

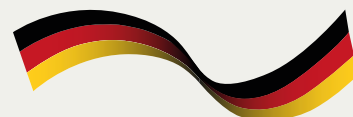


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Linkages to the Mining Sector in Colombia

October 2019



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Introduction

The Colombian mining sector is dominated by large coal projects in the North of the country, making it the 5th biggest coal exporter in the world.¹ Gold is the second biggest mining output by value, with several alluvial and underground mining projects operating, and with multiple gold-copper projects in exploration and development phase. The country is also famous for its emeralds, which are produced in the Departments of Boyacá and Cundinamarca.² A big Ferronickel project and two medium-sized iron-ore mines make up the rest of the large-scale mining sector. Apart from the large-scale mines, small and artisanal miners (both formal and informal) are particularly prevalent in the gold and emerald sectors.³

While the mining sector plays a relatively small role at the national level contributing to around 1.5-2% to GDP over recent years,⁴ it does play an important role in several Departments such as Cesar and La Guajira where it is the largest economic activity. There is also great geological potential to expand the mining industry in the country. The Colombian Mining Association estimates that an additional US\$6.7 billion⁵ of investments in the sector could be secured if several identified large-scale projects⁶ are realized.

There have been efforts by the Government to reinvigorate the mining sector in recent years and copper has been added as a strategic mineral given the geological potential in the country and the expected increase in demand due to the energy transition. However, few new projects have come on stream. Social opposition to proposed projects have resulted in rejections during public consultations.⁷ The number one criticism put forward during the

consultations is that impacted communities bear the costs, but do not reap sufficient benefits.⁸

One avenue to spread the benefits from mining projects more widely is through linkage creation. In this context, this policy brief reviews the existing linkages to the mining sector in Colombia, provides an overview of select Government and company programs that aim to create linkages, identifies bottlenecks, and provides suggestions of how to maximize the potential for linkages in the future. This analysis was done by reviewing the legislation and policies at the national level, and assessing select contracts and company programs. It was complemented by interviews with stakeholders from the Government, private sector, civil society and academia, as well as consultations during workshops in Bogotá. Given the scope of the project, it does not focus on a specific mineral or region. Instead, this policy brief aims to give a high-level overview of the topic.

The policy brief is structured as follows. Section 2 provides an overview of potential linkages to the mining sector. Section 3 reviews Colombia's mining sector by linkage type. Section 4 summarizes the findings and provides suggestions for next steps.

¹ International Trade Centre Statistics (2018)

² Agencia Nacional de Minería – Ficha Esmeraldas (https://www.anm.gov.co/sites/default/files/ficha_esmeraldas_es.pdf)

³ Excluding the quarrying sub-sector, which was not considered for the purpose of this brief.

⁴ Minenergia (2019) Análisis del comportamiento del PIB minero: Cuarto trimestre de 2018 (<https://www.minenergia.gov.co/documents/10192/23966843/PIB+IV+trimestre+2018.pdf/f2ce44da-5a6a-456c-9f2a-fa74d89d4d5f>)

⁵ Asociación Colombiana de Minería: Colombian Mining Sector Development 2018-2022 (<http://acmineria.com.co/acm/wp-content/uploads/2018/10/acm-colombianminingsectordevelopment.pdf>)

⁶ Proyectos de Interés Nacional y Estratégico PINE (<https://www.minenergia.gov.co/proyectos-de-interes-nacional-estrategico-pine>)

⁷ AngloGold Ashanti (Abril 2017) Comunicado oficial sobre La Colosa (<https://www.anglogoldashanticolombia.com/comunicado-oficial-la-colosa/1719/>)

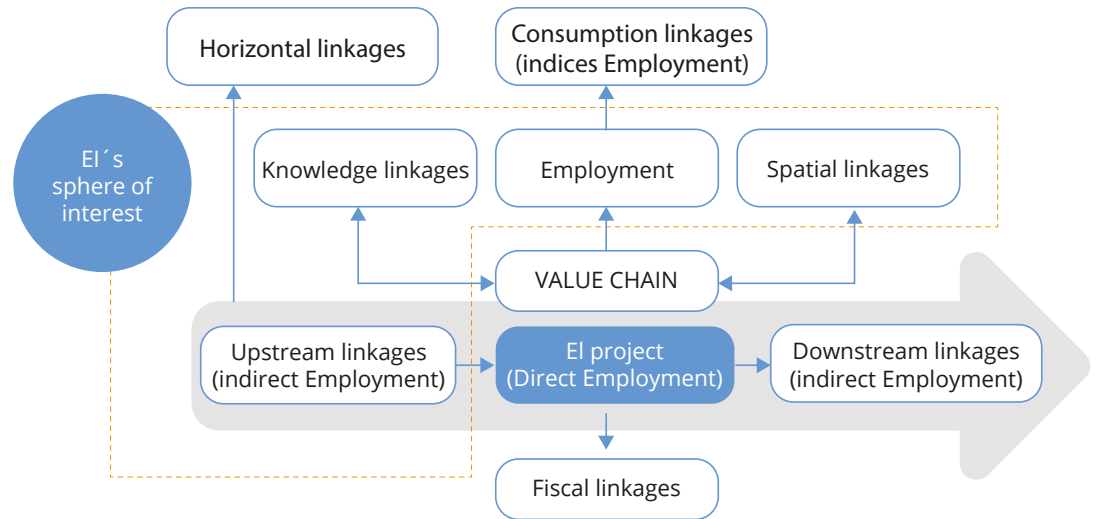
⁸ Gobierno de Colombia (2019) Plan Nacional de Desarrollo 2018-2022: Pacto por Colombia, pacto por la equidad

2

Linkages to the mining sector

Figure 1 outlines the positive linkages to the mining sector that have been reviewed for the purpose of this policy brief. These linkages can lead to increased value addition, employment, additional investments, the creation of new markets, transfer knowledge and help a region to diversify from mining.

Figure 1:
Linkages to the mining sector⁹



- **Upstream linkages:** relate to the procurement of goods and services that the mining sector requires to operate. For example, this includes welding services needed to maintain equipment. It may also include programs related to artisanal and small-scale miners if the mine buys the gold from these stakeholders.

- **Downstream linkages:** relate to the beneficiation of extracted commodities through refining, smelting and further downstream processing of the commodity before reaching the final consumer. For example, the cutting, polishing and further processing to jewelry adds value to mining of precious stones.

- **Horizontal linkages:** relate to the development of new industries using the capabilities of mining-related activities. For example, mining trucks could be re-engineered and adapted to service the logging industry.

- **Consumption linkages:** relate to the demand for goods and services resulting from the spending of earnings from the extractive industry (EI) sector. For example, when a truck driver employed to work at a mine site spends his salary on buying construction materials to build a family home.

- **Technology linkages:** relate to the transfer of knowledge and technological know-how. For example, a mining company may require IT services with higher expertise. Apart from benefitting the mining company itself, the developed IT expertise may also benefit other sectors in the economy.

