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Cheap but Costly: Constraints of Economic Development in the Coal Mining Industry

The demand for coal is set to increase over the coming years, especially among developing countries. However, while coal may be a cheap source of energy to facilitate economic development, it is costly in terms of the implications for human security. Coal mining has been seen to adversely impact local communities and cause sociopolitical instability. Long-term environmental sustainability is also negatively affected. This NTS Insight seeks to examine the extent to which governance mechanisms have been successful in mitigating these socioeconomic and environmental costs, with a focus on China and Indonesia. The paper will also assess the effectiveness of current initiatives designed to address the various forms of human insecurities stemming from coal mining in the two countries.

By Sofiah Jamil and Lina Gong.

A small coal mine in Shanxi, China, with a sign that - given poor safety records in the country's coal mines – ironically reads "work safely".

Credit: LHOON, flickr.com

The demand for coal, which is seen as a cheap source of energy, is set to increase, especially among developing countries. The International Energy Agency (IEA) projects that emerging economies will see energy demand grow by 93 per cent by 2030, driven largely by China and India, and coal is expected to lead in meeting this demand (IEA, 2009). Currently, coal supplies 25 per cent of the world's global primary energy and 40 per cent of global electricity. That said, while coal is a cheap source of energy for facilitating economic development, it is costly in terms of the implications for human security.

Table 1: Top 10 hard coal producers (2009)

	Production (in million tons)
China	2,971
US	919

Beyond jeopardising the safety and security of workers – as seen from the recent coal mining accident in China's central province of Henan – the coal mining industry can have a string of adverse impacts on the environment and surrounding communities if the appropriate governance mechanisms are lacking. In other words, while coal is a cheap energy resource in economic terms, its social and environmental costs are high. The needs of local communities are subordinated to the imperatives of the coal mining industry, which could lead to sociopolitical instability, and there are serious impacts on long-term environmental sustainability.

India	526
Australia	335
Indonesia	263
South Africa	247
Russia	229
Kazakhstan	96
Poland	78
Colombia	73

Source: IEA (2009); World Coal Institute (2009).

This NTS Insight thus seeks to examine the extent to which governance mechanisms have been successful in mitigating the socioeconomic and environmental costs associated with the coal mining industry. The focus will be on the developing countries of China and Indonesia, for two reasons. Firstly, the two countries are among the top 10 producers of coal in the world (see Table 1). Secondly, this paper seeks to highlight the precautionary and response measures which are available to address the growth of the coal industry in developing Asian countries. These have not received as much attention as in the developed world. For example, the institutionalisation of regional or national mechanisms for ensuring security and safety in coal mines is more advanced in Europe and the US than in Asia.

The paper is divided into four parts, addressing (1) the significance of the coal mining industry in China and Indonesia; (2) human security implications associated with the coal mining industry; (3) existing initiatives to address these threats to human security; and (4) the effectiveness of those initiatives.

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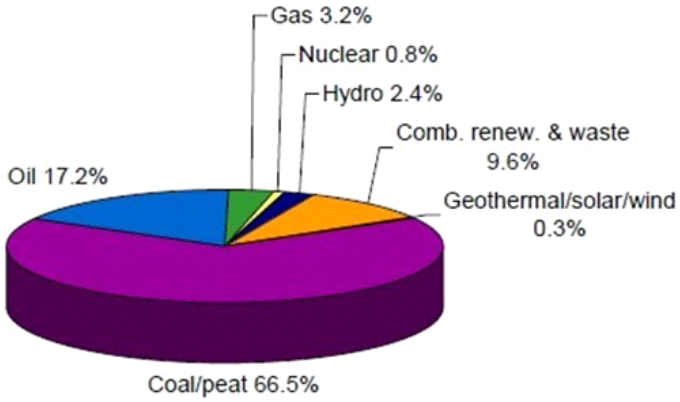
Significance of Coal in China and Indonesia

China has relied on coal as the predominant energy source to fuel its soaring economy. According to IEA statistics, coal accounted for 66.5 per cent of China's total primary energy supply in 2008 (see Figure 1). In July 2010, it was reported that China replaced the US to become the world's largest energy consumer, consuming 18 per cent of the global energy supply (Swartz and Oster, 2010). China's demand for coal has increased accordingly. To meet the growing demand, the country has witnessed a strong rebound in its coal production from the levels seen during the downturn in the mid-1990s. China's production has been so immense that, in 2008, it produced 2,761 million tons (Mt) of coal, which accounted for 47 per cent of the world's total output, dwarfing the combined total of the next nine largest producers (see Table 1). In the first quarter of 2010, its coal production grew by 28.1 per cent compared to the same period in 2009. It is estimated that China's total coal production capacity has exceeded 3.6 billion tons, up from 1.9 billion tons in 2004 (China's Coal, 2010; Wang, 2006:5).

