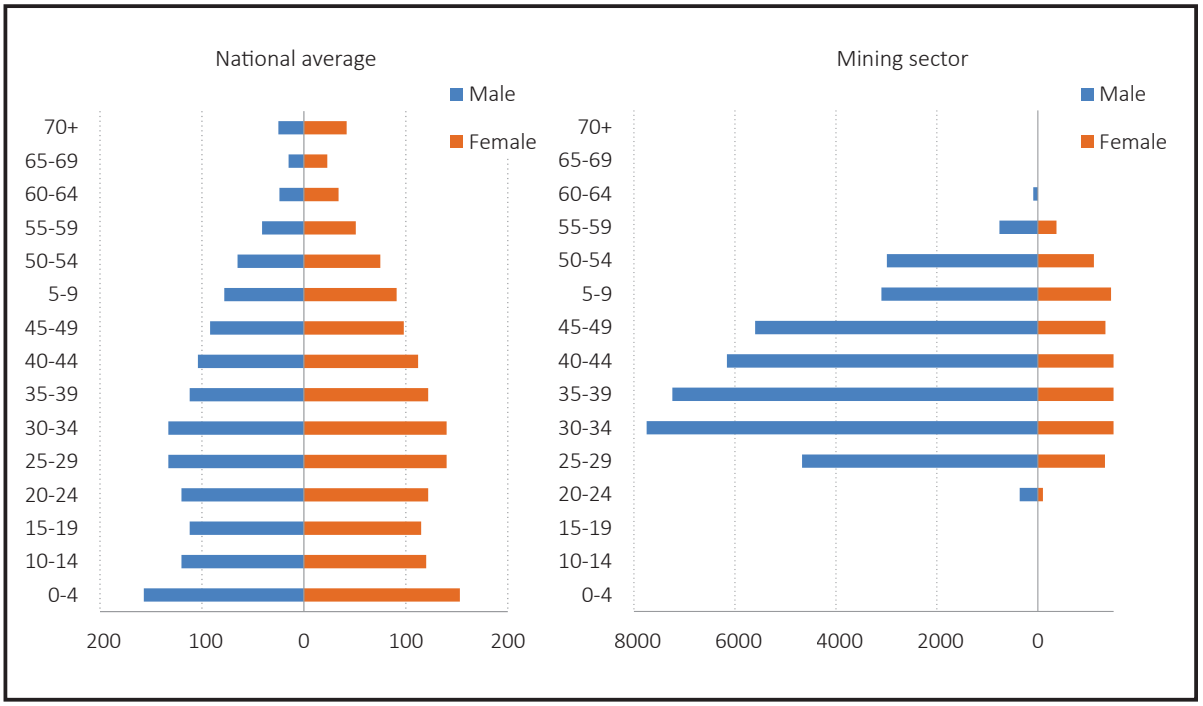

Fig. 3 | Sex ratio on national level and in mining sector, by age group

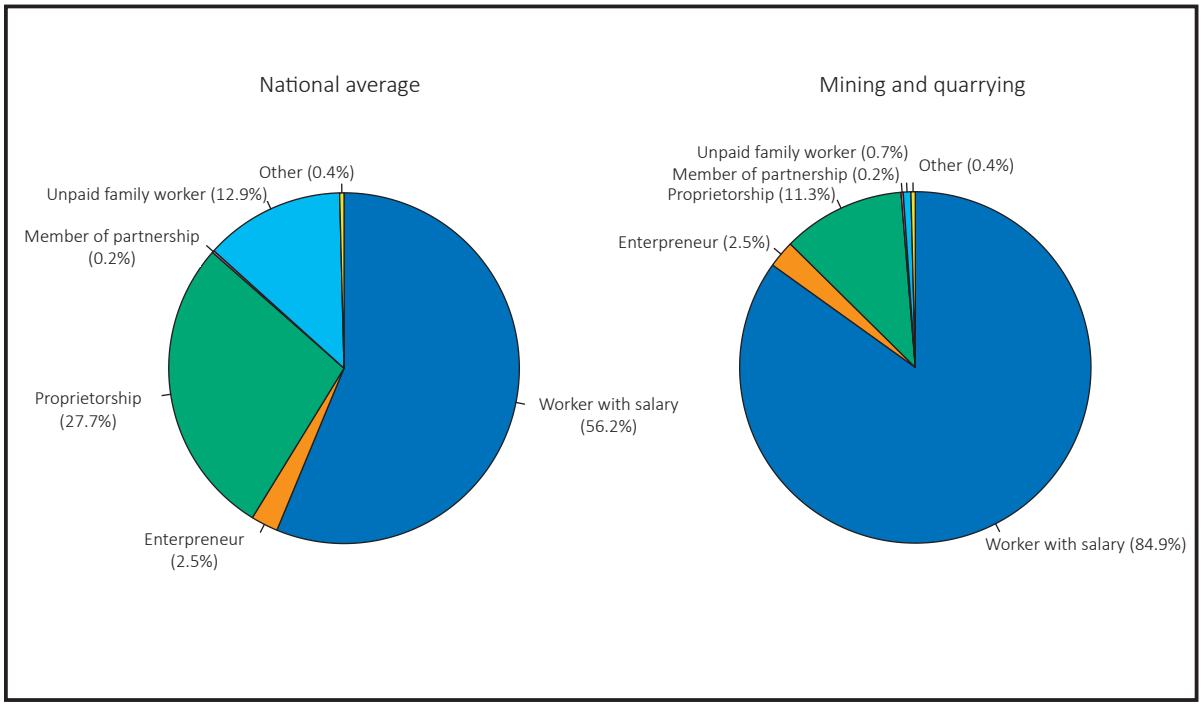

Fig. 4 | Structure of employees, by type of work, 2012

As shown in Figure 4, nearly 85 percent of all mining and quarrying employees are workers with salaries, and 11.3 percent are sole traders (known as a proprietorship). The structure of labor looks noticeably different in the economy as a whole, where - on average – 56.2 percent are workers with salary and 27.7 percent are sole traders. A substantial share of 12.9 percent is comprised of unpaid family workers; this only takes place on a very limited level in the mining and quarrying sector. The level of entrepreneurship is similar on both levels.

Conclusion

The key tasks ahead for Mongolia's National Statistical Office include identifying and creating data sources relevant for the UBCG-identified indicators, and subsequently improving the quality of data acquired. Based on such data, the National Statistical Office will conduct an analysis analyses on population growth and migration to mining provinces, on the poverty level of mining and non-mining provinces/counties, and on the level of investment by mining firms on human development, social programs and local community development. This will be supplemented with data from the – yet to be completed - mining site surveys comprising information on the social impacts of mining, as well as the social contribution of the selected companies on human capital development, labor force skills, the education system and the local health care system.

MINING INDUSTRY OF KAZAKHSTAN: IMPACT ON LABOR MARKET AND WAGES

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Labor

Between 2008 and 2013, the number of people employed in Kazakhstan's mining industry increased by 26.7 percent to approximately 250,000 people in 2013 (Figure 1). The industry's share of the total economy (measured in terms of number of employees) was 2.9 percent, growing from a share of 2.4 percent in 2010, and hereby back to the 2001 level. Male workers, whose number increased by 32 percent, mainly drove this increase. The number of female workers only increased by 11.1 percent

A regional comparison shows that the largest number of people employed in the mining industry is registered in Mangistauskaya (19.5 percent), Karagandinskaya (14.2 percent), Aktubinskaya (12.2 percent), Kostanaiskaya (11.2 percent) and East-Kazakhstan (8.9 percent).

When comparing the share of mining workers to the total regional workforce, Mangistauskaya (18.8 percent) is at the top, followed by Aktubinskaya (7.4 percent), Atyrauskaya (5.7 percent), Kostanaiskaya (5.5 percent), Karagandinskaya (5 percent) and Kzylordinskaya (3.9 percent).

A socio-demographic analysis of the mining industry in the years 2010-2013 reveals the following key observations:

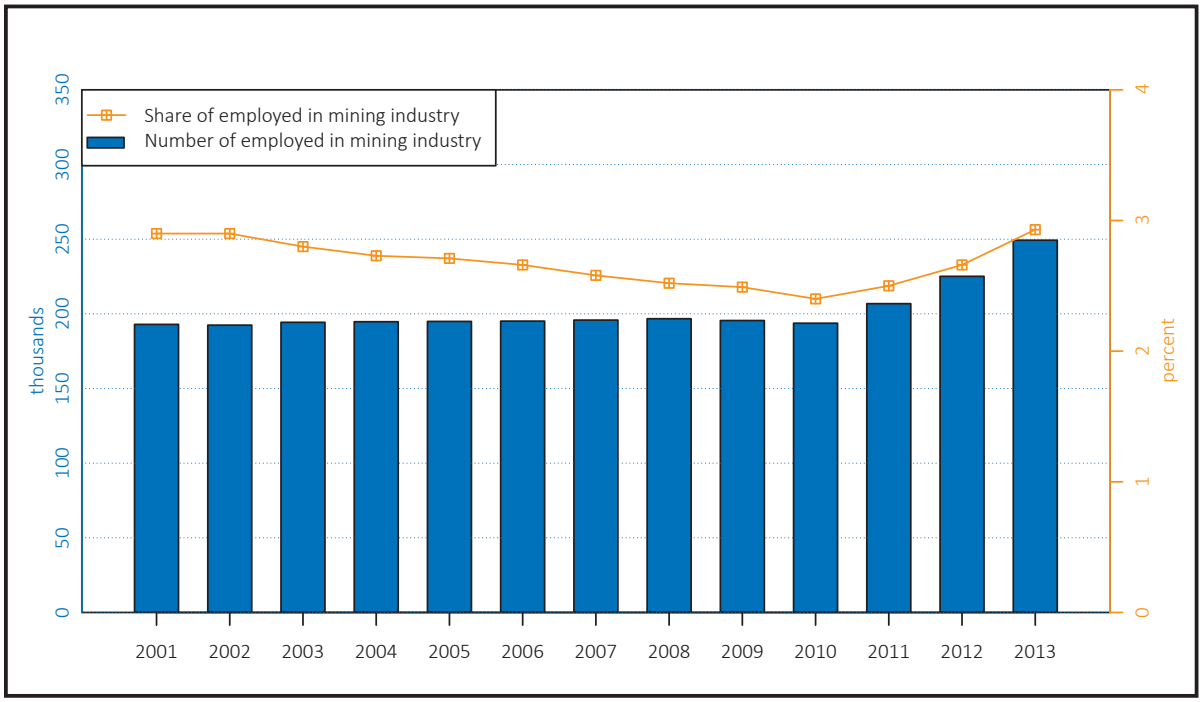

Fig. 1 | Number of employees in the mining industry, 2001-2013

- The age composition in the industry has changed; the share of workers aged 55-66 increased at the expense of workers aged 16-24. However, the bulk of workers in the mining industry (78.2 percent) are aged 25-54.
- Between 2010 and 2013, the share of mining industry workers with a specialized vocational education increased from 38.3 percent to 45.2 percent, and the share of workers who have completed or almost completed a higher education increased from 23.8 percent to 30.3 percent (Figure 2).
- A comparative dynamics is observed between the marital status of workers in the mining industry and in the overall economy. 65.3 percent of the labor force in the total economy was married in 2013, whereas 73.4 percent of all workers in mining industry were married.
- 34.7 percent of mining industry workers were qualified as “operators, devisors, machinists and machine installations and fitters” in 2013 (Figure 3). 31 percent were qualified workers employed in big and small industrial organizations (specifically within construction, transport, communications, geology and exploration), 10.5 percent were specialists with the highest possible level of qualification, and 8.8 percent were managers (all levels).

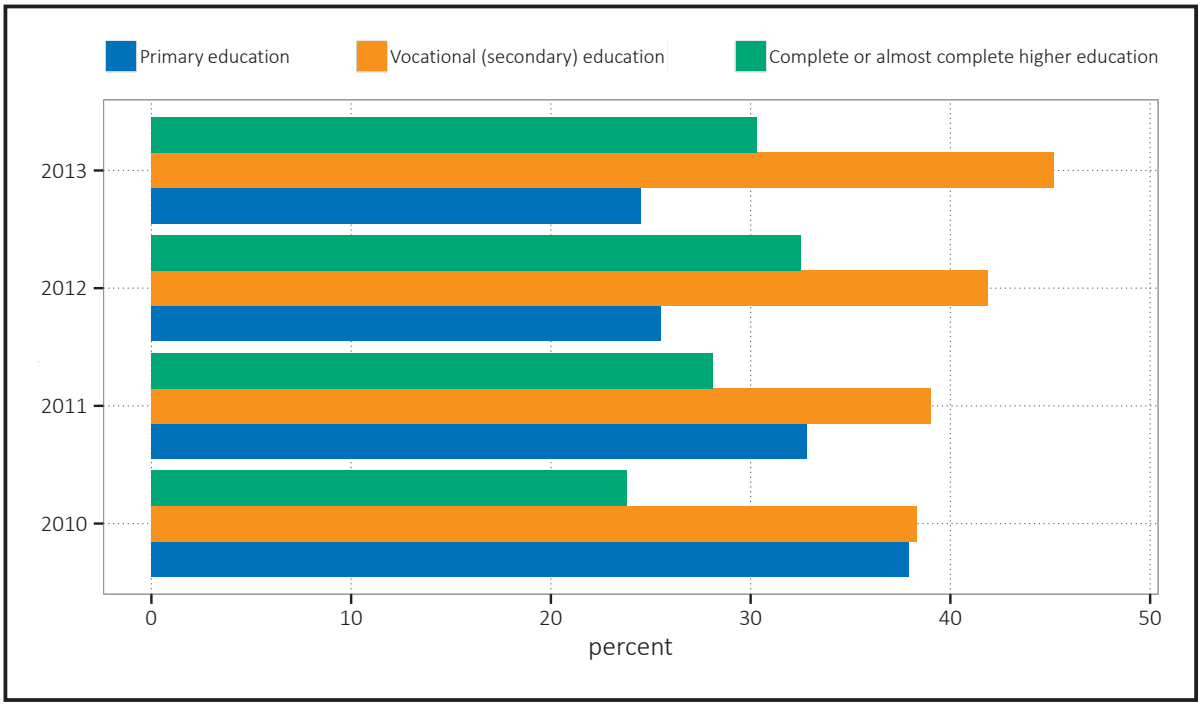

Fig. 2 | Distribution of employed in the industry by level of education, 2010-2013

- The high growth rates of the mining industry are expected to continue in 2014. This is reflected in the difference between actual vacancies in the industry at the beginning of the year (1,609) and the expected demand for workers over the entire year (3,591). Even though the number of mining industry workers has increased rapidly, the industry's demand for labor is yet to be met. Observations at the regional level reveal the location of bottleneck problems. For example, the demand for labor was 2,275 in Kostanaiskaya but only 62 positions were available. On the other hand, the demand was met in Pavlodarskaya, where there were 390 vacancies and no excess demand.
- 49.2 percent of all surveyed mining enterprises are looking for qualified workers within the industry (i.e. mining; manufacturing; electricity, gas, etc.; and water supply etc.), arts and crafts, construction, transportation, communications, geology and resource exploration. Operators, devisors, machinists and machine installations and fitters come second in the demand for skills in the mining industry (22.3 percent). The demand for workers to leadership positions in enterprises and

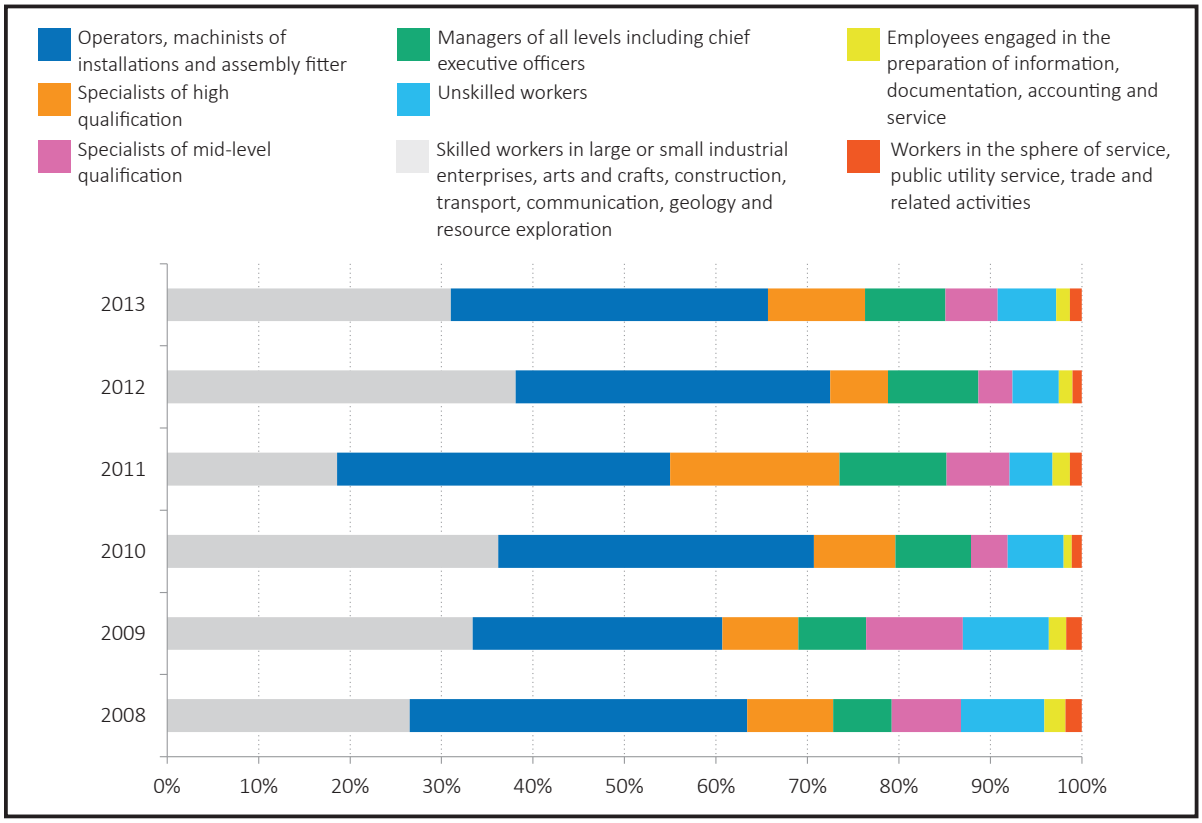

Fig. 3 | Distribution of workers of the industry enterprises by major occupational groups, 2008-2013

their subdivisions is higher than in the economy as a whole (4.6 percent to 3.1 percent).

- In 2013, 52.5 percent were employed as professional staff and 40.2 percent as heads of departments in the mining industry. However, the industry saw a general increase in the proportion of skilled workers and top managers of organizations in the period 2010-2013.

Income (wage)

Wages based on tariff rates and official base salaried are the main sources of income among workers in Kazakhstan's mining industry. They make up 55 percent of the total wages paid in the industry (compared to about 70 percent in the total economy), while incentive and compensation payments make up, respectively, 21.6 percent and 9.6 percent. The corresponding values for the economy as a whole are 12.4 and 4.8 percent – almost half the size of the mining industry values. In total, wages in the mining industry makes up 11.6 percent of all wages paid in the economy.

In 2013, the average nominal wage in the economy (109,141 Tenge) was only about half of the wages in the mining industry (210,404 Tenge). Data from June 2013 surveys also reveals large differences in

the distribution of gross wages. In the total economy, 8.2 percent of the employees earned less than 30.000 Tenge, 76.7 percent earned between 30.001 and 150.000 Tenge (with the majority below 90.000 Tenge) and 14.6 percent earned more than 150.001 Tenge. In the mining industry, the bulk of employees' earning was still in the 30.001-150.000 Tenge span, but within this group, the majority earned more than 90.001 Tenge. While only 0.8 percent earned less than 30.000 Tenge, 46.1 percent earn from 150.001 Tenge and upwards.

Moreover, average labor earnings are increasing at a higher rate in the mining industry than in the economy as a whole. This is reflected in the indexes for real and nominal wages (the former reflects changes in the purchasing power of labor earnings), which was 101.9 percent and 107.8 percent, respectively, for the total economy and 118.1 percent and 111.6 percent, respectively, for the mining industry. Table 1 highlights the key indicators on labor statistics for the mining industry.

Kazakhstan's mining industry is male-dominated. In 2013, the industry employed 169.000 men and only 43.800 women. A substantive and increasing wage gap exists in the industry: wages of male workers are 1.4 times higher than those of women.

The survey data also allow comparative analyses of the occupation-specific salaries in the mining industry by occupational group. For example, in October 2013, the wage level between the coal and lignite mining industry and the crude oil and natural gas industry differed with a factor of 1.5 to 4.5 within each occupation groups. The

Table 1 | Major indicators on labor in the mining industry

	Number of employees, thousands	Actual number of workers (for calculation of average wage), thousands	Wages fund, billion Tenge	Average nominal wage, Tenge	Index of nominal wage, in % to previous year	Index of real wage, in % to previous year
2008	175.2	170.2	225,644	110,502	123.0	105.1
2010	174.3	169.8	301,748	148,091	120.1	112.1
2013	218.8	212.8	537,333	210,404	118.1	111.6

largest differences were found for heads of specialized units, computer programmers, safety engineers, accountants, economists and office managers.

Finally, a regional comparison shows that mining workers in West-Kazakhstan have the highest average monthly wage in the country (509,765 Tenge), and working in North-Kazakhstan the lowest (91,125 Tenge).

Health and productivity

In the period January-December 2013, labor productivity in the mining industry was between 1.6 and 11.8 times higher than in other sectors of the economy such as transportation, manufacturing, construction and trade (see Table 2). Productivity is particularly high in crude oil and natural gas extraction.

Evaluating the impact of mining on society

Currently, there are no indicators on labor statistics describing the migration of labor. To enable the assessment of the impact of mining on society (i.e. migration, migration, poverty, education), the Agency is implementing a joint project with the World Bank called "KAZCTAT: Strengthening the National Statistical System of the Republic of Kazakhstan" in the period 2012-2016. The objective of the project is to improve the country's labor statistics.

Moreover, the Agency is yet to develop a mechanism to assess the impact of various economic sectors, including the impact of the mining activities on poverty levels in the country and its regions.

Table 2 | Labor productivity by economic activity (thousand USD per person)

	2008	2009	2010	2011	2012	Jan - Dec 2013
Mining industry and quarrying	**157.9**	**142.8**	**183.0**	**211.0**	**211.2**	**207.9**
Mining of coal and lignite	20.6	19.0	20.3	24.0	24.1	23.1
Mining of crude oil and natural gas	555.6	441.0	614.0	705.4	776.9	807.2
Mining of metal ores	31.5	24.1	41.7	50.2	62.9	48.6
Other industries of mining	6.5	7.2	12.4	12.5	12.5	13.1
Technical services in the mining industry	36.3	31.6	28.6	32.3	34.9	32.9
Manufacturing	**37.3**	**29.4**	**41.0**	**52.7**	**61.8**	**57.5**
Construction	**13.6**	**13.6**	**14.1**	**16.1**	**16.8**	**17.6**
Wholesale and retail trade; repair of motor vehicles and motorcycles	**25.8**	**18.3**	**27.1**	**34.6**	**41.3**	**38.8**
Transportation and warehousing	**62.9**	**58.7**	**65.2**	**77.3**	**77.7**	**128.6**

SESSION 4

Environmental Statistical Indicators

First part of Session chaired by Paul Roberts, Australian Bureau of Statistics
Shyam Upadhyaya, United Nations Industrial Development Organization

Second part of Session chaired by Bruce Hockman, Australian Bureau of Statistics
Badamtsetseg Batjargal, National Statistical Office, Mongolia

ENVIRONMENTAL-ECONOMIC ACCOUNTING IN AUSTRALIA

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What is the System of Environmental-Economic Accounts?

The System of Environmental-Economic Accounts (SEEA), which became an international standard in 2012, provides a structured and standardized way to organize environmental information. It has been in development since the early 1990s but is still in its infancy compared to the System of National Accounts, which was first published in 1953. The SEEA framework has a similar accounting structure as SNA and uses concepts, definitions and classifications consistent with SNA. In short, the SEEA integrates environmental information with social and economic information by linking environmental information to the SNA. It presents comparable information in a systematic way, using standard definitions and structuring accounts in monetary and physical terms. It hereby encourages the development of comprehensive and consistent datasets over time and provides a framework from which a range of indicators can be produced.

Timeline of environmental accounting in Australia

Table 1 gives a brief overview of the developments towards a system for environmental accounting in Australia.

Australian Environmental-Economics Accounts

The Australian Environmental-Economics Accounts (AEEA) is the flagship environmental publication of the ABS, and is an integration of a range of environmental information. With its first edition in 2014, it compiles tables and indicators of time series covering water, energy, waste, environmental assets, CO2 emissions, taxes, and land cover. The AEEA includes a minimum of analysis and interpretations of the accounts but instead special articles on issues of interest.

Figure 1 illustrates the current content and information sources for the Australian Environmental-Economic Accounts.

Support from government

Although the level of support has been changing with the government in place, since 2008 a number of milestones have supported the development of environmental accounting, particularly the 2008 Australia 2010 Summit, the 2009 Review of the Environment Protection and Biodiversity Act, and the 2012 Australia in the Asian Century.

Table 1 | Timeline of environmental accounting

1991	Greenhouse Gas emissions (Department of Environment)
1993	SNA revision and 1st edition of SEEA (EC, IMF, OECD, UN, WB)
1995	Natural resources on balance sheet (ABS)
1996	Energy account (ABS)
1998	Mineral account (ABS)
1999	Environmental expenditure, local government (ABS)
2000	Water account – Physical and Monetary Supply and Use (ABS)
	Greenhouse gas emission accounts (ABS)
2003	SEEA revision (UN)
2008	SNA revision (EC, IMF, OECD, UN, WB)
2011	Land account – Great Barrier Reef (ABS)
	Water account – Asset (BOM)
2012	SEEA Central Framework (EC, FAO, IMF, OECD, UN, WB)
	Completing the Picture (ABS) Environmental Taxes (ABS)
2013	SEEA Experimental Ecosystem Accounting (UNSD)
	Waste accounts (ABS)
	Ecosystem accounts (Victorian Environment and Primary Industry)
	Environmental Accounting Landscape (BOM)
2014	Australian Environmental-Economic Accounts (AEEA) (ABS)
	Experimental Environmental Expenditure Accounts (EEA) (ABS)

Applications of environmental accounting to issues and areas of interest

Since their completion, ABS has applied environmental accounting to issues such as land accounts and disaster management, GHG accounts and final consumption, energy accounts and decoupling, and water accounts and demand forecasting, as well as to areas of interest including the Great Barrier Reef catchments, the Murray-Darling Basin, and the state of Victoria.

How we got here and lessons learned

The progress till date is the result of three important efforts:

- Established an active research program, which has been internationally active in the development and implementation of SEEA, and which has conducted experimental estimates.
- Built strong relationships nationally through a) cooperation between geographic information professionals, accountants, economists, scientists and statisticians; b) support of key stakeholders (across areas of expertise as to bring together knowledge on the biophysical with the economy and society); and c) key data providers for energy, water and land information.
- Built a program of accounts, which has been possible through sustained high-level institutional support, and the development and maintenance of national accounts (natural capital such as minerals, land, plantation and timber) and environmental accounts (energy, water and land).

These efforts are the result of contributions at both the Federal government and State governments, specifically Victoria and

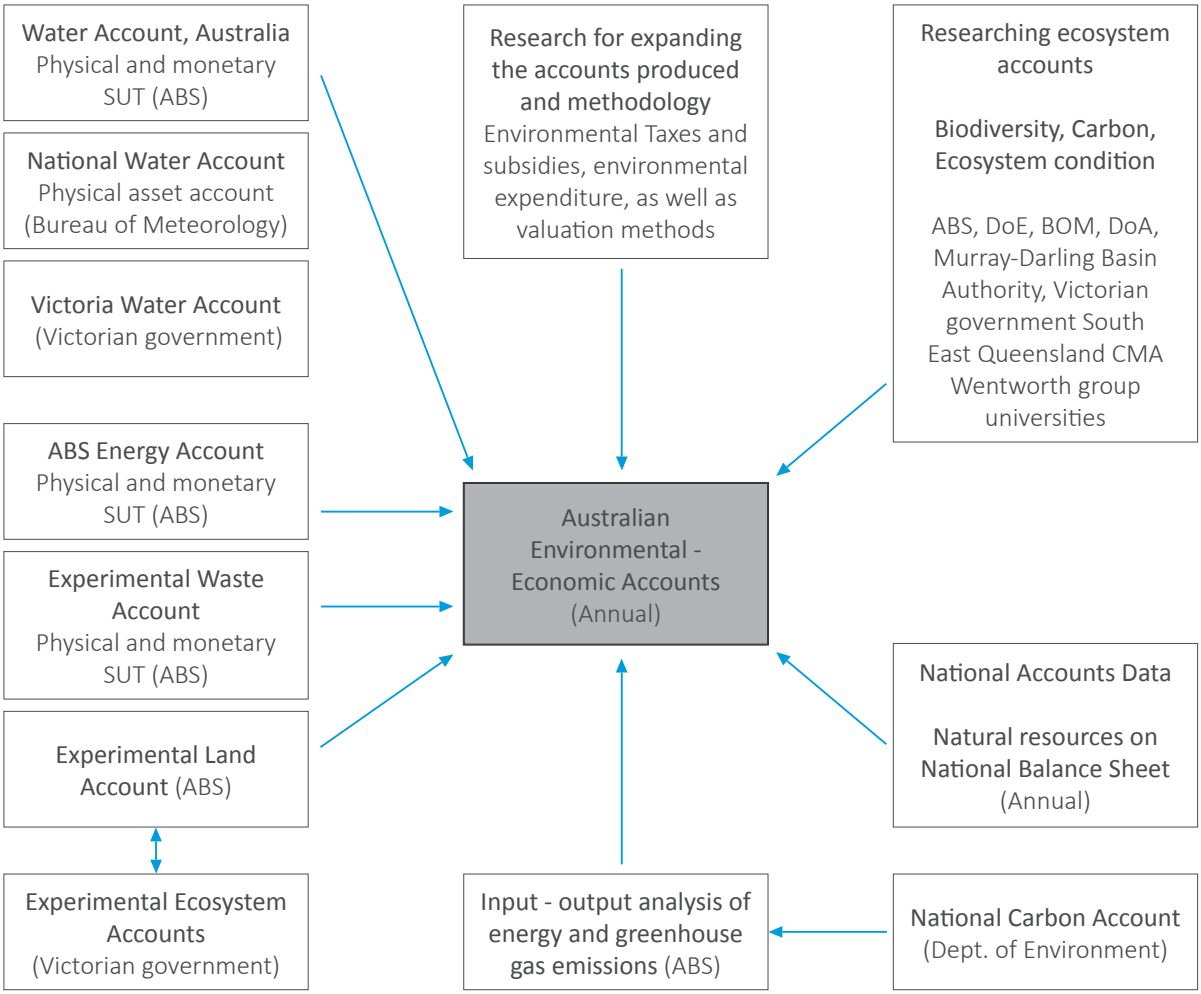

Fig. 1 | Current plan for the Australian Environmental-Economic Accounts

Queensland. The former includes the Australian Bureau of Statistics and various ministerial departments (for environment and for agriculture) and institutes dedicated to environmental issues such as the Bureau of Resources and Energy Economics. Other contributors include particularly universities.

The key lessons learned from the above-mentioned efforts are:

The institutional support in ABS has been sustained at a high level for nearly two decades. It has demonstrated that knowledge and capacity building takes time, as does acquiring understanding of the environmental accounts and how

to use them. A high level of support has especially been needed given the limited funding available and the changing focus of governments in place. Urgent environmental circumstances in the shape of a prolonged drought have led to a prioritization of improved water accounting.

Due to its international engagement, ABS has learnt from other experiences around the world and the collective work on common theoretical and practical problems. It has also participated in the establishment of international standards and recommendations, which it has applied on a national basis.

The creation of national experimental accounts – on land for example – has offered valuable lessons from learning-by-doing, collaborations and feedback from potential users who have been given the opportunity to see what an account looks like and to consider how it could meet their needs.

Finally, ABS has successfully built a program of accounts, specifically national accounts (on natural capital) and environmental accounts (energy, water and land), and has improved the maintenance of an ongoing set of accounts by increasing knowledge and skills of statistical staff, improving systems and methods, reduced data gaps and increasing the inclusion of user feedback.

Next steps

Important steps must be taken to ensure the continued development of sound environmental accounting in Australia. First of all, regular time series for energy, water, land and the Australian Environmental-Economic Accounts are needed. For example, experimental Land Accounts have been produced for Victoria, Queensland and Great Barrier Reef, and the Bureau is working with other jurisdictions to obtain permission to access their land information datasets. This resulted in 2014 in an update to the GBR Land Account, which showed changes in the use, cover and value of land.

Secondly, the progress will be forwarded if conversations on policy needs and on the benefits of environmental accounting take place.

Thirdly, continued dedicated research programs can improve the availability and quality of data. Current programs focus on biodiversity, carbon and ecosystem accounting, environmental expenditure, environmental taxes and subsidies, and agriculture. One is the Experimental Ecosystem Accounts for the Great Barrier Reef Region, which is scheduled for release in February 2015. Another example is the drafting of an information paper on Environmental Expenditure Accounts that is to be published in August 2014.

Specifically, research on agriculture is undertaken by the Australian (SEEA) Implementation Board, who serves as a technical capacity for producing core set of accounts, provides support for the implementation of SEEA using a flexible and modular approach, strives to effectively leverage related projects and resources as well as to effectively coordinate with related international and national initiatives. Australia is one of the five countries that work together with UNSC and FAO in the pilot testing of the SEEA-Agriculture accounts.

Challenges and issues

There is, however, still a lot of work to be done to achieve these measures. Although plenty of information is available, the quality varies and it is often not collected for environmental accounting purposes, meaning that adjustments and modeling are necessary. Moreover, the information is not collected regularly, can be hard to find and the standards and definitions are inconsistent across jurisdictions. Another issue also has to do with data availability. Much environmental information is based on one-off studies, but effective policy decision-making requires data spanning over 5-20 years.

Finally, a significant problem is the inadequate resources to undertake work for. This does not only have to do with the budgets dedicated to environmental statistics but also the fact that the Bureau's survey forms have limited space and they also need to cover other statistical areas.

Adequate resources to undertake work – not just budgets but competition with other ABS areas for space on survey forms.

STATISTICS IN THE FIELD OF ENVIRONMENTAL PROTECTION IN KAZAKHSTAN

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Environmental statistics in Kazakhstan is generated through three channels: state statistical observations, departmental observations, and administrative data. This presentation provides an overview of the available statistics and its sources.

State statistical observation

Valuable information on the environment from which basic indicators can be created are available through governmental reports, specifically information on the state of air protection, on the costs of environmental protection, on the collection, removal, sorting and depositing of municipal waste and on the work of water pipe and sewer facilities.

Departmental observations

Departmental efforts are responsible for the creation of two key environmental indicators: hazardous waste and GHG emissions. The Ministry of Environment and Water Resources collect data on the former. This was also previously the case for data on GHG emissions but in 2012 the task was assigned to the joint-stock company 'Zhasyl Damu', which 100 percent is owned by the ministry.

The formation of environmental statistics is guided by

1. Methodological recommendations on the formation of indicators of environmental statistics, No. 337 of 9 December 2010
2. Methodological explanations of energy statistics indicators, No. 20.09 of 23 November 2009.

Among, the activities undertaken by the Agency on Statistics of Kazakhstan are: Annual revisions of statistical tools (forms, questionnaires, classifiers, compendiums), which include consultations with international experts; and planning of events studying basic international standards within the framework of the project KAZSTAT;

Since 2009, the Agency has cooperated with the United Nations' Economic Commission for Europe on developing and implementing 36 ecological indicators for EECCA (Eastern Europe, Caucasus and Central Asia) countries. These indicators were divided into nine groups, i.e. air pollution and ozone depletion, climate change, water

resources, biodiversity, land resources, agriculture, energy, transport, waste). This led to a publication in 2010 with the title "Environmental Protection and Sustainable Development of Kazakhstan", which is now released on an annual basis. At the end of 2013, all 36 indicators were published online at http://stat.gov.kz.

In 2013, the questionnaire survey, 'RES-001', of enterprises with facilities for the use of renewable energy sources was developed together with the Statistical Bureau of Finland to monitor the transition of Kazakhstan to a green economy.

The survey will be conducted every year and will collect data on energy from geothermal sources, small hydroelectric stations, wind power stations, solar electric plants, and biogas and biomass plants. Based on such data, the Agency produces the following indicators:

1. Share of renewable energy sources in total energy supply
2. Energy consumption from renewable energy sources per capita
3. Final consumption of energy from renewable energy sources.

At the end of 2013, a working group was created to implement the SEEA in Kazakhstan. Moreover, cooperation between the Agency and the Organization for Economic Co-operation and Development (OECD) is planned to take place from 2014 onwards, which will result in the introduction of indicators on productivity and resource efficiency that meet the OECD's standards. The preliminary list consists of 25 indicators.

HARMONY BETWEEN ENVIRONMENTAL INDICATORS OF UBCG AND SEEA, FDES AND THE POST-2015 DEVELOPMENT AGENDA

Badamtsetseg Batjargal, Senior Vice Chairperson
National Statistical Office
Ulaanbaatar, Mongolia

Main goals of the UBCG

Four main goals have been defined for the UBCG. These are:

- Goal 1: Play leading role to develop methodological and practical guidelines;
- Goal 2: Serve as a forum for sharing the expertise of national and international statistical organizations and other parties;
- Goal 3: Collaborate with UN and its specialized agencies to develop and improving statistical methodologies and standards for statistics on natural resources;
- Goal 4: Develop practical manuals and recommendations to support countries with large a mining sector to implement the SNA, SEEA and FDES.

The FDES (or the 'Framework for the Development of Environment Statistics') is a "multi-purpose conceptual and statistical framework that is comprehensive and integrative in nature and marks out the scope of environment statistics. It provides an organizing structure to guide the collection and compilation of environment statistics at the national level. It brings together data from the various relevant subject areas and sources."[3]

Harmony between UBCG, SEEA and the post-2015 objectives

In total, 232 indicators have been defined to measure the impacts of the mining industry on the economy, society and the environment. Of these, 22 indicators have been defined to measure the latter and most of them developed as to harmonize with the SEEA and the FDES and with the goal to measure the progress of the post-2015 development agenda. Figures 1-4 compare the UBCG indicators, divided into five different sets of measurement issues, to the SEEA and the FDES. One set, related to the measurement of the impact of mining on green growth and the green economy, is not related.