- **Infrastructure linkages:** relate to the benefits associated with the infrastructure developed for a mining project profiting other actors in the economy. For example, a copper mine is likely going to require water infrastructure. Other users from the mining sector and non-mining sector may benefit from this water infrastructure if granted access.¹⁰

⁹ Adapted from CCSI (2016) Linkages to the Resource Sector (<http://ccsi.columbia.edu/files/2016/07/Linkages-to-the-resource-sector-GIZ-CCSI-2016.pdf.pdf>)

¹⁰ This is different from the royalty and tax offset program for infrastructure. To classify as shared-use infrastructure, the infrastructure in question needs to serve the mine site.

3

Linkages to the Mining Sector in Colombia

3.1. Overview

The 2017 national development plan for the mining sector¹¹ estimates the upstream and downstream linkages from the mining sector at a value of \$14.6 billion and \$25.7 billion respectively for 2010. Figure 2 shows that at the national level mining has fewer upstream linkages when compared to other sectors and performs below average on downstream linkages in 2012. The upstream linkages also have

fallen between 2004 and 2012. However, in Departments where mining plays an important role, such as Cesar and Chocó, the upstream linkages to the mining sector are significant.¹²

Figure 2: Sectoral indicators of the Leontief Matrix¹³

Sector	Backward	Forward	Backward	Forward
Agricultural	0.83	0.87	0.89	0.87
Mining	1.09	0.67	0.82	0.83
Industry	1.26	1.75	1.17	1.45
Construction	1.08	0.65	1.02	0.71
Transport	1.02	0.78	1.14	0.86
Public Admin	0.83	0.58	0.97	0.68
Services	0.89	1.70	0.97	1.61

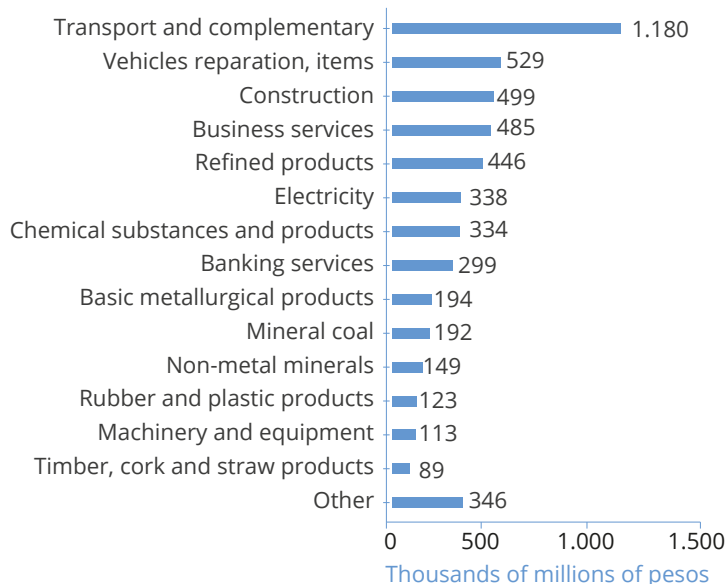
¹¹ Unidad de Planeación Minero Energética (2017) Plan Nacional de desarrollo minero con horizonte a 2025: Minería responsable con el territorio.

¹² Banco de la República (2016) Encadenamientos regionales en Colombia 2004-2012, Documentos de trabajo sobre economía regional, Núm. 234, ISSN 1692 - 3715

¹³ Banco de la República (2016) Encadenamientos regionales en Colombia 2004-2012, Documentos de trabajo sobre economía regional, Núm. 234, ISSN 1692 - 3715

Figure 3 provides an overview of the upstream linkages of the mining sector by category. These estimates were also done by sub-sectors. The largest supplier spending from the coal sub-sector was transportation and logistics, construction, storage and vehicle repair services. For the ferronickel and large-scale gold mining sub-sectors, it was storage services, auditing and legal services, transportation and logistics, as well as electricity procurement.¹⁴

Figure 3: Spending by the mining sector by category in 2011¹⁵



	Mineral coal		Metallic minerals	
	\$	%	\$	%
Exports	10.478	93,9%	1.999	33,6%
Gross fixed capital formation	21	0,2%	52	0,9%
Intermediary demand	657	5,9%	3.905	65,6%
Basic metallurgical products	23	0,2%	3.827	64,3%
Construction	0	0,0%	0	0,0%
Non-metallic mineral products	69	0,6%	11	0,2%
Mineral coal	160	1,4%	0	0,0%
Electricity	182	1,6%	0	0,0%
Chemical substances and products	9	0,1%	12	0,2%
Refined products	122	1,1%	0	0,0%
Transport equipment	0	0,0%	53	0,9%
Metallic minerals	27	0,2%	0	0,0%
Non-metallic minerals	6	0,0%	0	0,0%
Other	60	0,5%	2	0,0%
Total supply	11.156	100%	5.956	100%

Figure 4: Exports and domestic processing of the mining sector (millions)¹⁶

In terms of downstream linkages, **figure 4** shows that in 2010 most minerals were exported without adding value domestically.



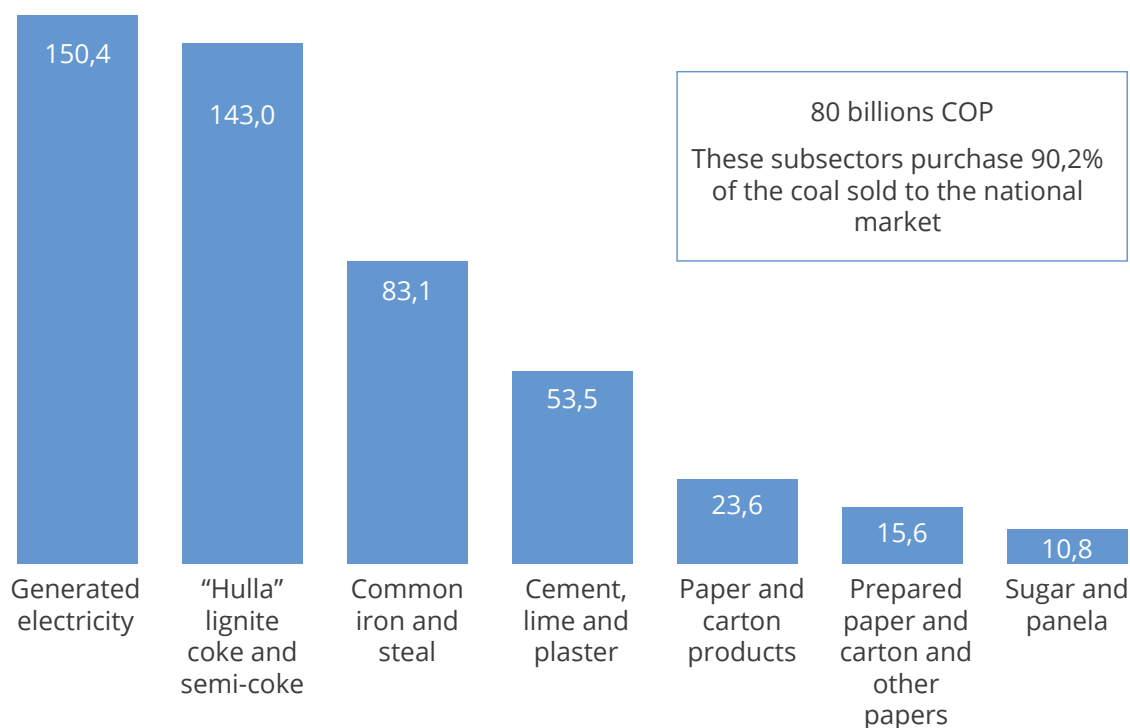
¹⁴ UPME (2017) Plan Nacional de Desarrollo Minero con Horizonte a 2025