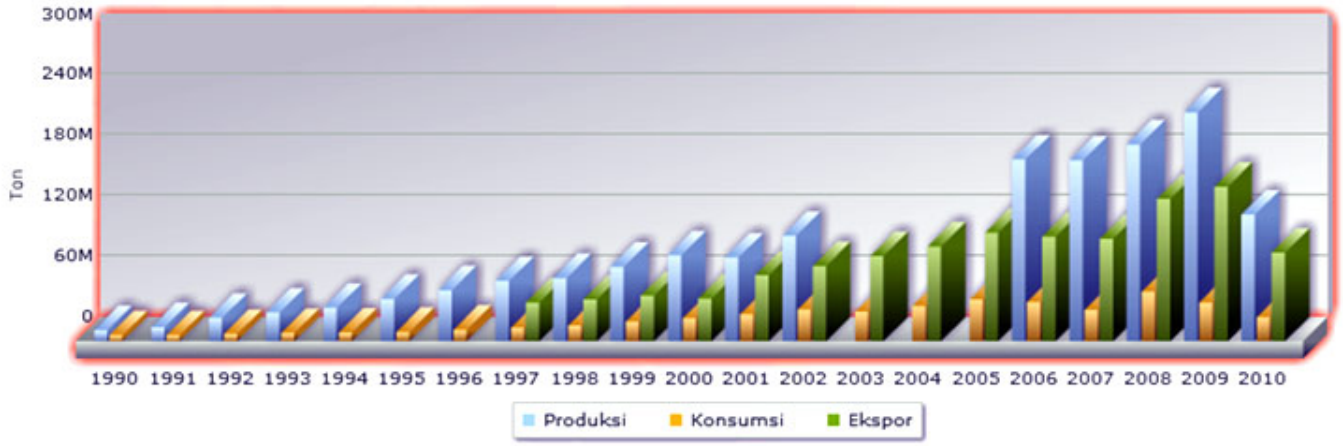
Figure 1: China's primary energy supply in 2008



Source: IEA (2010).

As for Indonesia, it is the world's leading producer of thermal coal and has the ninth largest coal reserves in the world. Coal is seen as a means of supporting the increasing demand for electricity due to industrialisation and reducing dependency on oil (Hamilton, 2005:29). Coal production in Indonesia steadily increased since the early 1990s (see Table 2), with 2006 coal production doubling from that of 2000 (Resosudarmo et al., 2009:34). The Indonesian coal industry's quick expansion of production, which has led to a corresponding rise in coal exports, is due to its favourable geology – almost all its coal comes from open-cut mines with fairly low capital costs (Kavalov and Peteves, 2007:28). Bob Kamandanu, chairman of the Indonesian Coal Mining Association (APBI), estimated in March 2010 that Indonesian coal production would rise by up to 8 per cent, thanks to the dry weather in mid-2010 (Alfian, 2010).

Figure 2: Production, consumption and export of coal in Indonesia (as of April 2010)



Source: Ministry of Energy and Mineral Resources, Indonesia (2010).

As a result of changes in the political and economic policies of China and Indonesia, restrictions on the development of artisanal and small-scale coal mines have been removed, and this has also contributed to the increase in coal production. In China, the economic reforms implemented since 1978 by Deng Xiaoping had provided the opportunity for small-scale industries to flourish by meeting demand where the large state-owned mines could not. Within 10 years, the number of small-scale mines had increased from 10,000 (1980) to over 100,000 (1990). China's growing economy two decades later further increased the demand for artisanal mining projects. By 1996, small-scale mines accounted for 50 per cent of China's total coal production, an increase of 18.3 per cent since 1980 (Wang, 2006:7).

In the case of Indonesia, the fall of President Suharto after the 1998 financial crisis brought about a lack of proper regulation of mining areas, thereby leading to an increase in the number of small-scale mines. Decentralisation policies in the post-Suharto era further fuelled this process as they gave provincial governments greater liberty in issuing mining licences directly to companies without having to go through the central government in Jakarta. (McMahon et al, 2000:vii). In combination, the physical, political and economic conditions in both China and Indonesia have led to high levels of growth in contemporary coal production. This growth has, however, had myriad human security ramifications for the two countries.

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Coal Mining and Its Implications for Human Security

Decentralisation policies can exacerbate the adverse effects from the pursuit of economic development. These negative implications include the lack of regulation and effective monitoring of mining activities, which are important components needed to facilitate a secure, safe and sustainable work environment. When applied to the human security dimensions introduced in the 1994 Human Development Report, it is clear that coal mining has the capacity to undermine the following dimensions: (1) economic security, that is, the assurance of a basic source of income or livelihood; (2) environmental security, that is, protection from adverse effects, such as a lack of clean water, as a result of a deterioration of the natural environment; and (3) community security, that is, protection of the rights and needs of indigenous peoples.