[3] Source: http://unstats.un.org/unsd/environment/fdes.htm

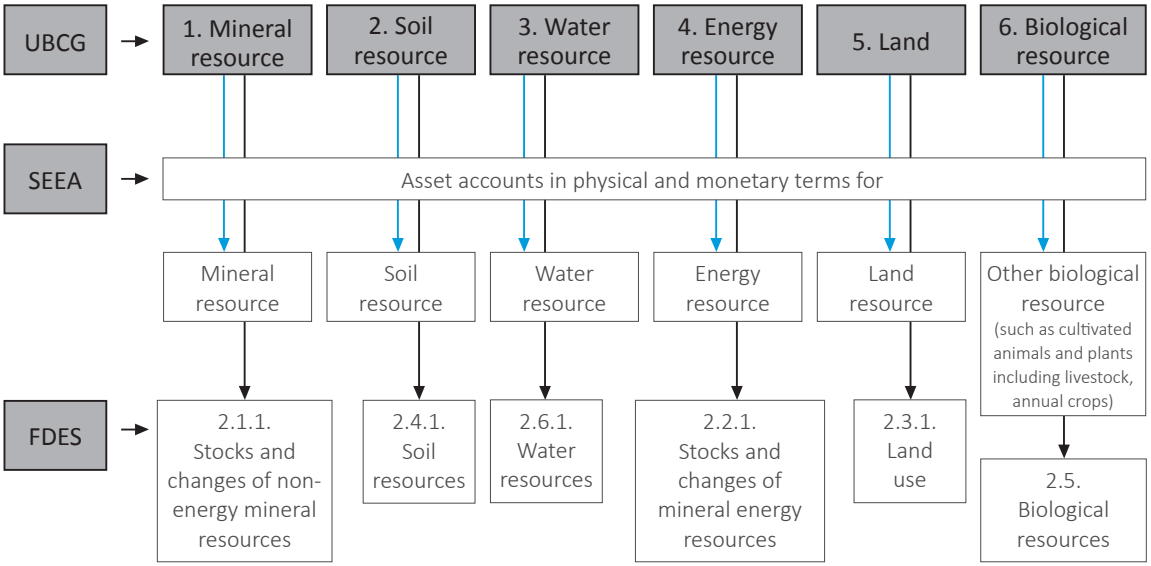

Fig. 1 | Measurement of the direct and indirect demand from the mining industry for environmental inputs, both market and non-market, incorporating measurement in terms of value

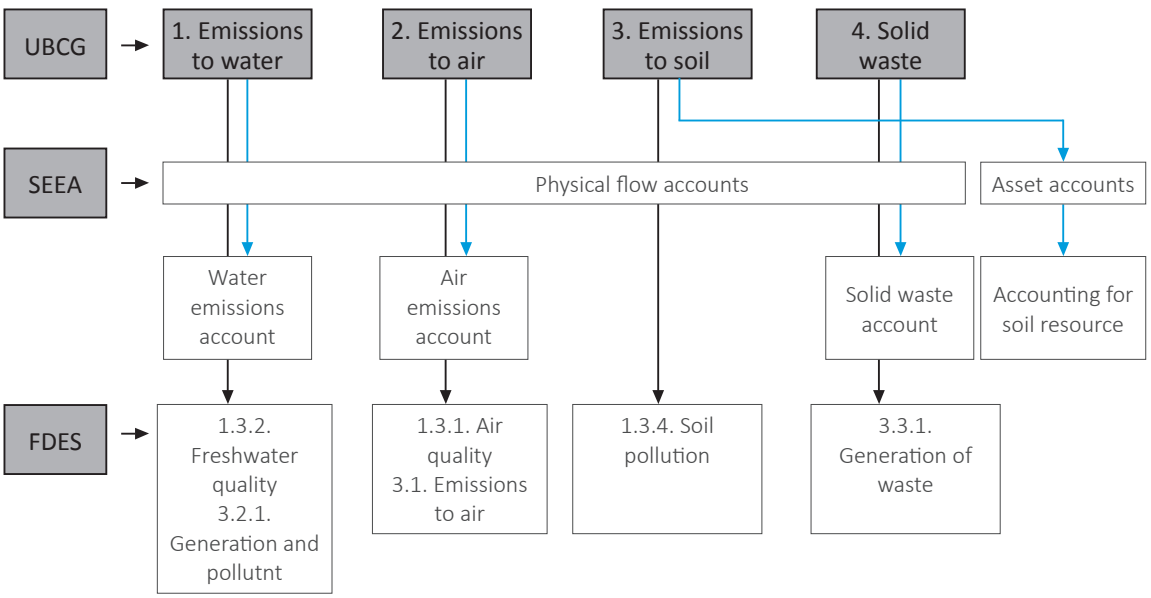

Fig. 2 | Measurement of emissions and waste products from the mining industry

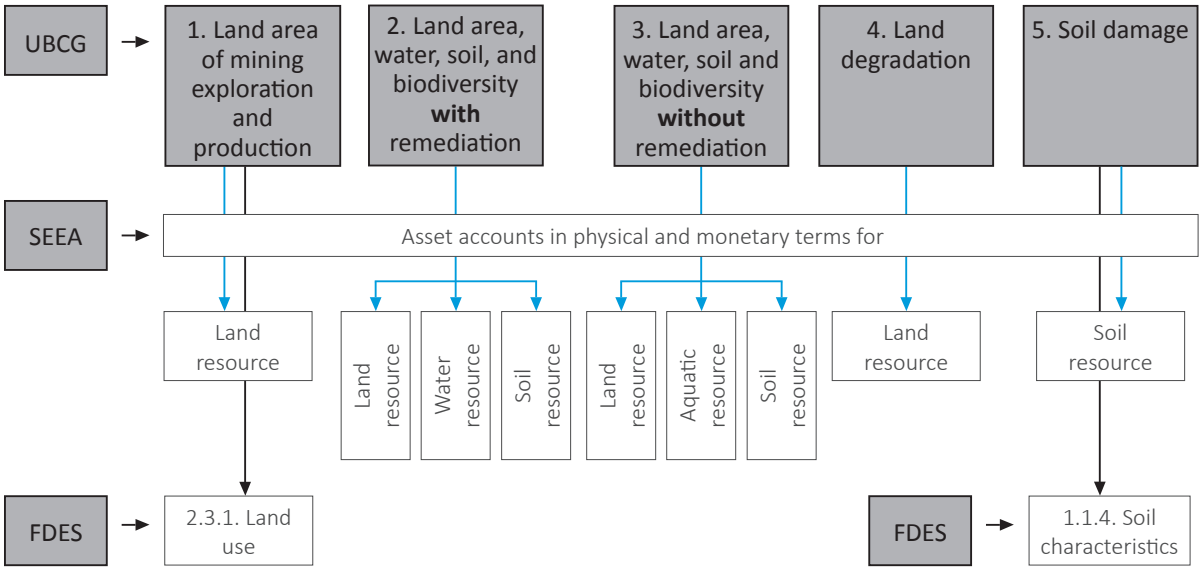

Fig. 3 | Measurement of damage to land

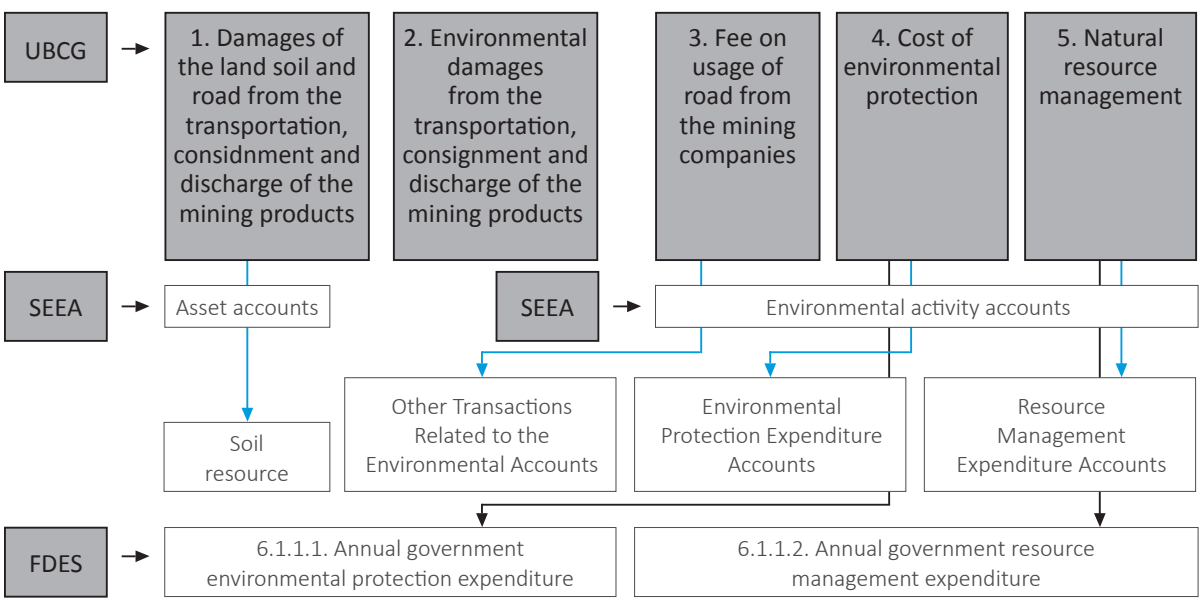

Fig. 4 | Measurement of the environmental impact of economic activity 'downstream' from the mining industry

Finally, Table 1 shows how the UBCG indicators have been defined to allow for measurement of the progress in meeting the goals and targets of the post-2015 development agenda.

Data sources and availability

The UBCG collects data from a large number of sources, particularly financial sheets, national accounts statistics, quarterly taxation reports, (annual) environmental economic statistics, and finally, surveys (small-scale, household socio-economic surveys, labor force surveys etc.). All data collection happens in compliance with the SEEA and the FDES.

Conclusion

The UBCG has succeeded in identifying indicators that harmonize with the framework of the SEEA and the FDES. Moreover, the indicators are consistent with the specified goals to measure the progress of the post-2015 development agenda.

Work is still to be done in terms of complimenting and integrating data sources, and improving data quality.

The experiences of the UBCG will be shared among the group member countries.

Table 1 | UBCG indicators to measure progress towards the post-215 development goals and targets

No	Goals of Post-2015	UBCG
1	**Proposed goal 6** Related indicators to water	• Water resource • Natural resource management
2	**Proposed goal 7** Related indicators to energy	• Energy resource
3	**Proposed goal 9** Related indicators to environmental activity accounts	• Fee on usage of road from the mining companies • Cost of environmental protection • Natural resource management
5	**Proposed goal 12** Related indicators to water, energy, carbon dioxide emissions, nutrient balances, and solid waste	• Water resource • Energy resource • Emissions to air • Solid waste • Emissions to soil • Natural resource management
6	**Proposed goal 13** Related indicators to emission permits and taxes and subsidies	• Natural resource management • Cost of environmental protection
8	**Proposed goal 15** Related indicators to land degradation	• Land degradation • Land degradation • Natural resource management • Cost of environmental protection

SESSION 5

Discussion on the Glossary

Session chaired by Raul Figueroa Diaz, National Institute of Statistics and Geography, Mexico

GLOSSARY AND GENERAL ASPECTS OF SEEA

Raul Figueroa Diaz, Accounts Director
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Glossary

Table 2 on page 120 is a detailed outline of a proposed glossary with internationally accepted definitions that is to be included in the Handbook with the purpose of providing conceptual guidance and enable countries to determine what type of information they ought to employ in order to construct national indicators. The glossary is mainly based on the conceptual content of the 2008 SNA and SEEA-CF standards.

During the Session, the proposed inclusions and definitions were discussed and some participating country representatives has prepared additional material based on Mexico's paper submission, which offered a detailed proposal for the glossary.

General aspects of the SEEA-CF

Units of measurement

The adopted units or measurement are selected as the most suitable to quantify physical and monetary data:

- Physical units: joules, cubic meters, tons, tons (biomass) and hectares
- Currency units: dollars and euros.

Hybrid accounts between the two are created to calculate indicators for productivity and intensity, and for decoupling.

Balance sheets

Table 1 is an example of a basic form of an asset account, which is divided into physical and monetary sub-accounts in which the additions and reductions to the stock is considered.

Classification of assets

According to the SNA 2008, assets are classified as either financial or non-financial, and the latter further is produced and non-produced. Assets that are produced are understood as cultivated biological resources or fixed assets (investment) and inventories. On the other hand, non-produced assets are natural resources including water, mineral and

Table 1 | Balance sheets

Physical asset account	Monetary asset account
Opening stock	**Opening stock**
Additions	Additions
◦ Growth	◦ Growth
◦ Discoveries	◦ Discoveries
◦ Reclassifications	◦ Reclassifications
Reductions	Reductions
◦ Extractions	◦ Extractions
◦ Normal and catastrophic losses	◦ Normal and catastrophic losses
◦ Reclassifications	◦ Reclassifications
	Revaluation
Closing stock	**Closing stock**

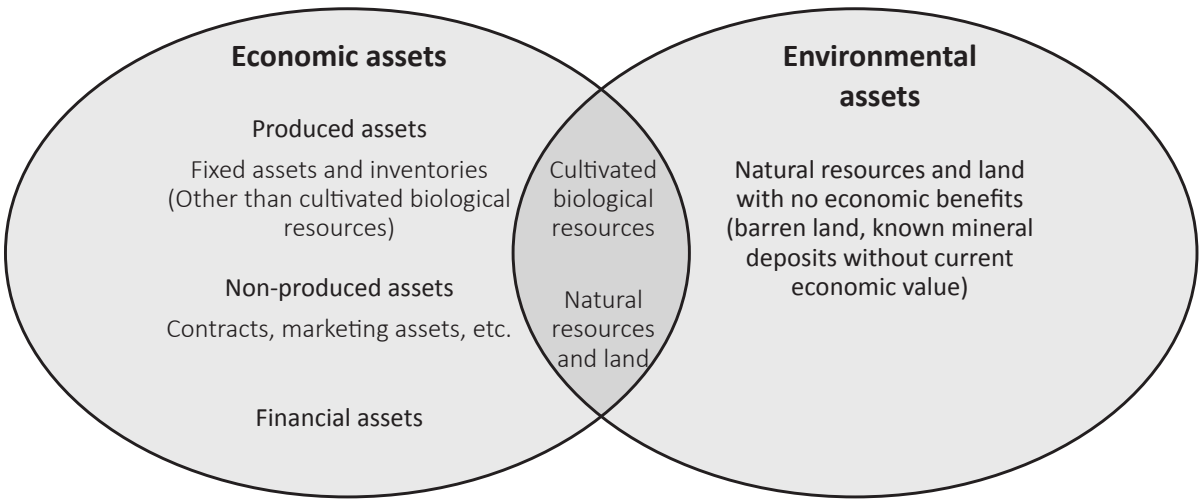

Fig. 1 | Relationship between environmental and economic assets

energy reserves as well as non-cultivated biological resources. This overlaps partly with the SEEA-2012 classification of environmental assets, i.e.

1. Mineral and energy resources
2. Land and soil
3. Timber and other biological resources
4. Aquatic and water resources.

The relationship between environmental and economic assets is best understood through the illustration in Figure 1, which shows that cultivated biological resources and natural resources and land are what connects the two asset groups.

Table 2 | Draft of proposed glossary

№	Word	Source	Paragraph	Reference	Other mentions
1	Produced assets	SNA	10.9 a	Produced assets are non-financial assets that have come into existence as outputs from production processes that fall within the production boundary of the SNA.	10.11 Fixed assets are produced assets that are used repeatedly or continuously in production processes for more than one year. The distinguishing feature of a fixed asset is not that it is durable in some physical sense, but that it may be used repeatedly or continuously in production over a long period of time, which is taken to be more than one year. Some goods, such as coal, may be highly durable physically but cannot be fixed assets because they can be used once only. Fixed assets include not only structures, machinery and equipment but also cultivated assets such as trees or animals that are used repeatedly or continuously to produce other products such as fruit or dairy products. They also include intellectual property products such as software or artistic originals used in production.
2	Goods for resale	SNA	10.145	Goods for resale are goods acquired by enterprises, such as wholesalers or retailers, for the purpose of reselling them to their customers. Goods for resale are not processed further by the enterprises that purchase them, except for presenting them for resale in ways that are attractive to their customers. Thus, goods for resale may be transported, stored, graded, sorted, washed, packaged, etc. by their owners but are not otherwise transformed.	
3	Finished goods	SNA	10.142	Finished goods are goods produced and the producer does not intend to further processing before delivery to other institutional units. It is said that a well is finished when his producer has completed its process of production, but later can be used as an intermediate input in other production processes. Thus, stocks produced by a coal mining company are classified as finished goods, although stocks of coal in a power plant to be classified as materials and supplies; also the stock of batteries produced by a manufacturer of batteries is real.	

4	Consumption of fixed capital	SNA	6.24	Consumption of fixed capital is the decline, during the course of the accounting period, in the current value of the stock of fixed assets owned and used by a producer as a result of physical deterioration, normal obsolescence or normal accidental damage. The term depreciation is often used in place of consumption of fixed capital but it is avoided in the SNA because in commercial accounting the term depreciation is often used in the context of writing off historic costs whereas in the SNA consumption of fixed capital is dependent on the current value of the asset.	10.156 Consumption of fixed capital constitutes a negative change in the value of the fixed assets used in production. Consumption of fixed capital must be measured with reference to a given set of prices, that is, the average prices of the type of asset of constant quality over the period. It may then be defined as the decline, between the beginning and the end of the accounting period, in the value of the fixed assets owned by an enterprise, as a result of their physical deterioration and normal rates of obsolescence and accidental damage. Consumption of fixed capital may be deducted from gross fixed capital formation to obtain net fixed capital formation to match the balancing item of net saving carried down from the use of income account.
5	Administrative costs	SNA	7.5	The left-hand side of the generation of income account records the uses of value added. There are only two main types of charges that producers have to meet out of value added: compensation of employees payable to workers employed in the production process and any taxes, less subsidies, on production payable or receivable as a result of engaging in production	7.64 For a defined contribution pension scheme, there are no imputed contributions unless the employer operates the scheme himself. In that case, the value of the costs of operating the scheme is treated as an imputed contribution payable to the employee as part of compensation of employees. This amount is also recorded as final consumption expenditure by households on financial services
6	Flow of funds	SNA	27.9	The flow of funds is a three dimensional presentation of financial statistics where both parties to a transaction as well as the nature of the financial instrument being transacted are elaborated. A similar three-dimensional presentation is also presented in respect of the stocks of financial assets and liabilities where the creditor and debtor of each instrument are shown.	

7	Value added type taxes	SNA	7.89	A value added type tax (VAT) is a tax on goods or services collected in stages by enterprises but that is ultimately charged in full to the final purchasers.	VAT is a tax on products collected in stages by enterprises. Producers are required to charge certain percentage rates of VAT on the goods or services they sell. The VAT is shown separately on the sellers' invoices so that purchasers know the amounts they have paid. However, producers are not required to pay to the government the full amounts of the VAT invoiced to their customers because they are usually permitted to deduct the VAT that they themselves have paid on goods and services purchased for their own intermediate consumption, resale or gross fixed capital formation. Producers are obliged to pay only the difference between the VAT on their sales and the VAT on their purchases for intermediate consumption or capital formation, hence the expression value added tax. The percentage rate of VAT is liable to vary between different categories of goods and services and also according to the type of purchaser. For example, sometimes goods purchased by visiting non-residents, which count as exports, may be exempt from VAT.
8	Gross national income	SNA	16.54	Gross national income (GNI) is defined as GDP plus compensation of employees receivable from abroad plus property income receivable from abroad plus taxes less subsidies on production receivable from abroad less compensation of employees payable abroad less property income payable abroad and less taxes plus subsidies on production payable abroad.	7.20 Net national income (NNI) is the aggregate value of the net balances of primary incomes summed over all sectors.
9	Real net national disposable income	SNA	15.193	The usual way to calculate real income figures is to start from real GDI and then follow the normal sequence of income aggregates, but with every intervening adjustment deflated to real terms. This is illustrated as follows: • Gross domestic product in volume terms; plus the trading gain or loss resulting from changes in the terms of trade; • Equals real gross domestic income; plus real primary incomes receivable from abroad; minus real primary incomes payable abroad. • Equals real gross national income; plus real current transfers receivable from abroad; minus real current transfers payable abroad; • Equals real gross national disposable income; minus consumption of fixed capital in volume terms; • Equals real net national disposable income.	

10	Foreign direct investment	SNA	26.84	Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy.	
11	Machinery and equipment	SNA	10.82	Machinery and equipment cover transport equipment, machinery for information, communication and telecommunications (ICT) equipment, and other machinery and equipment. As explained above, machinery and equipment under a financial	10.83 Machinery and equipment such as vehicles, furniture, kitchen equipment, computers, communications equipment, etc. that are acquired by households for purposes of final consumption are not fixed assets and their acquisition is not treated as gross fixed capital formation. However, houseboats, barges, mobile homes and caravans that are used as the principal residences of households are treated as dwellings, so that their acquisition by households is included in gross fixed capital formation.
12	Market prices	SNA	3.119	Market prices for transactions are defined as amounts of money that willing buyers pay to acquire something from willing sellers; the exchanges are made between independent parties and on the basis of commercial considerations only, sometimes called “at arm’s length.” Thus, according to this strict definition, a market price refers only to the price for one specific exchange under the stated conditions.	
13	Cultivated biological resources	SNA	10.88	Cultivated biological resources cover animal resources yielding repeat products and tree, crop and plant resources yielding repeat products whose natural growth and regeneration are under the direct control, responsibility and management of institutional units.	
14	Natural resources	SNA	10.15	Natural resources consist of naturally occurring resources such as land, water resources, uncultivated forests and deposits of minerals that have an economic value.	
15	Royalties	SNA	6.211	The payments made for the licenses may be described in various ways, such as fees, commissions or royalties.	17.342When a unit extracts a mineral resource under an agreement where the payments made each year are dependent on the amount extracted, the payments (sometimes described as royalties) are recorded as rent.
16	Capital services	SNA	20.5	Capital services can be thought of as simply the term for the way in which the changes in the value of assets used in production are captured in the production account and the balance sheet.	
17	Materials and supplies	SNA	10.131	Materials and supplies consist of all products that an enterprise holds in inventory with the intention of using them as intermediate inputs into production.	

18	Work in progress	SNA	10.134	Work-in-progress consists of output produced by an enterprise that is not yet sufficiently processed to be in a state in which it is normally supplied to other institutional units.	
19	Value added	SNA	2.138	Basically, GDP derives from the concept of value added. Gross value added is the difference between output and intermediate consumption. GDP is the sum of gross value added of all resident producer units plus that part (possibly the total) of taxes on products, less subsidies on products, that is not included in the valuation of output.	6.8 The balancing item in the production account is value added. It can be measured either gross or net, that is, before or after deducting consumption of fixed capital: a. Gross value added is the value of output less the value of intermediate consumption; b. Net value added is the value of output less the values of both intermediate
20	Intermediate consumption	SNA	6.213	Intermediate consumption consists of the value of the goods and services consumed as inputs by a process of production, excluding fixed assets whose consumption is recorded as consumption of fixed capital.	
				ENVIRONMENT	
21	Depletion	SEEA-CF	5.76	Depletion, in physical terms, is the decrease in the quantity of the stock of a natural resource over an accounting period that is due to the extraction of the natural resource by economic units occurring at a level greater than that of regeneration.	5.51 The depletion of natural resources concerns the physical using up of natural resources due to extraction which thereby limits the potential to extract amounts in the future. For non-renewable resources, the quantity depleted is the same as the quantity extracted but this is not the case for natural biological resources that can regenerate over time.
22	Cost of environmental protection	SEEA-CF	Changes relating to environmental activities and related transactions 24	Reference to the net cost of environmental protection, which was the final extension of the environmental protection expenditure accounts (EPEA) presented in the SEEA-2003, has been removed in the SEEA Central Framework.	
23	Land soil	SEEA-CF	Land 5.235 Soil 5.318	Land is central to economic and environmental accounting. Beyond an assessment of the ownership and use of land as part of economic production, some of the issues that can be considered in the context of land accounts include the impacts of urbanization, the intensity of crop and animal production, afforestation and deforestation, the use of water resources, and other direct and indirect uses of land.	5.318 Soil resources are a fundamental part of the environment. They provide the physical base to support the production and cycling of biological resources, provide the foundation for buildings and infrastructure, are the source of nutrients and water for agriculture and forestry systems, provide a habitat for diverse organisms, play an essential role in carbon sequestration, and fulfill a complex buffering role against environmental variability (ranging from dampening diurnal and seasonal change in temperature and water supply to the storage and binding of a range of chemical and biological agents).

24	Natural biological resources	SEEA-CF	5.464	Natural biological resources are distinguished from cultivated biological resources because their natural growth and regeneration are not under the direct control, responsibility and management of an institutional unit.	5.465 As a consequence of not being under direct control of institutional units, natural biological resources are not easily accounted for. Aside from natural aquatic and natural timber resources, most animals and plants that provide significant economic benefits have become cultivated. Thus, while there are a range of animal and plant resources that are harvested that are not cultivated, there is typically active measurement only of the animals, plants
25	Soil resources	SEEA-CF	5.301	Soil resources. Although land and soil are distinguished as separate environmental assets, in terms of valuation, land and soil are always considered jointly. Thus, the value of all land, especially agricultural land, implicitly includes the value of any associated soil.	
26	Water resources	SEEA-CF	5.474	Water resources consist of fresh and brackish water in inland water bodies, including groundwater and soil water.	5.470 Asset accounts for water resources focus on the inflows and outflows of water to and from the land surface and subsurface, and on the destination of these flows. In conjunction with information on in stream uses of water (e.g., fish breeding and run-of-the-river hydropower generation), seasonal variation of flows of water, and other factors, such a focus allows assessment of the availability of water to meet demands from the economy and to assess whether those demands are consistent with the longer-term sustainability of water supply.
27	Mineral and energy resources	SEEA-CF	5.172	Mineral and energy resources include deposits of oil resources, natural gas resources, coal and peat resources, non-metallic minerals and metallic minerals. Since the resources are generally found underground (hence commonly referred to as subsoil assets), the quantity of resources that one might reasonably expect to be extracted is not known with any large degree of precision. Consequently, a key factor in the measurement of mineral and energy resources is the concentration and quality of the minerals and energy resources in the deposit, since this will influence the likelihood and cost of extraction and the degree of confidence regarding the quantity that can be extracted in the future.	5.173 Mineral and energy resources comprise known deposits of oil resources, natural gas resources, coal and peat resources, non-metallic minerals and metallic minerals.
28	Solid waste	SEEA-CF	3.84	Solid waste covers discarded materials that are no longer required by the owner or user. Solid waste includes materials that are in a	ANEX I D. List of solid waste

SOCIAL SECTOR				
29	Wages and salaries	SNA	7.43	Wages and salaries include the values of any social contributions, income taxes, etc., payable by the employee even if they are actually withheld by the employer for administrative convenience or other reasons and paid directly to social insurance schemes, tax authorities, etc., on behalf of the employee. Wages and salaries may be paid in various ways, including goods or services provided to employees as remuneration in kind instead of, or in addition to, remuneration in cash.
30	Labor force	SNA	19.17	The labor force consists of those who are actively prepared to make their labor available during any particular reference period for producing goods and services that are included within the production boundary of the SNA.
31	Compensation of employees	SNA	7.5	Compensation of employees is defined as the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the latter during the accounting period. Taxes less subsidies on production consist of taxes payable or subsidies receivable on goods or services produced as outputs and other taxes or subsidies on production, such as those payable on the labor, machinery, buildings or other assets used in production.

SESSION 6

Discussion on the Handbook

Session chaired by Paul Roberts, Australian Bureau of Statistics

Following discussions throughout the Session, the below ten-chapter structure and content was agreed on for the Handbook. It was decided that the Handbook should include neither a summary nor a conclusion, as is common practice for many manuals. For each chapter one or more countries or organizations volunteered to take the lead in their preparation. It was also agreed that the drafting style used in the preparation of the chapters should be in accordance with the one applied by Australia and Mongolia in their country papers.

Chapter content of Handbook	Leading country name
Foreword	
Terms of reference	
Participating agencies	
Chapter 1. Introduction	Australia
Handbook and its rationale	
UN Statistical groups background and historical context	
Users of the Handbook	
Scope and content	
Chapter 2. Definitions and Classifications	
Definitions	Mexico
CPC classification and extensions	Russia
ISIC	UNIDO
International comparability	
Chapter 3. Frameworks and Principles	Mexico UNIDO
Chapter 4. Data Sources and General Methodological Notes	
Data sources and availability	
Methodological notes data	Mexico
[Processes in putting together the information contained in the manual]	UNIDO
Broad Collection strategies	
Presentation and dissemination [alternative could be last chapter]	
Chapter 5. Standard Indicators	
Economic indicators	
Societal indicators	
Environmental indicators	Mongolia

Chapter content of Handbook	Leading country name
Chapter 6. Measuring the Economic Impact of Mining	
Production statistics	
Expenditure statistics	
Revenue statistics	Mongolia
Stock statistics	IMF
Analytical statistics and transformations	China
Data sources and collection strategies	Kazakhstan
Survey procedures	UNIDO
Chapter 7. Measuring Societal Impacts from Mining	
Labor	
Income	
Health	India
Productivity	Kazakhstan
Analytical statistics and transformations	Vietnam
Data sources and collection strategies	
Survey procedures	
Chapter 8. Measuring Environmental Impacts from Mining	
Emissions related	
Analytical measures	
Data sources and collection strategies	Australia
Survey procedures	UNESCAP
Chapter 9. Priority Statistics for Economies Based on Natural Resources	Australia
Chapter 10. Remaining Issues	
Areas for further investigation	Australia
Expanding the scope	

CLOSING SESSION

Session chaired by Badamtsetseg Batjargal, National Statistical Office, Mongolia
Bruce Hockman, Australian Bureau of Statistics

In the Closing Session Mr. Roberts presented the first version of the handbook structure and allocation of leading country responsibilities for the handbook. The presentation was followed by discussions and the initial allocation of the Handbook chapters was agreed:

- Chapter 1: Australia
- Chapter 2: UNIDO, Russia
- Chapter 3: UNIDO, Mexico
- Chapter 4: UNIDO, Mexico
- Chapter 5: Mongolia
- Chapter 6: IMF, China
- Chapter 7: Kazakhstan, Vietnam, Madagascar
- Chapter 8: Kazakhstan, UNESCAP
- Chapter 9, 10: Australia

Further in the Closing Session, based on discussions on the progress made till date and the various methodological challenges that the Group is likely to face in producing the Handbook (as suggested by the member state presentations), the Steering Committee agreed on the following tasks ahead:

- Prepare and submit the report of the third meeting of the Steering Committee to the UNSC;
- Finalization by end of August 2014 of a global standard template to collect data on government revenues
- Finalize the allocation of the Handbook's chapters to member countries, nominate a lead country for each chapter and elaborate upon the details required for drafting the Handbook;
- Work on the glossary to be included in the Handbook, taking into consideration suggestions from members about additional terms that should be contained therein;
- Input provided to the Handbook by October 2014 with final deadline November 2014;
- Review and print all documents issued in respect of the meeting held in Vienna;
- Approve the 2015 plan of the Group and circulate it among members.

Moreover, the Steering Committee agreed on the date for its fourth meeting, which is to be held in Australia in September 2015. It also decided that the Expert Group is to have another videoconference on 9th or 10th of September at which the experts will discuss and exchange knowledge and experiences.

Finally, Bruce Hockman from the Australian Bureau of Statistics and Badamtsetseg Batjargal, from the National Statistical Office, Mongolia, were elected Chairs of the UBCG Steering Committee, and Paul Roberts, also from the Australian Bureau of Statistics, was elected Chair of the Expert Group.

4. PAPERS

IMPACTS OF MINING ON THE ECONOMIC, SOCIAL AND ENVIRONMENTAL SECTORS IN MEXICO. PROGRESS ON THE INDICATORS

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National Institute of Statistics and Geography (INEGI)
Aguascalientes, Mexico

Abstract

The production of economic goods and services (even regulatory or cultural services) from which humans daily benefit is largely based on materials provided by nature such as the supply of raw materials, water, wood and energy. Minerals and energy resources are unique environmental assets that can be employed in economic activities but often are non-renewable.

The development of statistical tools to measure the use and availability of natural resources is of upmost importance. For example, the construction of indicators allows for the measurement of the "pulse" of variables of interest as well as the description of their situation and their recent trends.

In this regard, the Initiative of Ulaanbaatar City Group (UBCG) is of particular relevance as it proposes the development of a core set of indicators to describe and measure the impacts of the mining sector on the economy, the society and the environment.

The project Indicators of the Mining Industry in Mexico is developed by the Directorate General of Economic Statistics (DGES) of the National Institute of Statistics and Geography (INEGI), which has joined the international effort to define such indicators coordinated by the Ulaanbaatar City Group (UBCG).

Finally, this paper aims to show the perspective and progress on the measurement of the mining sector based on a statistical tools developed by the National Institute of Statistics and Geography in Mexico, which includes lessons learned from the construction of national environmental accounts during the past 20 years. The paper also highlights the importance of other instruments, such as the proposal of a methodological sheet that allows comparability and harmonization of the statistical work across countries as well as a glossary of terms to facilitate an understanding of the context under which the work is carried out.

Introduction

Measuring the impact of mining on the economy, the society and the environment is an issue that can be addressed from different approaches, based on various factors, such as the availability of detailed information or topics of priority for different countries, or even commitments to international bodies.

The Steering Committee of the UBCG appointed Mexico to collaborate on the development of indicators in Group 2, "Impact of the mining industry in the social sector". At the same time, INEGI has expressed its intention to support UBCG on the development of indicators in Group 3, "Impact of mining on the environment".

It is important to note that the advances made by INEGI in the development of indicators do not correspond with the official version submitted by Mexico to the UBCG because it is a work progress within the institution. It is shared with the UBCG only with the purpose of providing samples of the methodology and methodological sheets currently being developed.

This paper describes the content of the report prepared by INEGI, the advances in the development of indicators, a detailed description of the proposed methodological sheet and examples as well as a proposal for a glossary of terms. It also lists the main sources of information used in the construction of the indicators.

Structure of INEGI's Report

The surge to develop indicators for the mining sector is based on the necessity to accurately measure the sector's impact on the economy, the society and the environment. To achieve this objective, the UBCG has established a set of indicators to visualize the three-dimensional impacts of the mining industry: 1) impact on the economy, b) impact on the society, and c) impact on the environment.

The Steering Committee of the UBCG appointed Mexico to collaborate on the development of indicators in Group 2, "Impact of the mining industry in the social sector". At the same time, INEGI has expressed its intention to support UBCG on the development of indicators in Group 3, "Impact of mining on the environment", mainly by leveraging information derived from Mexico's environmental accounts.

INEGI's report reflects the progress achieved in adopting the initiative of the UBCG. The work carried out for the implementation of the indicators for Mexico include the gathering of various economic, social and environmental statistics, embodied in the development of 22 indicators, of which 12 belongs to Group 2: "Impact on the social sector" and 10 belong to Group 3: "Impact on the environment".

Moreover, the report includes a proposal for the build-up of methodological sheets that contains elements such as: definition and objective of the particular indicator; an algorithm that shows how each indicator is constructed; a graph illustrating their trends; and a possible interpretation of results. It is found that this proposal would allow countries to develop a harmonized approach for the presentation of relevant indicators.

Additionally, INEGI is working on incorporating a general glossary of terms, which will be based on the 2008 SNA (System of National Accounts_ and the SEEA (the United Nations' System of Environmental-

Economic Accounting) Central Framework to enrich the conceptual framework related to the development of the indicators.

Depending on the availability and comparability of information some of the indicators developed by the INEGI cover the period 2003-2012, while others cover only 2010-2012. The coverage of the indicators will be expanded as more information is collected.

INEGI will begin the development of about 20 indicators in Group 1 based on the availability of information derived mainly from the System of National Accounts of Mexico.

Methodological sheet scheme

The dissemination of statistical results can have unexpected outcomes; even if data are scientifically supported, but the results are not properly understood by the general society, they will not be optimally utilized. Therefore, INEGI proposes methodology sheets as a simple and orderly way to present the results of each indicator defined by the UBCG. These features elements such: definition and objective of the particular indicator; an algorithm that shows how each indicator is constructed; a graph illustrating their trends; and a possible interpretation of results. It is found that this proposal would allow countries to develop a harmonized approach for the presentation of relevant indicators.

Conceptual framework

International statistical standards, such as 2008 SNA, provide explicit guidelines for the measurement of economic activities. However, for the measurement and preparation of the UBCG indicators, the use of other standards, including the SEEA

Table 1 | Summary of progress

Group	Numbers of indicators identified	Priority		INEGI
1. Impact of the mining industry on the economy	142	57 high priority 66 medium priority 19 low priority	10	9 1 -
2. Impact of the mining industry on the sector social	54	25 high priority 21 medium priority 8 low priority	12	6 6 -
3. Impact of the mining industry on the environment	27	27 high priority - -	10	10 - -
Total	**223**	**109 high priority** **87 medium priority** **27 low priority**	**32**	**25** **7** **-**

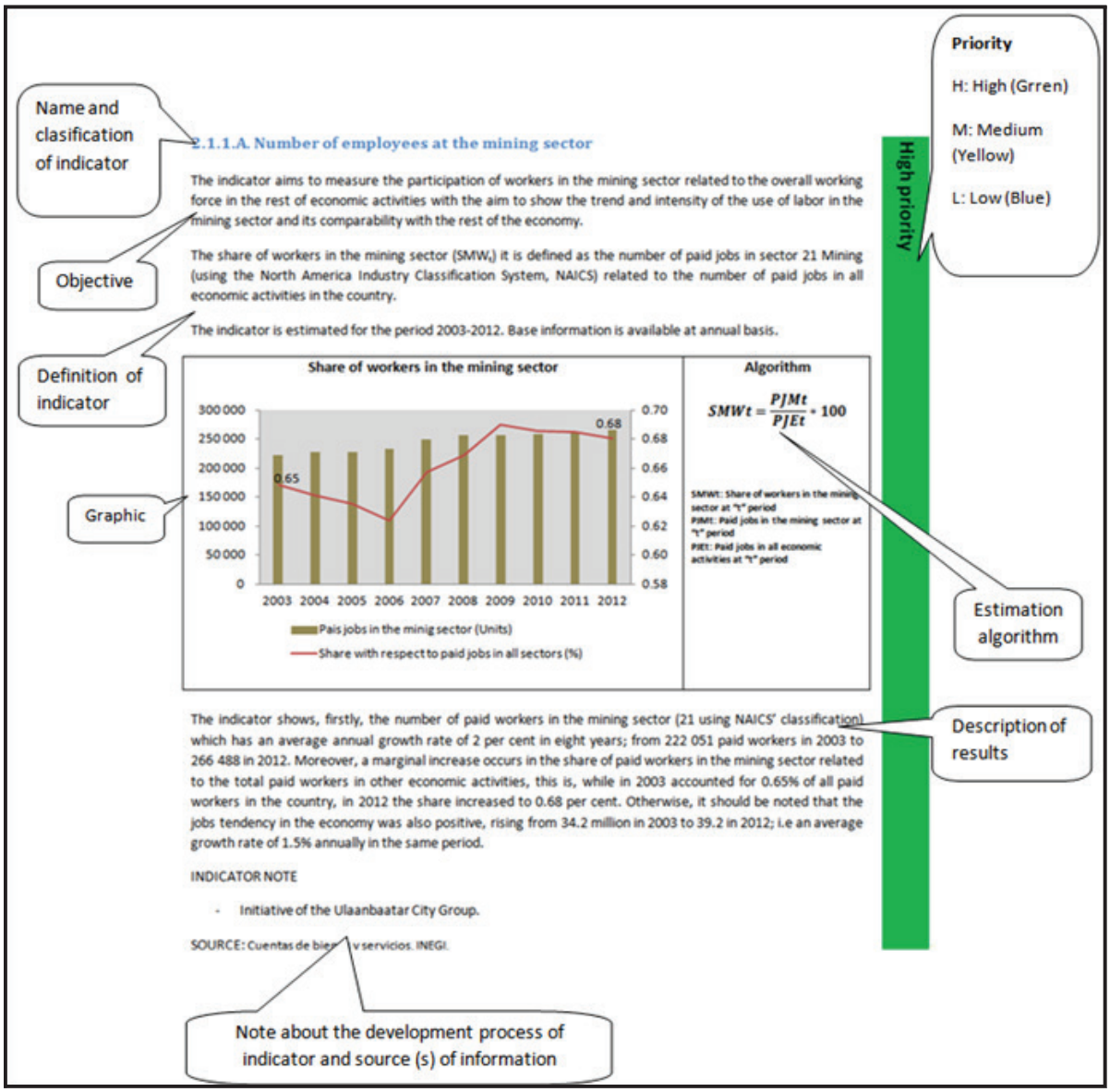


Fig. 1 | Schematic of methodological sheets

Central Framework, can extend the scope of measurement by incorporating links to the environment.