¹⁵ Fedesarrollo (2013) Estudio sobre los impactos socio-económicos del sector minero en Colombia: Encadenamientos sectoriales, Cuadernos Fedesarrollo 47

¹⁶ Fedesarrollo (2013) Estudio sobre los impactos socio-económicos del sector minero en Colombia: Encadenamientos sectoriales, Cuadernos Fedesarrollo 47

All of the ferronickel from Cerro Matoso and 94% of the coal is exported.¹⁷ As shown in figure 5, the majority of the coal sold domestically is used for energy generation and coke production.

Figure 5: Downstream linkages to coal mining in Colombia¹⁸



The iron-ore mines do sell into the domestic steel market explaining the domestic value add for metallic minerals. It is estimated that around 98% of gold¹⁹ and emeralds²⁰ are exported with only 2% being processed domestically into jewelry.

In terms of consumption linkages, which are measured by multipliers and are often referred to as induced impacts, it has been estimated that for every \$1 worth of increase in mineral production a \$2.44 contribution is induced into the national economy.²¹

The other linkage types outlined in figure 1 are more difficult to quantify and therefore the reviewed studies do not analyze these at a macroeconomic level. As expanded on in the below sections, the Government has included provisions that could facilitate infrastructure linkages in the railway sector and there are Government and company efforts to develop knowledge and horizontal linkages.

¹⁷ UPME (2017) Plan Nacional de Desarrollo Minero con Horizonte a 2025

¹⁸ UPME (2017) Plan Nacional de Desarrollo Minero con Horizonte a 2025

¹⁹ UPME (2012) Estudio para caracterizar la demanda interna de oro en Colombia, Contrato de consultoría No. 19547-010-2012

²⁰ UPME (2018) Esmeraldas: Caracterización y análisis de mercado internacional de minerales en el corto, mediano, y largo plazo con vigencia al año 2035, Contrato #: C-378359-003-2018

²¹ Fedesarrollo (2013) Estudio sobre los impactos socio-económicos del sector minero en Colombia: Encadenamientos sectoriales, Cuadernos Fedesarrollo 47

3.2. Regulatory tools

The mining law 685 from 2001²² and contracts for three large-scale mining operations were reviewed for provisions that promote linkages. These include the contracts of Cerrejón (1991, 1997 and 2001), two for Drummond (1988, 1997 and 2015) and two for Cerro Matoso (1996 and 2011).²³⁻²⁴

Local employment

- Law 685/2001 Articles 128, 251, 253 and 254 require employment preference to be given to nationals and to indigenous people (when located in indigenous territories) as long as these have the necessary skills. Salaries for nationals cannot be significantly lower than expatriate salaries. The mining authority can specify the percentages that should come from the region and the surrounding communities. During capacity building programs of the workforce the employment limits can be overridden upon authorization.

- With the exception of the Drummond (1988 and 2015) and Cerrejón (1991) contracts, all others have local minimum employment targets. These range from requiring 70% of nationals being employed in the Cerro Matoso (1996 and 2011) contract to 90% of nationals during construction and the first three years of operation increasing to 95% starting from the fourth year of extraction in the Cerrejón (1997) contract. Preference is to be given to people from the impacted communities.

Local procurement

- Law 685/2001 Article 252 requires preference to be given for local goods and services if they are competitive. Price competitiveness is defined as not exceeding 15% of the foreign goods and services. Companies have to disaggregate tenders in order to facilitate national participation.

- All contracts include a provision that stipulates that preference should be given to local and national companies. The Drummond (1988) and Cerrejón (1991) contracts require a feasibility study to be delivered that disaggregates technologies required by the project and assesses the domestic potential. This study needs to be undertaken during the construction phase of the project. Later contracts such as Drummond (1997) and Cerrejón (1997 and 2001) require semiannual reports that outline what was procured locally and internationally over a certain expenditure threshold. Drummond 2015 requires annual reporting on the strategy that is being followed to satisfy the national preference clause, as well as procurement expenses.



²² Ley 685 de 2001 (https://www.anm.gov.co/sites/default/files/ley_685_2001_0.pdf)

²³ Contracts reviewed are available on the website of the National Mining Agency (<https://www.anm.gov.co/?q=informe-de-materilidad>) and resourcecontracts.org

²⁴ The contracts reviewed for this policy brief are of several the large-scale projects in Colombia. They are not representative of the majority of the contracts signed in the sector given that the most of the licenses are held by small companies or individuals, and are in the exploration phase.

Technology transfer

- Law 685/2001 Articles 151 and 255 encourage companies to put in place technological transfer programs and to cooperate with local universities. These expenses can be deducted by up to 10 percent from the royalties paid. For marine mining projects, technology transfer provisions are stronger. They require that technology transfer obligations are included in all exploration and exploitation contracts.

- Drummond (1997) and the Cerrejón (1997) have the most extensive technology transfer provisions out of the analyzed contracts. These include liaising with the local entities to develop tertiary and technical training programs, payment of scholarships for locals and giving hiring preference to these upon graduation, training workers, supporting technology transfers to contractors and sending workers to mining projects in other countries to gain experiences. The Drummond (2015) contract requires the company to plan for and report on its partnerships with local institutions, which has to be revisited every 5 years. The report has to outline the transfer of new technologies that have been developed or acquired during that time.