In terms of economic security, while the development of the coal mining industry is often said to facilitate economic growth – and to some extent alleviate the pressures of poverty – this assessment does not fully take into account issues of access to resources. To the coal industry's credit, in Indonesia, national statistics show a gradual reduction in the number of people living below the poverty line in Kalimantan (see Table 2). However, according to a recent report by the Indonesian environmental group *Jaringan Advokasi Tambang* (Mining Advocacy Network), or JATAM (2010:13), the number of people living below the poverty line in East Kalimantan has increased from 10.57 per cent in 2006 to 11.04 per cent in 2007. The report also states that the three cities with the highest rates of unemployment are Balikpapan, Samarinda and Kutai Kertanegara; the latter two cities have the greatest number of mining concessions in Indonesia. Specifically, in the East Kutai District, close to half of its population of 98,025 are regarded as poor – a majority of these poor live near the mines. This illustrates the fact that the coal mining industry in some areas has not been of much benefit to local communities. Moreover, the coal mining industry is ultimately capital- and technology-intensive rather than labour-intensive and is thus unable to fully address issues of unemployment (JATAM, 2010:13).

Table 2: Percentage of population below the poverty line by province, 2006–2008

Kalimantan Provinces	2006	2007	2008
West	15.24	12.91	11.07

Central	11.00	9.38	8.71
South	8.32	7.01	6.48
East	11.41	11.04	9.51

Source: Bandar Pusat Statistik Republik Indonesia (2009:51).

Further instances of inequitable access to resources are reflected in the fact that the development of the coal mining industry has generally done little to improve social infrastructure. It is ironic that while the domestic electricity needs of communities are only a fraction of the amount needed by industrial companies, community-level electricity needs are not efficiently met. Several Indonesian cities experience blackouts due to irregular access to domestic electricity despite the fact that the total power consumed by neighbouring industrial plants is far greater. PT Kaltim Prima Coal, for instance, consumes three times more power for its coal production than the whole of East Kutai District (JATAM, 2010:19). Instances in China, however, seem to provide a contrasting view. There, the demand and supply of power have struck a general balance, with only a few brownouts in some regions due to extreme weather conditions (Expert: Power Shortage, 2010).

Furthermore, coal mining accidents can jeopardise the economic security of victims and their families. At the global level, mining employs only 1 per cent of the workforce but is responsible for 8 per cent of fatal industrial accidents (Hilson, 2002:8). China has the worst safety record among the world's coal producers – coal mining accounts for less than 4 per cent of China's industrial workforce but over 45 per cent of industrial fatalities (Wright, 2004:1). As indicated in Figure 3, the bulk of accidents in China occur as a result of gas explosions (Wang, 2006:9). According to China's State Administration of Coal Mine Safety, the year 2002 witnessed the highest number of on-site fatalities ever recorded – 6,995 (Deconstructing Deadly Details, 2006). Although this number gradually decreased to 2,631 in 2009 (China's Coal, 2010), the numbers are appalling when compared to that of the US, the world's second largest coal producer. In terms of the ratio of fatalities to the amount of coal produced, China's coal mining industry still appears much more deadly than the coal mining activities in the US. For the production of every Mt coal in China in 2006, 1.91 miners lost their lives, while the number for the US in the same year was only 0.05 (China Labour Bulletin, quoted in Homer, 2009). It may be argued that it is unfair to draw comparisons between China and the US since the two are at different levels of development. However, even India, the third largest producer, which is at a level of development similar to China, had a far lower fatality to production ratio of 0.32. To complicate matters, the amount of compensation given to families is often insufficient, particularly when the victim is the sole breadwinner of the family. According to a 1996 decree on compensation payable to families of miners injured or killed in accidents in China, the average level of compensation was only RMB10,000–20,000 (USD1,500–3,000) with a maximum of RMB50,000 (USD7,484). The high fatality rate and low level of compensation have a negative impact on the economic conditions of families who lose an important wage earner.

Figure 3: Major causes of fatalities in coal mining in 2001

Source: Wang (2006:10).

Studies have shown that the probability of fatalities occurring in small-scale mines is higher than in large-scale state-owned operations. This is because small-scale mines may not have the necessary safety standards and equipment, and are oftentimes more difficult to regulate. Poor building codes for underground mine workings allow for haphazard construction which increase the danger of collapse while poor ventilation can cause breathing difficulties for coal miners (Hilson, 2002:9). As seen in Table 3, town and village enterprises (TVEs, i.e., small-scale mines) have the highest fatality rate vis-à-vis large-scale state-owned enterprises (SOEs). Yet the expansion of small-scale mines can potentially yield tangible benefits such as ending energy shortage, creating employment, alleviating poverty, adding vitality to the coal market and developing infrastructure (Rui, 2005). Nevertheless, while the bourgeoning small-scale mines could be seen as an alternative source of livelihood – especially when economic development at the macro level fails to meet the needs of communities living in neighbouring towns and villages – these mines are also the most prone to accidents.