Therefore, it is essential to use the conceptual frameworks already established worldwide as these, among other things, can allow for international comparisons and perhaps facilitate regional studies.

Developing of mining indicators is not an external subject, as it is complemented by the information that can be derived from the conceptual frameworks and this information is the base for the calculations. In the case of Mexico, some indicators of economic and social impacts are developed based on the information available from the country's System of National Accounts, which implements the recommendations of the 2008 SNA.

It is noteworthy that efforts to quantify the impact of economic activities on the environment have already taken place

worldwide. In Mexico, INEGI is responsible for developing the economic and environmental accounts (SEEA-Mexico) based on the methodology proposed by SEEA. This work is an important basis for the development of mining indicators in Mexico as they represent an essential data source.. In addition, other statistical tools also generated by the INEGI are exploited, such as population and economic censuses along with household surveys.

In this sense, SEEA-Mexico provides properly organized information enabling the characterization of the economic dynamics of the country beyond GDP. This provides decision makers at different levels (government, households, businesses, etc.) additional variables related to pollutant emissions to air, water and soil, as well as those related to the loss of forests and oil, to name a few.

High priority

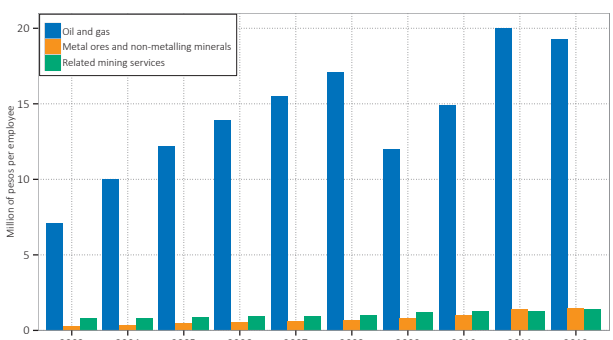
Labor productivity, by classification of economic activities

The indicator aims to measure labor productivity in the mining sector, by classification of economic activities.

The Labor productivity in the mining sector (LPSM) is defined as the gross value added divided by the number of paid jobs, according to the classification of economic activities.

The indicator is estimated for the period 2003-2012. Base information is available at annual basis.

Labor productivity



Algorithm

$$LPMS_{it} = \frac{VA_t}{PJEA_i}$$

where

LMS_{it}: labor productivity in the mining sector for economic activity i at period t,

VA_i: value added of economic activity i and

$PJEA_i$: number of paid jobs in the economic activity i.

Extraction of oil and gas makes up the bulk of value added in the mining sector. In 2012, the labor productivity of each employee generated 19.3 million pesos. In the same year, the extraction of metal ores and non-metallic minerals generated 1.5 million pesos per employee and mining related services generated 1.4 million pesos per employee.

With an average annual increase in labor productivity of 21 percent in 2003-2012, a higher growth rate was recorded in the extraction of metal ores and non-metallic minerals compared to the extraction of oil and gas (12 percent) and mining-related services (7 percent).

Source: Sistema de Cuentas Nacionales de México. Cuentas de bienes y servicios.INEGI.

Depletion of natural resources, by resource types

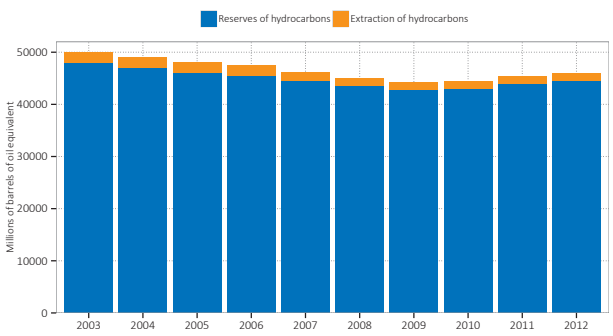
Depletion of natural resources, by resource types

The indicator aims to measure the depletion of hydrocarbons (specifically oil and natural gas) occurring through extraction (production) of the resources.

Whenever this natural asset is considered non-renewable, all extraction is recorded as resource depletion. The depletion of hydrocarbons (DpH) is defined as subsoil resource extraction.

The indicator is estimated for the period 2003-2012. Base information is available on an annual basis.

Depletion of hydrocarbons



Algorithm

$$DpH_t = Q$$

where

DpH_t: Depletion of hydrocarbons at time t and

Q : Production (extraction) of hydrocarbons.

In 2012, the extraction of hydrocarbons amounted to 1,353 million barrels of oil equivalent, while total reserves were 44,530 million barrels of oil equivalent. Between 2003 and 2012 resource depletion accounted for 3 percent of total reserves, which is estimated to correspond to an annual average decrease of 1.8 percent.

Moreover, as the useful life of oil is nearly 33 years, Mexico's total reserves (proved, probable and possible) as of 2012 have a service life close to 10 years

Source: Memoria de labores. PEMEX.

Proposal for a glossary

The UBCG proposes that the output of the UBCG should include a glossary of terms with internationally accepted definitions that offers conceptual guidance and enables countries to determine what type of information they ought to employ in order to construct national indicators.

In harmony with the preceding ideas, the glossary is mainly based on the conceptual content of the 2008 SNA and SEEA-CF standards.

The basic idea is to identify essential keywords from the original conceptual document on indicators provided by the UBCG and the statistical material developed by other countries, including the work done by Mexico. By identifying such keywords, e.g. employment, income, depletion, etc., the members of the UBCG can be certain that they are referring to concepts used in the statistical standards, and thereby all members will be considering the characteristics and the same elements.

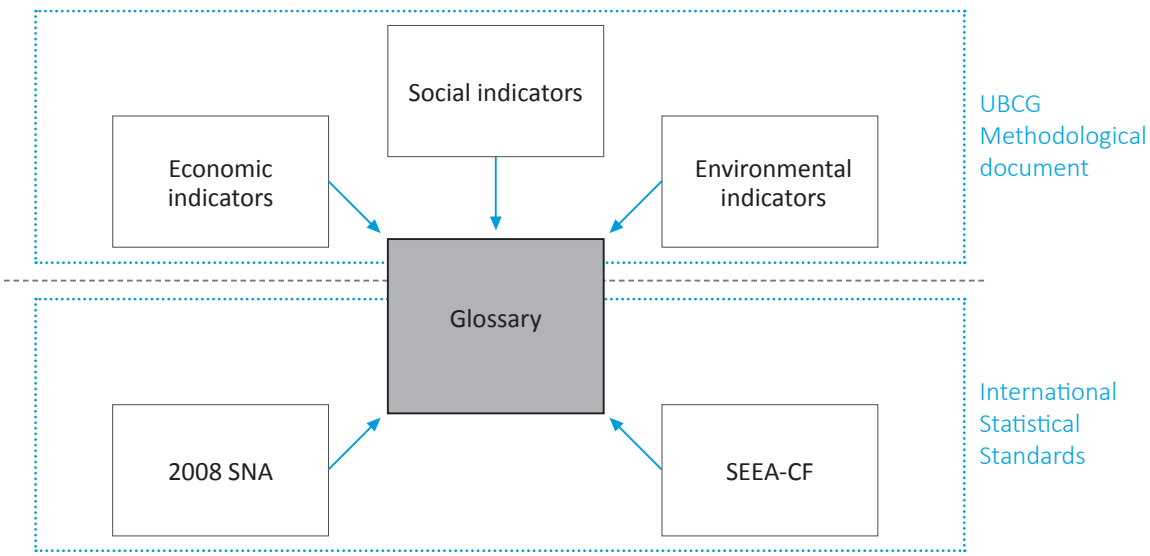


Fig. 2 | Scheme 1- Integration of the glossary of terms

To this end, INEGI has worked on a proposal for a core set of concepts (and their definitions).

Sources of information for the development of indicators

INEGI has an important statistical pool covering areas such as the measurement of the economy, surveys, censuses, price indices and so on.

For the current developments of indicators in Mexico, INEGI has utilized information from sources such as:

- Bank of information;
- Population and Housing Census 2010;
- National Survey of Occupation and Employment 2010-2012;
- System of National Accounts of Mexico. Goods and services accounts, 2012 preliminary, base 2008;
- System of National Accounts of Mexico. Economic and ecological accounts of Mexico, 2012 preliminary, base 2008;
- Others.

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IMPACTS OF MINING ON THE ECONOMY OF KAZAKHSTAN

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Kazakhstan is one of the richest mineral countries in the world with large reserves of natural resources ranging from coal to uranium. The country has a variety of minerals; 99 of the 105 elements on Mendeleev's periodic table have been identified, reserves of 70 elements are being explored and more than 60 elements are used in production. As of today, 493 exploration fields containing 1,225 kinds of minerals are known.

According to results of geological and economic evaluations of the available mineral reserves, coal, oil, copper, iron, lead, zinc, chromate, gold and manganese are of great economic importance to Kazakhstan.

Overall, the mining industry - activities related to mining and processing of minerals occurring naturally as solids (coal and ores), liquids (oil) or gaseous (natural gas - is an important part of Kazakhstan's economy.

The share of mining in GDP according to preliminary data in 2013 was 16.5 percent in GVA industry - 56.6 percent. A decline in the share of GVA of mining in GDP from 19.5 percent in 2010 to 16.5 percent in 2013 is observed. Decline of GDP volume index is noted in 2012 and is 105 percent, GVA volume index of mining in 2011 and 2012, 101 percent and 100.4 percent, respectively. In 2013, the GVA volume index of mining increased to 103.7 percent. See Box 1 for a description of the indicators GDP and GVA.

In 2013, GDP amounted Tenge to 34,140 billion (USD183.6 billion). The regions

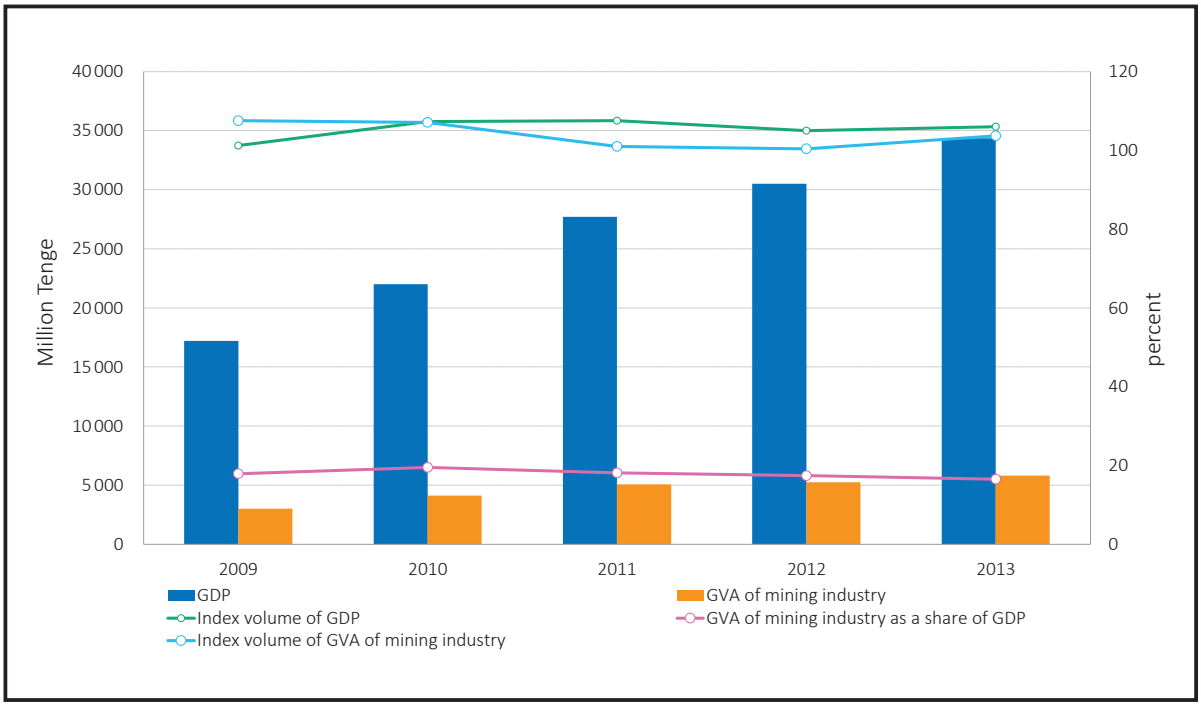

Fig. 1 | Change in GDP and gross value added of mining, 2009-2013
Note: Data for 2013 is preliminary.

contributing the most to GDP were: Almaty, Atyrau and Astana with 19 percent, 10.6 percent and 9.5 percent, respectively. Of these three regions, Atyrau had the largest share (51.3 percent or 1,863.1 billion Tenge) of the mining industry in terms of gross regional product (GRP). When measuring the regional impact of mining on GRP five regions with a significant mining industry stand out. In each of these regions, the economy is dominated by the oil and gas sector. Most notably is the region of West Kazakhstan, which has a share of GRP to GDP of 5.4 percent, and a share of mining in GRP of 51.9 percent. In the four other significant regions, the value of the share of mining in GRP is as follows: Atyrau, 51.3 percent; Mangistau, 47 percent; Kyzylorda Oblast, 45 percent; and Aktobe, 31.2 percent.

In 2006, the IMF's Statistics Department conducted a multidisciplinary mission with the purpose to disaggregate national accounts and balance of payments for oil and non-oil components. The mission's results reveal that Kazakhstan since 2006 has performed calculations of gross value added (GVA) for its oil and gas sector. Employees of the Agency of Kazakhstan on Statistics have - in cooperation with statistics experts from the IMF - built a list of economic activities related to this sector. The list was broken down into primary, secondary and tertiary sectors. For example, the primary sector was assigned

Box 1 | Indicator description: gross domestic product

Name of indicator	Gross domestic product (GDP)
Periodicity	Quarterly, annually
Measure	Million units of the national currency, million
Used classifiers	National Classification of Economic Activities (NACE), containing the authentic text of the Classification of Economic Activities in the European Community (NACE Rev.2)
Disaggregated by	Economic activity, region, sector and ownership of enterprises
Definition of the indicator	The production measure, gross domestic product, is derived as the value of output minus intermediate consumption, plus any taxes, and minus subsidies on products not already included in the value of output. (SNA 2008 item 16.47). Gross value added (GVA) is the value of output less the value of intermediate consumption. (SNA 2008, item 6.8).

industries directly involved in production of crude oil and natural gas, services in this area, as well as industry related to the carriage and transportation of crude oil and natural gas, such as the construction of pipeline networks for oil and gas.

Between 2009 and 2012, the GVA of the oil and gas sector increased from 3,772 billion Tenge to 8,013 billion Tenge (see Figure 3). In the same period, an increase in the share of oil and gas sector in GDP from 22.3 percent to 26.4 percent was observed. According to preliminary data, both measures declined in 2012-2013: the GVA of the oil and gas sector to 6,509 billion Tenge and the sector's share in GDP to 19 percent. As of 2013, the share of the primary sector in GDP was 15.8 percent, and the corresponding share of the secondary and tertiary sectors were 2 percent and 1.2 percent, respectively.

Figure 4 summarizes the structure of production volumes in the mining sector (see Box 2 for an indicator description of industrial output). Extraction of crude oil and natural makes up the largest share with 84.5 percent, and other mining and quarrying the lowest share with 1.1 percent. The share of metal ore mining and technical services in the mining industry is 7.2 percent and 5.3 percent, respectively. The data presented in Table 3 shows a general rise in the production of major mining products over the past 5

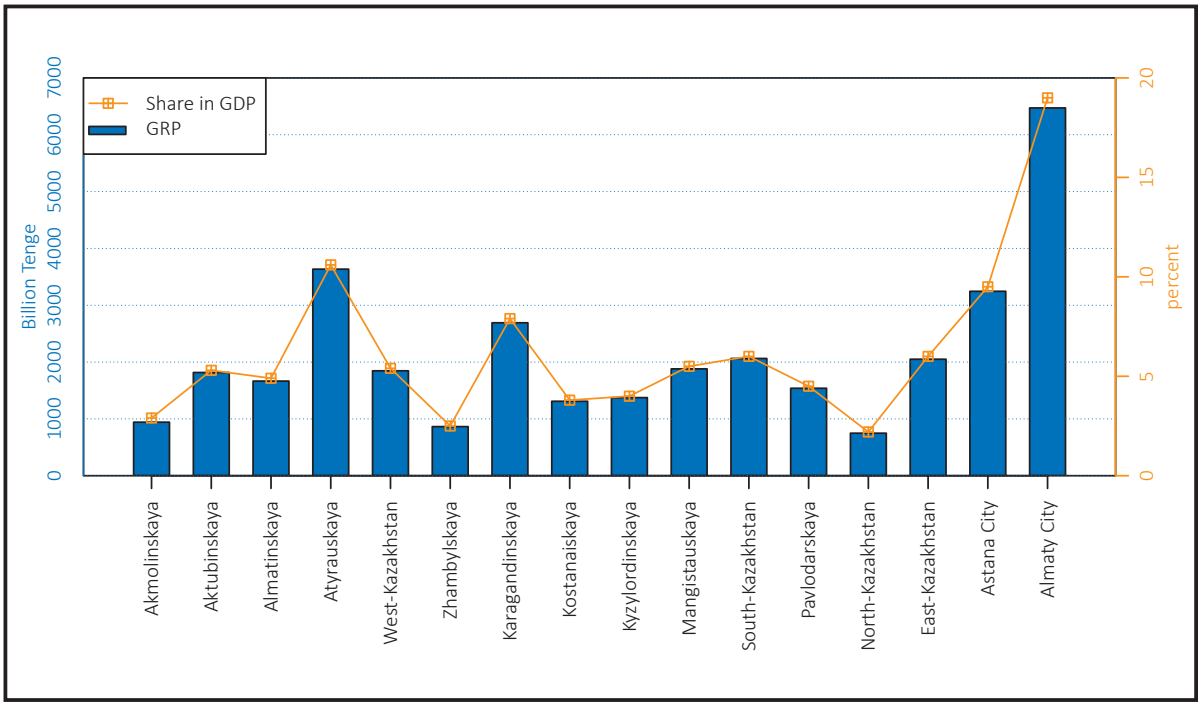

Fig. 2 | Gross regional product, 2013
Note: Data for 2013 is preliminary.

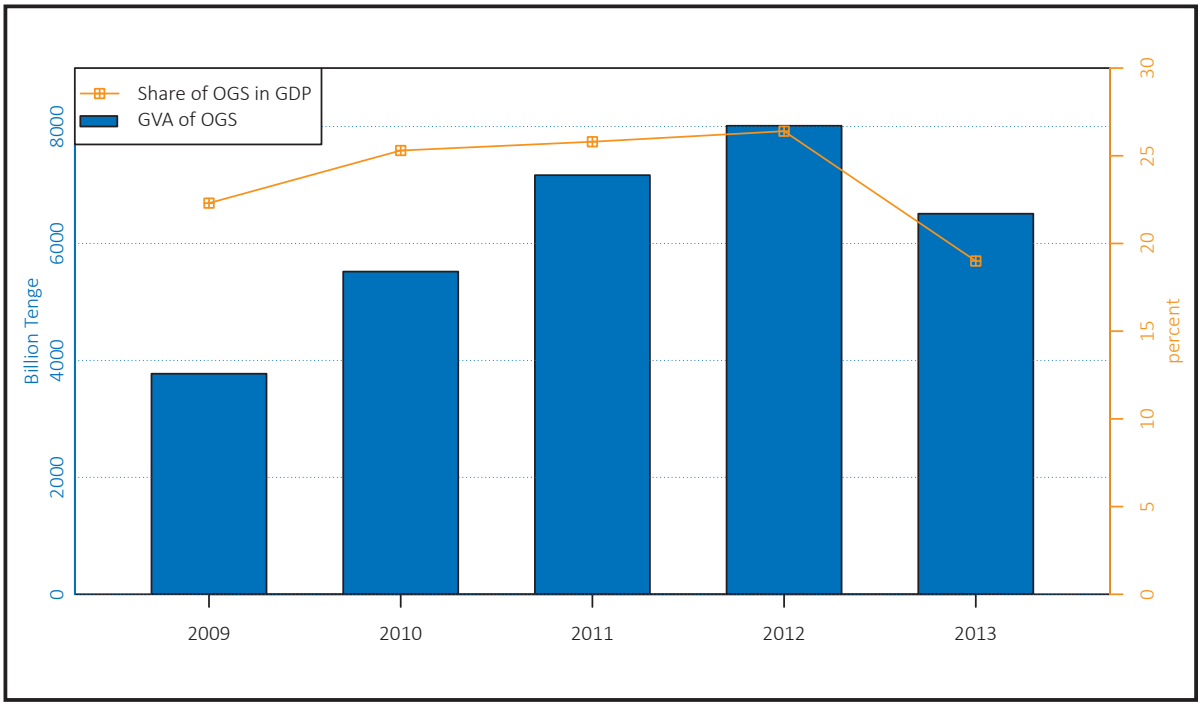

Fig. 3 | Size of the oil and gas sector, 2009-2013
Note: Data for 2013 is preliminary.

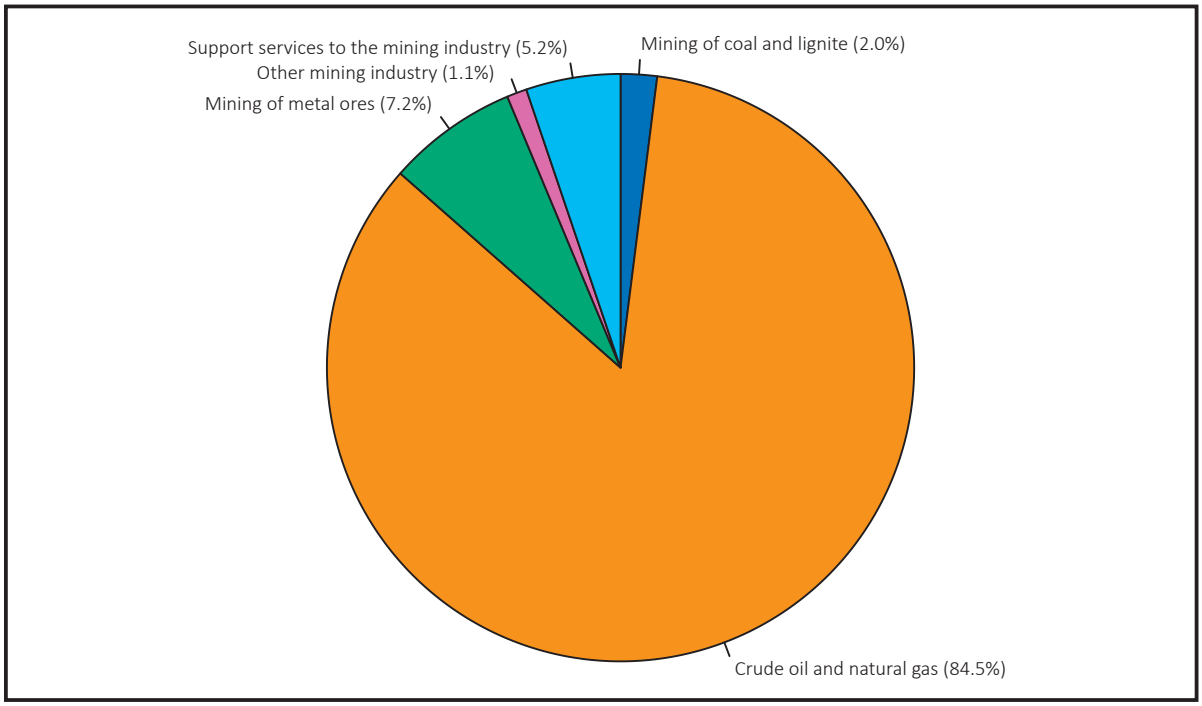

Fig. 4 | Structure of production volumes in mining (percentage), 2013

years, reflecting a steady increase in the production of industrial products. However, the production of zinc decreased between 2010 and 2013 from 405.3 thousand tons to 361.1 thousand tons. A decline in oil production and lead was observed in 2012 and in chrome ore in 2011.

The mining industry makes a significant contribution to the development of the national economy. Tax revenues from the oil sector organizations are the main source of inflow to Kazakhstan's National Fund.

The National Fund was established by Presidential Decree on 23 August 2000 in order to ensure sustainable socio-economic development, accumulation of funds for future generations and reduction of the dependence of the economy from adverse external factors. The Fund's assets are kept in the Government's account in the National Bank of Kazakhstan, which also manages the Fund's assets. Every year, the government annual report on the formation and use of the Fund is presented and subject to approval by the President of Kazakhstan. This report is published on the official website of the Ministry of Finance.

Funds are spent on two main objectives: guaranteed transfers to the national budget for the implementation of development programs and budget targets transfers from the budget for purposes defined by the President.

Figure 5 shows that tax revenues from the oil sector in 2012 largely exceeded tax revenues from all other sectors of the economy. The difference between severance tax and income tax on mining

Box 2 | Indicator description – industrial output

Name of indicator	Industrial output
Periodicity	Monthly and annually
Measure	Thousands. National currency units, as well as in-kind
Used classifiers	Classification of products by economic activity, international classifier identical products by economic activity of the European Community (CPA 2008)
Dissected by	Region, economic activity, ownership and enterprise dimension
Definition of the indicator	Production output (goods and services) (salable) - it all worked out the cost of finished products now (products), semi-finished its production (as of its raw materials and raw materials of the customer), intended for sale on the side, its capital construction and its non-industrial units, the issuance of its employees on account of wages, as well as work and industrial services performed under orders.

Table 3 | Production of major mining products, 2009-2013 (thousand tons unless otherwise indicated)

	2009	2010	2011	2012	2013
Coal	100,854.3	110,929.4	116,449.3	120,527.5	119,860.1
Oil, including gas condensate	76,482.6	79,684.8	80,060.9	79,224.5	81,731.4
Natural gas in liquid or gaseous form, million cubic meters	35,941.8	37,405.9	39,531.3	40,299.4	41,911.6
Agglomerated iron ores and non-agglomerated	22,281.3	24,016.2	24,736.1	25,888.5	25,241.8
Copper ore	30,593.6	32,038.8	34,396.1	38,905.8	41,731.7
Lead in lead concentrate	33.6	35.4	38.8	38.1	40.8
Zinc in zinc concentrate	398.4	405.3	376.7	369.7	361.1
Manganese ore	2,457.4	3,044.7	2,963.0	2,975.0	2,852.1
Chrome ore	4,678.1	5,091.7	5,059.0	5,233.1	5,255.0

and rent tax on export was 860 billion Tenge and 779 billion Tenge, respectively. The smallest gap observed was on 147 billion Tenge and is with corporate income tax revenues, which are also the largest source of tax revenue (52.5 percent).

In 2009, revenues from corporate income tax declined to 559 billion Tenge and tax revenues from the extraction of minerals in the oil sector to 317 billion Tenge (see Figure 5). Slight decrease in the corporate income tax and rent tax on export is noted in 2012 compared with 2011, 5 billion Tenge and 17 billion Tenge, respectively.

Kazakhstan's improved position in the global economy is primarily due to its increased participation in global trade. Currently, export specialization in Kazakhstan is predominantly focused on mineral resources but also includes commodities and processed intermediate goods requiring further processing.

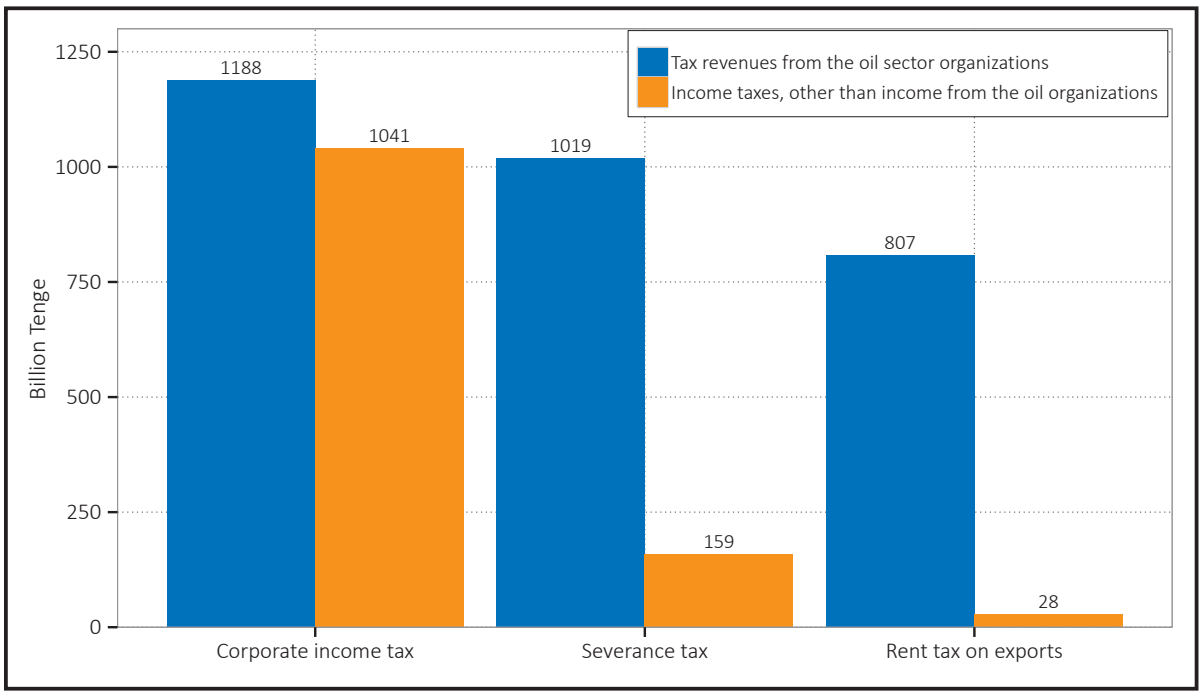

Fig. 5 | Proceeds of individual taxes, 2012

Figure 7 shows Kazakhstan's major trade partners, which account for the largest share in exports of crude oil and petroleum products. The main export markets are China, Italy, the Netherlands, Austria and France, with shares in total exports of crude oil and petroleum crude of 26.1 percent, 15.6 percent, 11.7 percent, 9.4 percent and 9 percent, respectively.

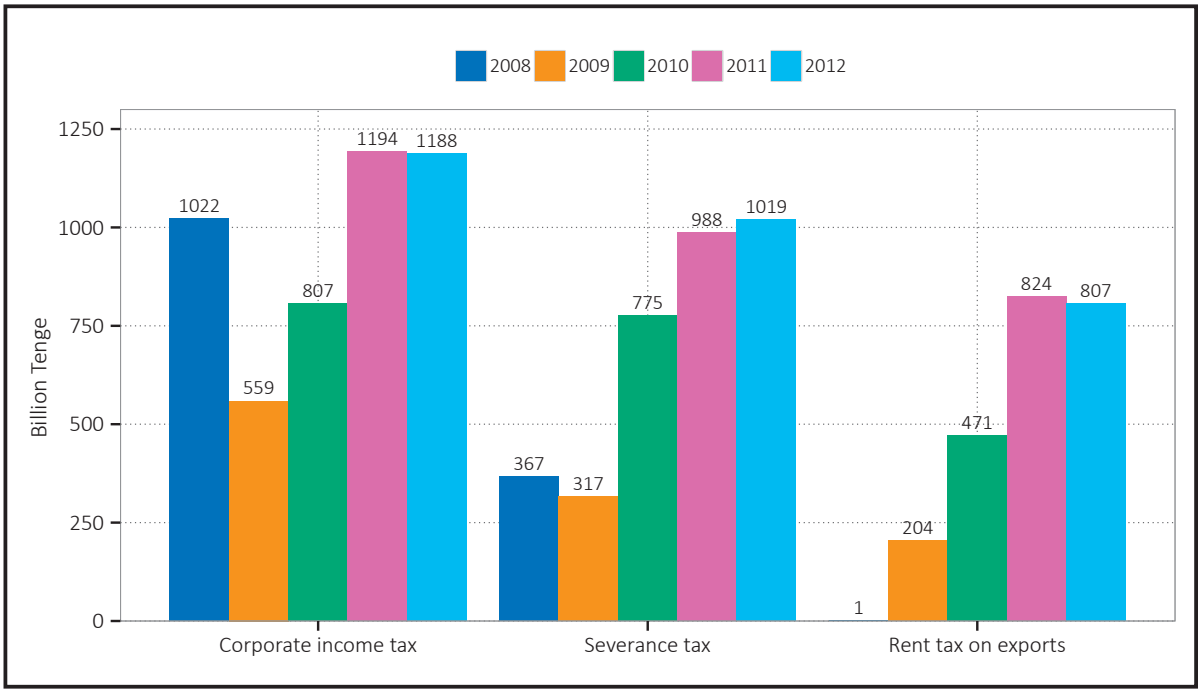

Fig. 6 | Tax revenues from the oil sector, 2008-2012

Box 3 | Corporate income tax payers

Corporate income tax payers are legal entities - residents of Kazakhstan, except for government agencies as well as non-resident corporations doing business in Kazakhstan through a permanent establishment or receiving income from sources in Kazakhstan.

Objects of corporate income tax are:

1. Taxable income;
2. Income subject to withholding;
3. The net income of the foreign entity carrying out activities in Kazakhstan through a permanent establishment.

Minerals extraction taxpayers are mineral developers engaged in the extraction of oil, minerals, underground water and therapeutic mud, including the extraction of minerals from technogenic mineral formations within each contract concluded with mineral developers.

Object of taxation on mining is the physical amount of crude oil, condensate and natural gas extracted by mineral developers in the tax period.

Payers of rent tax on exports are individuals and legal entities that export crude oil, gas condensate and coal.

The object of taxation for export rent tax is the amount of crude oil, gas condensate and coal sold for export.

Source: Tax Code of the Republic of Kazakhstan dated December 10, 2008 N 99-IV.

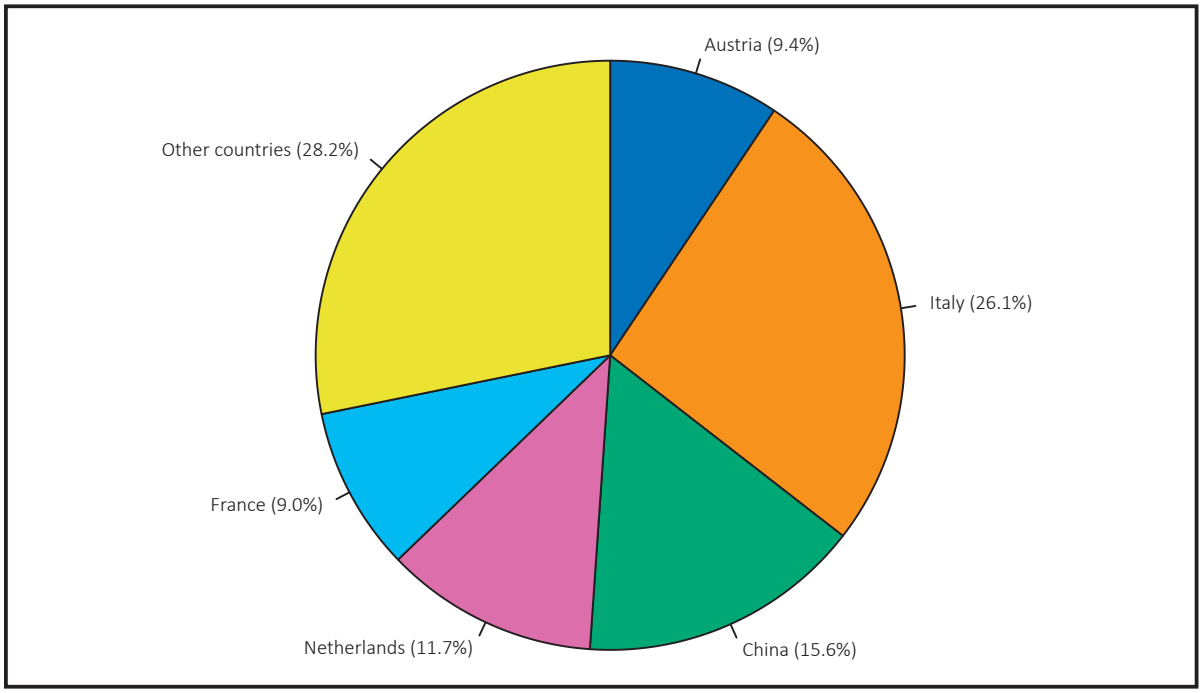

Fig. 7 | Exports of crude oil and raw petroleum (percentage), 2012
Source: Data on exports and imports of goods generated by the Customs Committee of the Ministry of Finance of the Republic of Kazakhstan.
Notes: For disaggregation of goods Commodity nomenclature of foreign economic activity of the Customs Union is used.

In 2012, the largest importers of natural gas condensate from Kazakhstan were the Netherlands, Finland and Romania with export quantities of 585.4, 289.3 and 146.9 thousand tons, corresponding to shares of 47 percent, 23 percent and 12 percent, respectively (see Figure 8). 9 percent of Kazakhstan's natural gas condensate is exported to Italy, and 4 percent to both Germany and Russia. With a share of 87 percent, Russia is the biggest importer of coal from Kazakhstan. Other smaller trading partners are Kyrgyzstan and Ukraine, who accounted for, respectively, 4 percent and 3 percent of total coal export.

Accelerated diversification and competitiveness is expected to ensure the sustainable development of Kazakhstan's economy over the next decade. Specific projects under implementation are the State Program on Forced Industrial-Innovative Development of Kazakhstan for 2010-2014, the Industrialization Map of Kazakhstan for 2010-2014 and the Strategy of Industrial and Innovation Development of Kazakhstan for 2003-2015. It is the objective to enter the top-50 most competitive countries in the world. As a mean to this end, foreign direct investments are considered as one of the main

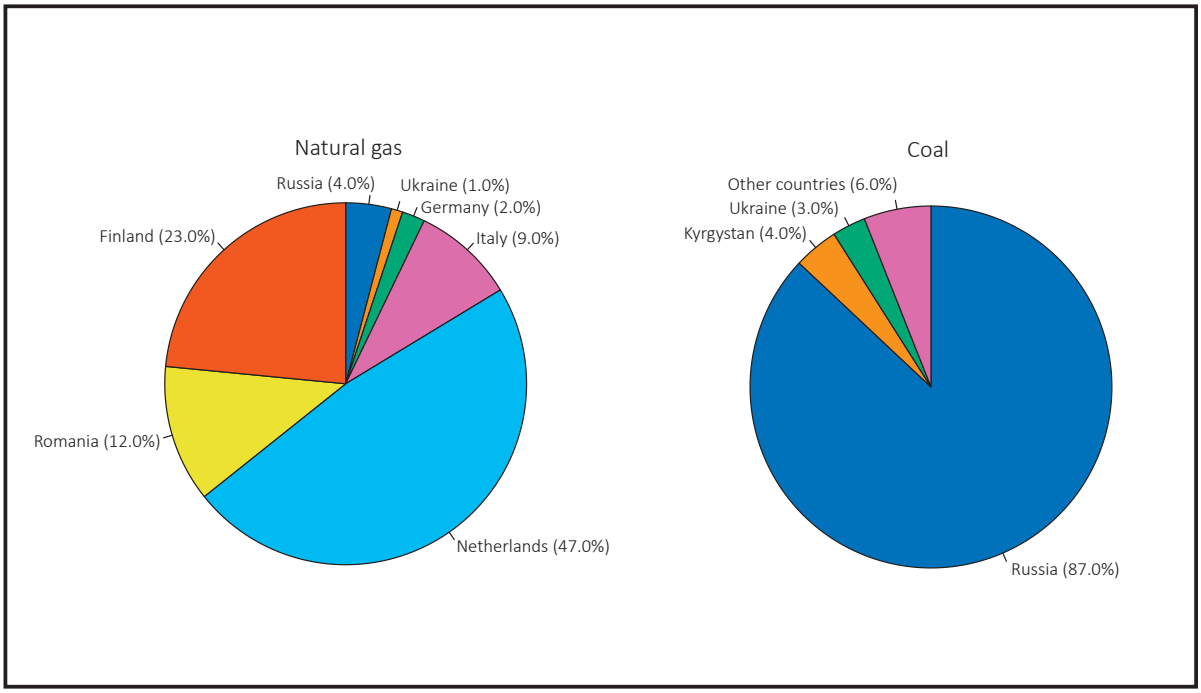

Fig. 8 | Export of selected goods (largest share in country's total exports) by major trading partners, 2012

Source: Data on exports and imports of goods generated by the Customs Committee of the Ministry of Finance of the Republic of Kazakhstan.