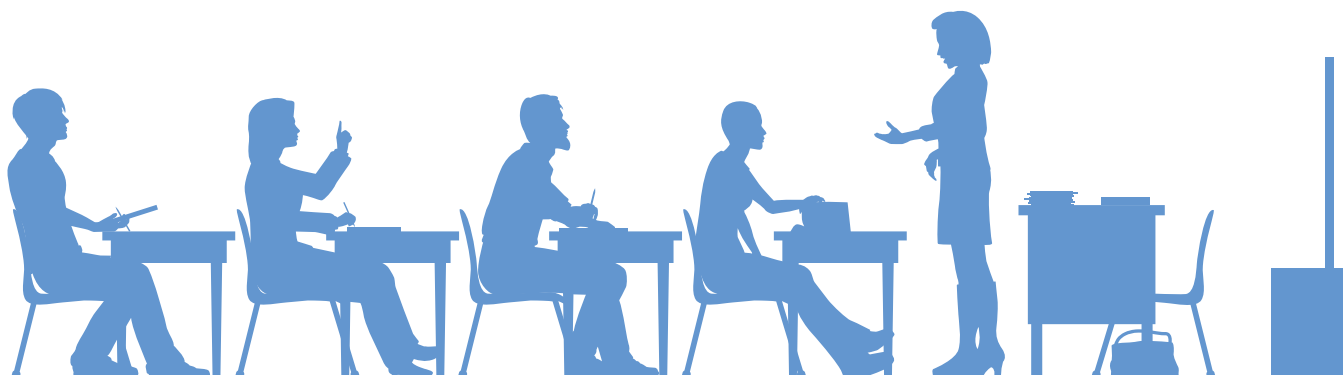
Shared-use infrastructure

- While the law does not stipulate shared-use infrastructure requirements, the contracts of Drummond (1988, 1997 and 2015) as well as Cerrejón (1991, 1997 and 2011) foresee the use of the port and railway infrastructure by third party actors. The tariff

for accessing the infrastructure needs to be agreed upon by the two parties. Drummond 2015 refers to an existing open access contract signed with American Port Company Inc. and Transport Services LLC.

Apart from the explicit clauses outlined above, there are also social responsibility clauses in the contracts where funds could be allocated to support linkage creation programs. For example, the Cerro Matoso (2011) contract requires that the company invests US\$10 million in social investments at the regional level during the following 5 years, as well as 1% of earnings or US\$2.5 million (whichever is higher) in social responsibility programs. These may include infrastructure, education and procurement projects. Similarly, Drummond (2015) has regional and permanent social contribution clauses that are broad and may include investments in linkage creation programs.

When compared with other mining jurisdictions, Colombia has placed relatively strict employment restrictions with set targets. The procurement provisions are relatively lax and difficult to enforce. Shared-use infrastructure provisions exist in several coal mining contracts, and the technology transfer provisions are extensive and detailed.



3.3. Government policies and support mechanisms

The fourth part of the national development plan²⁵ states that the mining and hydrocarbon sectors should contribute to sustainable development. The national development plan for the mining sector²⁶ and the mining policy²⁷ go into more detail about how to achieve this. The documents highlight the lack of coordination between local, regional and national mining to be a major bottleneck for linkage creation²⁸. Furthermore, there is a lack of human capital and infrastructure in the mining regions that hinder the integration of the sector with the rest of the economy. The Ministry of Mines and Energy is in charge of providing technical support to address these challenges and coordinate activities among the various actors.

The following strategic interventions are outlined in the national development plan for the mining sector that contribute to linkage creation:²⁹

1. Increase the participation of the mining sector in the infrastructure planning process,
2. coordinate and develop agendas for science and technology programs that support the mining sector,³⁰
3. develop a linkages program along the value chain of minerals at the local, regional and national level, and
4. coordinate the curricula and professional training programs to build human capacity in the sector.

Several programs and activities that have or are currently being implemented by the Government to support the achievement of these strategic interventions are listed below:

Local Employment

To support mining companies to achieve the local employment targets set out in the legislation and in the contracts, and to further spur the technology transfer through increased local employment, the Ministry of Mines and Energy in collaboration with the Ministry of Education has developed the National Framework of Qualifications in the mining sector. This document outlines what courses and qualifications are offered in Colombia and what is needed to support the coal and gold mining sectors in the future. Technological developments in the mining sector are identified to help determine what courses should be offered at universities and technical schools to capacitate the worker of the future. Figure 6 outlines the identified qualifications by level of qualification requirement (with level 6 being the highest).



²⁵ Gobierno de Colombia (2019) Plan Nacional de Desarrollo 2018-2022: Pacto por Colombia, pacto por la equidad

²⁶ UPME (2017) Plan Nacional de Desarrollo Minero con Horizonte a 2025

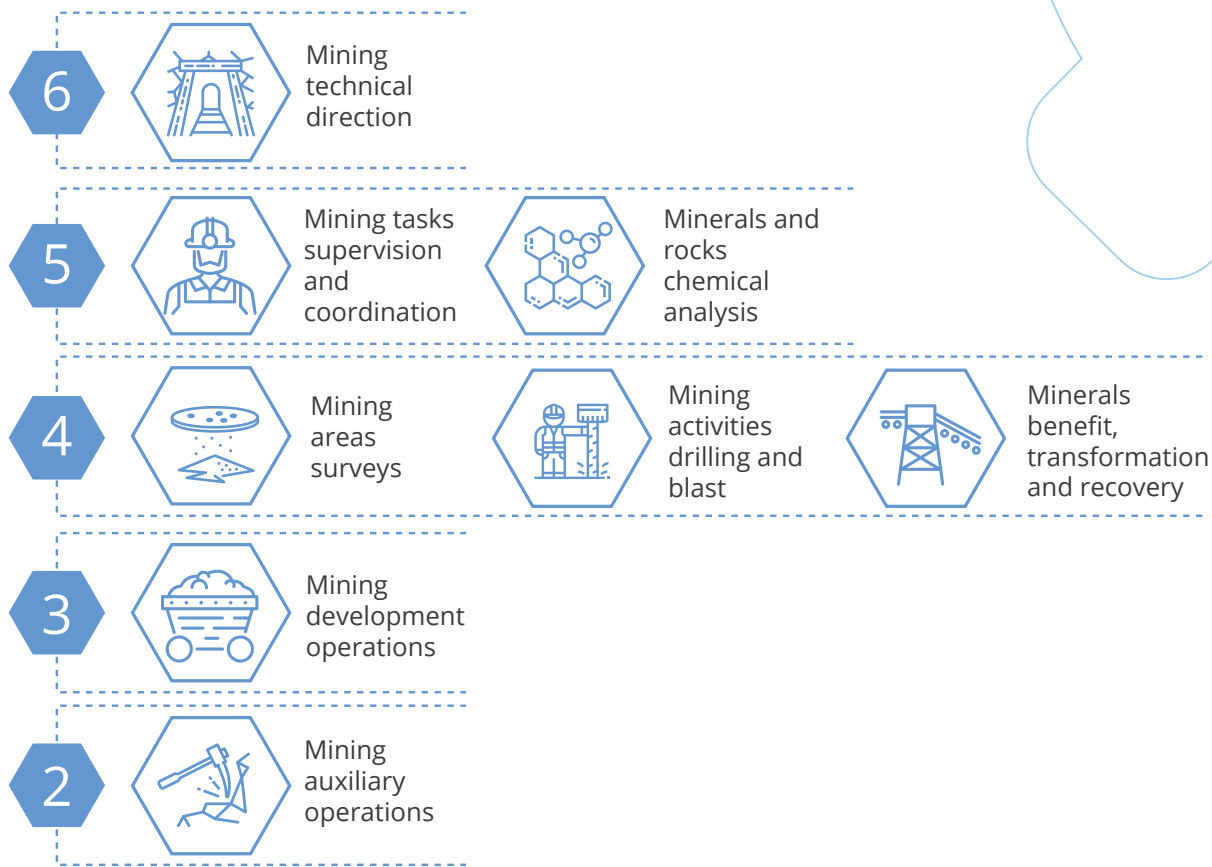
²⁷ Minminas (2016) Política Minera de Colombia: Bases para la minería del futuro

²⁸ This lack of coordination and missing presence of the National Government in mining regions was also highlighted as being a major bottleneck to linkage creation by the interviewees.

²⁹ UPME (2017) Plan Nacional de Desarrollo Minero con Horizonte a 2025

³⁰ El decreto 1651 de 2019 – Organization and functionality of the National System of Competitiveness and Innovation complements this strategic intervention.

Figure 6: Qualification requirements in the mining sector³¹



Local procurement

The National Planning Department initiated a program in 2011 to support and develop companies that could supply to the hydrocarbon and coal mining sector.³² Apart from increasing the upstream linkages to the sector, the aim was also to transfer technologies to local industries and develop their capacities. A baseline analysis was commissioned to assess the potential of local enterprises supplying to the coal mining companies and a database was established. This project was reinvigorated in 2016 with a study and updated [supplier database](#)³³ in the regions of Cesar, Guajira, Magdalena, Atlántico, Norte de Santander, Santander, Boyacá and Cundinamarca.³⁴ 60,029 companies that could potentially supply the sector were identified through

consultation workshops. The below table outlines the goods and services that are needed by the coal industry and categorizes the goods based on the availability in Colombia (y-axis) and the value-add they can create (x-axis). The squares towards the bottom right hand side of the table indicate goods and services that currently are not offered in the region and where there are opportunities to create value added by new businesses. This study provides a good indication of what sectors the Government and mining companies should prioritize with support mechanisms to build a vibrant supplier sector to the coal industry.

³¹ Mineducacion (2017) Marco Nacional de Cualificaciones: Sector Minero

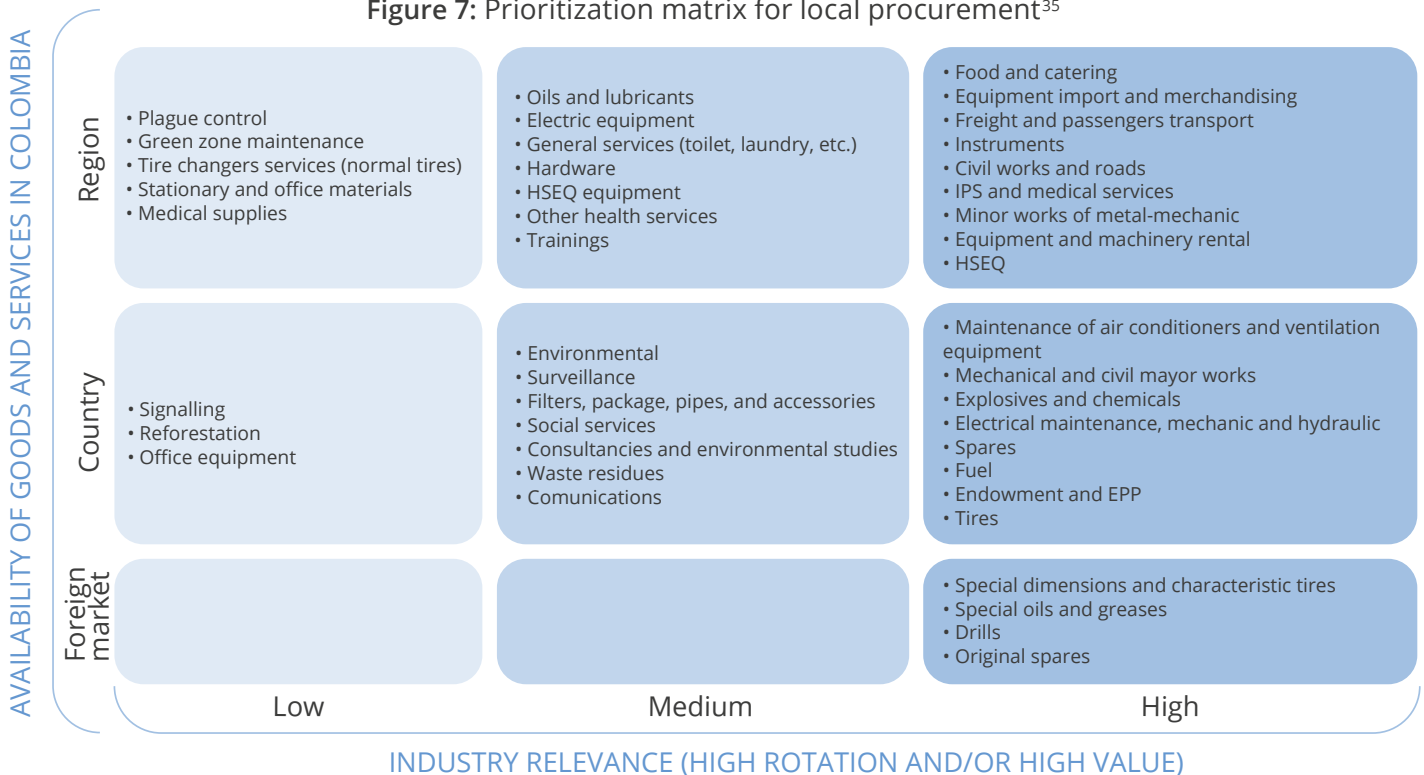
³² DNP (2011) Programa nacional de desarrollo de proveedores de bienes y servicios para hidrocarburos y minería de carbón a gran escala

³³ UPME (2016) Directorio de posibles proveedores de la minería por departamentos

³⁴ UPME (2016), Estrategias para acercar la oferta y demanda de bienes y servicios de alta rotación y prioritarios del sector de minería del carbón en los departamentos de Cesar, Guajira, Magdalena, Atlántico, Norte de Santander, Santander, Boyacá y Cundinamarca.



Figure 7: Prioritization matrix for local procurement³⁵



Technology transfer

As outlined above, the technology transfer provisions in the mining law and contracts are detailed and extensive. However, unlike in the hydrocarbon sector, the mining companies have not extensively used the incentive to offset technology transfer expenses from royalty and tax payments (the Cerro Matoso project used this incentive in 2007 and 2008 to some extent).

³⁶ In addition to the incentives, a set amount of royalty payments from the mining sector go into the Colciencias fund, which can subsequently fund research and development programs and studies with universities. Figure 8 outlines the strategy to implement the science, technology and innovation strategy for the energy and mining sector.