Notes: For disaggregation of goods Commodity nomenclature of foreign economic activity of the Customs Union is used.

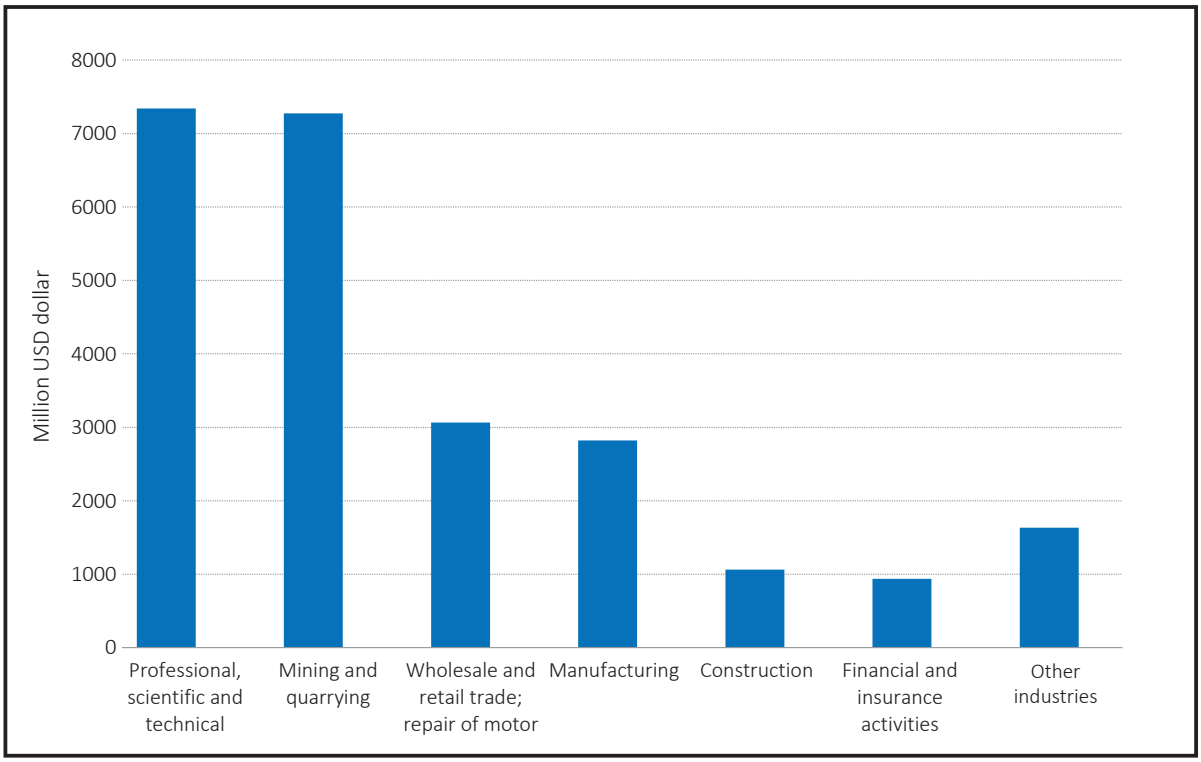

Fig. 9 | Gross inflow of foreign direct investments in Kazakhstan, 2013

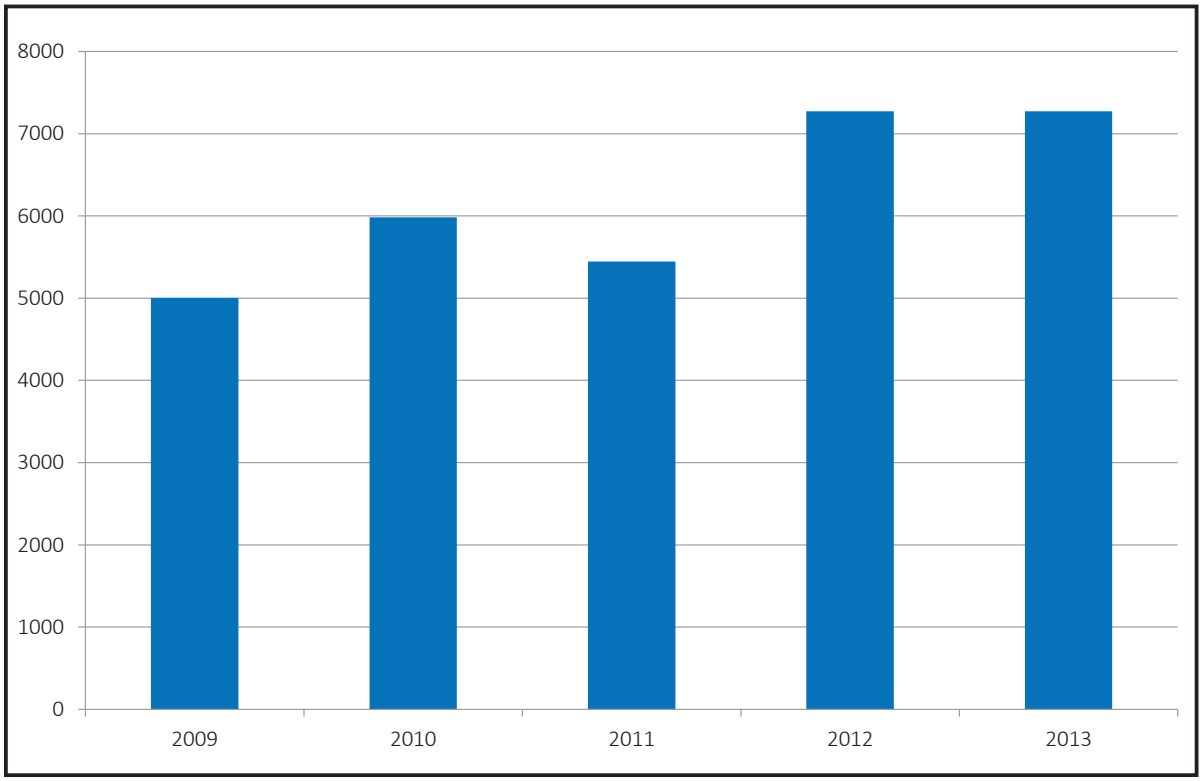

Fig. 10 | Gross inflow of direct investments in mining (billion USD), 2009-2013

sources of diversification. Figure 9 shows how the gross inflow of foreign direct investments in Kazakhstan is distributed across industries.

The largest volumes of direct investment inflows were observed in professional, scientific and technical activities (USD7,339 billion), as well as in mining and quarrying activities (USD7,274 billion). This is reflected in Figure 10 below. According to the National Bank of Kazakhstan, the gross inflow of direct investments in the mining industry increased by USD2,272.1 billion to USD7,273.6 billion between 2009 and 2013. A decrease in gross inflows from USD5,982.2 billion in 2010 to USD5,446.3 billion in 2011 was observed.

Assessing the impact of mining on the economy is not limited to the above indicators. However, among the many indicators that characterize the development of the economy, the input-output tables are currently not a common tool for analysis and require further development. The Input-Output analysis focuses on the relationship between the industries in an economy, taking into account outputs produced, how this output is used by other industries as well as imported products from abroad. Input-output tables are also convenient for assessing the impact of changes on relative prices or on demand for labor and capital in the changing levels of production; the effects of changes in the structure of demand, etc. The tables can also be used for extended analyses such as to assess the impact of the economy on the environment.

IMPACTS OF MINING ON THE ECONOMY OF MONGOLIA

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Background

In recent years, Mongolia has experienced an expansion of its mining sector, which is expected to continue growing in the future. This paper looks at how mining has affected the Mongolian economy and society, and examines these impacts based on official statistics and samples of two copper mines, specifically the Oyu Tolgoi and Erdenet copper mines. It shows that the contribution of mining to the economic sector has been significant. Mining has contributed to more than half of Mongolia's gross industrial output and 80 percent of export revenue, and constitutes 20.2 percent of GDP and 32.9 percent of government revenue.

The rest of the paper is structured in three sections, as follows:

- Methodology and data sources;
- Impacts of mining on economy; and
- Conclusion

Methodology and data sources

The UBCG has identified 155 indicators to measure the economic impacts of mining (see Figure 1).

These indicators have been categorized according to production, stock and investment statistical indicators, expenditure statistical indicators, trade and price statistical indicators and analytical statistics and transformations:

- Production, stock and investment statistics:
  - Total production of mining products, by value;

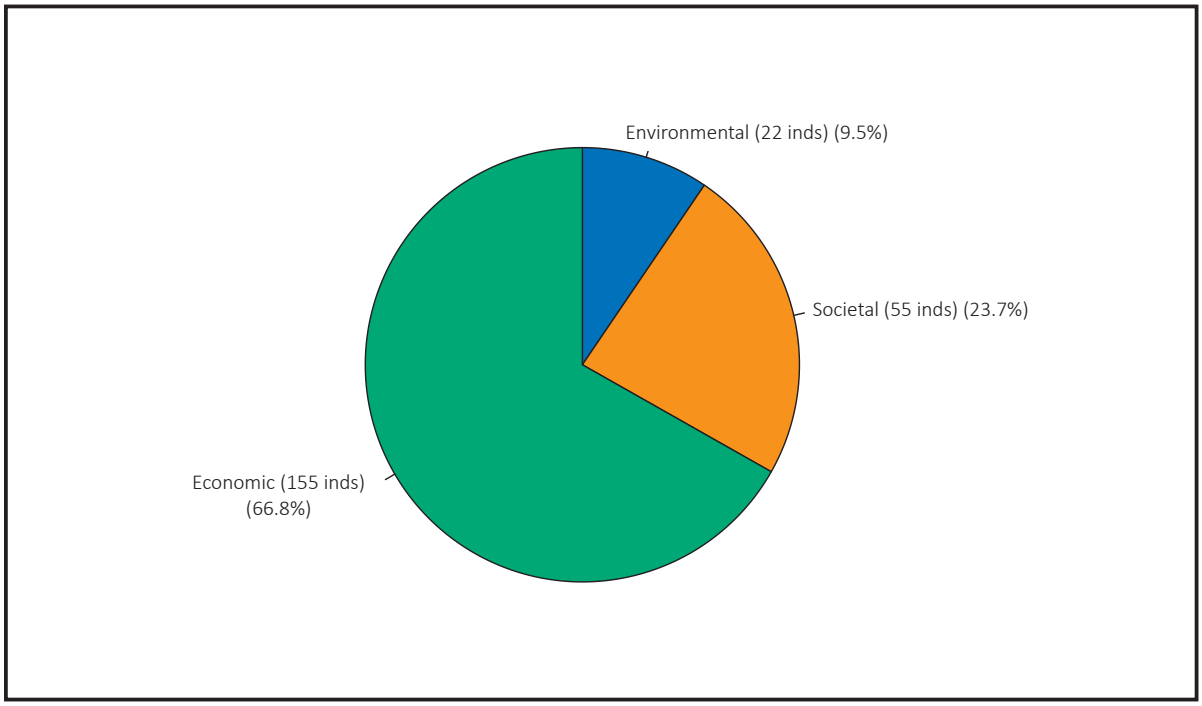

Fig. 1 | Indicators for measurement of the impacts of mining
Notes: ind's = indicators

- Total production of mining products, by quantity;
- Inventories, fixed capital and investment.

- Expenditure statistics:
  - Expenditure, by raw materials, spare parts, and packing materials used for production processes;
  - Expenditure of electricity, fuel and water;
  - Expenditure of transport vehicles and other transport running expenses;
  - Expenditure of waste and air emissions management;
  - Cash costs;
  - Other service costs.
- Trade and price statistics:
  - External trade;
  - Domestic trade;
  - Consumer and housing price.
- Analytical statistics and transformations:
  - GDP and GNI (gross national income);
  - IOT (input-output tables) and SUT (supply and use tables);
  - Productivity;
  - Taxes, royalty and export duties.

As seen from the Figure 2, the data sources to derive these indicators include:

Official statistics:

- National accounts;
- SUT, IOT and national wealth;
- Quarterly capital and investment survey;
- Enterprise and price survey;
- Other surveys such as the mining sites' survey and artisanal and the small scale mining survey.

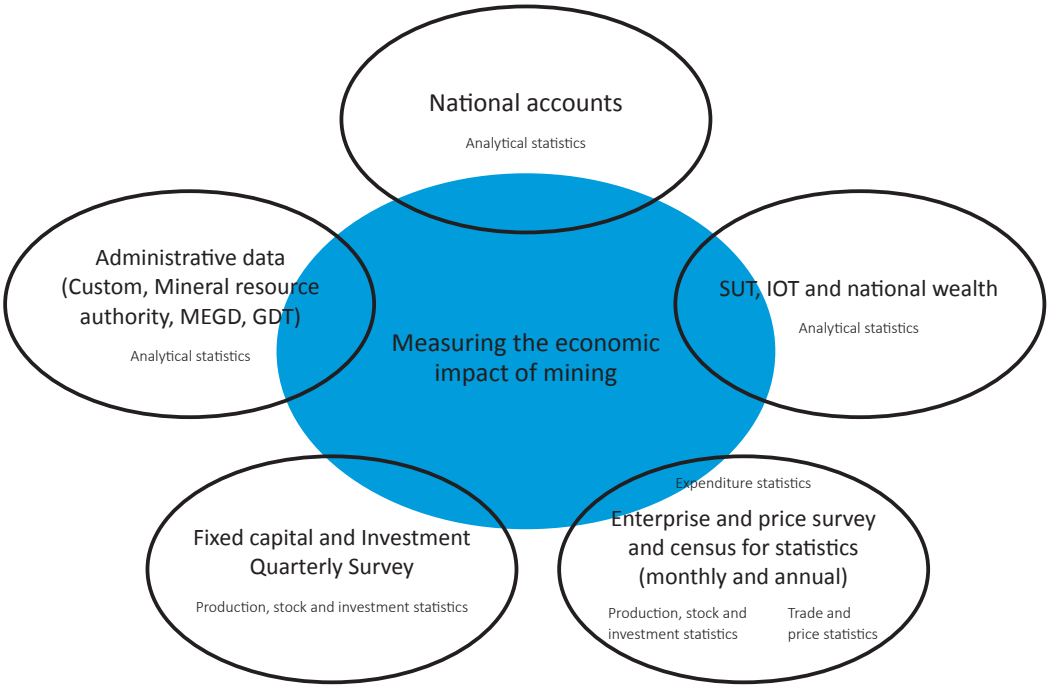

Fig. 2 | Data sources

Administrative data is understood as data from ministries and agencies such as the Customs Authority, the Mineral Resources Authority, the Ministry of Environment and Green Development (MEGD) and the General Department of Taxation (GDT).

An assessment of data sources shows (see Figure 3) that Mongolia's National Statistical Office can estimate 107 indicators out of the total 155 indicators, while for the remaining indicators there is a need to identify possible data sources, assess the quality of data and create a comprehensive database.

Figure 4 shows the consistency of the UBCG indicators to measure economic impacts of mining with those of the Mongolian system of national accounts (SNA). For example, the indicators for production statistics identified by the UBCG matches the production indicator of the SNA. The difference is that the UBCG considers quantity when estimating total production, whereas the SNA recommends using volume. The UBCG proposes to derive a productivity indicator, which is linked to the indicator for total factor productivity in the SNA. The expenditure consumption indicator proposed by the UBCG is related to the SNA indicator of intermediate consumption. Inventory statistics of the UBCG is coherent with inventories statistics of the SNA, which covers raw materials, supplies, work in process, finished goods

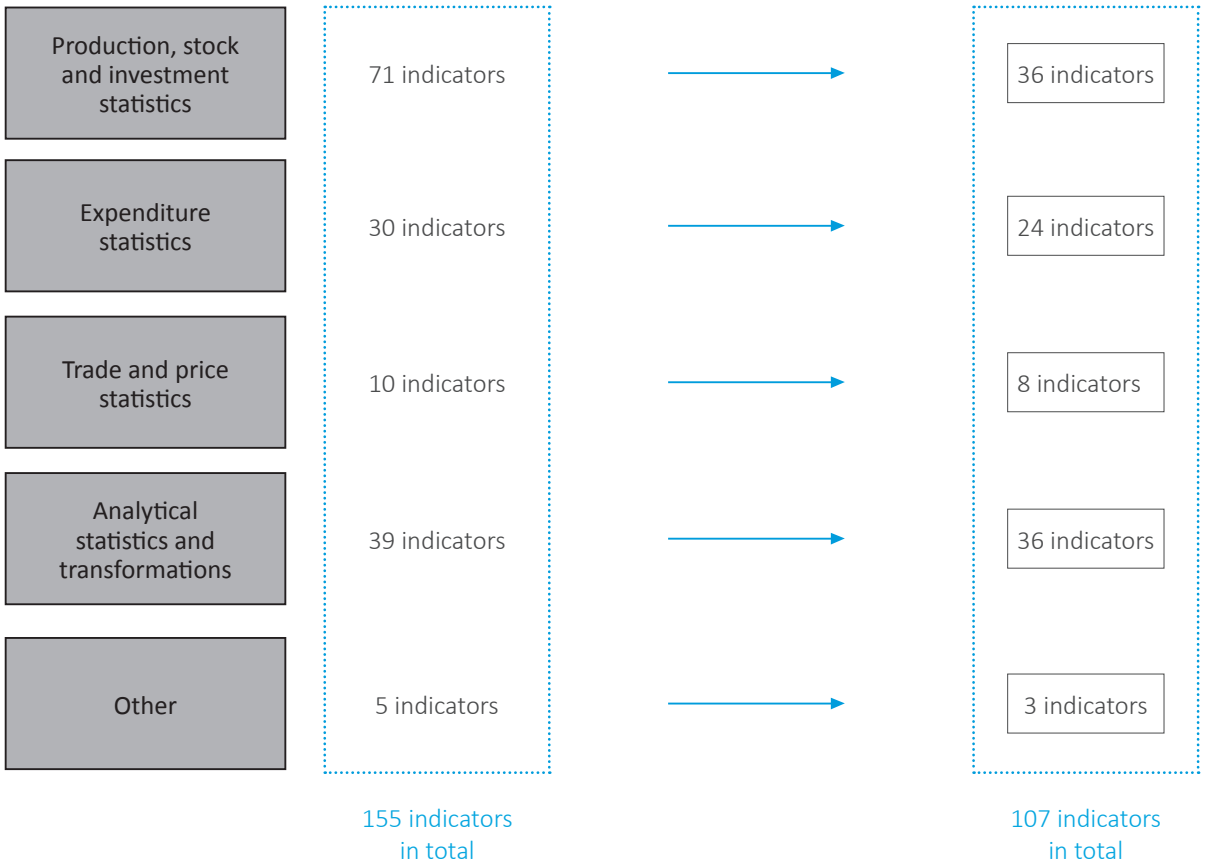

Fig. 3 | Data availability

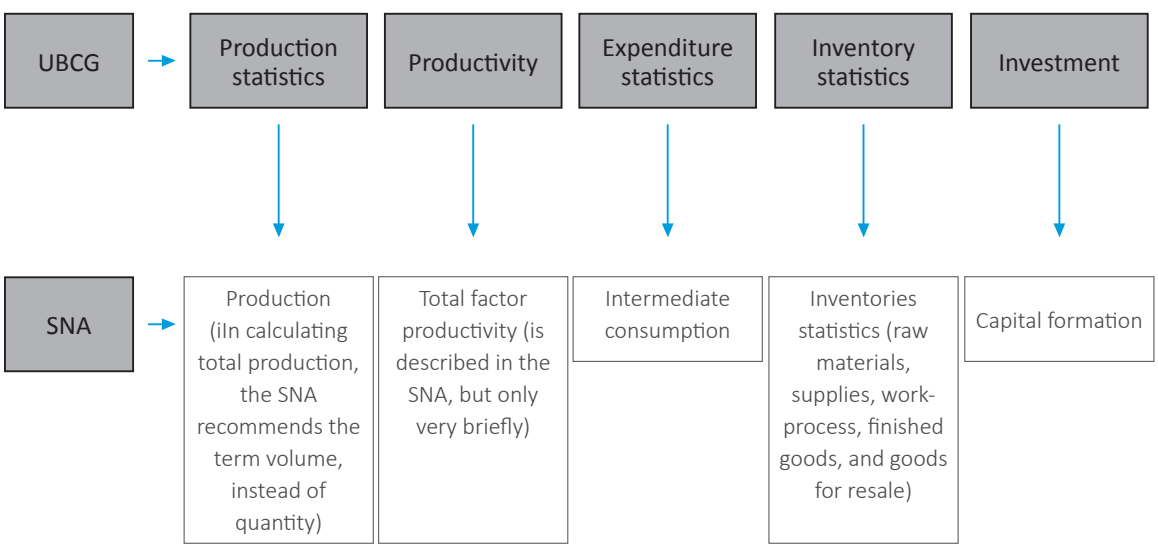

Fig. 4 | Connection between indicators of the UBCG and the SNA

and goods for resale. The UBCG indicator for fixed capital investments is related to the capital formation of the SNA statistics.

Impacts of mining on the economy

Macroeconomic contributions of mining

High contributions from mining are found in some macroeconomic areas of the Mongolian economy. In 2005, gross industrial output of the mining industry constituted 66.8 percent of total industrial output (Figure 4). Since then, its share has been gradually decreasing, but still makes up the largest share of Mongolia' gross industrial output, accounting for 58.7 percent in 2012 and 2013. Of the mining outputs, metal ores extraction contributes the most with a share of 33.6 percent (in 2013).

The mining and quarrying industry made up 20.2 percent of GDP in 2013; this is a slight increase from 2012. The highest contribution of the industry was measured in 2011 with 24.1 percent. See Figure 5 for Mongolia's industrial composition of GDP between 2009 and 2013.

Figure 6 shows the direct relationship between the mining and quarrying industry and the annual change in GDP.

In 2013, mining made up 80 percent of Mongolia's export revenue of which coal and copper accounted for 24.3 percent and 20.2 percent, respectively. The export revenue of coal and copper peaked in 2011 and has since then decreased significantly.Mining constitutes 32.9 percent of government revenue. Of this contribution, 93.3 percent goes to the central government's revenue and 5.8 percent to the local government's revenue.

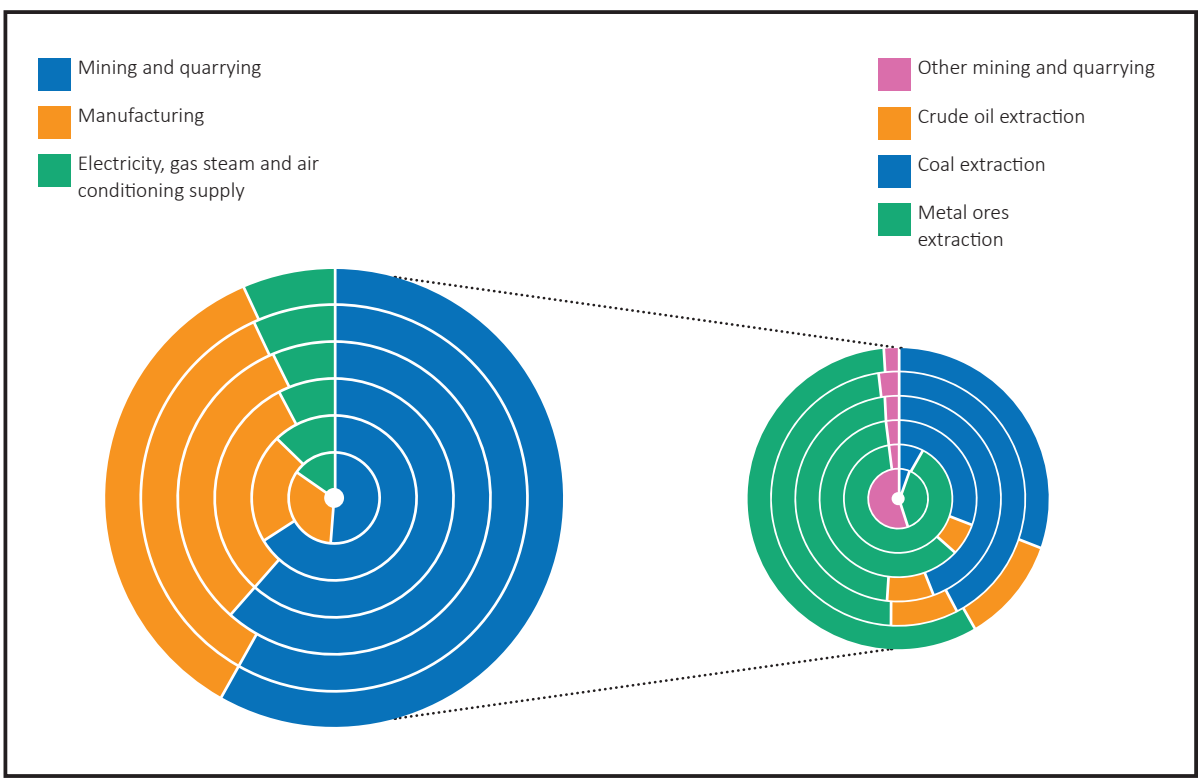

 Fig. 4 | Contribution of mining to gross industrial output, 2013

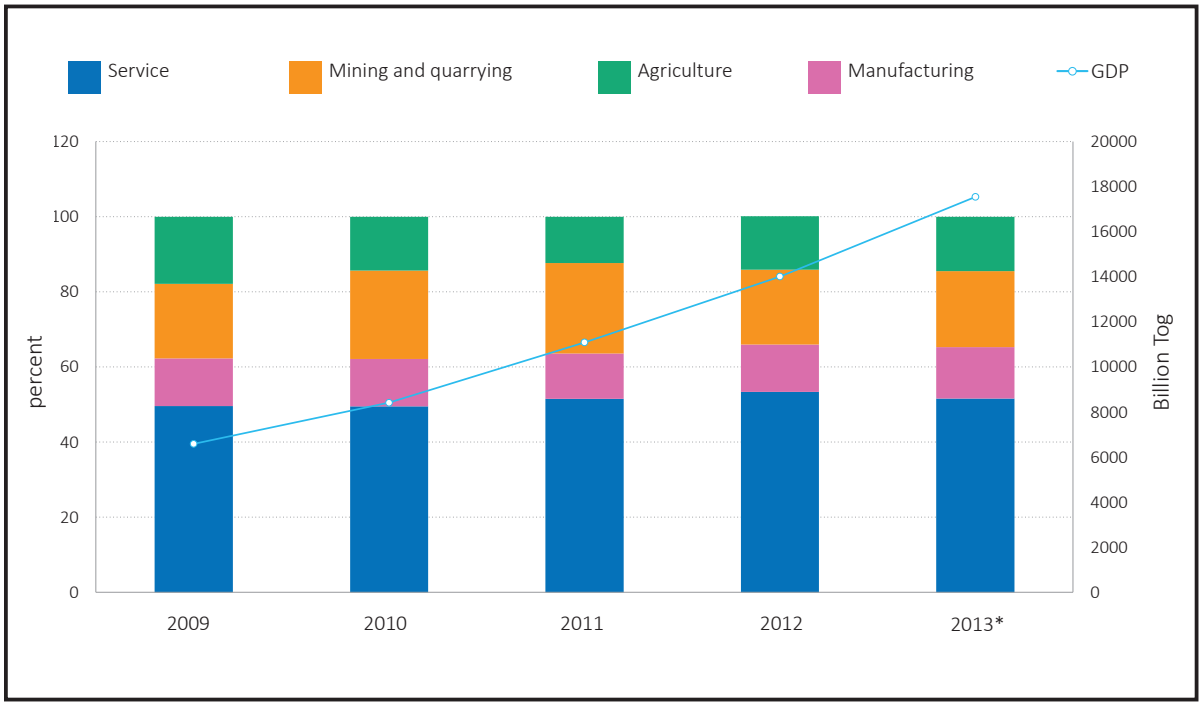

Fig. 5 | Strucuture of GDP, 2009-2013

Notes: Numbers for 2013 are estimates.

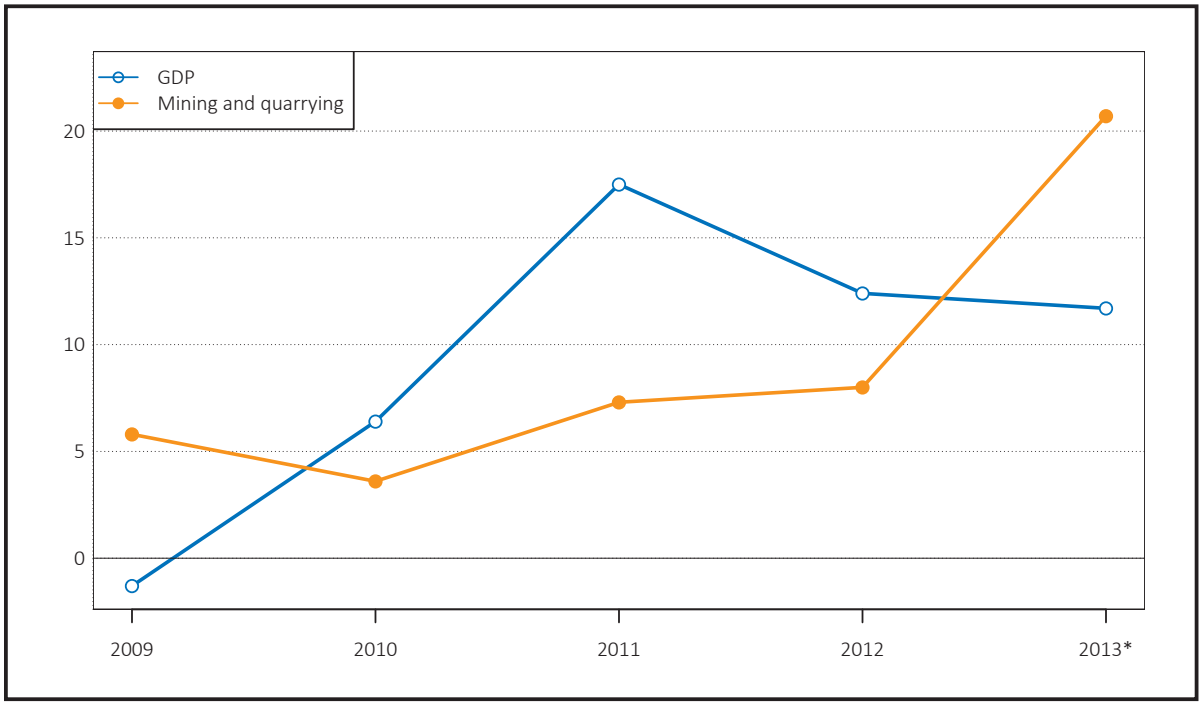

Fig. 6 | Annual change in GDP and in the contribution of the mining and quarrying industry (percentage), 2009-2013

Notes: Numbers for 2013 are estimates.

Conclusion

The paper recognizes the need for more data sources in order to compile necessary indicators for measuring the impacts of mining on the economy and in order to deduct policy implications. An analysis of the contribution of mining on local development, economic diversification and employment should be carried out. Moreover, a comparison of the development of mining and non-mining towns and provinces will be beneficial for government policy and programs in support of local development.

The survey conducted on the mining sites of Oyu Tolgoi will provide useful supplementary information in regard to products, revenues, local investments, efficiency of using natural resource inputs as well as commercial activities of the mining firms in the local areas such as procurement of goods and services from domestic enterprises and local small and medium enterprises and producer-supplier relations.

The quality of data is another area, where more efforts are needed both from the National Statistical Office of Mongolia and relevant government agencies. Although it is the responsibility of the National Statistical Office to create, produce and disseminate high quality data, collaboration with government agencies responsible for relevant data is crucial.

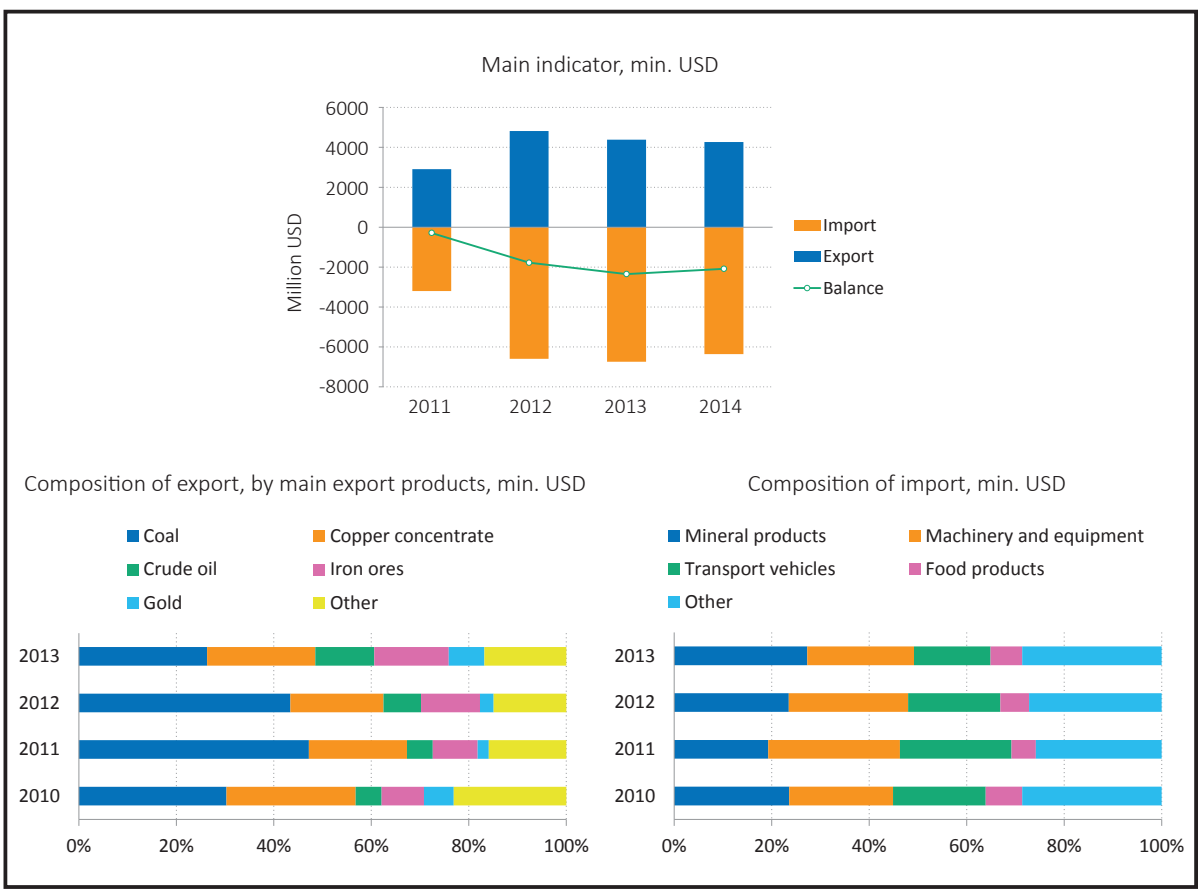

Fig. 7 | Composition of Mongolia's mining exports and imports

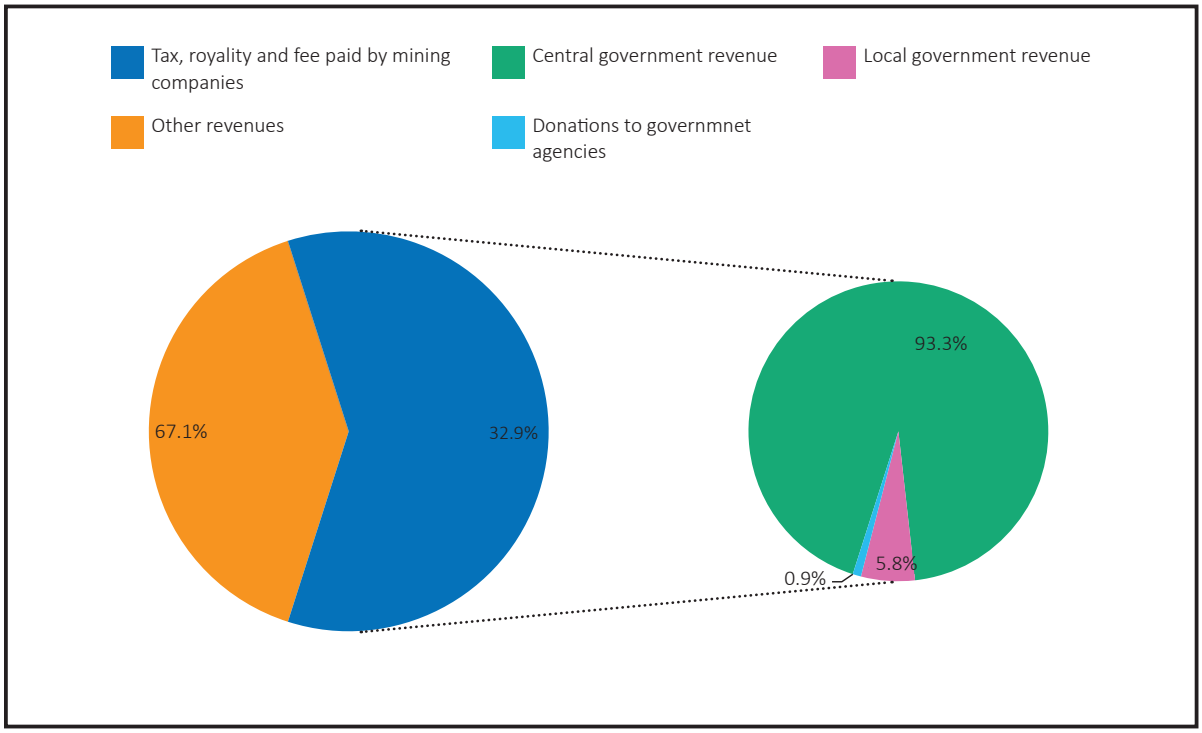

Fig. 8 | Contribution of mining to government revenue

Table 1 | Possible data gathering from the survey on the mining sites of Oyu Tolgoi

Production, stock, revenue and investment statistics	Expenditure statistics
Products of main activity, by level of production process, characteristics, and the content	Expenditure, by main and supplementary raw materials, spare part, and packing materials, in volume and value
Income, by type of activity	Expenditure of electricity, fuel and water
Total capital and accumulated depreciation, by type of capital	Transportation cost
Carried freight, by goods, ths.tn	Other related costs
Freight turnover, by goods, mln.tn.km	

STATUS OF THE MINING INDUSTRY IN VIETNAM

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Status of the mining industry in Vietnam

The earth endows mankind with natural resources. With 60 different types of mineral and crude oil, Vietnam is among the countries in the world that has a great potential for mineral resource extraction.

In recent years, the mining and quarrying industry has played an important role in Vietnam's economic development. As seen in Figure 2, the number of mining and quarrying enterprises increased from 1,277 in 2005 to 2,642 in 2012.

Every year, Vietnam's mining and quarrying industry contributes with about 10-12 percent to the country's GDP and with about 10 percent to its total export revenue (see Table 1). The oil revenue alone contributes with about 15-19 percent to the state budget revenue. The mining and quarrying industry also provides input (such as coal, tin, zinc, iron, copper and apatite) to other economic activities including the production of thermal power, cement, chemicals and metals.