³⁵ UPME (2016), Estrategias para acercar la oferta y demanda de bienes y servicios de alta rotación y prioritarios del sector de minería del carbón en los departamentos de Cesar, Guajira, Magdalena, Atlántico, Norte de Santander, Santander, Boyacá y Cundinamarca.

³⁶ Colciencias (2013) Plan estratégico de ciencia, tecnología e innovación en energía y minería 2013-2022.

Figure 8: Strategy to implement the energy and mining research program³⁷



It is noteworthy that while the mining sector is one of the main contributors to the fund, there are very few research projects on mining and research groups associated with the mining sector. The research projects fall under the umbrella of the National Research Program in Energy and Mining (PIEM) and in 2012, research groups associated with this program (105) made up only 1.9% of the total recognized research groups. Of those, the large majority focused on the energy sector with only 10 groups linked explicitly to mining.³⁸

Another avenue through which the Government is seeking to support innovation in Colombia is INNpulsa, an entity created in 2012 under the Ministry of Commerce, Industry and Tourism. In 2014, INNpulsa developed a program of open innovation for the mining and petroleum sectors (PIAGE).³⁹ The program has identified several problems that large anchor projects are faced with and which smaller

suppliers in Colombia can help address. Among the case studies, there were no major mining companies. However, it does include Ecopetrol from the petroleum and Argos from the cement sector, which may provide valuable lessons learned.⁴⁰

Infrastructure development

While there are provisions in the analyzed coal mining contracts to share infrastructure investments, shared-use infrastructure is not referred to in the context of the policies or programs. Infrastructure provision and the construction of transport infrastructure is discussed, but only in the context of Government investments to improve the business environment for the mining sector.

³⁷ Colciencias (2013) Plan estratégico de ciencia, tecnología e innovación en energía y minería 2013-2022

³⁸ Energy efficiency (21) and the electricity sector (20) make up the largest number of research groups. These are followed by research groups focusing on hydrocarbons (13), alternative energies (11), prior to mining focused research groups.

³⁹ Banco de Desarrollo de América Latina (2015) El caso de INNpulsa Colombia: La evolución de una política pública para el crecimiento empresarial extraordinario, serie políticas públicas y transformación productiva, No. 19/2015

⁴⁰ INNpulsa (2014) Programa de Innovación abierta, Reporte de avance mayo 20, 2014

3.4. Company programs

All large-scale mining companies have developed programs to promote linkages to the domestic economy. This is good business practice as it can reduce operating costs and help gain acceptance of the mining project by the local population. A full review of the large-scale mining company programs is beyond the scope of this brief. Therefore, the examples provided below should not be viewed as a value judgement, but rather as examples of a broad set of programs that are being implemented by some of the large-scale mining companies in the country.

Local employment and technology transfer at Cerrejón⁴¹

Out of the 5,997 people working at Cerrejón, 68% come from La Guajira and the company sets annual goals to increase the proportion of women, indigenous people and residents of communities that are impacted by the project. The company had 521 courses to improve worker skills, thereby supporting the knowledge and technology transfer linkage. Knowledge and technology transfers are also supported through the company's procurement program with entrepreneurial courses provided to 40 local companies since 2016, and through its scholarship and vocational training program. Cerrejón founded TecnoGuajira Institute of Vocation Studies, in which 1024 students have enrolled and about half have graduated over the years. Particular support is provided to students from impacted communities.

Local procurement and diversification program at Continental Gold⁴²

Continental Gold's Buriticá gold mine is currently under construction and will be the largest gold mining project in the country. To support impacted communities, the company has entered into partnerships to develop an agriculture and supplier program in the impacted regions. The agriculture program, called "Siembra Futuro",

supports agricultural production in the western part of Antioquia. It was launched in August 2017 and aims to develop new agriculture markets, improve nutrition standards, and provide alternative revenue sources. It also aims to ensure that the region does not become dependent on the mining project and continue to have a thriving agriculture sector. Technical support, access to capital and trainings are provided to agriculture associations. This is done in collaboration with Comfenalco and the Corporación Tecnológica Católica de Occidente (TECOC). To date (September 2019), the program has contributed with US\$1,075,333 towards the development of 332 agriculture projects. Part of the agriculture program will also link up to the supplier development program with agricultural goods that are going to be sold in the region, thereby reducing the procurement costs and transport times for local buyers. The supplier program has contributed US\$900,000 to date (September 2019) and is implemented in collaboration with the local chamber of commerce and the Inter-American Development Bank. After having completed a baseline analysis of the existing capacity in the region, capacity building programs have been developed in order to prepare and support 75 micro and small-sized enterprises to provide goods and services to the mining project and other sectors in the region.⁴³ Apart from the project component to build capacity, the program also has a territorial planning component that supports the local entities in developing regional linkages through identified priority projects and interventions.

⁴¹ Cerrejón 2017 Sustainability Report

⁴² Continental Gold 2017 Sustainability Report

⁴³ Continental Gold (2019) Comité Estratégico Programa de Encadenamiento Productivo - Fase 3



Inclusion/formalization of artisanal miners at AngloGold Ashanti and Mineros, SA⁴⁴⁻⁴⁵

AngloGold Ashanti's Gramalote project, which is in advanced exploration stage, is located in an area where artisanal mining has long been practiced. Together with the National and Local Governments, and with support of USAID⁴⁶ the company has developed the 'Coexistence program' that foresees the recruitment of 40% of artisanal miners directly impacted by the project. Furthermore, it aims to provide legal, social and technical support to formalize artisanal miners, and to help improve mining and processing practices in the region. A processing plant will be built for artisanal miners to add value without having to rely on practices that adversely impact their health and the environment.⁴⁷

Mineros SA, which has gold mining projects in Colombia, Nicaragua and Argentina, also has experience with artisanal mining linkage programs. Particularly its Hemco project in Nicaragua can provide valuable lessons learned. It integrates artisanal miners in its operations by reserving a proportion of its concession for artisanal purposes. It is estimated that 1675 artisanal miner collectives each with three to four miners operate in this area. The model foresees that Hemco buys gold from artisanal miners and reserves a certain capacity of its gold

processing facilities to be used by artisanal miners. The company also provides trainings with 1871 artisanal miners attending these in 2018 and provides protective gear. The closure and rehabilitation of one mining area is thought to be the first one of its kind in artisanal mining. To manage the relationship and address the needs of the company and the artisanal miners, a Municipal Commission of Artisanal Miners was created which is integrated in the Municipality of Bonanza. Apart from 11 cooperative representatives from artisanal cooperatives, Government entities including the Ministry of the Family, the Ministry of Environment and Natural Resources, the Institute of Forestry and the police have representatives that are part of the commission.

Shared-use infrastructure at Cerro Matoso⁴⁸

Cerro Matoso has built, maintained and improved road systems close to where the project operates. These roads are not only reserved for the project, but are also used by third parties. As such, these investments can be seen as shared-use infrastructure.