Moreover, the mining and quarrying industry contributes to job creation; in 2012, the industry had approximately 300,000 employees, corresponding to 0.6 percent of total employment. The average

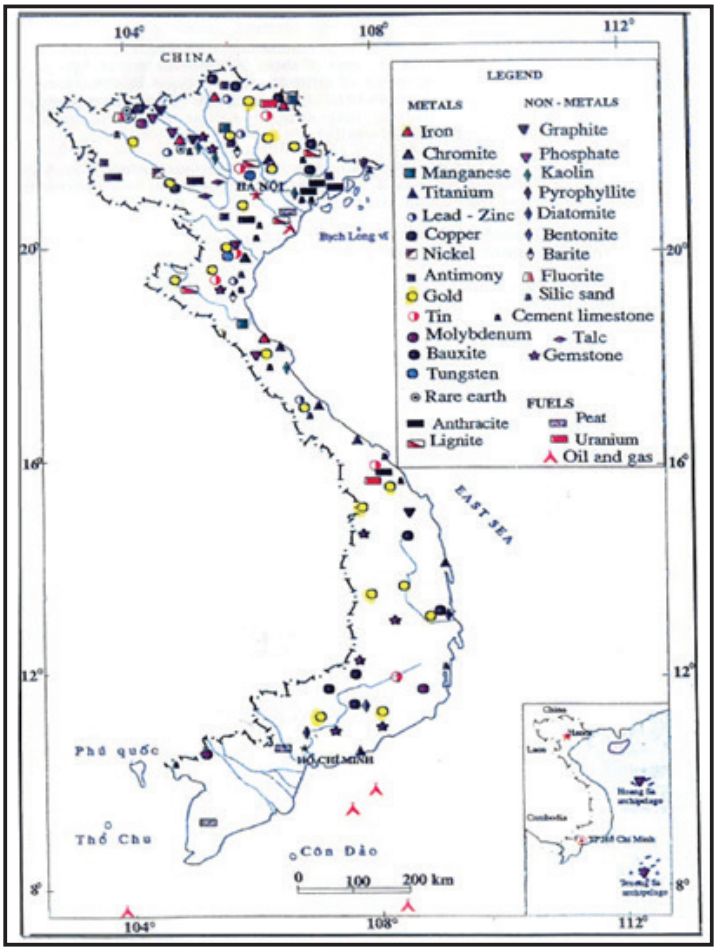

Fig. 1 | Mineral mapping of Vietnam

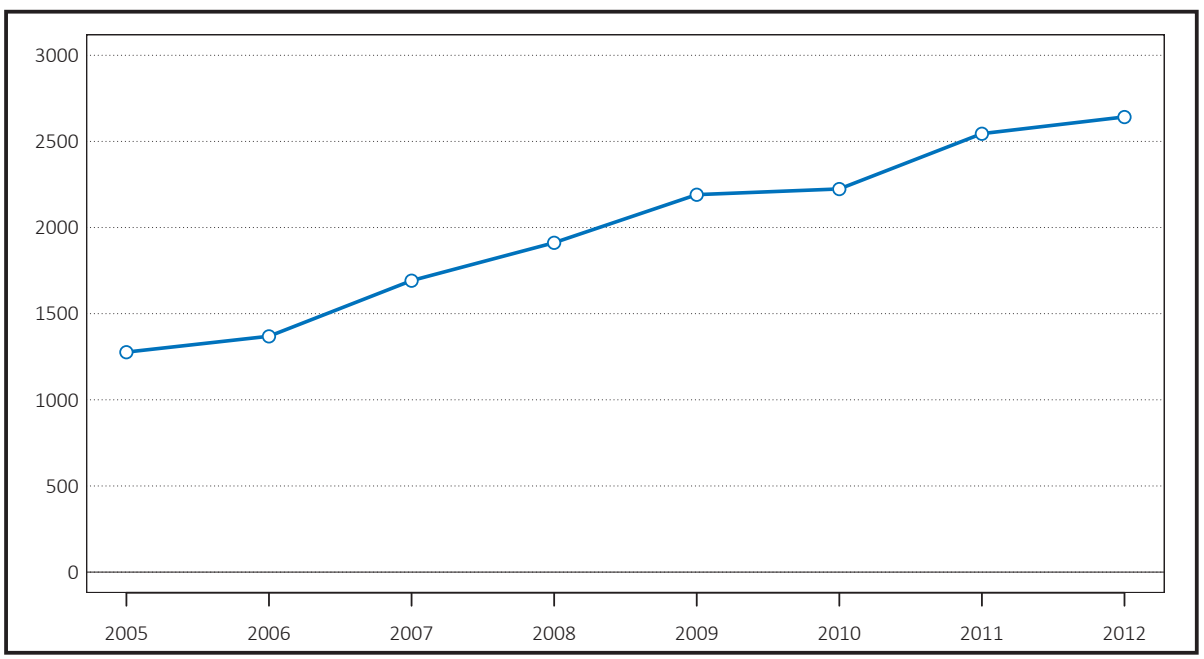

Fig. 2 | Number of mining and quarrying enterprises in Vietnam, 2005-2012

Table 1 | Structure of state budget revenue final accounts, 2005-2011 (percentage)

	2005	2008	2009	2010	Preliminary 2011
Domestic revenue (excl. oil revenue)	**52.50**	**55.76**	**61.59**	**64.07**	**61.21**
Revenue from state owned enterprises	17.12	16.68	18.48	19.06	18.02
Revenue from foreign invested enterprises	8.36	10.21	11.17	11.03	10.99
Revenue from non-state sector	7.42	10.11	10.53	11.90	12.26
Agricultural land-use tax	0.06	0.02	0.01	0.01	0.01
Tax on high-income earners	1.85	3.01	3.15	4.47	5.46
License tax	1.23	1.71	2.13	2.14	2.23
Gasoline fee	1.73	1.05	1.97	1.79	1.59
Fees	1.84	1.81	2.06	1.70	1.17
Revenue from land and houses	7.78	9.07	9.60	9.49	8.45
Other revenue	5.11	2.09	2.49	2.48	1.03
Oil revenue	**29.16**	**20.81**	**13.44**	**11.76**	**15.65**
Custom duty revenue	**16.69**	**21.24**	**23.23**	**22.15**	**22.12**
Export and import duties, special consumption tax, surtax on import	10.36	14.04	16.93	12.59	11.56
VAT on import	6.33	7.20	6.30	9.56	10.56
Grants	**1.65**	**2.19**	**1.74**	**2.02**	**1.02**
Total revenue	**100**	**100**	**100**	**100**	**100**

Table 2 | Average monthly compensation per employee, 2008-2011

	2008	2009	2010	2011
Average monthly compensation, total economy	2,909	3,399	4,094	4,700
Average monthly compensation, mining industry	4,716	5,509	7,012	7,156

monthly compensation per employee in the mining industry is nearly 1.5 times of the average monthly compensation per employee in the total economy (see Table 2).

Besides the positive impact on the economy, the mining and quarrying industry also have negative effects on human welfare, the environment and the eco-system. The full effects are yet to unfold as the Vietnamese economy continues to develop.

Implementation of indicators for assessing the impact of Vietnam's mining industry

Research group at Vietnam's General Statistics Office

Vietnam is a member of the Ulaanbaatar City Group (UBCG). After attending the first and the second meetings of Steering Committee of the UBCG, on 19th November 2013, national representatives from Vietnam's General Statistics Office decided to establish a research group responsible of developing

Table 3| Summary of indicators identified by the UBCG and by the research group in Vietnam

	UBCG		Vietnam	
	Number of identified indicators	**Priority**	**Number of available indicators**	**Priority**
1. Impact of the mining industry on the economy	139	54 of high priority 66 of medium priority 19 of low priority	27	19 of high priority 8 of medium priority 0 of low priority
2.Impact of the mining industry on the sector social	54	25 of high priority 21 of medium priority 8 of low priority	19	11 of high priority 5 of medium priority 3 of low priority
3. Impact of the mining industry on the environment	27	27 of high priority - of medium priority - of low priority	2	2 of high priority - of medium priority - of low priority
Total	**220**	**106 of high priority** **87 of medium priority** **27 of low priority**	**48**	**32 of high priority** **13 of medium priority** **3 of low priority**

statistical methodologies for indicators to assess the economic, social and environment impacts of the mining industry. The research group has six members:

- 2 members from the Industrial Statistics Department;
- 1 member from the Social and Environmental Statistics Department;
- 1 member from the System of National Accounts (SNA) Department;
- 1 member from the Trade and Service Statistics Department;
- 1 member from the Statistical Methodology and Information Technology (IT) Department.

The work of the research group

So far, the research group has taken upon itself to carry out the following work:

- Attending all online conferences of the UBCG;
- Updating all information related to experiences and results from the UBCG meetings;

Reviewing the implementation of indicators to assess the impacts of the mining and quarrying industry in Vietnam.

The outcomes of reviewing the implementation of indicators in Vietnam is summarized in Table 3 and compared to the indicators identified by the UBCG:

Table 4| Indicators for measurement of the impacts of mining

(H = high, M = medium, L = low, X = published, O = not published, A = annually, Q = quarterly, M = monthly)

Issue/indicator	Priority	Published	Sources	Frequency
I. Impact of the mining industry on the economy				
1. Measurement of mining production in terms of quantity and value				
A. Total production of mining products, by value**	H	X	Enterprise, establishment survey	A
B. Total production of mining products, by quantity**	H	X	Enterprise, establishment survey	A
C. Total production of mining products by commodity and level of processing and contents*	M	O		
2. Measurement of prices of mineral commodities and the impact of mineral prices on the terms of trade, as well as mining-induced terms of trade impacts on the rest of the economy				
A. Export and import unit price of mining products**	H	X	Export and import price survey	Q,A
B. Export and import price index of mining products**	H	X	Export and import price survey	Q,A
C. Export and import price index*	M	X	Export and import price survey	Q,A
D. Terms of trade index (ratio of export price index to import price index)*	M	X		Q,A
3. Measurement of intermediate consumption in the mining industry, including energy inputs				
A. Intermediate consumption of the mining industry	-			
i. Cost of energy in the mining industry	-			
a. Consumption of the water in mining industry, by volume**	H	O		
b. Share of the consumption of water, surface water and groundwater in mining industry to total consumption of water**	H	O		
c. Share of the consumption of water in mining industry to total consumption (of water)**	H	O		
d. Consumption of fuel in mining industry, by volume**	H	O		
e. Cost of the management or consultant service in mining industry with foreign investment**	H	O		
f. Consumption of chemical products in the mining industry, by types of chemical products**	H	O		
4. Measurement of mining gross operating surplus				
A. Total income of the mining industry**	H	X	IO survey, final consumer survey	Every 5 year
B. Total expenditure of the mining industry*	M	X	IO survey, final consumer survey	Every 5 year
5. Measurement of mining inventories (by value or quantity)				
A. Raw materials*	M	O		
B. Supplies*	M	O		

C. Work in progress*	M	O		
D. Finished goods*	M	O		
E. Goods for resale*	M	O		
6. Measurement of mining fixed capital investment (for example, current and expected expenditure, capital stock, capital services, consumption of fixed capital expenditure)				
A. Dwellings**	H	O		
B. Other buildings and structures**	H	O		
C. Machinery and equipment	-			
i. Off-train / locomotive, wagon etc./**	H	O		
ii. Vehicle and rolling stock	-			
a. Heavy vehicle for mining transportation, accumulated depreciation**	H	O		
b. Truck for transportation of domestic technology, accumulated depreciation**	H	O		
c. Heavy mechanism for mining activity**	H	O		
D. Military weapons*	M	O		
E. Cultivated biological resources	L	O		
F. Costs of ownership transfer on non-produced assets	L	O		
G. Research and development*	M	O		
H. Mineral exploration and evaluation*	M	O		
I. Computer software and databases	L	O		
J. Entertainment, literary or artistic originals	L	O		
K. Other intellectual property products	L	O		
7. Measurement of financial investment (including foreign investment, both direct and portfolio) and associated incomes, including retained earnings				
A. Financial investment**	H	O		
B. Foreign direct investment**	H	O		
C. Other investment*	M	O		
D. State budget investment*	M	O		
E. Private investment*	M	O		
F. Cash flow*	M	O		
8. Measurement of impact of mining on trade statistics, including coherency with production statistics				
A. Total sales of the domestic trade sector*	M	X	Enterprise, establishment survey	A
B. Total sales of the mining products at the domestic market, by types of minerals**	H	O		
C. Total exports and imports**	H	X	Integrate report of Financial Ministry	M,Q,A
D. Total exports and imports of the mining products*	M	X	Integrate report of Financial Ministry	M,Q,A

9. Measurement of mineral exploration, discoveries and sub-soil reserves				
A. Total output of mineral explorations, by types of mineral, by physical quantity**	H	O		
B. Number of discoveries, by natural resources, by physical quantity**	H	O		
C. Soil resource, by physical quantity**	H	X	Integrate report of Natural Resources and Environment Ministry	A
10. Measurement of the impact of mining on government finances, including measuring of taxes on mining				
A. Corporation income tax**	H	O		
B. Royalty**	H	O		
C. Value added tax, repayment of VAT**	H	O		
D. Fee for exploration and mining special permit of the mineralresources**	H	O		
E. Other royalty**	H	O		
F. Cumulative royalty*	M	O		
G. Exports duties*	M	O		
H. Contributions and donations to the local government and individuals from the mining enterprises*	M	O		
11.Measurement of productivity in the mining industry				
A. Total productivity of mining industry**	H	O		
B. Total factor productivity of mining industry**	H	O		
C. Labor productivity of mining industry**	H	X		A
D. Fixed capital productivity of mining industry**	H	O		
E. Main raw material productivity of mining industry**	H	O		
F. Electricity productivity of mining industry**	H	O		
12.Measurement of construction activity associated with the mining industry				
A. Construction, capital repairs and maintenances associated with the mining industry. In which:	-			
i. Residential building*	M	O		
ii. Non residential building	-			
a. House building industry*	M	O		
b. Trade and service*	M	O		
c. Hospital, school, cultural institutions*	M	O		
d. Others*	M	O		
iii. General engineering construction	-			
a. Energetics*	M	O		
b. Communication*	M	O		
c. Railway*	M	O		

d. Road*	M	O
e. Bridge*	M	O
f. Dam, dicht, cable, network*	M	O
g. Minor works and other*	M	O
iv. Capital repairs and maintenances	-	
a. Energetics*	M	O
b. Communication*	M	O
c. Railway*	M	O
d. Road*	M	O
e. Bridge*	M	O
f. Dam, dicht, cable, network*	M	O
g. Minor works and other*	M	O
13.Measurement of impact of mining on transportation		
A. Freight turnover of the mining products, by mln ton km	-	
i. Railway*	M	O
ii. Road*	M	O
iii. Water*	M	O
B. Carried freight of the mining products, by ton	-	
i. Railway*	M	O
ii. Road*	M	O
iii. Water*	M	O
C. Passenger turnover of the mining employees, by pass km	-	
i. Railway*	M	O
ii. Road*	M	O
iii. Air*	M	O
iv. Water*	M	O
D. Passengers carried of the mining employees, by number of people	-	
i. Railway	L	O
ii. Road	L	O
iii. Air	L	O
iv. Water	L	O
E. Freight turnover of the mining products per 1 km railway length, by ton km	L	O
F. Freight turnover of the mining products per 1 km improved auto road, by ton km*	M	O
G. Average intensity of traffic per day, by type of vehicle, by conversion to light car from heavy vehicle *	M	O
H. Tarmac and macadam road, power capacity of road construction, by value*	M	O
I. Power capacity of crossroad of railway, by value *	M	O

14. Measurement of other economic activity to support the mining industry, including role of input-output analysis				
A. Total supply, by products and economic activities *	M	X	IO survey	Every 5 year
B. Total use, by products and economic activities *	M	X	IO survey	Every 5 year
C. IOT analysis. In which:	-			
i. Production multiplier, by economic activities	L	O		
ii. Income multiplier, by economic activities	L	O		
iii. Labor multiplier, by economic activities	L	O		
iv. Input multiplier, by economic activities	L	O		
v. Backward and forward linkages, by economic activities	L	O		
i. Total production of the electricity, gas, steam and air conditioning supply **	H	X	Enterprise, establishment survey	A
ii. Total production of the water supply; sewerage, waste management and remediation activities**	H	X	Enterprise, establishment survey	A
iii. Total production of the **wholesale** and retail trade; repair of motor vehicles and motorcycles**	H	O		
iv. Total production of the transportation and storage**	H	X	Enterprise, establishment survey	A
v. Total imports of the **heavy** machinery, mechanism and equipments**	H	O		
16.Measurement of infrastructure to support mining activity				
A. The telecommunication indicators at the mining industry:	-			
i. Telephone lines *	M	O		
ii. Transmitting TV stations *	M	O		
iii. Wired-radio stations *	M	O		
iv. Cable television users *	M	O		
v. Mobile phone subscribers *	M	O		
vi. Permanent internet subscribers*	M	O		
vii. Computers *	M	O		
B. Energy and public services	-			
i. Petrol and gas tubes **	H	O		
ii. Electric adjustment assets *	M	O		
iii. Allocation and transmission system **	H	O		
iv. Water supply purification **	H	O		

17. Measurement of mining impact on national income, including balance of payments incomes associated with mining and measures of real gross domestic income and real net national disposable income;				
A. Value added of mining sector, at current and constant prices**	H	X		Q,A
B. Annual change of value added of mining sector**	H	X		Q,A
C. The share of value added of mining sector to the GDP**	H	X		Q,A
D. GNI , at current and constant prices**	H	X		A
E. Annual change of GNI**	H	X		A
F. GNI per capita**	H	X		A
18.Measurement of national wealth				
A. Natural resource (oil, coal, natural gas, minerals etc.)**	H	O		
B. Produced assets (machinery and equipment, buildings and urban land)**	H	O		
C. Human resource (number of employees)**	H	X	Population and housing census; Labor and employment survey	A
19.Measurement of impact of mining on regional economies (including regional prices and regional housing markets)				
A. Consumer price index, by regions*	M	X	Consumer Price survey	M
B. Housing price index, by regions	L	O		
20.General measurement issues, including dealing with multinational enterprises, dealing with confidentiality issues, correction of 'off year' reporting, ensuring coherence of information from different sources and consistency thereof, by developing a coordinated approach to large mining projects, measuring informal mining activity				
A. Number of multinational enterprises at the mining industry	L	O		
B. Number of mining companies with FDI, percentage of FDI**	H	X	Enterprise survey	A
C. Main indicators of the artisanal mining (total output, intermediate consumption, value added, total tax paid, contributions to the local government, number of employees, land damage, remediation)**	H	O		
21.Measurement of the procurement of nationally produced goods and services				
A. Total procurement of nationally produced goods and services of the mining units *	M	O		
22.Standardization of units of measure				
A. USD, ton, barrel?				
23.Including related issues that emerge during considerations or requested by the Steering Committee.				

Issue/indicator	Priority	Published	Sources	Frequency
II. Impact of the mining industry on the social sector				
1.Labor force				
Measuring employment in the mining industry				
A. Number of employees at the mining sector**	H	X	Population and housing census; Labor and employment survey	A
B. Number of foreign employees at the mining sector, by nationality **	H	O		
C. Number of engineering and technical staffs required newly in coming 3 years, by professions**	H	O		
1.2. Measuring the demographic characteristics of the mining labor				
A. The demographic characteristics of the mining labor	-			
i. Number of family*	M	?		
ii. Age*	M	O		
iii. Sex*	M	O		
iv. Education*	M	O		
v. Occupation*	M	O		
vi. Marital status*	M	O		
1.3. Measuring employment in mining related activities				
B. Labor productivity, by classification of economic activities **	H	X		A
C. Employment elasticity, by classification of economic activities**	H	O		
2.Income				
2.1. Measuring mining wages and salaries, total and averages				
A. Total compensation of employees of the mining industry**	H	X	Labor and employment survey	A
B. Monthly average wages and salaries of employees of the mining industry, by domestic and foreign employees *	M	O		
C. Real wage index of the employees of the mining industry *	M	X	Labor and employment survey	A
2.2. Measuring the distribution of mining incomes, including gender distributions				
A. Monthly average wages and salaries of employees of the mining industry, by sex *	M	O		
B. Monthly average wages and salaries of employees of the mining industry, by classification of occupations *	M	O		
3.Health and productivity				
3.1. Measuring workers conditions and industrial relations in the mining industry				
A. Occupational safety of the mining employees (safety work wear and facilities etc.)**	H	O		
B. Number of basic social services, access and distance. In which: hospital, police, school, kinder garden, bank, shop, hairdresser and beauty salon etc.	L	O		

3.2. Measuring mining skills and capabilities, including job vacancies skill shortages				
A. Number of employees of the mining industry, by sex and education**	H	O		
B. Number of employees of the mining industry, by sex and profession**	H	O		
C. Number of employees of the mining industry, by classification of occupations**	H	O		
3.3. Measuring the impact of mining on workers' health and the health of the community generally				
A. Life expectancy at birth, by sex and regions **	H	X	Population and housing census; Population change survey	Every 2 year
B. Deaths, by sex, age group, level of education and occupations**	H	X	Population and housing census; Population change survey; Administrative data	A
C. Crude death rate, by regions**	H	X	Population and housing census; Population change survey; Administrative data	A
D. The sex ratio at death, by regions**	H	X		A
E. Number of inpatients, by classification of disease, by regions**	H	O		
F. Number of prevalence and deaths of malignant neoplasms, by regions**	H	O		
G. Diseases of the mining employees, by type of diseases**	H	O		
H. Accidents from the mining activity, by type of accidents**	H	O		
I. Accidents from the mining activity, by number of people **	H	O		
4. Measuring the impact of mining on social issues				
4.1. Measuring fly-in/fly-out and drive-in/drive-out workers, including impacts on demands for social services				
4.2. Measuring internal and international migration flows associated with mining (including remittances)				
A. Number of internal migrant, by regions**	H	X	Population and housing census; Population change survey	A
B. Number of international migrant, by regions*	M	O		
C. Workers' remittances*	M	O		
4.3. Measuring the impact of mining on poverty				
A. Household income and expenditure, by regions**	H	O		
B. Poverty headcount index, by regions*	M	O		
4.4. Measuring social impacts of population dislocation associated with mining activity				
A. Number of population, by sex, age group and regions**	H	X	Population and housing census; Population change survey	A
B. Number of households, by regions*	M	X	Population and housing census; Labor and Employment survey	A
4.5. Measuring the impact of mining on education and training				
A. Expenditure on education as percentage to total expenditure of General Government budget	L	O		

B. Per capita educational expenditure	L	O		
C. Number of pupils and students in all levels of educational institutions	L	X	Integrate report of Education and Training Ministry	A
D. Number of educational institutions	L	X	Integrate report of Education and Training Ministry	A
E. Number of graduates of all level educational institutions	L	X	Integrate report of Education and Training Ministry	A
F. Number of general educational schools, by regions	L	?		
G. Gross enrollment ratio	L	?		
H. Number of students in vocational and technical education institutions, by sex*	M	X	Integrate report of Education and Training Ministry	A
I. Number of students in higher educational institutions, by sex*	M	X	Integrate report of Education and Training Ministry	A
J. Students and graduates of domestic universities, institutes and college, by professional areas*	M	X	Integrate report of Education and Training Ministry	A
K. Trainings and courses from the mining companies for their employees*	M	O		
L. Number of qualified drivers of mining transportation*	M	O		
M. Number of operators of heavy vehicles and mechanisms*	M	O		
N. Number of auto serves for mining sector*	M	O		
4.6. Including related issues that emerge during considerations or requested by the Steering Committee				

Issue/indicator	Priority	Published	Sources	Frequency
III. Impact of the mining industry on the environment				
1.Measurement of the direct and indirect demand from the mining industry for environmental inputs, both market and nonmarket, incorporating measurement in terms of value				
A. Mineral resource, by mineral types**	H	O		
B. Soil resource**	H	O		
C. Water resource**	H	O		
D. Energy resource (oil, natural gas, coal, peat, uranium)**	H	O		
E. Land**	H	O		
F. Biological resource**	H	O		
2. Harmonization of definition for indicators reflecting internal and international needs				
3. Measurement of emissions (air and water) and waste products from the mining industry				
A. Emissions from the mining activities	-			
i. Emissions to water**	H	O		
ii. Emissions to air**	H	O		
iii. Emissions to soil**	H	O		
B. Solid waste**	H	O		

4. Measurement of damage to land (including agricultural land) and ecosystems from mining activity and any subsequent rectification activity				
A. Land area of mining exploration and production**	H	X	Integrate report of Natural Resources and Environment Ministry	A
B. Land area, water, soil and biodiversity with remediation**	H	O		
C. Land area, water, soil and biodiversity without remediation**	H	O		
D. Land degradation**	H	O		
E. Soil damage**	H	O		
5. Measurement of the sustainability of mining activity				
A. Asset accounts for natural resource, by resource types**	H	O		
B. Depletion of natural resources, by resource types**	H	O		
6. Measurement of the environmental impact of economic activity 'downstream' from the mining industry				
A. Damages of the land, soil and road from the transportation, consignment and discharge of the mining products**	H	O		
B. Fee on usage of road from the mining companies**	H	O		
C. Environmental damages (water, animal, plant etc.) from the transportation, consignment and discharge of the mining products**	H	O		
D. Cost of environmental protection**	H	O		
E. Natural resource management**	H	?		
7. Measurement of the impact of mining on green growth and the green economy				
A. GDP**	H	X		Q,A
B. Environmental assets accounts (monetary), by resource types **	H	O		
C. Natural resource depletion (monetary), by resource types**	H	O		
D. Assessment of environmental pollution**	H	O		
E. Green GDP**	H	O		
8. Including related issues that emerge during considerations or requested by the Steering Committee				

Indicators to measure the impacts of the mining industry on the environment

Each indicator can be explained through:

- Concepts, content and calculation method;
- Key disaggregation;
- Data sources.

This is exemplified through the indicator used to measure 'Cost of environment protection' (6.D in sub-table III above):

- Concepts and content: Environmental protection expenditure is all expenditures from all sources to cleaning and protection environment

in a given period. It includes these expenditures:

- Expenditures from the State budget;
- Expenditures from revenues obtained from units and individuals;
- Expenditures from international funding;
- Expenditures from enterprises and establishments, including:
- Investment expenditures for environmental protection;
- Expenditures for basic survey;
- Regular and unscheduled expenditures;
- Other expenditures from other organizations and individuals.

- Classification:
  - Source of environment protection expenditures;
  - Type of ownership;
  - Province/city.
- Data sources:
  - Integrated report from the Ministry of Natural Resources and Environment;
  - Integrated report from the Ministry of Finance;
  - Enterprise survey and establishment survey;
  - Other special object surveys of the General Statistics Office and other Ministries.

ARTISANAL AND SMALL-SCALE MINING: THE CASE OF MONGOLIA

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Abstract

Like most other national statistical organizations, Mongolia's National Statistical Office has been endeavoring to account for informal sector economic activities in the country's GDP and in the System of National Accounts. The National Statistical Office has estimated the size of the non-observed economy following a tabular approach developed by Eurostat that categorizes such activities according to 7 categories (the so-called N1-N7 framework) and the OECD's "Handbook for Measurement of the Non-Observed Economy, 2002", the "System of National Accounts, 2008" (2008 SNA) and the "Survey of the Non-Observed Economy in National Accounts", which includes practices of the EU and other UN countries.

A number of projects have been undertaken to incorporate the non-observed economy in Mongolia's national accounts. One of the surveys conducted by the National Statistical Office was the artisanal and small-scale miners' (ASMiners) Survey. The aim of the survey was to establish a general database and to identify the number of artisanal and small-scale miners working in different mineral commodity industries in Mongolia, their locations and their contribution to the economy. A total of 13.4 thousand citizens were involved in the survey, which, by the end of 2012, represented 1.2 percent of the economically active population and 14.1 percent of the total number of unemployed citizens. The results of the survey were reflected in estimations of the country's GDP.

Background

The mining and quarrying industry is one of the key economic industries in Mongolia. It comprises 20.2 percent of GDP and almost 82 percent of export revenues. The industry employs 4.6 percent of the total labor force, which accounts to 1,056,400 people. 35 percent hereof are employed in agriculture. Of people employed in non-agricultural sectors, 25.8 percent or 177,000 are self-employed people, and 13,400 hereof are in the artisanal and small-scale mining industry. Furthermore, the mining and quarrying industry makes up 13.4 percent of the total non-observed economy in Mongolia.

A key goal of the UBCG is to play a leading role in the development of methodological and practical guidelines and recommendations to track mining industry activities and accurately measure the industry's contribution to the economy as well as its impacts on social sectors and the environment within the framework of the System of National Accounts. To meet this objective, the group has defined a number of activities:

1. The impacts of mining on the country's economy extend to the development of methodologies and recommendations for determining the size of the informal mining sector and estimating the economic contribution of the sector to the economy. In the case of Mongolia, the ASMiners' Survey has been carried out as a part of the efforts to estimate and incorporate the non-observed economy in the national accounts. The ASMiners' Survey has enabled the estimation of the size of the artisanal and small-scale mining industry as well as its, gross output, value added, intermediate consumption and surplus.
2. The second scope of activities focuses on measuring the impacts of the mining sector on the social sectors of the economy, as well as the impact from the benefits and income generated by the sector on the living standards and poverty level of the population. The ASMiners' Survey has enabled the National Statistical Office to supplement this data with information on the impacts of the artisanal and small-scale mining industry on its employees' household livelihood, income, employment, health and education.
3. The third set of activities under the UBCG covers the impacts of the mining sector on the environment and the improvement of indicators to estimate the sustainable development of countries affected by pollution and other externalities. For this account, ASMiners' Survey has enabled the measurement of areas of the artisanal and small-scale mining industry, particularly affected and rehabilitated areas.

The National Statistical Office conducted the Establishment Census in 2006, which enabled the registration of 52,600 individuals engaged in activities and services whose revenues cannot be estimated. Of these people 20,500 were self-employed and engaged in mining. In 2012 and with the support of the Swiss International Development Agency, the National Statistical Office conducted the ASMiners' survey, which involved 13,400 individuals engaged in the artisanal and small-scale mining industry. The aim of the survey was to identify the number of artisanal and small-scale miners working with different mineral commodities in Mongolia, their

locations and their contribution to the economy, as well as to establish a general database. The implementation of the ASMiners' survey significantly contributed to the improvement of the quality of the national accounts by incorporating the survey results into GDP estimates.

This paper is based on the Report of Artisanal and Small Scale Miners' Survey and describes main results of the survey and draws conclusions based on results, challenges ahead and future plans. Section two of the paper focuses on the conceptual framework, namely the international classifications applied and definitions. Section three describes survey organization and procedures while sections four, five and six focuses on the impacts of the artisanal and small-scale mining industry on the economy, the society and the environment, respectively. Finally, Section 7 concludes.

Conceptual framework and data sources

Concepts and definitions

The National Statistical Office has estimated the size of non-observed economy according to Eurostat's N1-N7 framework and the OECD "Handbook for Measurement of the Non-Observed Economy, 2002", the "System of National Accounts, 2008" (2008 SNA) and the "Survey of the Non-Observed Economy in National Accounts", which includes practices from the EU and other

Table 1 | Relationship between the UBCG's activities and the ASMiners' Survey of Mongolia

Scope of activities of the UBCG	**ASMiners' Survey**
Economy	**Impact on the economy**
Develop methodologies and recommendations for determining the size and economic contribution of the informal mining sector.	Contribution of the artisanal and small-scale mining industry in terms of: • Size and gross output • Value added • Intermediate consumption • Estimated surplus
Society	**Impact on the society**
To measure the impacts from the benefits and income generated by the mining sector on the living standards and poverty level of the population.	Benefits for mining workers • Household livelihood • Income • Employment • Health • Education
Environment	**Impact on the environment**
To measure the impacts of the mining sector on the environment, to improve indicators used to estimate the sustainable development of the country, and to develop data sources.	Areas of the artisanal and small-scale mining industry: • Total • Affected areas • Rehabilitated areas

UN countries. The non-observed economy refers to all productive activities that may not be captures in regular statistics, that is, activities that are not directly observed.

The N1 type covers the informal sector's production under the non-observed economy classification as well as producers who are deliberately not registering their activities. The United Nations Economic Commission for Europe defines main characteristics of informal sector production as follows:

- Consists of units engaged in production with the purpose of generating income and employment for the person concerned;
- Characterized by a low level of organization, informal employment relations (e.g. oral agreements), with little or no division between labor and capital as factors of production, on a small scale.

Artisanal and small-scale mining falls into the informal sector production definition. Small-scale mining is activities of an individual undertaken by unregistered partnerships established as stated in sub-part 1 of article 481 of Mongolia's Civil Code for the purpose to extract minerals from the deposits of non-commercial and non-economic value and artificial deposits formed by the extraction and technological waste and areas of mineral occurrences, allocated for the purpose stated in the Article 16.1.11 of Mongolia's "Law on Land". A small-scale mining partnership is a group of people who are organized as unregistered partnerships on the basis of contracts of collaboration under Article 481.1 of Mongolia's Civil Law, and who are under the regulation of "Regulation on Extraction of Minerals from Small-scale Mines". An artisanal miner is a citizen who is not a member of any partnership but explores mineral resources through artisanal mining.

Table 2 | Eurostat's N1-N7 tabular framework of the non-observed economy

Classification of non-observed economy activity	Type of non-observed economy activity
Underground production	N6 - Producers deliberately misreporting
Illegal production (drugs, prostitution, etc.)	N2 - Producers deliberately not registering – illegal
Informal sector production	N1 - Producers deliberately not registering – underground N5 - Registered entrepreneurs not surveyed
Household production for own final use	N3 - Producers not required to register
Other missed productive activities	N4 - Legal persons not surveyed N7 - Other statistical deficiencies

Data sources

To estimate the non-observed economy of Mongolia, the National Statistical Office carried out several surveys and in accordance with the international N1-N7 framework of the non-observed economy:

- Survey of household unincorporated enterprises producing for the market;
- Survey of household unincorporated enterprises producing for the market, except agricultural and mining;
- Survey of artisanal mining;
- Survey on experts opinion of intentional distortion of business accounting;
- Estimation of illegal production.

This paper focuses on the ASMiners' Survey from which information on the impacts of mining on the economy, the society and the environment can be derived.

Artisanal and small-scale miners' survey: Organization and Procedures

The ASMiners' Survey was carried out in 2012 with the support of the Swiss International Development Agency. It had three phases: In the first phase, the survey was carried out in provinces where mining is dependent on seasons. In the second phase, the survey was carried out among those artisanal and small-scale miners whose activities intensify during the cold seasons of the year. In the third and last phase, the dissemination of the survey results was organized and the survey data were linked to the database to GIS. The database has 74 indicators across seven datasets.

The survey covered 238 deposits and mining sites located in 76 counties of 20 provinces and one district of Ulaanbaatar, the capital city of Mongolia. 13,375 citizens were involved in the survey on artisanal and small-scale miners. 14.4 percent (1,930

Fig. 1 | Distribution of artisanal and small-scale miners by province, 2011

persons) hereof were leaders or members of partnerships, 14.7 percent (1,960 persons) ran businesses supporting small-scale mining, 20.3 percent (2,713 persons) were unpaid workers in family businesses, and 50.6 percent (6,772 persons) were artisanal miners.

The geographical distribution of artisanal and small-scale miners in Ulaanbaatar City and the 20 provinces is shown in Figure 1.

Of the 13,400 artisanal and small-scale miners who took part in the survey, 10,500 (78.2 percent) mined gold, 1,400 (10.2 percent) mined coal, 1,000 (7.6 percent) mined fluorspar, 300 (2.3 percent) mined tungsten, 47 (0.4 percent) mined tin, 10 (0.1 percent) mined limestone, 100 (1 percent) mined precious stones, and 49 (0.4 percent) mined salt.

Figure 2 shows the distribution by age group: 1.8 percent of the artisanal and small-scale miners surveyed were between 10 and 14 years of age, 5.2 percent were 15-19, 89.3 percent were 20-54, and the remaining 3.7 percent were 55 or older. The average age was 35. The majority of the artisanal and small-scale miners were an economically active population aged from 20 to 54.

Of those surveyed, 70.7 percent of the artisanal and small-scale miners surveyed were male and 29.3 percent female. Table 3 shows the distribution across gender and age groups.

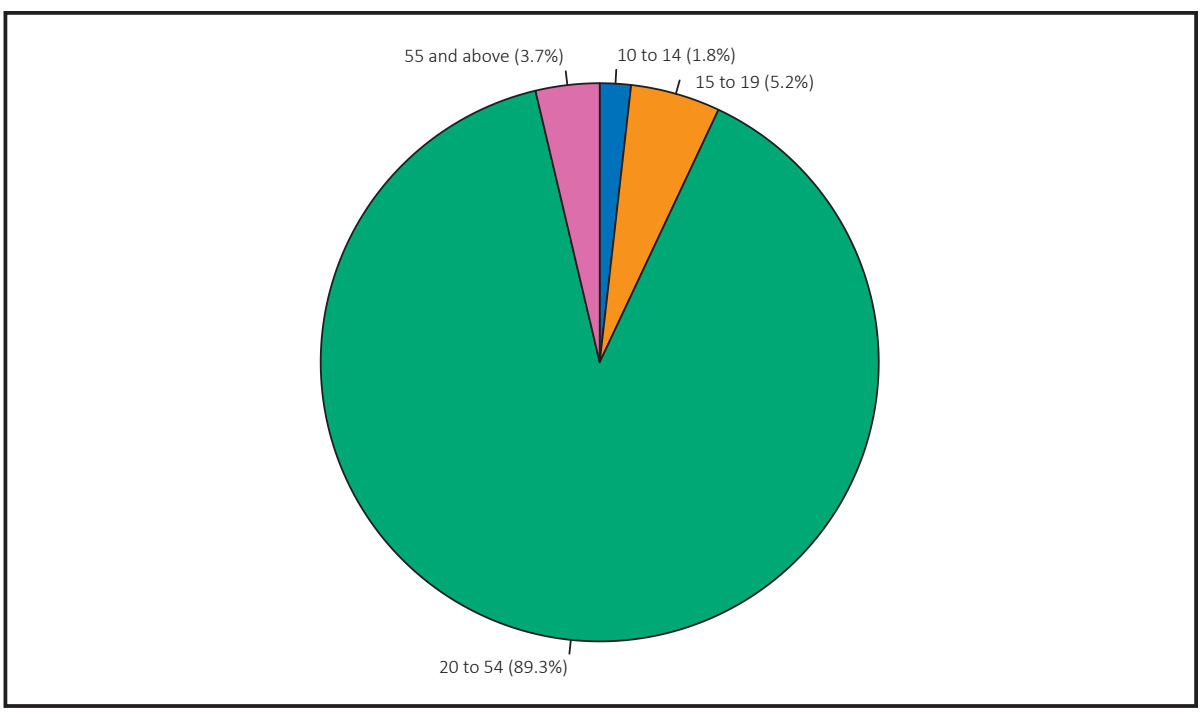

 Fig. 2 | Artisanal and small-scale miners by age group

Table 3 | Artisanal and small-scale miners by age group, gender and gender ratio

Age group	Total		Male		Female		Gender ratio
	Persons	Percent	Persons	Percent	Persons	Percent	
10-14	236	1.8	125	53.0	111	47.0	112.6
15-17	329	2.5	227	69.0	102	31.0	222.5
18-19	363	2.7	255	70.2	108	29.8	236.1
20-24	1,765	13.2	1,346	76.3	419	23.7	321.2
25-29	2,011	15.0	1,536	76.4	475	23.6	323.4
30-34	2,090	15.6	1,530	73.2	560	26.8	273.2
35-39	2,013	15.1	1,411	70.1	602	29.9	234.4
40-44	1,787	13.4	1,171	65.5	616	34.5	190.1
45-49	1,439	10.8	948	65.9	491	34.1	193.1
50-54	844	6.3	553	65.5	291	34.5	190.0
55-59	355	2.7	255	71.8	100	28.2	255.0
60-64	94	0.7	72	76.6	22	23.4	327.3
65-69	37	0.3	23	62.2	14	37.8	164.3
70 and up	12	0.1	8	66.7	4	33.3	200.0
Total	**13,375**	**100**	**9,460**	**70.7**	**3,915**	**29.3**	**241.6**

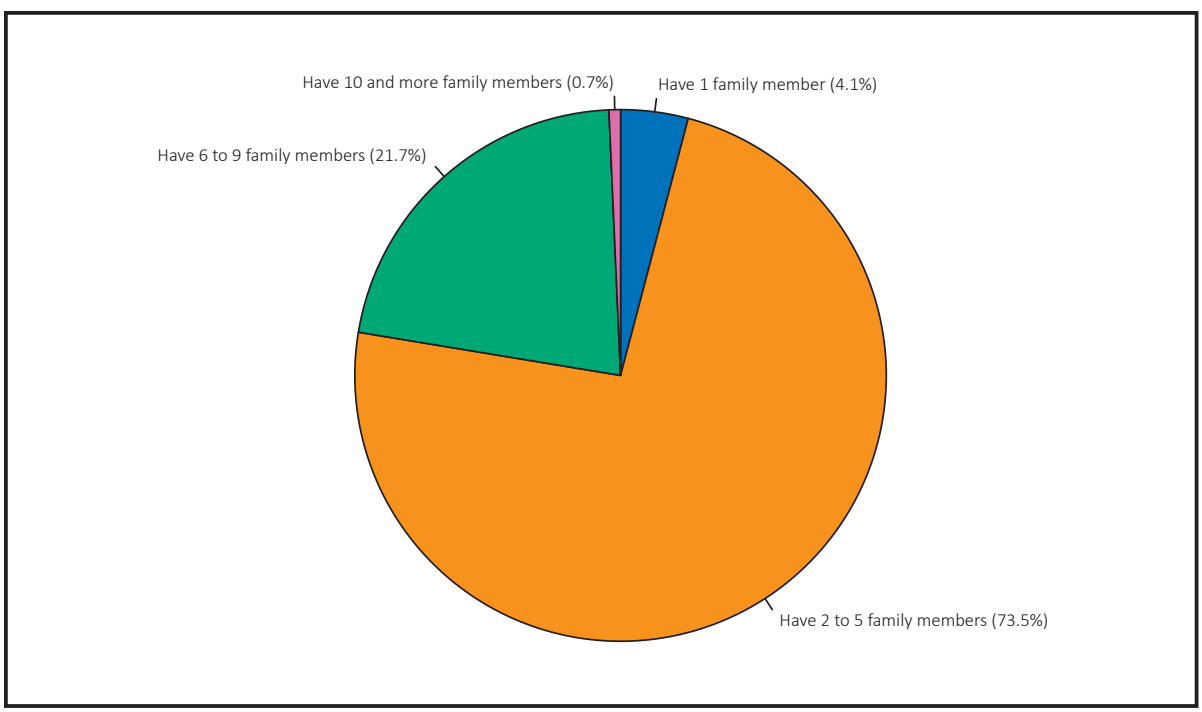

Fig. 3 | Artisanal and small-scale miners by the number of family members

Table 4 | Level of education of artisanal and small-scale miners, by gender (percentage)

	Total	Male	Female
		Percent	Percent
Uneducated	4.1	4.2	4.0
Educated	95.9	95.8	96.0
Primary	14.0	14.9	11.7
Secondary	27.9	28.6	26.4
High school	40.4	39.3	42.8
Technical and vocational	6.8	7.3	5.3
Special vocational	2.6	2.0	4.3
Higher	4.2	3.7	5.5
Total	**100.0**	**100.0**	**100.0**

As seen from Table 3, the majority of artisanal and small-scale miners between 20-29 and 55-64 years of age are male. Of the 13.4 artisanal and small-scale miners, who participated in the survey, 73.5 percent had two to five family members, 21.7 percent had six to nine family members, 4.1 percent had one family member, and 0.7 percent had 10 and more family members (Figure 3). The average number of family members was four.

As seen in Table 4, of those surveyed in 2011, 600 (4.1 percent) were uneducated, 1,900 (14 percent) had a primary education, 3,700 (27.9 percent) had a secondary education, 5,400 (40.4 percent) had a high school education, 900 (6.8 percent) had a technical or vocational education, 400 (2.6 percent) had a special vocational education, and 600 (4.2 percent) had a higher education.

The years of work experience in the artisanal and small-scale mining industry vary with the level of education and 46.9 percent of those surveyed with an education lower than high school level had worked four or more years. The number of miners with a higher education was 600 or 4.2 percent. Of these 200 persons or 1.7 percent had worked up to one year in the industry, 200 persons or 1.3 percent had worked for two to three years, 100 persons or 0.6 percent had worked for four to five years, 33 persons had worked for six to seven years, 13 persons or 0.1 percent had worked for eight to nine years, 18 persons worked for 10-11 years, and 22 persons had worked for 12 or more years.

Of those who participated in the survey, 50.6 percent were artisanal miners, 20.3 percent were unpaid workers in a family business, and 14.7 percent ran supporting businesses and 14.4 percent were partnership leaders or members of partnerships.

Of the 13,400 artisanal and small-scale miners who participated in the survey, 2,900 (22 percent) had worked for up to one year, 4,200 (31.8 percent) for two to three years,

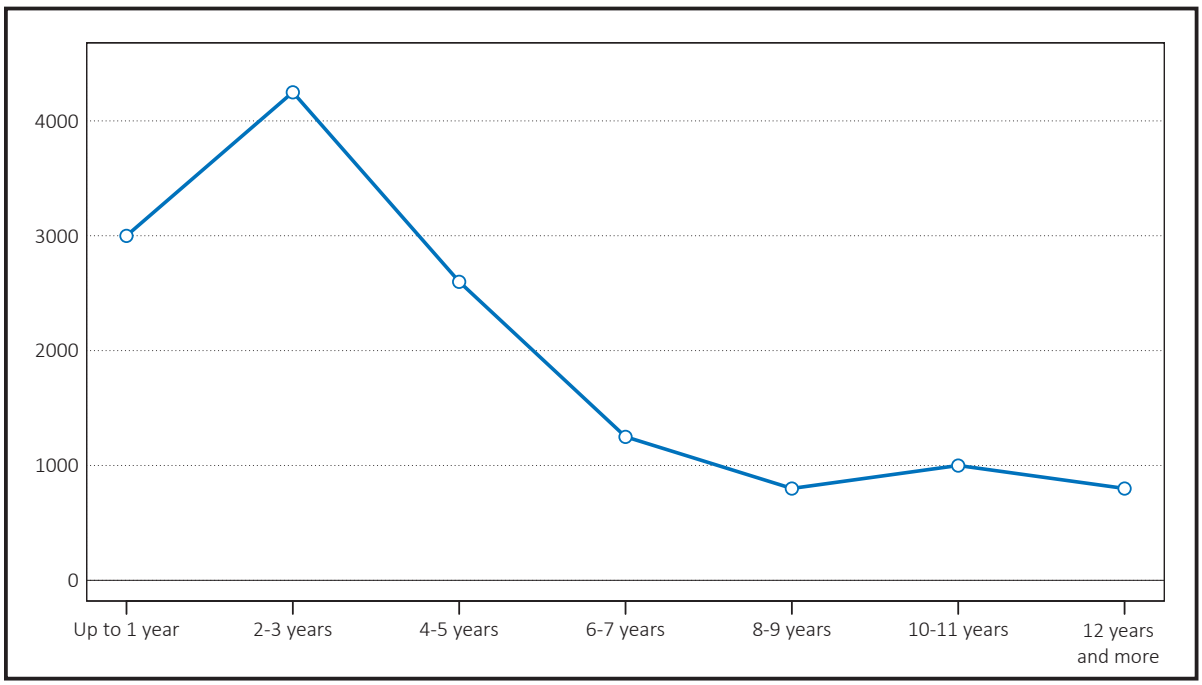

Fig. 4 | Artisanal and small-scale miners by years of working in the artisanal and small-scale mining industry (percentage)

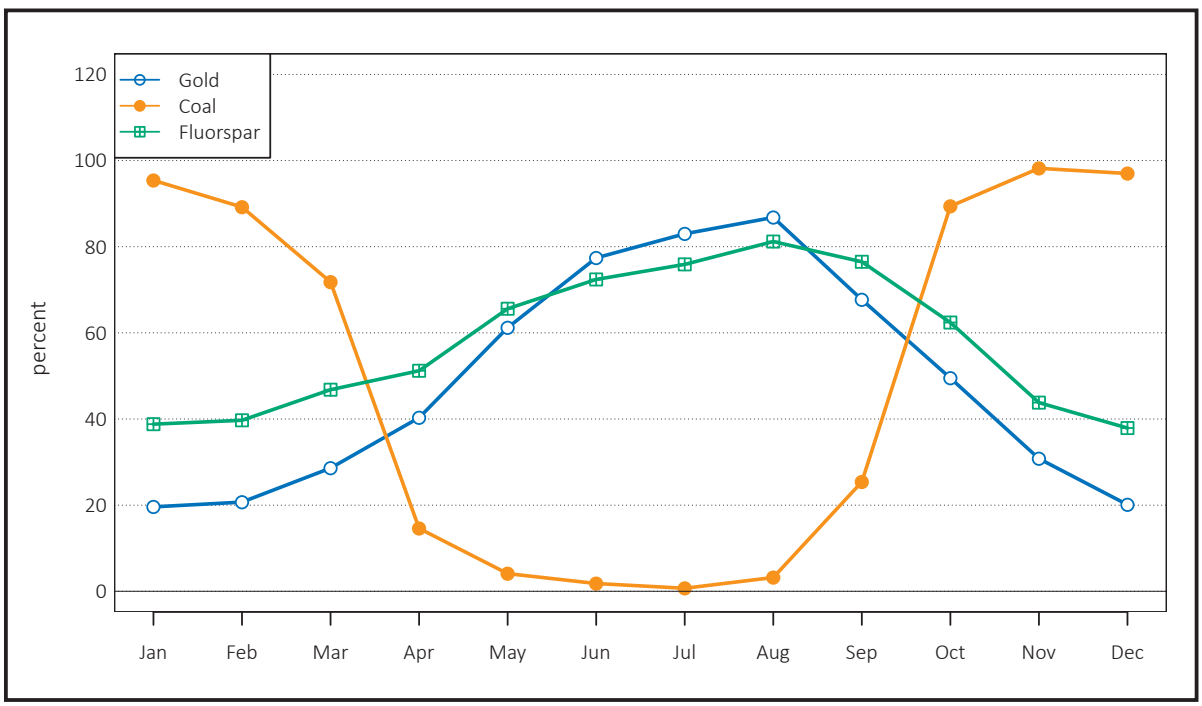

Fig. 5 | Activity periods for artisanal and small-scale miners, by mineral type (percentage)

2,600 (19.3 percent) for four to five years, 1,200 (8.8 percent) for six to seven years, 700 (5.6 percent) for eight to nine years, and 1.6 thousand (12.6 percent) for 10 or more years. The majority of artisanal and small-scale miners (4,200 or 31.8 percent) had worked for two to three years, which demonstrates that many people are only recently engaged in the sector. Figure 4 illustrates these findings.

Impacts of the artisanal and small-scale mining industry on the economy

The artisanal and small-scale mining industry is largely dependent on season and the periods with activity differs by types of minerals (see Figure 5): for example, the activity in the gold mining industry peaks from May to September, while activity is at a low from December to March. August was the most active period during the year with 86.8 percent of all gold miners engaged in mining whereas January was the least active period with just 19.6 percent active miners. Similarly, for fluorspar miners and coal miners the most active period is May-October and October-February, respectively.

According to the results from the ASMiners' Survey (Table 5), artisanal and small-scale miners exploited 354.6 kg of gold, approx. 142,000 tons of coal, approx. 38,500 tons of fluorspar, 108.3 tons of tungsten, 5.5 tons of tin, 66.6 tons of limestone, 14.7 tons of precious stone and 1062.3 tons of salt in 2011 (Table 5).

The total income derived from sales of mineral resources in 2011 was MNT25, 389.6 million. The average annual sale-derived income per individual artisanal and small-scale miner was MNT3.5 million. Variations between regions are as follows: in the Western region, the average sales per miner totaled MNT2.5 million; MNT3.6 million in the Khangai region; MNT4 million in the Central region; MNT2.9 million in the Eastern region; and MNT4.9 million in Ulaanbaatar City.

In 2011, 25 percent of survey participants paid taxes and deductions to the state, amounting to MNT195.5 million. Of this, MNT70.2 million (35.9 percent) were classified as auto and transportation vehicles taxes, MNT103.3 million (52.8 percent) as personal income tax derived from private business and services, MNT10.9 million (5.6 percent) as paid membership taxes, and MNT11.1 million (5.7 percent) as other types of taxes and deductions.

Table 5 | Quantity of minerals sold, 2011

Types	Quantity of minerals sold	Units
Gold	354.6	kilograms
Coal	141,970.6	tons
Fluorspar	38,482.7	tons
Tungsten	108.3	tons
Tin	5.5	tons
Limestone	66.6	tons
Precious stone	14.7	tons
Salt	1,062.3	tons

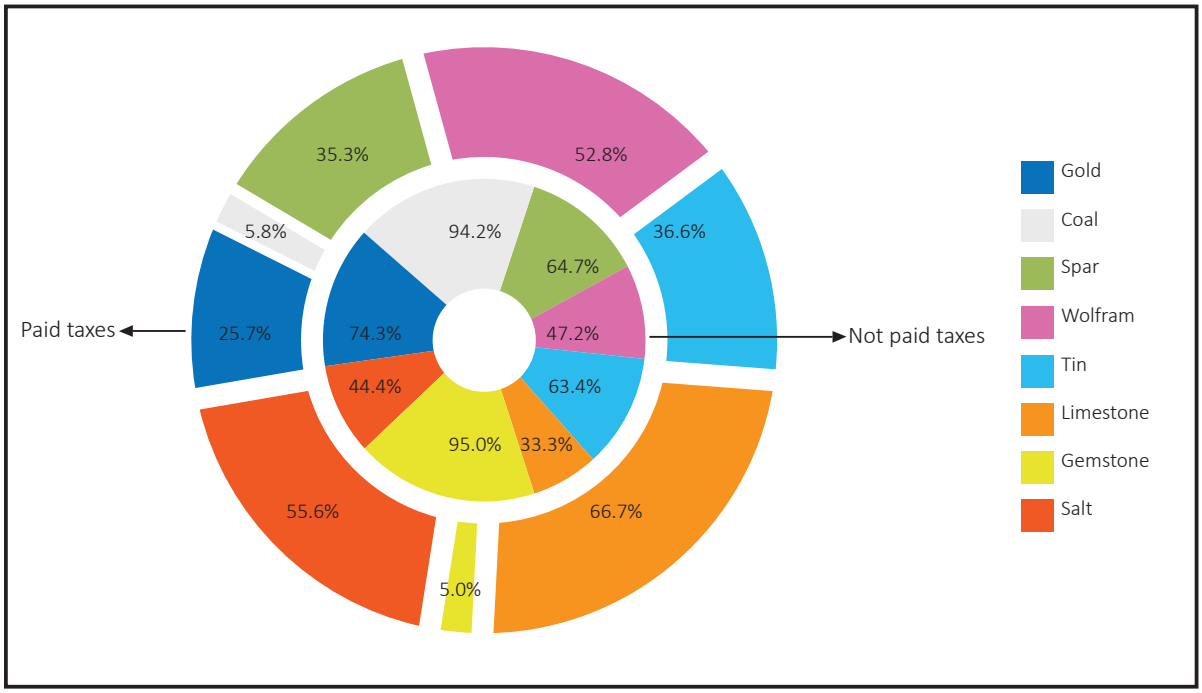

Fig. 6 | Percentage of artisanal and small-scale miners who paid taxes by type of mineral commodity

The percentage of artisanal and small-scale miners who paid some form of taxes in 2011 varied according to the type of mineral resources: 25.7 percent of gold miners, 5.8 percent of coal miners, 35.3 percent of fluorspar miners, 52.8 percent of tungsten miners, 36.6 percent of tin miners, 66.7 percent of limestone miners and 5 percent of precious stone miners. Figure 6 shows this distribution.

Artisanal and small-scale miners created annual value added of MNT 19,806.1 million and spent MNT 5,583.6 million on in-between consumption. Of the total value added, 21.4 percent is attributed to the Western region, 29.3 percent to the Khangai region, 33.9 percent to the Central region, 1.7 percent to the Eastern region and 13.7 percent to Ulaanbaatar City.

The ratio of value addition to gross output reflects the level of efficiency of economic activities. For artisanal and small-scale miners, this indicator is relatively high at 78 percent. Results by provinces show that the Dornod province has the highest ratio of 95.9 percent. This means that expenses constitute 4.1 percent and value addition 95.9 percent in the region. The lowest ratio is in the Khentii province at 37.3 percent.

Table 6 shows the provinces, which generated the highest value added through activities in the artisanal and small-scale mining industry in 2011: Khuvsgul province (MNT 2,885.3 million), Tuv province (MNT 2,659.1 million), Bayankhongor province (MNT 2,029.3 million), Selenge province (MNT 1,949.4 million) and Ulaanbaatar City (MNT 2,717.2 million).

The total value added in the artisanal and small-scale mining industry is presented in (Table 7): wages MNT 1,615.2 million (8.2 percent); monetary and non-monetary grants to workers MNT 176.8 million (0.9 percent); loan interest MNT 99.2 million (0.5 percent);

Table 6 | Gross output, intermediate consumption and value addition by region

Province, capital, region	Gross output (million MNT)	Intermediate consumption (million MNT)	Value added (million MNT)	Share of total value added	Ratio of gross output and value added
Western region	4,890.7	654.9	4,235.7	21.4	86.6
Khangai region	7,820.7	2,009.3	5,811.4	29.3	74.3
Central region	8,903.5	2,194.5	6,708.9	33.9	75.4
Eastern region	735.4	402.6	332.8	1.7	45.3
Ulaanbaatar	3,039.4	322.2	2,717.2	13.7	89.4
Total	**25,389.6**	**5,583.6**	**19,806.1**	**100.0**	**78.0**

tax on income derived from private business and service and other tax deductions MNT 195.5 million (1 percent). The remaining MNT 1,6681.1 million (84.2 percent) is generated through profit from activities.

Of the total intermediate consumption by artisanal and small-scale miners, 35.4 percent was fuel, combustibles and lubricant material expenses, 17.1 percent was transportation expenses, 8 percent was spare parts, 5.3 percent was occupational safety, 4.2 percent was raw materials and the remaining 30.1 percent was other expenses.

By region (see Table 8), 11.7 percent of total intermediate took place in the western region, 36 percent in the Khangai region, 39.3 percent in the Central region, 7.2 percent in the Eastern region and 5.8 percent in Ulaanbaatar City.

Table 7 | Value added by component and region

Types	Total	Region (in millions MNT)					Share
		Western region	Khangai region	Central region	Eastern region	Ulaanbaa-tar City	
Value added	**19,806.1**	**4,235.7**	**5,811.4**	**6,708.9**	**332.8**	**2,717.2**	**100.0**
Wages	1,615.2	32.9	1,210.7	151.8	162.9	57.0	8.2
Tax on auto and transportation vehicles	70.2	18.1	11.5	37.3	2.8	0.5	0.4
Tax on income derived from private business and service	103.3	8.8	31.9	50.5	11.4	0.7	0.5
Membership tax	10.9	0.6	1.2	1.8	7.3	-	0.1
Other taxes	11.1	2.9	2.1	1.4	3.6	1.0	0.1
Monetary and non-monetary grants to workers	176.8	32.0	63.5	62.2	15.5	3.5	0.9
Loan interest	99.2	27.8	14.3	38.7	17.9	0.5	0.5
Compensation of losses due natural disaster	3.2	0.1	0.0	1.1	-	2.1	0.0
Payment to land owners	1,035.1	2.4	2.8	3.2	2.5	1,024.2	5.2
Calculation profit	16,681.1	4,110.1	4,473.4	6,360.9	108.8	1,627.9	84.2

Impacts of the artisanal and small-scale mining industry on the society

Artisanal and small-scale miners often suffer from accidents, injuries and illnesses due to poor safety conditions on the workplace. This section focuses on available information on accidents and injuries, damages, diseases and access to medical services.

Of the artisanal and small-scale miners who participated in the ASMiners' Survey (see Figure 7), 93.8 percent did not have any accidents or injuries on the workplace in 2011. The 6.2 percent who did either fell into holes and shafts (32 percent), were buried under collapsed roofs (29.3 percent), experienced suffocation due to lack of ventilation systems (28 percent), suffered from frostbites (4.4 percent) or burns (1.9 percent) and 4.4 percent were involved in other types of accidents.

Regionally, 53.1 percent of miners who experienced suffocation were from the Central region and 32.3 percent from the Khangai region. 45.3 percent of those who were buried under collapsed roofs were from the Central region and 32.3 percent were from the Khangai region. Of those who suffered burns, 61.5 percent were from the Khangai region, 23.1 percent from the Central region and 15.4 percent from the Western region.

Impacts due to mining activities are classified as health damages and material damages/ losses. Of those, 28.8 percent of the artisanal and small-scale miners who suffered from health effects were caused by suffocation, 30.2 percent from being buried, and 30.6 percent from falling into holes. In terms of material damages, 22.8 percent were caused by airlessness, 35.1 percent from being buried, and 34.5 percent from falling into holes.

The survey results also reveals that 70 percent of the participants did not fall ill during mining activities in 2011 while 30 percent did. Of those who fell ill (see Figure 8), 48.2 percent suffered from backache, 23.9 percent from respiratory diseases, 7.3 percent from

Table 8 | Intermediate consumption by component and region

	Total	Region (in million MNT)					Share
		Western region	Khangai region	Central region	Eastern region	Ulaanbaatar City	
Intermediate consumption	**5,583.6**	**654.9**	**2,009.3**	**2,194.5**	**402.6**	**322.2**	**100.0**
Raw materials	233.5	46.5	49.8	67.6	23.2	46.6	4.2
Spare parts	448.0	75.0	105.3	212.0	30.9	24.8	8.0
Electricity and heating	166.1	4.0	33.0	54.2	5.9	69.0	3.0
Fuel, combustibles and lubricant materials	1,977.6	262.0	761.3	795.1	150.6	8.6	35.4
Rent: houses & buildings	36.7	1.0	27.1	5.1	1.4	2.1	0.7
Rent on machines and equipment	96.9	8.1	17.9	65.9	5.1	-	1.7
Transportation	952.6	115.4	252.3	424.9	146.8	13.1	17.1
Occupational safety	293.5	46.5	67.8	113.0	24.3	41.8	5.3
Environmental rehabilitation	69.3	7.6	10.9	12.8	1.4	36.6	1.2
Other expenses	1,309.5	88.9	683.9	444.0	13.2	79.5	23.5

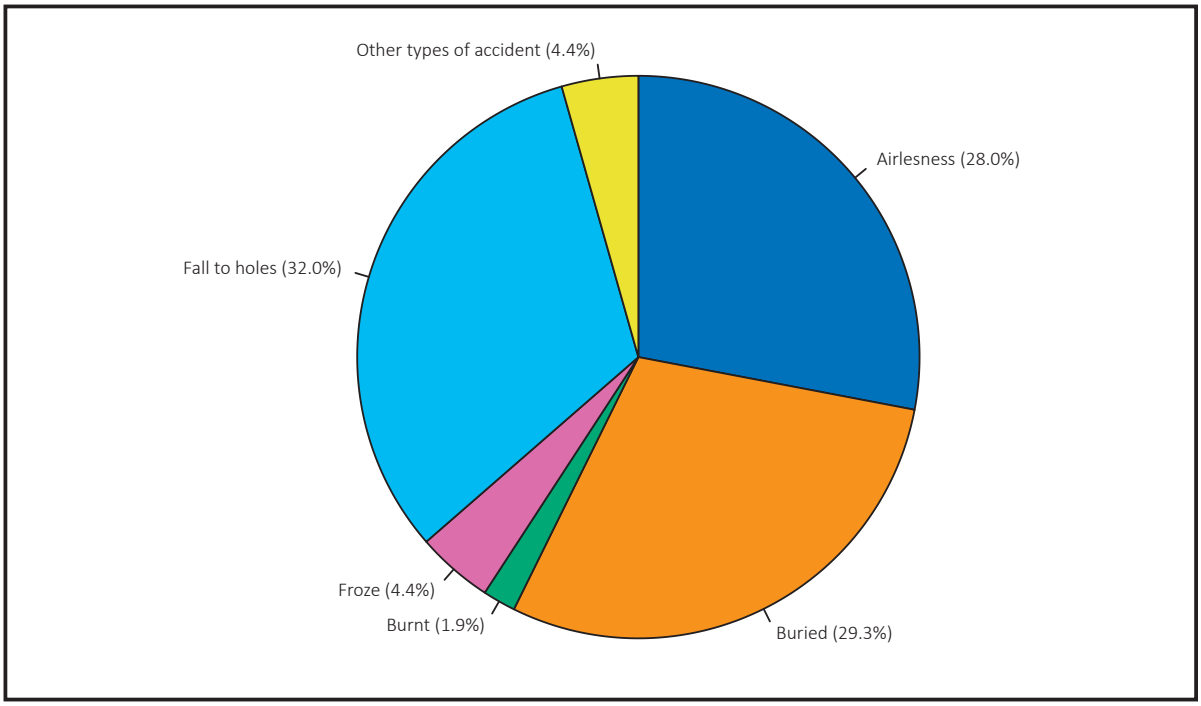

Fig. 7 | Accidents in artisanal and small-scale mining by type (percentage of miners who had accidents in 2011)

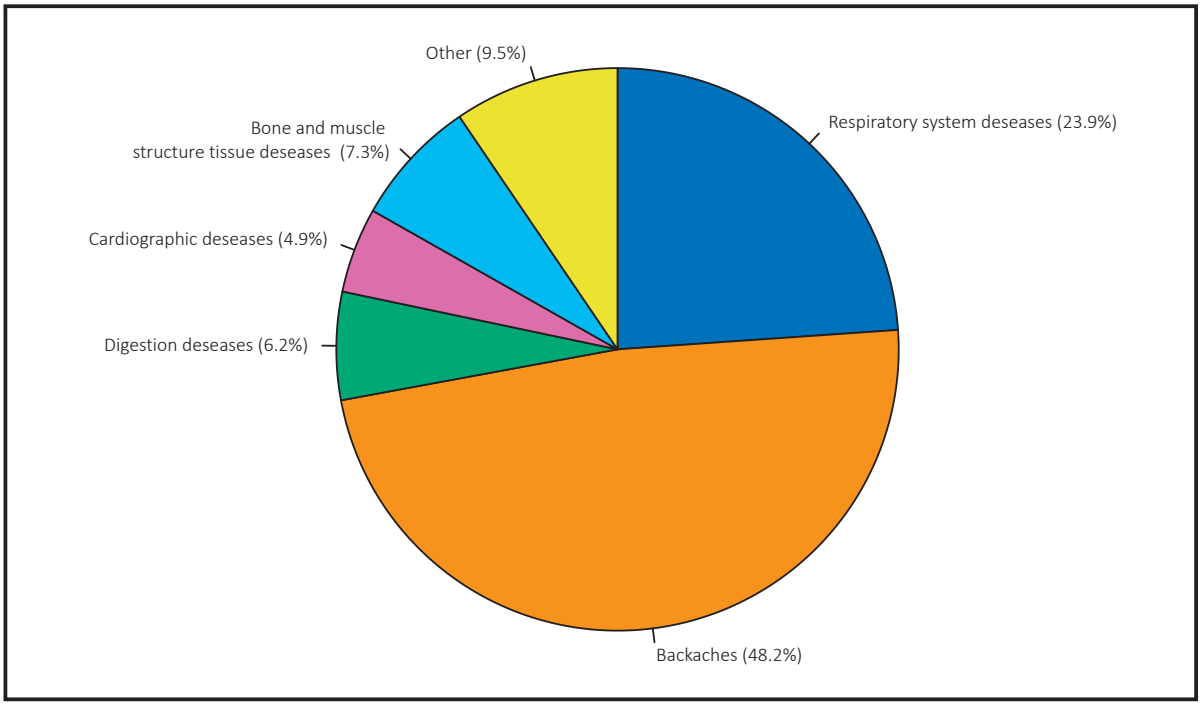

Fig. 8 | Disease and illness afflicting artisanal and small-scale miners (percentage of miners who experienced an illness/disease in 2011)

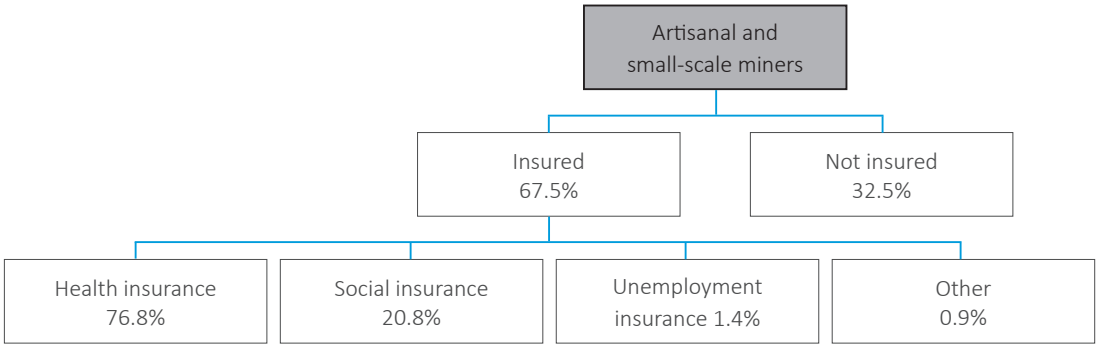

Fig. 9 | Share of artisanal and small-scale miners with insurance, 2011

diseases affecting bone and muscle structure and connecting tissue, 6.2 percent from digestion related diseases, 4.9 percent from cardio diseases and the remaining 9.5 percent suffered from other types of diseases (skin and subcutaneous cellulose diseases, urinary and genital diseases, injuries, intoxication and other diseases caused by external causes, infectious and parasitic diseases).

Moreover, 67.5 percent of the survey respondents reported that they had some kind of insurance in 2011 (Figure 9).

From the total number of insured people, 76.8 percent had health insurance, 20.8 percent had social insurance, 1.4 percent had unemployment insurance and 0.9 percent had another type of insurance. Of those with health insurance, 37.2 percent were located in the Central region, 32.6 percent in the Khangai region, and 23.2 percent in the Western region. Of those with social insurance, 55.7 percent were located in the Central region, 18.2 percent in the Khangai region and 15.8 percent in the Western region.

The social implications of being involved in the artisanal and small-scale mining industry include creation of a source of income for the household (4,996 survey responses), creation of permanent workplaces (1,454 responses), purchase of vehicle (1,122 responses), payment of school fees (1,092 responses) and purchase of house (346 responses). Figure 10 summarizes the survey results.

The survey results reflected gender imbalances in the industry. Of the people reporting positive social impacts, male workers benefitted the most. The male shares in the above survey categories were: provided with permanent workplaces (82.2 percent), provided with household living income source (83.4 percent), purchased houses (84.1 percent) or transportation vehicles (86.1 percent) and payment of tuition fees (79.2 percent).

Impacts of the artisanal and small-scale mining industry on the environment

As of 2011, a total of 8,319.3 hectares of area was being used for artisanal and small-scale mining (Table 9). Of this, 2,871.3 hectares (34.5 percent) was in the Western region, 1,584.8 hectares (19.1 percent) in the Khangai region, 2,113.2 hectares (25.4 percent) in the Central region, 558.9 hectares (6.7 percent) in the Eastern region and 1,191 hectares (14.3 percent) in Ulaanbaatar City.

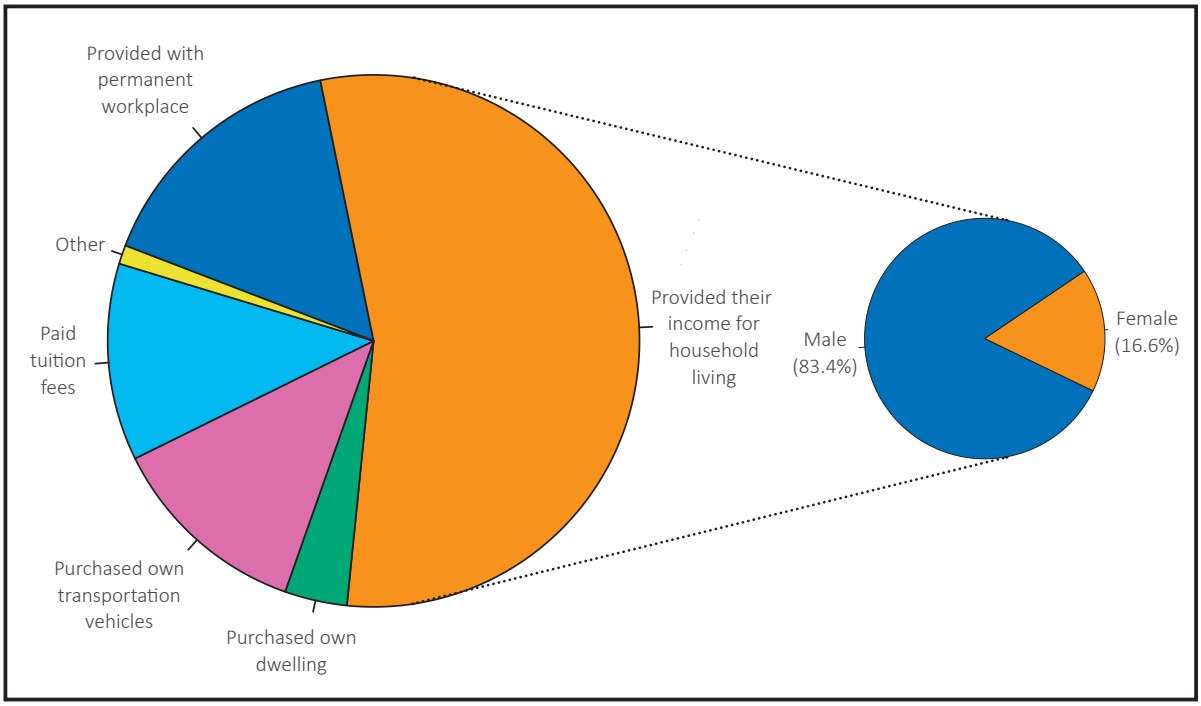

Fig. 10 | Social implications of involvement in the artisanal and small-scale mining industry, 2011

A total of 8,287.9 hectare were affected by small-scale mining operations, of which 57.2 percent was in the Western region, 9.7 percent in the Khangai region, 14.7 percent in the Central region, 6.3 percent in the Eastern region, and 12.1 percent in Ulaanbaatar City.

Of the total number of artisanal and small-scale miners surveyed, 22.7 percent worked in permitted areas: 83.3 percent of limestone miners, 76.5 percent of coal miners, 60.2 percent of tungsten miners, 51.8 percent of fluorspar miners, and 12.8 percent of gold miners.

Only 5.5 percent of all artisanal and small-scale miners were involved in some form of rehabilitation. The highest percentage of area

Table 9 | Areas of artisanal and small-scale mining industry activities, affected areas and rehabilitated areas, by region, 2011

Region	Areas being exploited (hectares)	Areas affected by mining since the start of activities (hectares)	Areas rehabilitated (hectares)
Western region	2,871.3	4,741.0	78.6
Khangai region	1,584.8	808.8	146.9
Central region	2,113.2	1,217.0	4.3
Eastern region	558.9	521.2	356.5
Ulaanbaatar City	1,191.0	1,000.0	8.0
Total	**8,319.3**	**8,287.9**	**594.3**

rehabilitation was made in the Western region with 13.3 percent while efforts were much lower in the Central region (4.8 percent), the Eastern region (2.8 percent), the Khangai region (0.7 percent) and in Ulaanbaatar City (0.5 percent).

The corresponding shares, when accounting for the type of mineral commodity undertaken by the miners in the areas being rehabilitated, are: 27.6 percent in tungsten mining, 16.7 percent in limestone mining, 9.8 percent in tin mining, 9.1 percent in fluorspar mining, 5 percent in gold mining and 0.4 percent in coal mining.

In 2011, artisanal and small-scale miners rehabilitated 594.3 hectares of which 78.6 hectares (13.2 percent) was in the Western region, 146.9 hectares (24.7 percent) was in the Khangai region, 4.3 hectares (0.7 percent) was in the Central region, 356.5 hectares (60 percent) was in the Eastern region, and 8 hectares (1.3 percent) was in Ulaanbaatar City. This size of area rehabilitated in 2011 represents 7.2 percent of all affected areas since mining commenced in Mongolia.

When rehabilitation was complete, 58.4 percent of all artisanal and small-scale miners handed over the rehabilitated areas to environmental inspectors and 26.7 percent to the local Governor's offices.

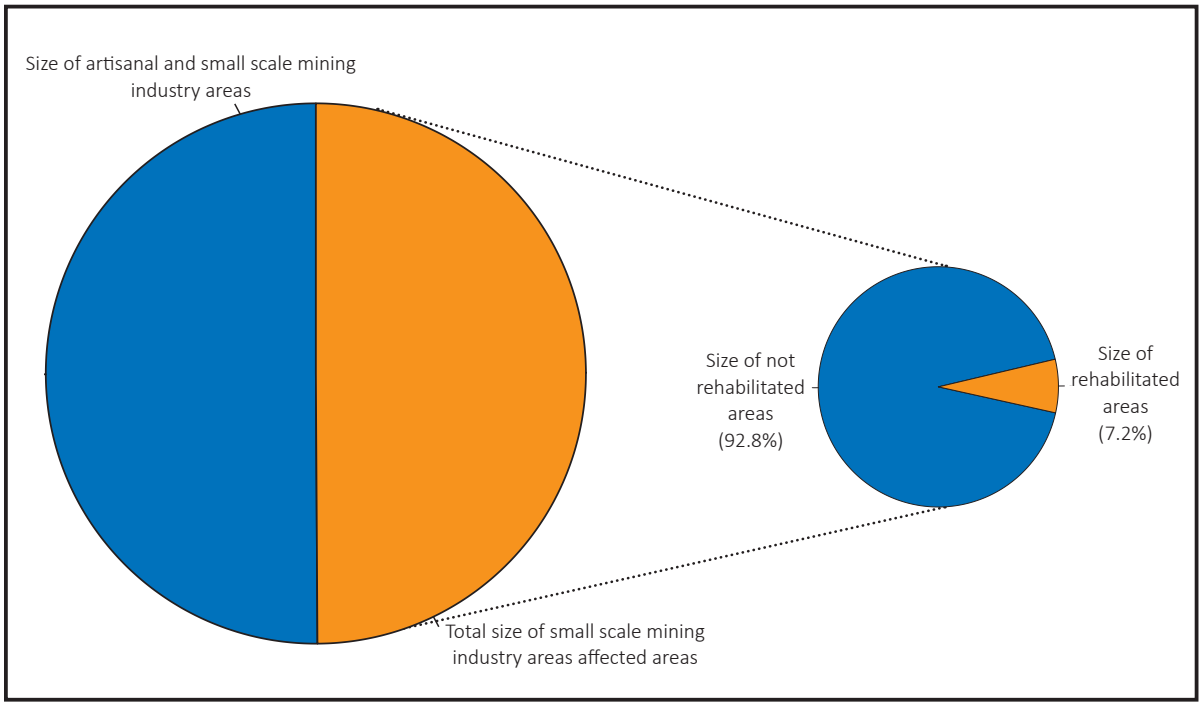

Fig. 11 | Areas of artisanal and small-scale mining industry activities, affected and rehabilitated areas in hectares, 2011

Conclusion

The importance and benefits of the ASMiners' Survey has been significant for a number of reasons:

- The survey enabled the definition of the survey frame of the artisanal and small-scale mining industry and its registration;
- Mongolia's National Statistical Office has created a data source for official statistics;
- The results of the survey have been incorporated into the estimation of GDP.