⁴⁴ AngloGold Ashanti: Sustainability Report 2017, Artisanal and Small Scale Mining

⁴⁵ Mineros SA - Memoria de Sostenibilidad 2018

⁴⁶ USAID, Artisanal Gold Mining Program: Oro Legal, Fact Sheet (https://www.usaid.gov/sites/default/files/documents/1862/ArtisanalGoldMining_FactSheet.pdf)

⁴⁷ Semana Sostenible (23.07.2019) La formalización es el camino (<https://sostenibilidad.semana.com/hablan-las-marcas/articulo/la-formalizacion-es-el-camino/45102>)

⁴⁸ Cerro Matoso - Aporte de Cerro Matoso al mejoramiento y construcción de las vías en Alto San Jorge



Findings

From the analysis above and from the discussions during the interviews and workshops the following conclusions can be drawn:

There is potential to develop more linkages to the mining sector in mining dependent regions. The macroeconomic analyses suggest that the linkages to the mining sector in the country have decreased over the years. This can partly be traced back to linkage creation not being a priority by the Government at the national level. This is understandable given that mining is relatively small as compared to countries that lead on mining linkage-creation programs such as Chile or Australia. In Colombia, more focus has been placed on the revenue generation component from mining with several recent changes in legislation being related to tax collection and allocation. As a result, linkage creation programs are primarily a result of company initiatives. The interest for linkage creation in the Government is changing though, as there is a growing sense that linkages are needed to attain social acceptance of new mining projects.⁴⁹ As a testimony of this change in approach is the current assessment by Ministry of Mines and Energy to explore possibilities of expanding the cluster strategy of the Ministry of Commerce, Industry and Tourism and iNNpulsa to include the mining sector, and to pilot this in a mining-dependent region. This policy brief aims to feed into this ongoing discussion.

Improved vertical coordination between the National and Sub-National Governments in linkage development programs is needed. All national mining strategies and policies mention the importance of creating linkages to the mining sector. However, these policies are indicative and programs to promote linkages at the local level are isolated efforts. This can partly be traced back to the lack of coordination and interaction between the National and Sub-National Governments. While the approach to assess linkage opportunities can be replicable, the

implementation will have to adapted to the locality and is dependent on the commodity, mine sites, needs and priorities of the impacted communities, as well as existing capabilities in the region. Local Governments where mining is an important economic sector therefore have an important role to play in elaborating development strategies that outline how the mining sector can support sustainable development through linkages. These should have long-term horizons beyond election cycles and be developed in a consultative process to help depoliticize the debate and increase social acceptance of new projects.⁵⁰ The National Government can help in providing support, guidance and lessons learned from other Departments in the country. Furthermore, the National Government's role should include the promotion of linkages across Departments to leverage economies of scale. For example, it can replicate the coal sector analysis and strategy proposal to review and support supplier opportunities to other commodities⁵¹ and it can expand the supplier database developed for the coal mining regions⁵² to the rest of the country. The experience of the "Distritos Mineros"⁵³ program may help in empowering local governments in taking a more proactive role in linkage policies to the mining sector and in setting up information systems.

⁴⁹ Workshop Bogota on the 22nd of May, 2019

⁵⁰ For examples of local development plans in regions affected by large-scale mining projects see <http://ccsi.columbia.edu/work/projects/localizing-the-sdgs-data-driven-development-planning/>

⁵¹ UPME (2016), Estrategias para acercar la oferta y demanda de bienes y servicios de alta rotación y prioritarios del sector de minería del carbón en los departamentos de Cesar, Guajira, Magdalena, Atlántico, Norte de Santander, Santander, Boyacá y Cundinamarca.

⁵² UPME (2016) Directorio de posibles proveedores de la minería por departamentos

⁵³ UPME (2012) Plan nacional de desarrollo minero al 2014: Sector minero de cara a la sociedad

Review linkage opportunities by commodity and location. As highlighted above, the opportunities for linkage creation will vary by location and should be reviewed as part of the sub-national development plans in mining regions. There are several characteristics that are worth keeping in mind when reviewing linkages opportunities and designing policies:⁵⁴

Upstream linkages:⁵⁵ In regions with a longer mining history the potential for upstream linkages are likely to be higher. In regions without a mining history more emphasis will have to be placed on SME support and entrepreneurship programs. To support upstream linkage creation close collaboration with the Ministry of Commerce, Industry and Tourism and its SME programs that provide financing, skill promotion, modernization and institutional strengthening support will be key. Linkage programs between large-scale investors and artisanal miners can be considered in the gold and emerald sectors.

Downstream linkages: It may be worthwhile to re-assess the opportunities of adding value domestically in the gold and emerald sectors, as formalization in these two sectors advance.⁵⁶ Moving downstream into the jewelry sector could be part of the priorities of the Ministry of Commerce, Industry and Tourism⁵⁷ and the Ministry of Culture.⁵⁸

Technological linkages: Technological linkages often emerge from suppliers and therefore are more likely to occur in regions where upstream linkages have

already been established. The INNpulsa and Colombia Productiva⁵⁹ programs under the Ministry of Commerce, Industry and Tourism are a natural fit to help develop technological linkages through suppliers. In regions where there are few upstream linkages, technological transfers can also be encouraged through capacity building programs and collaboration with technical schools and universities. Lessons learned from cement and oil sectors should be reviewed and taken into account to formulate programs or policies to favor technological linkages.

Horizontal linkages: Horizontal linkages can emerge through upstream and technology linkages and can help with the diversification into other sectors. The INNpulsa program could seek to encourage suppliers to innovate and support other economic sectors. Synergies between the mining and the agriculture sector could also be explored in regions that do not have a mining history and where farming is the primary economic activity.

⁵⁴ For case studies from countries developing upstream, downstream, employment and horizontal linkages see <https://www.iisd.org/library/igf-guidance-governments-local-content-policies>

⁵⁵ In the design of linkage promotion policies, and particularly upstream linkages, it is key to provide a level playing field for potential domestic suppliers without giving preference to certain individuals or companies.

⁵⁶ Fedesmeraldas (2015) Estudio de caracterización del sector esmeraldero, así como de la cadena productiva Colombiana de la esmeralda y la joyería: Informe trabajo de campo

⁵⁷ Ministerio de Comercio, Industria y Turismo (2003) Política nacional de apoyo a la cadena productiva de la industria de la joyería, metales, piedras preciosas y bisutería en Colombia, Red Cluster Colombia - Iniciativa clúster de joyería y bisutería

⁵⁸ Mincultura – ABC Economía Naranja

⁵⁹ <https://innpulsacolombia.com/> and www.colombiaproductiva.com

Infrastructure linkages: Heavy and bulky commodities such as coal and iron-ore provide opportunities for shared-use transport infrastructure given that investments in the logistics component of the project are key to make them viable. Gold and copper mines tend to be energy and water intensive projects, which provides for shared-use power generation and water infrastructure opportunities. In water-scarce regions such as La Guajira⁶⁰ and agriculture dependent communities, shared-use water infrastructure projects can also help address social concerns. All projects also require telecommunication access and significant economies of scope can result from coordinating in this space. To assess how the mining sector can contribute to infrastructure development in the country, close coordination will be required with the respective Ministries responsible for transport, energy, water and ICT infrastructure provision.⁶¹

Consumption linkages: As consumption linkages are linked to the number of people working in the mining sector, this linkage type is best targeted in regions that have a lot of mining projects. This linkage type can be promoted by facilitating the setting up of small businesses that can provide goods and services to mine workers such as restaurants, hotels and transportation. Here too the SME programs by the Ministry of Commerce, Industry and Tourism that provide financing, skill promotion, modernization and institutional strengthening support play an important role.