Table 10 summarizes the size of the non-observed economy and its share of the total economy.

Some challenges were encountered when conducting the survey. First of all, artisanal and small-scale miners do not tend to stay in one place, and the frequent migration of these miners have increased the costs and time for conducting the survey by making data collection more difficult. In the future, the National Statistical Office plans to carry out the survey every three years and make estimations for the artisanal and small-scale mining industry in intermediate years based on the results of the previous survey.

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Table 10 | Share of the non-observed economy in the total economy (including mining and quarrying)

Industries	Non-observed economy	GDP	Total economy (non-observed economy + GDP)	Share of the non-observed economy to the total economy
Agriculture	8,060.2	120,334.8	1,211,408.2	0.7
Mining and quarrying	305,661.8	1,981,970.1	2,287,631.9	13.4
Manufacturing	84,089.5	708,931.6	793,021.1	10.6
Electricity, gas, steam and air conditioning supply	1,454.2	174,302.8	175,757.0	0.8
Water supply; sewerage, waste management and remediation activities	2,230.2	33,051.7	35,281.9	6.3
Construction	82,511.7	147,178.0	229,689.7	35.9
Wholesale and retail trade; repair of motor vehicles and motorcycles	528,875.9	1,310,622.1	1,839,498.0	28.8
Transportation and storage	186,841.2	659,297.7	846,138.9	22.1
Accommodation and food service activities	28,266.1	54,553.4	82,819.5	34.1
Other services	104,102.3	2,141,249.1	2,245,351.4	4.6
Total	**1,332,093.1**	**8,414,504.5**	**9,745,568.2**	**13.7**

IMPACTS OF MINING ON SOCIETY IN MONGOLIA

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Background

In recent years, Mongolia has experienced an expansion of its mining sector, which is expected to continue growing in the future. This paper looks at the impact of mining on the country's social sector based on official statistics and samples from two copper mines, specifically the Oyu Tolgoi and Erdenet mines. It is found that the two mines have made significant social investment locally and nationally and that the mining sector in general has contributed positively to human capital development, employment and income generation, and in turn has resulted in overall poverty reduction and improvement in living conditions for the population.

The rest of the paper is structured in three sections, as follows:

- Methodology and data sources;
- Impacts of mining on society; and
- Conclusion.

Methodology and data sources

The UBCG has identified 55 indicators to measure the social impacts of mining (see Figure 1).

These indicators have been categorized according to labor statistics, health statistics, income statistics and other statistics. Figure 2 shows the indicators under each statistical category as well as sources and availability of data. Of the 55 indicators, 43 can be derived from national sources such as household socio-economic surveys (HSES), labor force surveys (LFS), wage and salary surveys and other special surveys. Other official statistics includes

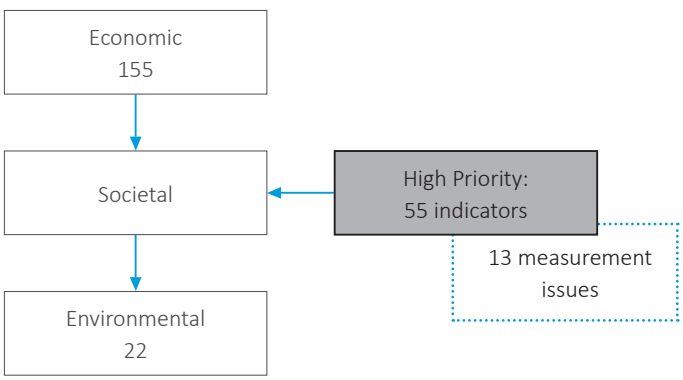

Fig. 1 | Indicators for measurement of the impacts of mining

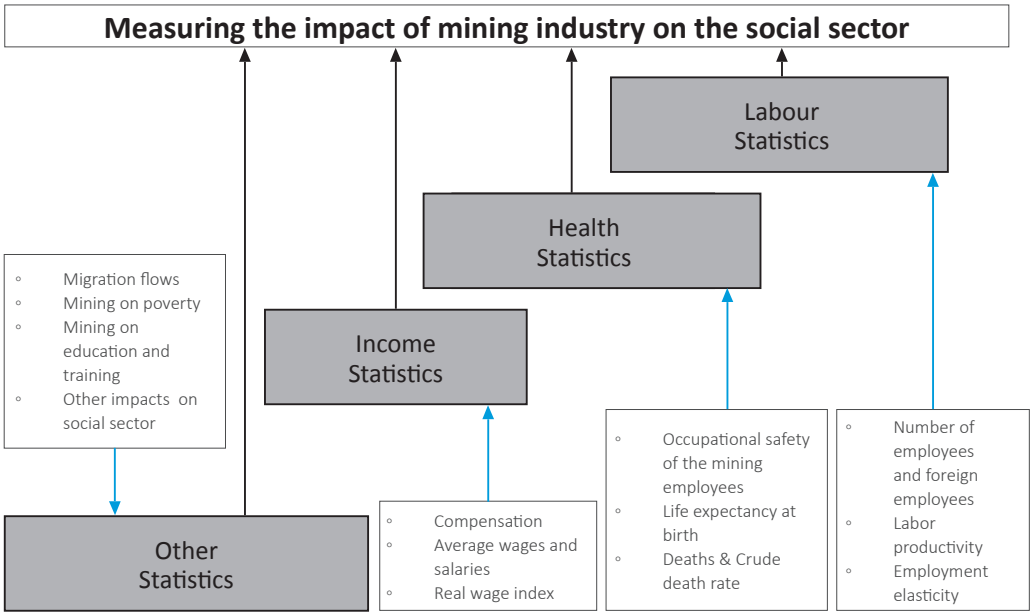

Fig. 2a | Measuring the social impacts of the mining industry: Composition of social statistics

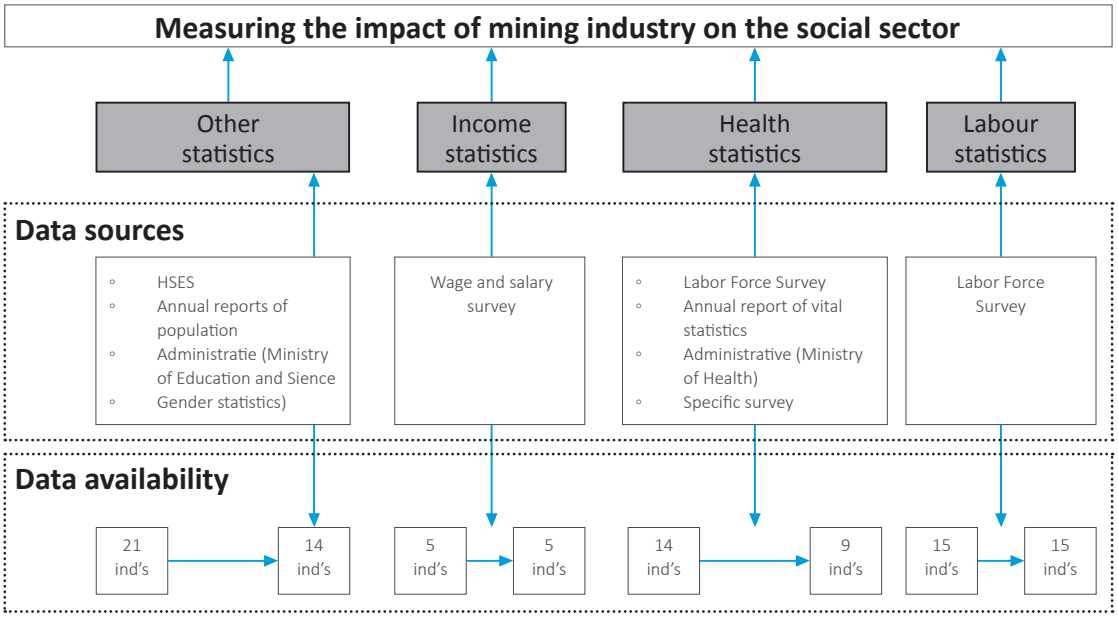

Fig. 2b | Measuring the social impacts of the mining industry: Definition of indicators

gender statistics, GDP, population and vital statistics reports. The administrative data used for measuring impacts on social sectors include data from the Ministry of Health and Ministry of Education and Science.

The assessment of data sources suggests that there is a need to identify more data sources, assess the quality of data and create a comprehensive database.

Social impacts of mining

Mining plays a vital role in generating jobs in Mongolia. As seen from Figure 3, the national monthly average salary of employees is 1.46 times lower than that of employees in the mining sector - MNT557,600 against MNT814,500 (USD411 and USD600), respectively. This shows that the mining sector greatly contributes to the poverty reduction and improvement of living conditions in Mongolia.

The composition of employees in the mining sector is illustrated in Figure 4. Nearly 85 percent of its employees are categorized as workers receiving a salary. This is almost 29 percentage point higher than the national average.

Figure 5 shows the gender balance among employees in the mining sector. Compared to the national average, the majority of employees in the sector are male. At the national level, male employees comprise 54.3 percent of total employment, while the corresponding number in the mining sector is 80.2 percent.

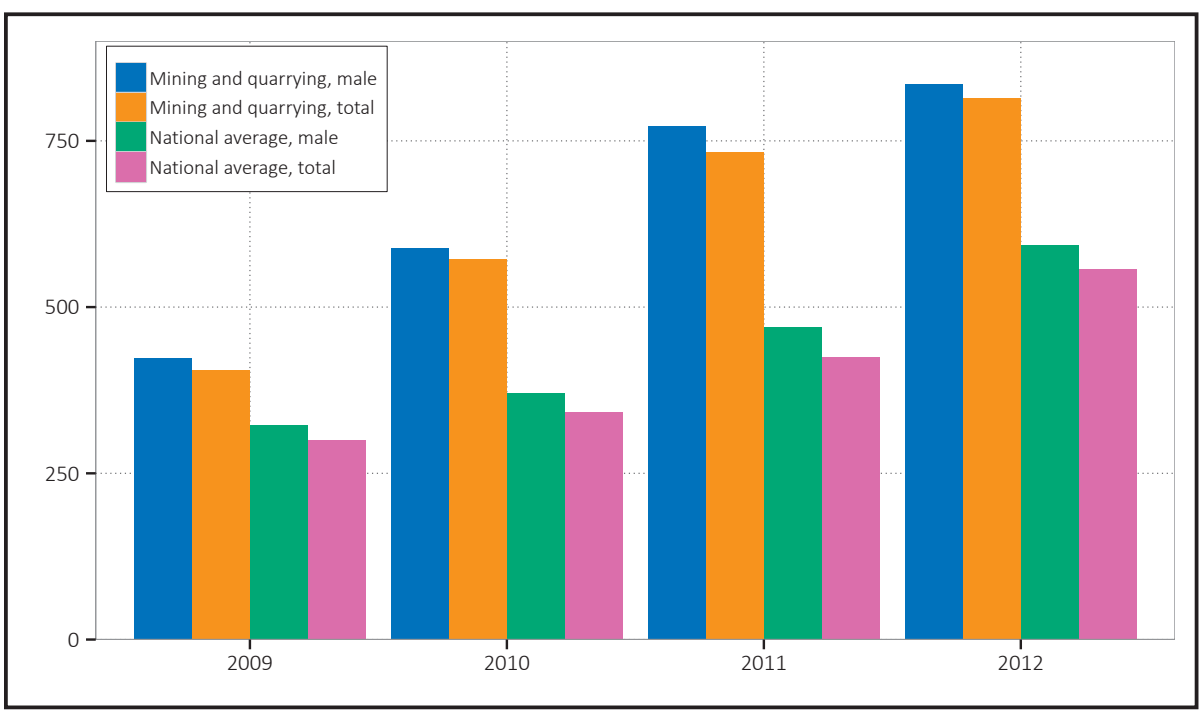

Fig. 3 | Monthly average wages and salaries of employees, 2009-2012

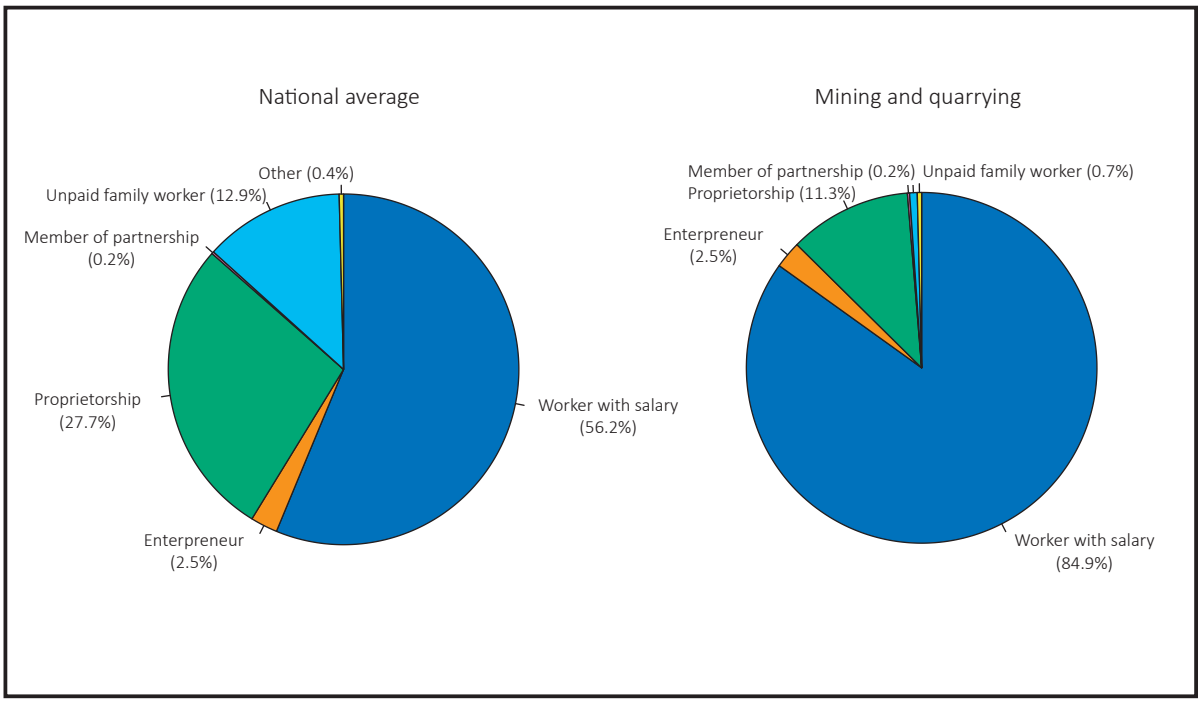

Fig. 4 | Structure of employees, 2012

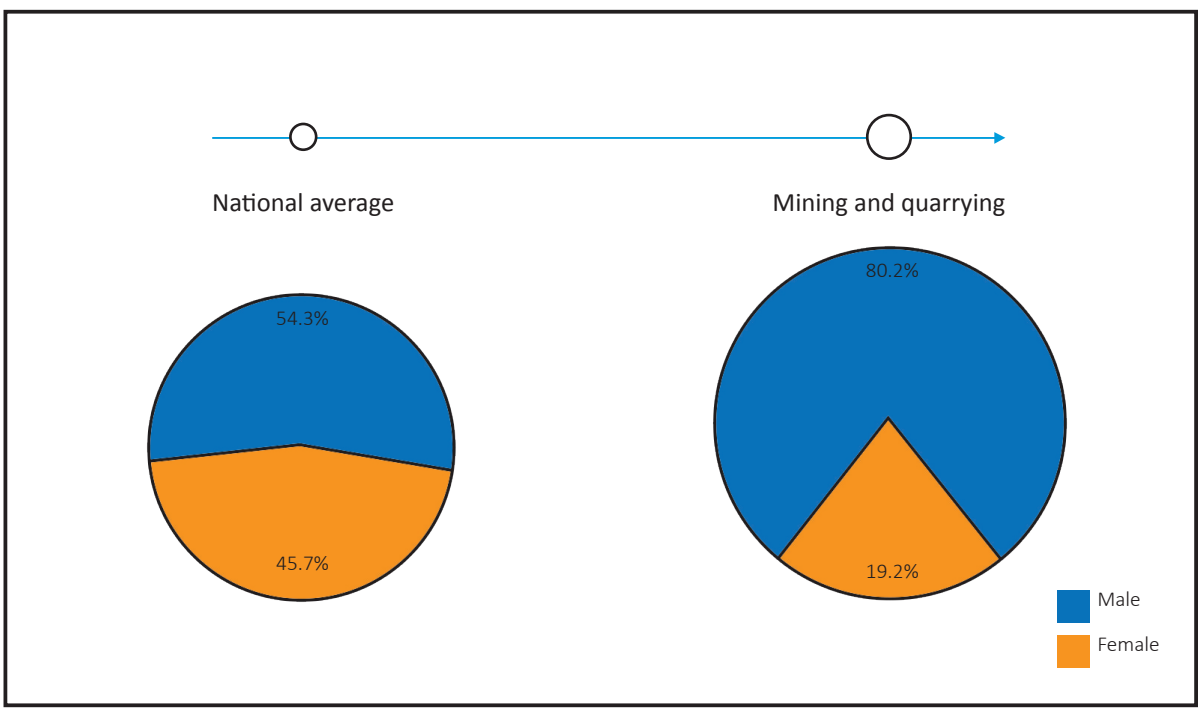

Fig. 5 | Gender balance in the mining sector, 2012

Conclusion

The paper recognizes the need for more data sources in order to compile necessary indicators for measuring the social impacts of mining and in order to deduct policy implications (Figure 6). An analysis should be undertaken of the contribution of mining on population growth, migration between provinces, relative poverty levels of mining and non-mining provinces/counties, and investment flows from by mining enterprises to human development, social programs and local community development.

The survey conducted on the mining sites of Oyu Tolgoi and Erdenet will add to the existing statistical indicators on the impacts of mining on labor, health and education in Mongolia. Furthermore, it will enable analysis of the social contribution of the mining companies active on these sites; in particular of their contribution to human capital development (training, internships, and scholarships), the educational system (vocational training and other school systems) and the local health care system.

The quality of data is another area, where more efforts are needed both from the National Statistical Office of Mongolia and relevant government agencies responsible for producing official and administrative statistics. Although it is the responsibility of the National Statistical Office to create, produce and disseminate high quality data, collaboration with government agencies responsible for relevant data is crucial.

Table 1 | Survey data to be used for impact measurement of mining on social sectors

Labor	Health	Education	Income
Number of employees, by country; education level; marital status; number of family member; training type; occupation; and year of worked in mining sector	Number of sick workers, by type of disease	Trainings and courses from the mining companies for their employees	Total wage and salary
	Number of inpatients, by classification of disease Accidents from the mining activity, by type of accidents	Number of qualified drivers of mining transportation Number of operators of heavy vehicles and mechanisms	Average wage and salary

THE MINING INDUSTRY IN KAZAKHSTAN: EFFECTS ON LABOR MARKET AND WAGES

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This report is an attempt of the experts of the national statistical office of Kazakhstan to assess the impact of the mining and mineral resources industry on the social sector, specifically on the labor market and on wages.

Firstly, the report will describe the characteristics of the mining industry in Kazakhstan. It is the largest contributing industry in terms of GDP to the economy. In 2013, it constituted 16.5 percent or 5.7 trillion Tenge (USD37.2 billion), and the volume index of the industry was 103.7 percent. In terms of gross value added the oil and gas sector and commodity sector constituted 19.7 percent and 21.2 percent, respectively.

Taking into consideration the abundance of raw materials in Kazakhstan and the low efficiency and utilization of the labor force, a state program rolled out in 2010-2014 encouraging industrial-innovative development in the country was developed and launched by Decree (No. 958) of President Nursultan Nazarbayev. Developing priority sectors in the economy through increased diversification and competitiveness was one of the program's key objectives. The challenge in the oil and gas sector and mining and smelting enterprise sector was to facilitate and support the transition from primary production to higher-value added production through the application of more advanced methods, technologies and processes.

In these sectors, the program particularly focused on:

- Creation of oil, gas and petrochemical industries for deep processing of hydrocarbon for the production of base and wide range products with high value added;
- Organization of main (base) metals by large enterprises;
- Organization of the production of final products based on basic or rare metals by small and medium-sized businesses.

These targets increased the demand for labor in the respective industries.

The Agency on Statistics of the Republic of Kazakhstan defines the labor force as the population aged 15 years or more available on the labor market for the production of goods and services. This definition corresponds to the description of the metadata index presented by the national statistics office of Mexico. The economically active population comprises people employed in all types of economic activities as well as the unemployed population.

Since 2010, the amount of people working in the industry has grown by 26.7 percent to approximately 250,000 people in 2013 (Figure 1). Table 1 shows that male, who are the dominating gender in the industry (only 22.5 percent of the workforce were female in 2013), were responsible for most of this increase. The share of employment in the mining industry reached a record level in 2001 and accounted for 2.9 percent of total employment in the economy by 2013.

As seen in Figure 2, the regions in Kazakhstan that employs the highest proportion of mining industry workers are: Mangystau (19.5 percent), Karaganda (14.2 percent), Aktobe (12.2 percent), Kostanay (11.2 percent) and East Kazakhstan (8.9 percent). In the same regions, the mining industry is the largest employer compared to total employment in the regional economy (Table 2).

When examining the socio-demographic characteristics of mining industry workers

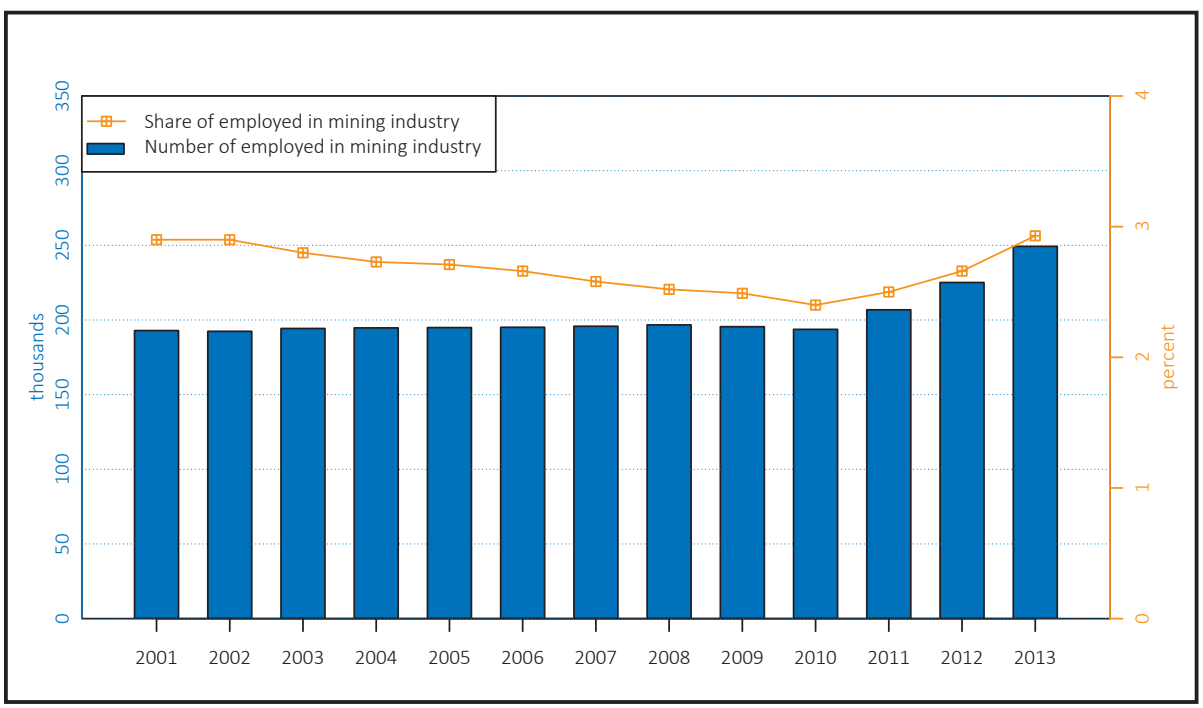

Fig. 1 | Employment in the mining industry, 2001-2013

Table 1 | Labor resources, by gender, 2008-2013 (thousands)

	2008			2010			2013		
Total economy	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**
Employed population	7,857.2	4,017.7	3,839.5	8,114.2	4,161.6	3,952.6	8,570.6	4,389.4	4,181.2
Employees	5,199.4	2,711.0	2,488.4	5,409.4	2,825.3	2,584.1	5,949.7	3,016.0	2,933.7
Mining industry									
Employed population	196.8	146.4	50.4	193.7	147.0	46.7	249.3	193.3	56.0
In % to employed in economy	2.5	3.6	1.3	2.4	3.5	1.2	2.9	4.4	1.3
Employees	196.8	146.4	50.4	193.7	147.0	46.7	249.3	193.3	56.0
In % to employees in economy	3.8	5.4	2.0	3.6	5.2	1.8	4.2	6.4	1.9

through a sample survey for the years 2010-2013, it is found that qualitative changes have occurred in this period (Figure 3). The age composition in the industry has changed; the share of workers aged 55-66 increased at the expense of worked aged 16-24. However, the bulk of workers in the mining industry (78.2 percent) are aged 25-54.

The observed changes in the age composition are to a large extent determined by qualitative changes in the professional training of the industry's workers. The accelerated development of enterprises and introduced new products in industry has increased the demand not just for labor but also for higher skills, which is to be acquired through, especially,

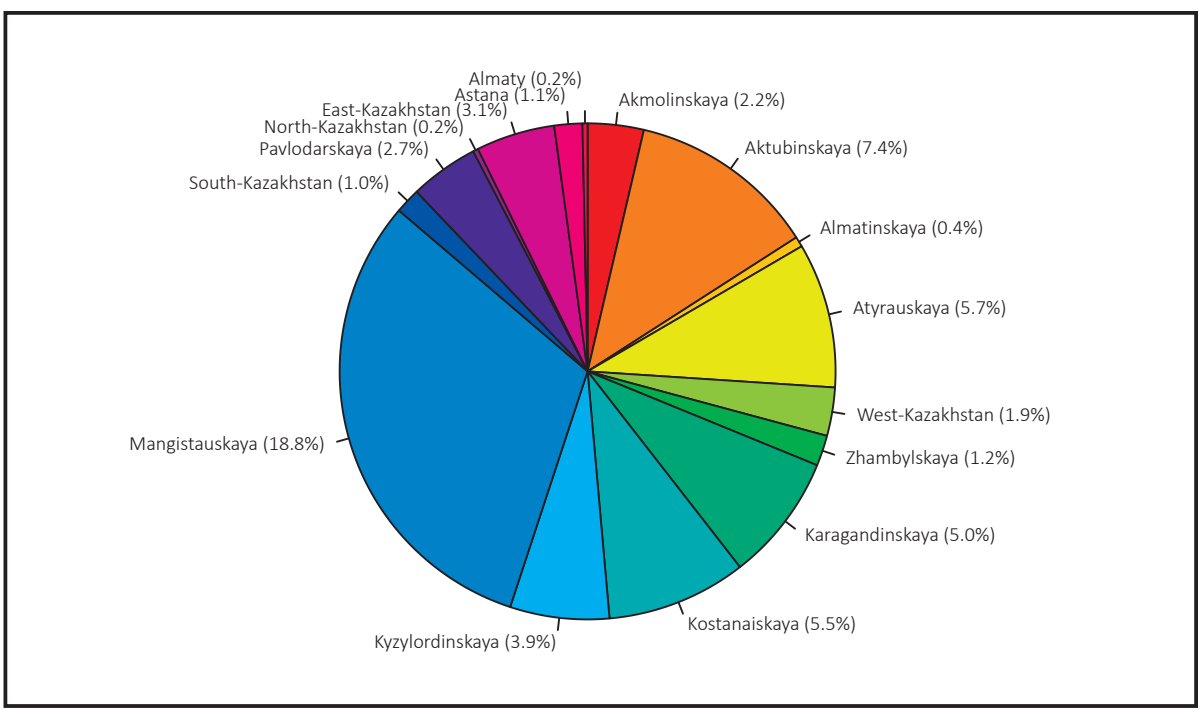

Fig. 2 | Distribution of employed in the mining industry, by region, 2013

Table 2 | Number of workers in the mining industry, by region, 2013

	Total economy	Mining industry	Total economy	Mining industry
	Thousands		Percent	
Akmolinskaya	419.0	9.4	100	2.2
Aktubinskaya	412.7	30.4	100	7.4
Almatinskaya	993.1	3.7	100	0.4
Atyrauskaya	279.5	15.8	100	5.7
West-Kazakhstan	316.5	5.9	100	1.9
Zhambylskaya	550.8	6.8	100	1.2
Karagandinskaya	707.2	35.5	100	5.0
Kostanaiskaya	503.6	27.8	100	5.5
Kyzylordinskaya	334.4	13.2	100	3.9
Mangistauskaya	259.1	48.7	100	18.8
South-Kazakhstan	1,185.7	12.1	100	1.0
Pavlodarskaya	418.0	11.2	100	2.7
North-Kazakhstan	329.3	0.7	100	0.2
East-Kazakhstan	708.2	22.1	100	3.1
Astana	410.5	4.5	100	1.1
Almaty	743.1	1.5	100	0.2
Kazakhstan	**8,570.6**	**249.3**	**100**	**2.9**

operating training and further technical and vocational education. Between 2010 and 2013, the share of mining industry workers with a specialized vocational education increased from 38.3 percent to 45.2 percent, and the share of workers who have completed or almost completed a higher education increased from 23.8 percent to 30.3 percent.

A comparative dynamics is observed between the marital status of workers in the mining industry and in the overall economy. Figure 4 shows that 65.3 percent of the labor force in the total economy was married in 2013, whereas 73.4 percent of all workers in mining industry were married.

Figure 5 further adds to the qualitative portrait of labor in the mining industry by describing the composition of workers according to qualification level and their major occupational group.

The figure shows that the majority or 34.7 percent of mining industry workers

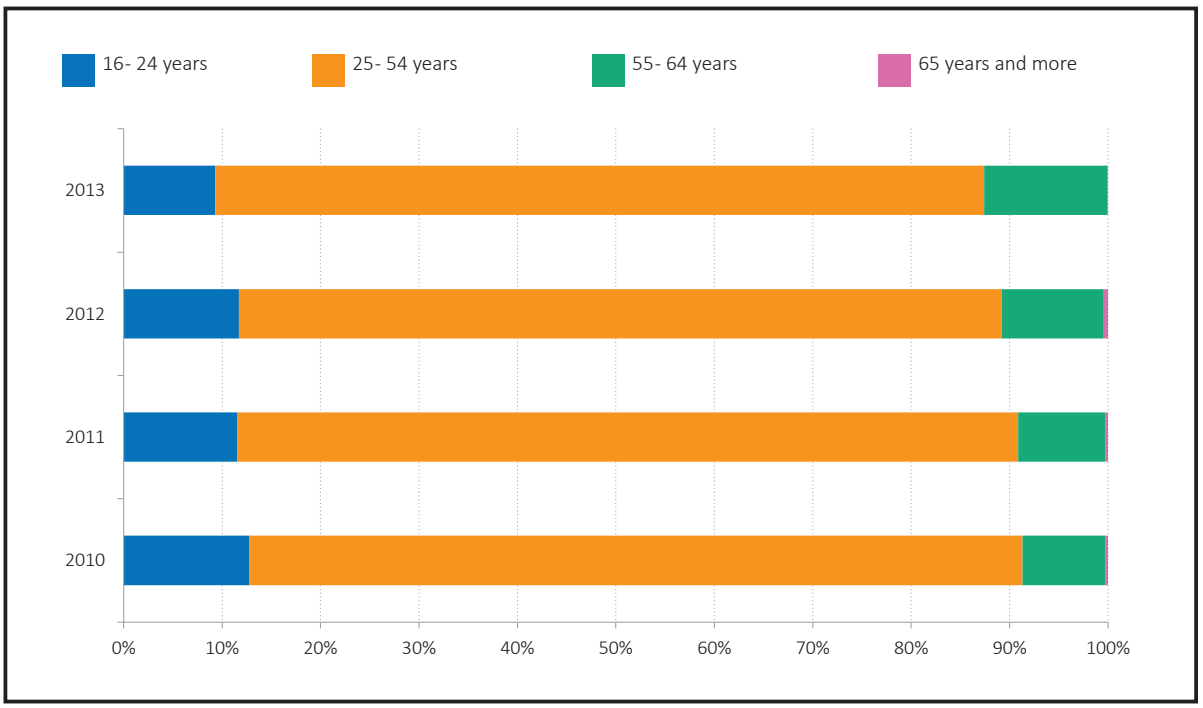

Fig. 3 | Distribution of employed in the industry, by age group, 2010-2013

Fig. 4 | Distribution of employed in the economy and mining industry, by marital status, 2010-2013

were qualified as "operators, devisors, machinists and machine installations and fitters" in 2013. 31 percent were qualified workers employed in big and small industrial organizations (specifically within construction, transport, communications, geology and exploration), 10.5 percent were specialists with the highest possible level of qualification, and 8.8 percent were managers (all levels).

Even though the number of mining industry workers has increased rapidly, the industry's demand for labor is yet to be met. This is the conclusion from a survey of large and medium-sized enterprises in Kazakhstan conducted in 2013 with the objective to acquire the needed information to match the training of personnel with the needs of employers and to be able to predict the availability of labor resources in the medium term (Table 3).

In 2014, the demand for personnel in the mining industry was estimated to 3,600 people, while there were only 1.600 available vacancies at the beginning of the year. Demand for labor is expected to be highest in the Kostanay region. This situation is caused by the reactivation of inactive enterprises and addition of new steel products: hot briquette iron, rolled steel and metal.

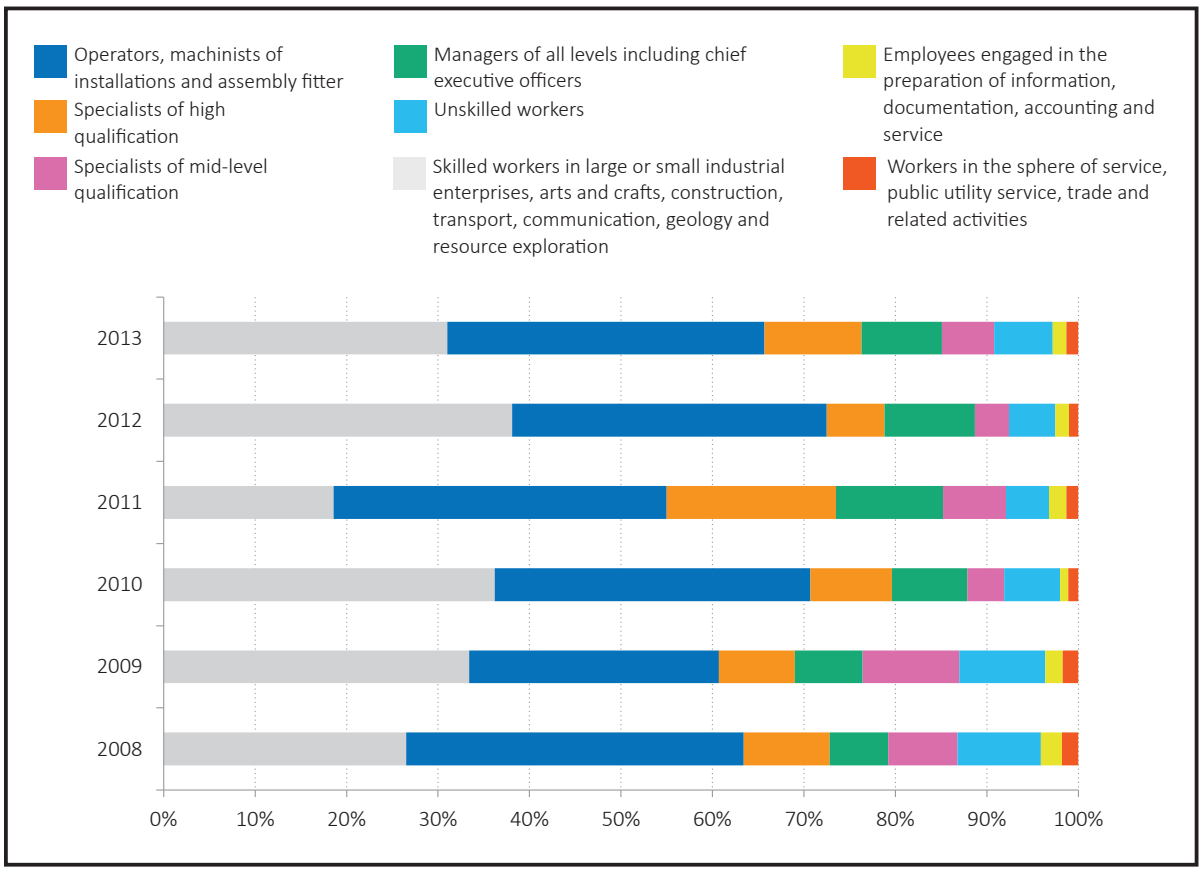

Fig. 5 | Distribution of workers in the mining industry, by major occupational group, 2008-2013

Table 3 | Number of vacancies and expected demand of workers in the mining industry, 2014

Number of employees at the beginning of the reporting period, thousands	Number of vacancies at the beginning of 2014	Share of job vacancies in the total number of employees at the appropriate type of economic activity, percent
209.2	1,609	0.8
	Number of vacancies at the beginning of 2014	**Expected demand for workers in 2014**
Akmolinskaya	106	4
Aktubinskaya	121	75
Almatinskaya	53	2
Atyrauskaya	167	153
West-Kazakhstan	106	165
Zhambylskaya	-	-
Karagandinskaya	65	631
Kostanaiskaya	62	2,275
Kzyldordinskaya	143	41
Mangistauskaya	186	161
South-Kazakhstan	68	68
Pavlodarskaya	390	-
North-Kazakhstan	-	5
East-Kazakhstan	139	11
Astana	-	-
Astana	3	-
Kazakhstan	**1,609**	**3,591**

Source: Based on the results of the 2013 publication "Report on the number and demand for staff in large and medium-sized enterprises".

Figure 7 illustrates the demand for labor according to skills, or occupation groups, both in the mining industry and in the general economy. Almost half (49.2 percent) of all surveyed mining enterprises are looking for qualified workers within industry (i.e. mining; manufacturing; electricity, gas, etc.; water etc.), arts and crafts, construction, transportation, communications, geology and resource exploration (Figures 6 and 7). Operators, devisors, machinists and machine installations and fitters come second in the demand for skills in the mining industry (22.3 percent). The demand for workers to leadership positions in enterprises and their subdivisions is higher than in the economy as a whole (4.6 percent to 3.1 percent).