Improved horizontal coordination across Government Agencies and with the private sector to design linkage development programs is key. As highlighted in the point above, each linkage type requires the liaison with government agencies that are not necessarily engaged with or knowledgeable about the mining sector. A comprehensive approach and strategy to develop linkages to the mining sector

therefore not only requires coordination with sub-national actors, but also requires coordination across Ministries.

The good news is that there is no need to reinvent the wheel. While often done in isolation, there are several studies, baseline assessments, Government initiatives and company programs that have been implemented to support linkage creation in Colombia. This brief outlines some of them. This means that there is a basis of institutional knowledge and experience on which a more holistic and comprehensive linkages program can be built on. A review of the successes and failures of existing initiatives should be prioritized. For example, significant effort and resources have been invested to encourage technology transfers. It would be worthwhile to take stock of what has worked and understand the reasons behind why there is little interest to apply research funds to the mining sector. Lessons learned from the cluster program⁶² by the Ministry of Commerce, Industry and Tourism can also provide valuable insights from other sectors to determine how it can be adapted and improved on prior piloting it in mining regions. The experiences of the cement industry and the hydrocarbons sector where Ecopetrol has led on linkages programs such as local supplier promotion and developing the petrochemical cluster in Medellín can provide further inputs.

⁶⁰ Cerrejón 2017 Sustainability Report

⁶¹ For case studies on shared-use infrastructure see <http://ccsi.columbia.edu/work/projects/leveraging-infrastructure-investments-for-development/>

⁶² INNpulsa (2018) Iniciativas clúster en Colombia: Instrumentos de desarrollo económico y competitividad

Bringing in the private sector is key, as mining companies can share experiences and lessons learned from their linkages programs in the regions. The Ministry of Mines and Energy together with the Colombian Mining Association could provide a platform for mining companies to exchange information about respective linkages programs and also invite representatives from abroad to share lessons learned from other mining jurisdictions on cluster and growth pole projects that are linked to the mining sector.⁶⁴

Need to consider future trends when designing linkage development programs. Climate change and automation are two drivers⁶⁵ that will transform the mining sector in the coming years. Given the long-term nature to build linkages, these trends should be considered from the outset to ensure the right allocation of resources when designing these programs. Climate change will have consequences for the commodities that are going to be demanded in the future. Coal demand is expected to decrease⁶⁶ and other commodities needed for the energy transition such as copper is expected to increase. Mining companies are also pressed to reduce their own emissions and renewable power integration will increase.⁶⁷ This may provide opportunities for renewable energy infrastructure linkages. Automation is likely going to reduce direct employment and upstream linkage opportunities at the local level, thereby also reducing the potential benefits from consumption linkages. More focus will have to be placed on technology linkages in order for locals or nationals to be capacitated to work at automated mines.⁶⁸ This could start by reviewing and updating the qualification requirements for the

mining sector and by further promoting joined research projects between industry and higher education institutions. The potential collaboration with the Northern Centre for Advanced Technology (NORCAT) and other institutions that offer skills training for future oriented jobs will help prepare the country for this transition.

To summarize, we believe that it is an opportune time to reassess the Government's policy on linkage creation to the mining sector as the country seeks to respond to changes in global demand and diversify its mining sector, and to ensure that impacted mining communities benefit more from future projects. While a lot of isolated efforts by both the Government and companies exist, a more holistic and coordinated approach to linkage development programs is likely to lead to better outcomes. Experiences from other countries suggest that the regulatory tool used (soft vs. hard law) is only secondary in importance to the efforts to support linkage creation by the various stakeholders. This requires coordination across government entities and the private sector, as well as vertical coordination between the National Government and with the localities where mining occurs. Developing these vertical and horizontal coordination mechanisms, and reviewing past and existing interventions by the various actors to develop linkages in order to improve upon them, should be the next steps taken by the Government of Colombia if it seeks to implement a holistic linkage creation program to the mining sector.

⁶³ The suppliers also need to be included in the conversations about upstream and technological linkages to better understand the difficulties that they are faced with. This year's Mining and Metallurgy Fair roundtable results, where many existing and potential suppliers to the mining sector participated, could provide useful inputs into identifying opportunities.

⁶⁴ The World Bank for example has performed several growth pole and corridor assessments for mining jurisdictions.

⁶⁵ World Economic Forum (2019) Seven trends shaping the future of the mining and metals industry (<https://www.weforum.org/agenda/2019/03/seven-trends-shaping-the-future-of-the-mining-and-metals-sector/>)

⁶⁶ See for example Guillermo Fonseca's, executive director of Cerrejón, view on the future of the coal market: Portafolio (August 10, 2019) Cerrejón ve un futuro oscuro para el carbon (<https://www.portafolio.co/economia/cerrejon-ve-un-futuro-oscuro-para-el-carbon-532438?fbclid=IwAR2hxG6BBm5UzSaSvzcAV99KBL51xyikMbaFQJRABVsSHvDBOK9WxSPYmCg>)

⁶⁷ CCSI (2018) The renewable power of the mine: Acceleration renewable power integration (<http://ccsi.columbia.edu/work/projects/the-renewable-power-of-the-mine/>)

⁶⁸ IISD and CCSI (2016) Mining a mirage: Reassessing the shared-value paradigm in light of the technological advances in the mining sector (<http://ccsi.columbia.edu/files/2015/07/mining-a-mirage-CCSI-IISD-EWB-2016.pdf>)

As a first step to implement a holistic linkages program, it would be worthwhile updating the macroeconomic study by Fedesarrollo from 2013,⁶⁹ in order to understand how linkages to the mining sector have developed in the last years. A working group could collect experiences of initiatives at the local level around mining projects. This could be complemented by lessons learned from previous policies such as the Distritos Mineros policy, and other sector programs where cluster approaches have been implemented such as the petroleum industry and the cement/construction industry. A series of multi-stakeholder workshops across the relevant government ministries and departments, private sector companies, academia and civil society where these examples are discussed could help inform how to develop a Colombian linkages strategy that is targeted at the mining sector.

⁶⁹ Fedesarrollo (2013) Estudio sobre los impactos socio-económicos del sector minero en Colombia: Encadenamientos sectoriales, Cuadernos Fedesarrollo 47