Due to the favorable investment climate in Kazakhstan's' mining industry, 70 percent of all foreign direct investments flow to this sector as does an increasing number of foreign labor. There is a general lack of reliable data on the inflow flow of foreign, and this paper therefore uses data estimated on the basis of official quotas, formed by the Committee of Migration of the Ministry of Labor Force and Social

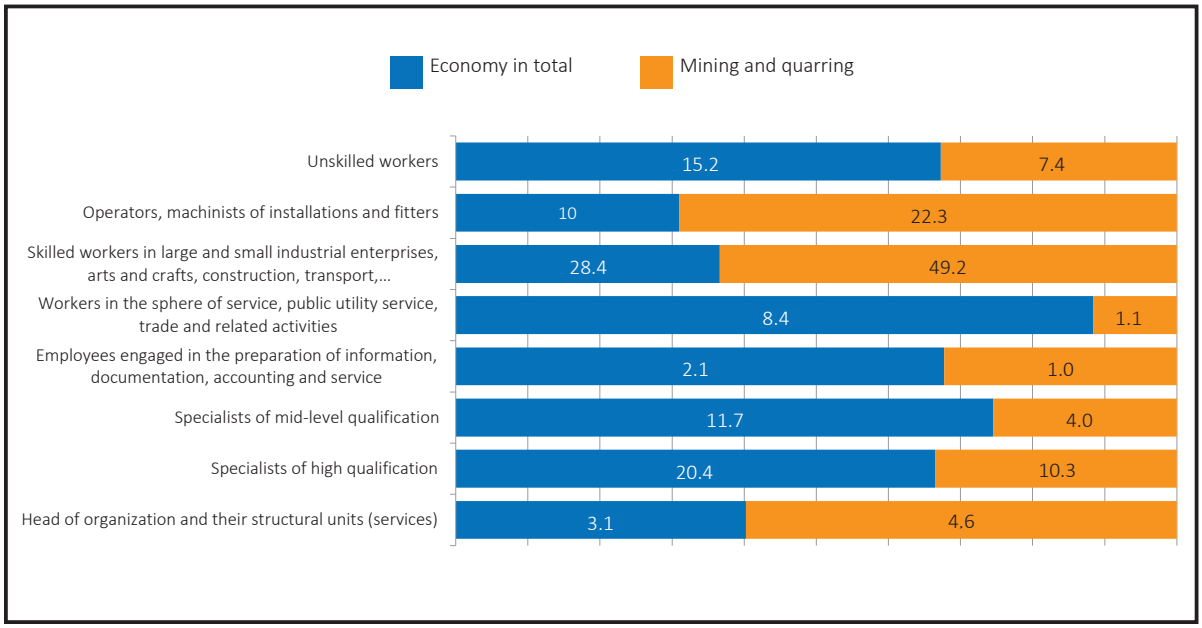

Fig. 6 | Demand for labor in the mining industry and in the general economy, 2014 (percentage)

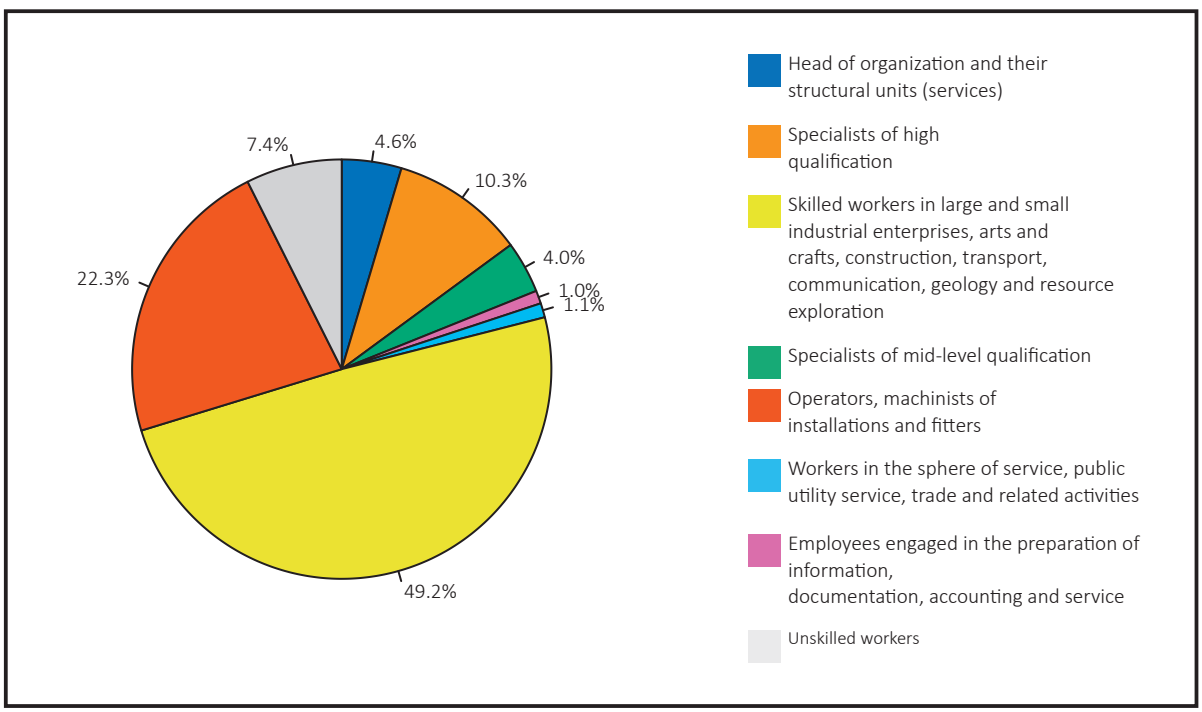

Fig. 7 | Demand for labor in the mining industry, by major occupational group, 2014 (percentage)

Protection, on the "legal" foreign labor force.

According to this data (Table 4), the number of enterprises employing foreign workers in the mining industry in 2013 was 210, which corresponds to 7.2 percent of all enterprises in Kazakhstan that take in foreign labor. The number of foreign workers in the mining industry was 3,400 people, equivalent to 15.2 percent of all foreign workers in the country and 1.4 percent of mining industry workers.

The Ministry's data also allows for a qualitative characterization of the foreign labor force (Figure 7). In 2013, 52.5 percent were employed as professional staff and 40.2 percent as heads of departments in the mining industry. However, the industry saw a general increase in the proportion of skilled workers and top managers of organizations in the period 2010-2013.

Even though the employment statistics on foreign labor provided above indicates that more qualified labor is available in the country, there continues to be imbalances between the demand and supply of qualified labor. This will require changes in the training methods of labor.

Measuring the income is a significant component in the activities of the Ulaanbaatar City Group, and wages are the main source of income in Kazakhstan's mining industry. The average monthly nominal wage per employee is determined by dividing the total payroll with the total number of employees and the number of months in a specified period. The payroll is understood as the total cash payments to

Table 4 | Foreign labor in the mining industry and in the general economy, 2010-2013

Indicator	2010	2011	2012	2013
Number of employers, involving foreign labor, total in economy, units	**3,004**	**3,187**	**2,792**	**2,935**
Of which: Mining	263	249	222	210
in %	8.8	7.8	8.0	7.2
Number of foreign workers in Kazakhstan, total in economy	**29,179**	**27,132**	**23,978**	**25,566**
Of which: Mining	4,152	4,438	3,773	3,387
in %	14.2	16.4	15.7	13.2
Number of workers in mining	**193,731**	**206,817**	**225,076**	**249,338**
Of which: Foreign workers	4,152	4,438	3,773	3,387
in %	2.1	2.1	1.7	1.4

Source: Ministry of Labor and Social Protection

workers as well as assets in kind remitted into monetary payment of workers in the form of wages (base salaries or calculated by tariff rates), bonuses and other incentive or compensatory payments less taxes and other deductions (such as income tax, mandatory pension contributions). This definition corresponds to the description of the metadata index represented by the national statistics office of Mexico.

Table 5 shows the composition of the payroll of employees in the mining industry in 2013. For comparison, the table also shows the total payroll for all employees in the economy. It is noteworthy that the payroll share allocated to incentive and compensatory payments is twice that of the total economy.

According to enterprise reports, the average nominal wage in the economy was 109,141 Tenge (USD717.4) in 2013, which was only half of the wages in the mining industry (210,404 Tenge or USD1,353.1). The index for real and nominal wages in the economy was 101.9 percent and 107.8 percent, respectively. This was lower than the corresponding indexes for the mining industry (118.1 percent and 111.6 percent respectively) (Table 6).

The payroll of workers employed in the mining industry was 11.6 percent of the total economy's wage bill. The presence of large and medium-sized enterprises for the distribution of their employees due to their wages held 1 time in 2 years in the statistics of wage survey makes it possible

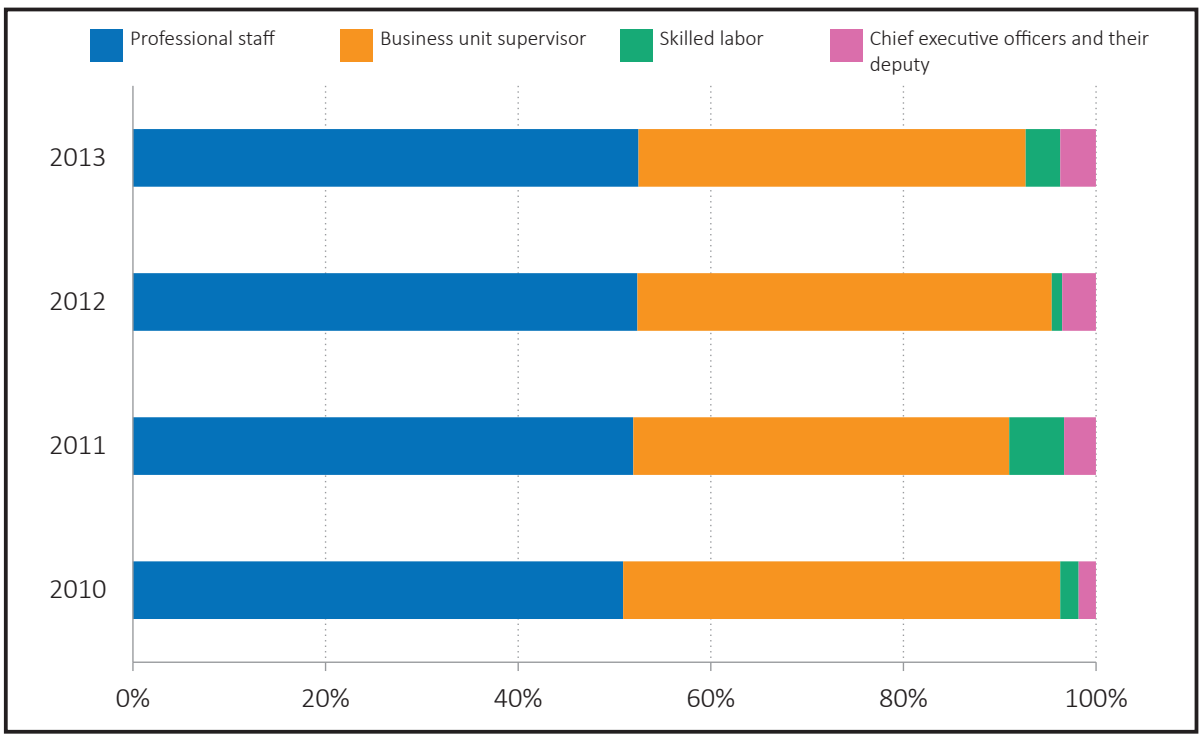

Fig. 8 | Foreign labor in the mining industry, by occupational group, 2010-2013
Source: Ministry of Labor and Social Protection.

Table 5 | Payroll compositions for workers in the mining industry and the general economy, 2013 (million Tenge)

	Payroll	Composition					Reference
		Wage by tariff rate and official (base) salaries	Incentive payments	Compensation payments, connected with	Payment for non-worked time	Other payments	Wage fund in kind
Mining industry	537,333.9	295,216.3	115,904.1	51,442.0	57,742.4	17,029.2	19.7
Total economy	**4,640,683.9**	**3,225,268.5**	**574,448.4**	**224,615.7**	**468,845.6**	**147,505.7**	**681.1**
Share of total payroll in percent							
Mining industry	100	54.9	21.6	9.6	10.7	3.2	X
Total economy	**100**	**69.5**	**12.4**	**4.8**	**10.1**	**3.2**	**X**
Share of payroll category in total economy in percent							
Mining industry	11.6	9.2	20.2	22.9	12.3	11.5	2.9
Total economy	**100**	**100**	**100**	**100**	**100**	**100**	**100**

to calculate the modal and median values of wages.

At the end of the survey period (June 2013), the median wage of mining industry workers was 140,493 Tenge (USD927.8), which is almost twice as that of the total economy (75,559 Tenge or USD466) (Table 7).

The survey data also reveals a gender pay gap in the mining industry. In 2013, the wages of male workers were 1.4 times higher than female workers (Table 8). This gap is explained by the hours required and complexity of the tasks in the industry as well as severe (unsafe and heavy) labor conditions.

Table 6 | Major indicators on the workforce in the mining industry

	Number of employees, thousands	Actual number of workers (for calculation of average wage), thousands	Wages fund, billion Tenge	Average nominal wage, Tenge	Index of nominal wage, in % to previous year	Index of real wage, in % to previous year
2008	175.2	170.2	225.7	110,502	123.0	105.1
2010	174.3	169.8	301.8	148,091	120.1	112.1
2013	218.8	212.8	537.3	210,404	118.1	111.6

Table 7 | Distribution of employees, by gross wages, June 2013

	Total economy	Mining industry	Total economy	Mining industry
Including the size of gross wages, Tenge	**Number of workers**		**In percent to all workers**	
Up to 30,000	263,624	1,403	8.72	0.84
30,001-60,000	870,261	14,713	28.77	8.81
60,001-90,000	729,405	27,576	24.12	16.51
90,001-120,000	456,642	25,847	15.10	15.48
120,001-150,000	263,584	20,399	8.71	12.22
150,001-180,000	132,913	15,023	4.39	9.00
180,001-210,000	85,444	11,653	2.83	6.98
210,001-240,000	51,640	9,718	1.71	5.82
240,001-270,000	36,859	6,975	1.22	4.18
270,001-300,000	27,318	6,222	0.90	3.73
300,001-330,000	19,440	4,757	0.64	2.85
330,001-360,000	15,070	3,627	0.50	2.17
360,001-390,000	13,098	3,220	0.43	1.93
More than 390,000	59,017	15,813	1.95	9.47
Total	**3,024,315**	**166,946**	**100**	**100**
Mode of wage, Tenge			**54,348**	**86,446**
Median of wage, Tenge			**75,559**	**140,493**

Table 8 | Main indicators on labor in the mining industry, 2008-2013

	Number of workers, thousands	Actual number of workers (for calculation of average wage), thousands	Wages fund, billion Tenge	Average nominal wage, Tenge	Indices of nominal wage, in % to previous year
Female					
2008	40.5	38.1	37.9	82,958	121.2
2010	40.3	37.4	51.6	114,814	120.7
2013	47.5	43.8	85	161,721	120.5
Male					
2008	134.7	132.1	187.8	118,438	123.0
2010	134.0	132.4	250.2	157,505	119.8
2013	171.3	169.0	452.4	223,011	117.4
Difference between indicators of men and women, factor					
2008	3.3	3.5	5.0	1.4	
2010	3.3	3.5	4.8	1.4	
2013	3.6	3.9	5.3	1.4	

Note: Excludes small enterprises, engaged in entrepreneurial activity.

Table 9 | Income in the mining industry, by mineral type, gender and occupation

	Mining of coal and lignite	Mining of crude oil and natural gas	Differentiation, times		Mining of coal and lignite	Mining of crude oil and natural gas	Differentiation, times
Head of organizations				**Purchasing agent**			
Male	438,796	1,218,447	2.8	Male	96,000	224,623	2.3
Female	570,000	871,938	1.5	Female	80,000	279,467	3.5
Total	**443,747**	**1,196,790**	**2.7**	**Total**	**93,091**	**238,566**	**2.6**
Heads of specialized (production-operational) units (services)				**Lawyer (mid-level qualification)**			
Male	214,846	750,114	3.5	Male	173,280	311,146	1.8
Female	153,515	646,526	4.2	Female	155,117	424,471	2.7
Total	**20,710**	**732,634**	**3.6**	**Total**	**163,373**	**357,133**	**2.2**
Computer programmer				**Secretary, office manager**			
Male	101,960	339,333	3.3	Male	51,333	231,529	4.5
Female	156,500	301,492	1.9	Female	66,068	276,204	4.2
Total	**108,376**	**335,018**	**3.1**	**Total**	**64,489**	**272,823**	**4.2**
Safety engineer				**Security guard**			
Male	120,100	378,514	3.2	Male	48,673	75,940	1.6
Female	96,278	387,239	4.0	Female	28,800	38,333	1.3
Total	**113,184**	**380,217**	**3.4**	**Total**	**47,254**	**73,433**	**1.6**
Accountant				**Car driver**			
Male	74,700	317,687	4.3	Male	112,411	304,126	2.7
Female	98,634	318,674	3.2	Female	-	-	
Total	**98,338**	**318,473**	**3.2**	**Total**	**112,411**	**304,126**	**2.7**
Economist				**Loaders, maintenance workers**			
Male	108,000	330,347	3.1	Male	71,505	148,948	2.1
Female	96,880	301,822	3.1	Female	70,188	107,769	1.5
Total	**99,139**	**309,347**	**3.1**	**Total**	**71,192**	**146,217**	**2.1**

Additionally, the results of a comparative analysis of the occupation-specific salaries paid by mining enterprises are shown in Table 9. Such a comparison is possible due to the availability of annual statistical observations in large and medium-sized enterprises by economic activity level.

The results of the last observations (October 2013) allows for a comparison of two mining industries, i.e. coal and lignite mining and crude oil and natural gas extraction). Within each occupation groups, the wage level between the two mining sub-industries differs with a factor of 1.5 to 4.5.

Finally, considering the full territorial presence of the mining industry (in all 16 regions of the country), a comparative analysis of the industry's labor productivity was conducted in the years 2008, 2010 and 2013. The reduction of regional differences in the salaries of mining industry worker

has been taken into account. Even though the industry suffers from certain problems in the structure and quality of its labor force, mining industry enterprises have the highest labor productivity compared to enterprises in other industries. According to preliminary data, labor productivity in mining industry enterprises was USD207.9 thousand (Table 10) in January-December 2013, which is several times higher than in industries such as transportation, manufacturing, construction and trade.

As noted in the beginning of this paper, the number of workers in the mining industry made up less than 3 percent of the total labor force in 2013; however, their share in total gross profits was 77 percent (of which total payroll is 11.6 percent and wages by tariff is 22 percent). This level was reached thanks to the work of 2.1 million employees, which is 24.2 percent of the total employment in the country.

The data presented in this paper on Kazakhstan's mining industry, which generates a sixth of the country's GDP and employs less than 3 percent of the total labor force, suggest that it is capital-intensive with a high level of added value products and low labor costs, making its influence on the composition and quality of national labor force limited.

At the same time, even though statistics for monitoring the labor force and wages in the mining industry are available - following the indicator guidelines of the Ulaanbaatar City Group – these data does not provide sufficient means for analysis of labor migration and the impact of the mining industry on the quality of life in the population. The general statistical problems are expected to be solved by the Statistical Agency within the process of implementing a joint project with the World Bank called "KAZCTAT: Strengthening the National Statistical System of the Republic of Kazakhstan" in the period 2012-2016. Even so, Kazakhstan pays great attention and puts significant effort into the development of indicators in accordance with the framework put forward by the Ulaanbaatar City Group, and aims, through these efforts, to acquire experience and new knowledge on methodical and practical guidelines, and learn from recommendations for effectively monitoring the mining industry and its contributions to economic and social development.

Table 10 | Labor productivity by economic activity, 2008-2013 (in thousand USD/person)

	2008	2009	2010	2011	2012	Jan-Dec 2013
Mining industry and quarrying	**157.9**	**142.8**	**183.0**	**211.0**	**211.2**	**207.9**
Mining of coal and lignite	20.6	19.0	20.3	24.0	24.1	23.1
Mining of crude oil and natural gas	555.6	441.0	614.0	705.4	776.9	807.2
Mining of metal ores	31.5	24.1	41.7	50.2	62.9	48.6
Other industries of mining	6.5	7.2	12.4	12.5	12.5	13.1
Technical services in the mining industry	36.3	31.6	28.6	32.3	34.9	32.9
Manufacturing	**37.3**	**29.4**	**41.0**	**52.7**	**61.8**	**57.5**
Construction	**13.6**	**13.6**	**14.1**	**16.1**	**16.8**	**17.6**
Wholesale and retail trade; Repair of motor vehicles and motorcycles	**25.8**	**18.3**	**27.1**	**34.6**	**41.3**	**38.8**
Transportation and warehousing	**62.9**	**58.7**	**65.2**	**77.3**	**77.7**	**128.6**

STATISTICS IN THE FIELD OF ENVIRONMENTAL PROTECTION IN KAZAKHSTAN

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Current statistics in the field of environmental protection is based on data of national statistical surveys, and governmental and administrative sources. In Kazakhstan, two of the main indicators used to assess the impact of mining on the environment are:

- Hazardous waste;
- Emissions of greenhouse gases.

Kazakhstan's Ministry of Environment and Water Resources generate data on hazardous waste on the basis of departmental observations. In a similar way, data on greenhouse gases is generated by the Ministry's sub-departmental organization "Zhasyl Damu". Both indicators are updated on annual basis and are provided to the Agency on Statistics of Kazakhstan.

Based on national statistical observations, the Agency generates data on the following indicators with the purpose to assess the impact of mining on the environment:

- Emissions of air pollutants;
- Number of stationary sources of emissions;
- Collection and disposal of air pollutants from stationary sources;
- Costs for environmental protection;
- Charges for the use of natural resources;
- Special payments of subsoil users;
- Investment in environmental protection and rational use of natural resources;
- Total final energy consumption in industry;
- Heat distribution by economic activity;
- Water release by economic activity.

For the abovementioned indicators, the national statistical bodies annually form data using the following forms: 2-TP "Report on air protection", 4-OS "Report on the costs of environmental protection" and 1-wastes "Report on the collection and export of municipal waste", 1-VK "Report on the water pipe, sewerage and its individual networks" on the basis of which following papers are published: "On the state of air protection in the Republic of Kazakhstan", "On the costs of environmental protection in the Republic of Kazakhstan", "On the collection, removal, sorting and depositing municipal waste" and "On the work of water pipe and sewer facilities in the Republic of Kazakhstan".

When forming the statistical data staff members of energy and environment management are guided by:

1. Methodological recommendations on the formation of indicators of environmental statistics, № 337 of 9 December 2010;
2. Methodological explanations of energy statistics indicators, № 20.09 of 23 November 2009.

Once a year, the Agency published the compilation "Environmental protection and sustainable development of Kazakhstan". Along with this, annually press releases "On emissions of pollutants into the air" and "On the costs of environmental protection in the Republic of Kazakhstan" are posted on the Agency's website, http://stat.gov.kz/Main/. Also, eight indicators on environmental statistics are published on an annual basis on the website under the heading "Time series of indicators for the Millennium Development Goals".

If additional information or advice is needed in the field of the environment there is an enquiry portal on the Agency's website, which, for example, received eight requests in 2013.

Starting from 2009, according to the recommendations of the United Nations European Economic Commission for Eastern Europe, Caucasus and Central Asia, the Agency established 36 indicators under 9 groups for assessing the state of the environment: air pollution and ozone depletion, climate change, water resources, biodiversity, land resources, agriculture, energy, transport and waste. These figures are published on the Agency's website under the heading "Environmental monitoring and evaluation indicators of the environment".

Moreover, in 2013, within the framework of the project KAZSTAT, the Agency, together with international experts of the Central Bureau of Finland, developed statistical tools for the accounting of volumes of electricity production from renewable energy sources ("Questionnaire survey of enterprises with facilities for the use of renewable energy sources, RES-001").

In 2014, the Agency plans to publish indicators such as:

- "Production of electricity and heat from renewable energy sources (RES)";
- "Public access to environmental products and services";
- "Volume of production of environmentally friendly products";
- "Investments in renewable energy";
- "Investments aimed at reducing greenhouse gas emissions";
- "Cost of construction work performed

on “green” construction”.

Within the development of environmental statistics, Agency is planning to develop and implement a core set of environmental indicators groups, which have been recommended to all countries by the UN Statistical Commission:

- “Innovations in the use of resource-saving technologies and environmental protection”;
- “Deposits of major mineral resources (by source)”, “Deposits of energy (by source)”;
- “Forest reserves”, “Reserves of aquaculture (by species)”;
- “Deposits\volumes of water (by main rivers, lakes, reservoirs)”;
- “Deposits of underground water resources”;
- “Ecologically adapted clean domestic product”;
- “Pollution of trans-boundary rivers”;
- “Energy intensity of industries”;
- “Investments in energy-saving technologies and improving energy efficiency”.

In addition, the Agency plans on the medium term to develop indicators that meet the standards of the Organization for Economic Cooperation and Development, which sets targets for the introduction of additional indicators on productivity and resource efficiency. At the moment, a preliminary list of green growth indicators produced by the organization consists of 25 indicators, whose phased implementation is scheduled to begin in 2014.

HARMONY BETWEEN ENVIRONMENTAL INDICATORS OF UBCG AND SEEA, FDES AND POST-THE 2015 DEVELOPMENT AGENDA

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Abstract
The system of environmental and economic accounting, the (SEEA) Central Framework, is endorsed by the United Nations Statistical Commission (UNSC) as an international statistical standard defining the interaction between the economy and the environment. It places statistics on the environment and its relationship with the economy at the core of official international statistics. Furthermore, at its 45th session, the UNSC recognized SEEA as an important statistical framework in support of the post-2015 development agenda and for the development of indicators to trace the progress towards achieving the Sustainable Development Goals. To this end, the UBCG uses SEEA to develop indicators to assess the impacts of the mining industry on the environment. These indicators are in turn linked to the measurement of goals and targets of the post-2015 development agenda.

This paper analyses the role of the UBCG in deriving indicators to measure the impacts of mining on the environment in the context of SEEA, FDES and the post-2015 development agenda. It is concluded that the UBCG's efforts to develop such impact indicators ensures the harmonization of basic statistics in support of SEEA and FDES and that the derived indicators are consistent with the goals of the post-2015 development agenda. Also, the work of the UBCG compliments existing data sources for official statistics and contributes to improving the quality of such data.

Background
Countries with an abundance of mineral resources may benefit from rapid economic growth driven by a mining industry. Possible benefits are increased revenues, enhanced local development, better employment opportunities, reduced poverty and improved wellbeing of people.

Alongside such benefits, mining activities threaten the environment and the biodiversity of mineral rich countries who are faced with the challenge of better balancing economic growth and environmental degradation. To this end, countries need to have appropriate tools to monitor the three-dimensional impacts

of mining on the economy, the society and the environment.

The joint inputs of members of the UBCG have resulted in the development of over 200 indicators for measuring the mining impacts and determining priorities for these indicators (high, medium and low). Within the framework of the UBCG, the National Statistical Office of Mongolia has made significant efforts to harmonize indicators for the measurement of the mining industry's impacts on the environment with international classifications and statistical standards such as SEEA and FDES. Furthermore, the National Statistical Office has created optimal inter-agency coordination mechanisms to compile environmental and economic accounts and assessed the quality of its existing data.

The goal of this paper is to demonstrate the role of the UBCG in supporting the efforts of international development agencies, in particular the UNSD, to promote and apply international statistical standards such as FDES and SEEA for measuring interactions and relationships between the economy and the environment.

The paper analyses and demonstrates that the indicators proposed by the UBCG to measure the impacts of the mining industry on the environment is in harmony with the conceptual framework of SEEA and FDES, and that the UBCG's work contributes to the vision of international organizations to create a statistical tool for measuring to progress towards achieving the Sustainable Development Goals and the post-2015 development agenda.

Section two of the paper focuses on analyzing the relationship between the UBCG's indicators for measuring the impacts of mining on the environment and the definitions and classifications of SEEA and FDES. Section three focuses on the importance of these indicators for measuring the goals and targets of the post-2015 development agenda. Section four provides an overview of existing data sources in Mongolia. Finally, section five draws conclusions on the advantages and benefits of the work done by the UBCG.

Harmonization of indicators developed by the UBCG together with SEEA and FDES

The SEEA Central Framework is based on agreed concepts, definitions, classifications and accounting rules. The integrated information from the tables can be used for assessing trends in the usage and availability of natural resources, the level of emissions and discharges to the environment resulting from economic activity and the amount of economic activity undertaken for environmental purposes. The UBCG has developed 22 indicators to measure the impacts of mining on the environment. These indicators are grouped into five sets as below:

- Measurement of the direct and indirect demand from the mining industry for environmental inputs, both market and non-market, incorporating measurement in terms of value;
- Measurement of emissions and waste products from the mining industry;
- Measurement of damage to land;
- Measurement of the environmental impact of economic activity 'downstream' from the mining industry; and
- Measurement of the impact of mining on green growth and the green economy.

Table 1 shows the definitions of these indicators and their consistency with FDES and SEEA. The consistency of classifications and definitions with international standards allows for the direct use of the statistical data for compiling environmental and economic accounts, which in turn enables measurement of interaction between the economy and the environment as well as provides information for monitoring these interactions for strategic planning and policy making for sustainable development (EU Commission). For example, the UBCG has proposed an indicator to measure soil resources, and this indicator is consistent with the FDES indicator definition 2.4.1 Soil resources and the SEEA indicator definition 2.3 Soil resources. The definition of soil resources is drawn from the conceptual framework of FDES "subsoil resources are underground deposits of various minerals that provide raw materials and sources of energy for humans".

Table 1| Consistency of indicators developed by UBCG with FDES and SEEA

Measurement of the direct and indirect demand from the mining industry for environmental inputs, both market and non-market, incorporating measurement in terms of value			
UBCG	**Definition**	**FDES**	**SEEA**
Mineral resource, by mineral types	-	2.1.1 Stocks and changes of non energy mineral resources	2.1. Mineral resources
Soil resource	Subsoil resources are underground deposits of various minerals that provide raw materials and sources of energy for humans (FDES).	2.4.1 Soil resources	2.3. Soil resources
Water resource	Water resources consist of fresh and brackish water, regardless of their quality, in inland water bodies including surface water, groundwater and soil water.	2.6.1 Water resources	2.7. Water resources
Energy resource (oil, natural gas, coal, peat, uranium)	Mineral and energy resources are defined in SEEA as the known deposits of oil resources, natural gas resources, coal & peat resources, non-metallic minerals and metallic minerals.	2.2.1 Stocks and changes of mineral energy resources	2.1. Mineral resources
Land	Land provides space for natural ecosystems, human habitats and human activities (FDES).	2.3.1 Land use	2.2. Land
Biological resource	Biological resources are renewable resources that are capable of regeneration through natural (non-managed or managed) processes (FDES).	2.5.1 Biological resources	2.6. Other biological resources

Measurement of emissions (air and water) and waste products from the mining industry			
Emissions to water	Emissions to water are substances released to water resources as a result of economic activities	1.3.2 Fresh water quality 3.2.1 Generation of pollutants	1.5. Water emission account
Emissions to air	Emissions to air are gaseous and particulate substances released to the atmosphere by establishments and households as a result of production, consumption and accumulation activities.	1.3.1 Air quality 3.1 Emissions to air	1.4. Air emissions account
Emissions to soil	Emissions to soil are substances released to the soil as a result of economic activities	1.3.4 Soil pollution	
Solid waste	Solid waste is another form of residual, defined as: "discarded materials that are no longer required by the owner or user" excluding small particulate matter released to the atmosphere (emissions to air)	3.3.1 Generation of waste	1.6. Solid waste account
Measurement of damage to land (including agricultural land) and ecosystems from mining activity and any subsequent rectification activity			
Land area of mining exploration and production		2.3.1e Land use	2.2. Land
Land area, water, soil and biodiversity with remediation			2.2. Land 2.3. Soil resources 2.7. Water resources
Land area, water, soil and biodiversity without remediation			2.2. Land 2.3. Soil resources 2.7. Water resources
Land degradation			2.2. Land
Soil damage	Land degradation, soil damage, and desertification are commonly overlapping concepts, all of which generally fall within the scope of degradation	1.1.4.bSoil characteristics	2.3. Soil resources
Measurement of the environmental impact of economic activity 'downstream' from the mining industry			
Damages of the land, soil and road from the transportation, consignment and discharge of the mining products Fee on usage of road from the mining companies			2.3. Soil resources

Environmental damages (water, animal, plant etc.) from the transportation, consignment and discharge of the mining products			
Cost of environmental protection	The Environmental protection expenditures by the mining sector (EPEM) are defined as the sum of current and investment expenditures	6.1.1.1 Annual government environmental protection expenditure	3.1. Environmental Protection Expenditure Accounts
Natural resource management		6.1.1.2 Annual government resource management expenditure	3.2. Accounts for resource management expenditures
Measurement of the impact of mining on green growth and the green economy			
GDP	The GDP on the production side, its defined as the sum of the value added generated by all productive sectors plus net taxes on products subsidies. Current measuring of GDP does not include issues related to depletion of natural resources		
Green GDP			

Relevance of indicators developed by the UBCG in support of the post-2015 development agenda

Table 2 shows the relevance of the UBCG indicators for the goals and targets of the post-2015 development agenda. For example, Goal 6 (secure water and sanitation for all for a sustainable world) has a number of targets, and the National Statistical Office has identified the most relevant ones as Target 6.4 (improve water use efficiency by 2030 by x percent across all sectors) and Target 6.5 (implement integrated water resource management). Under the indicator-group "measurement of the direct and indirect demand from the mining industry for environmental inputs, both market and non-market, incorporating measurement in terms of value", the UBCG proposes to compile data on water resources with the objective to estimate water use efficiency in the mining sector. In the same way, the energy resource indicators (for oil, natural gas, coal, peat and uranium) proposed by the UBCG will enable the estimation of energy use efficiency in the mining sector. Such data is useful to measuring the progress towards achieving the Sustainable Development Goals, which include ensuring access to affordable, sustainable and reliable modern energy services for all, doubling the global rate of improvement in energy efficiency and phasing out inefficient fossil fuel subsidies by 2030.

Data sources and availability

The indicators being developed to measure the impacts of mining on the environment are compiled using a wide range of data sources (see Figure 1). Although national accounts are the main source, other data sources are equally important. These include environmental and economic statistics questionnaire (survey) covering official registrations of mining companies, their financial balance sheets, quarterly taxation reports, as well as censuses and surveys such as the artisanal and small scale mining survey, HSES, LFS and so on.

The environmental economic statistics survey is the main survey providing data for measuring:

- The direct and indirect demand of the mining industry for environmental inputs, both market and non-market, incorporating measurement in terms of value;
- The emissions (air and water) and waste products from the mining industry;
- The damage to land (including agricultural land) and ecosystems from mining activity and any subsequent rectification activity;
- The environmental impact of the economic activity 'downstream' from the mining industry; and
- The impact of mining on green growth and the green economy is environmental economic statistics survey.

Additionally, administrative data collected and integrated by the Ministry of Environment and Green Development is an important source for deriving statistical indicators to measure the impact of the mining sector on the environment.

A compilation of existing data shows that there is still lack of data. Data requirements for planning, policy making and monitoring are large, and the National Statistical Office is faced with challenges such as poor quality or comparability of existing data or missing data.. Other challenges include the statistical analysis capacity of the Office's staff and lack of resources needed for collecting environmental data.

Conclusion

The UBCG brings a number of advantages and benefits for its member countries as well as for the international statistical community. These include:

- Harmonization of basic statistics in support of SEEA and FDES;
- Consistency of the work of the UBCG with the goals of the post-2015 development agenda;
- Complementation and integration of data sources for official statistics;
- Improved data quality;
- Development of clear goals and strategies for implementation of SEEA and other relevant international recommendations;
- Harmonization of methods and procedures for collecting and processing data to derive indicators for measurement of impacts of mining on the environment;
- Timely analysis of data for policy making, implementation and monitoring; and
- Capacity building of national statistical offices through close collaboration and sharing of best experiences among member countries and international experts.

Table 2 | Relevance of indicators developed by UBCG to Post 2015 Development Agenda

	Goals	Targets	UBCG
Goal 6	Secure water and sanitation for all for a sustainable world	6.4 Improve water use efficiency by 2030 by x% across all sectors 6.5 Implement integrated water resource management	• Water resource (water use data for mining sector) • Natural resource management
Goal 7	Ensure access to affordable, sustainable, and reliable modern energy services for all	7.5 Double the global rate of improvement in energy efficiency 7.6 By 2030 phase out inefficient fossil fuel subsidies	• Energy resource
Goal 9	Promote sustainable industrialization	9.9 Improve industrial resource efficiency by accelerating the development, transfer and adoption of environmentally sound technologies and processes 9.11 retrofit x% of existing industries with clean technologies and environmentally sound industrial processes to achieve y% energy and z% resource efficiency	• Cost of environmental protection • Natural resource management
Goal 12	Promote sustainable consumption and production patterns Related indicators to water, energy, carbon dioxide emissions, nutrient balances, and solid waste	12.2 Achieve sustainable management and efficient use of natural resources to enhance human welfare within carrying capacity of ecosystem 12.3 improve resource efficiency of economic activities and decouple growth from environmental degradation 12.5 by 2030 reduce by x% per capita waste 12.9 increase number of companies reporting on CSR 12.10 increase share of private sector actors incorporating sustainable development principles into business practices	• Water resource • Energy resource • Emissions to air • Solid waste • Emissions to soil • Natural resource management
Goal 13	Proposed goal 13. Promote actions at all levels to address climate change/Build a climate change goal based on outcome of COP21 and UNFCCC Related indicators to emission permits and taxes and subsidies	13.4 introduce instruments and incentives for investments in low carbon solutions in all relevant sectors	• Natural resource management • Cost of environmental protection
Goal 15	Proposed goal 15. Protect and restore terrestrial ecosystems and halt all biodiversity loss Related indicators to land degradation	15.1 halt the loss of all biodiversity 15.2 ensure conservation and sustainable use of ecosystems 15.4 ensure the implementation of sustainable management of all types of forests and mountain ecosystems 15.6 halt and prevent land degradation, reclaim land affected by desertification, drought and improve land productivity and soil quality	• Land degradation • Natural resource management • Cost of environmental protection

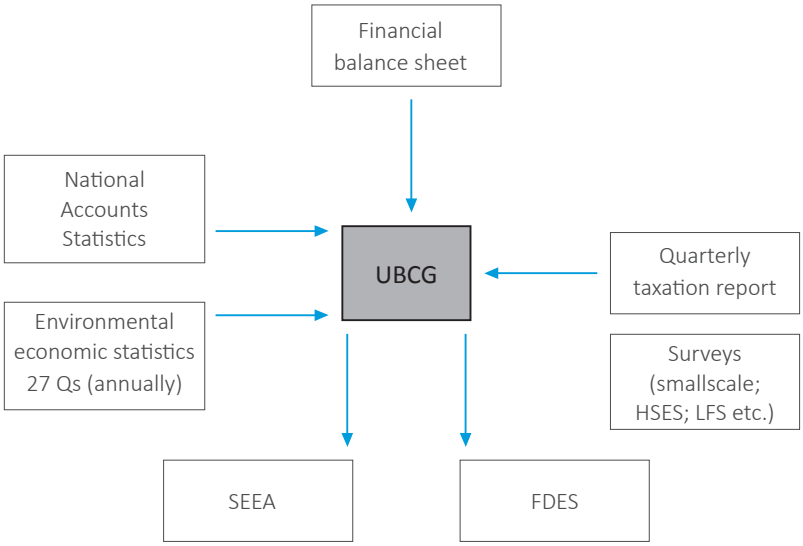

Fig. 1 | Data sources for measuring impacts of mining on environment

The importance of the work done by the UBCG is that the indicators, mutually agreed and developed by the member countries, ensure comparability of data across the countries and provide insight efficiency of using natural resources (inputs) for mining and the current situation of environment. However, high costs and need for resources to collect and process the necessary data and lack of expertise within the national statistical system may hold back the initiatives of the UBCG. Alongside with creating necessary data, the countries may also face problems associated with the quality of existing data. With an increasing demand for new data as a result of post-2015 development agenda, it is essential to advance international collaborations. The UBCG is one example hereof, and it is essential to decide on how to continue and sustain the functions of the UBCG in the future to the benefits of the countries involved.

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