Table 3: Fatality rates in Chinese coal mines, 1999–2003

Coal producers	1999	2001	2002	2003 (Jan-April)
Average	4.500	5.311	4.641	3.580
Key SOEs	0.966	1.487	1.270	1.010
Local SOEs	3.458	4.682	3.743	1.970
TVEs	10.990	18.501	12.171	13.380

Key: SOE – state-owned enterprises; TVE – town and village enterprises
Source: Rui (2005:68).

Excessive coal mining activities can also have adverse implications for environmental security. Aside from environmental damage from deforestation and land clearing activities, surface mining can adversely impact water resources through acid mine drainage (Hamilton, 2005:1–6). The improper disposal and storage of tailings in a mining area can also result in a spill, with fine waste being discharged primarily into waterways and the sea. Such pollution of water sources would inevitably threaten crucial environments for local communities' livelihoods. This was particularly the case in Indonesia after the fall of President Suharto in 1998, as military forces were no longer deployed to discourage illegal mining. As a result, there was a rise in the number of illegal small-scale mines, which caused further damage to the surrounding environment (Aspinall, 2001:24).

The implications related to economic and environmental insecurity as mentioned above cannot be seen in isolation from community security. Indeed, the lack of economic and environmental security ultimately feed into community insecurity. This transition arises when businesses (and to a certain extent government officials) involved in coal mining pay minimal attention to the needs and rights of communities living around the mining area. Many of China's coal-rich provinces, such as Guizhou, Inner Mongolia and Xinjiang, are inhabited by large populations of ethnic minorities while Kalimantan in Indonesia is home to indigenous groups such as the Dayaks.

According to JATAM (2010:7), coal mining in Indonesia is yet another means of resource extraction initiated by government officials and businesses that has very little regard for indigenous communities. In China's Inner Mongolia, Ordos, a coal producing area, is experiencing severe land degradation and desertification due to excessive coal mining without appropriate environmental protection measures (Wu et al., 2008:855). Land desertification threatens animal husbandry, which is a major income source for local Mongolians. In addition to this, sluggish growth in China's coal industry in the 1990s affected the income and welfare benefits of coal miners. Due to this decreasing income for coal miners, skilled coal miners have been replaced by inexperienced migrant workers on short-term contracts. This was the case in Xinjiang, China, where the influx of migrant workers, most of whom are Han Chinese, has caused concern about job security among the Uighur community. This is exacerbated by the fact that the Uighur comunity cannot return to their traditional sources of livelihood as industrial projects in Xinjiang have been developed in areas historically used for traditional livelihood practices by the Uighur community.

Hence, it is important to ensure community rights as such rights can help to preserve the resiliency and sustainability of communities. This was effectively summed up through an analogy by a participant at a Workshop on Indigenous Peoples and Mining, Minerals and Sustainable Development: 'human rights provides [sic] a right to eat the cabbage, indigenous rights provides a right to own the farm' (IIED, 2002:10). Such efforts would require a genuine understanding of local practices as well as sociopolitical dynamics in areas in which mining activities take place, and more importantly, multilevel and multi-stakeholder cooperation to effectively address these highly interconnected concerns, i.e., a process which is consistent with a non-traditional security (NTS) approach. An NTS approach advocates the need for effective collaboration across various sectors and levels with communities and individuals as their reference point.

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Existing Initiatives to Address Human Security Concerns

While the implications of coal mining for human security may seem rather bleak, there are, fortunately, existing initiatives to address these concerns. According to Hamilton (2005:11), sustainable development and coal mining can be compatible, if three conditions are met during mineral development:

1. effective control of environmental effects and costs during mining is maintained.
2. mined land is reclaimed for other productive uses.
3. revenues from mineral extraction are allocated to investments in infrastructure and enterprises when mineral reserves are depleted.

Moreover, in line with an NTS approach, many of these initiatives – which are primarily realised through legislation and the creation of institutions – have sought multi-stakeholder participation. The main thrust of these legislative initiatives has centred around better safety standards and the closure of coal mines after their contracts are over to control the emergence of small-scale mines.

Creation of Institutions

With the increasing awareness among local communities on the vulnerabilities and risks stemming from the coal mining industry, business corporations have inevitably been blamed for the adverse impacts of coal mining. This has spurred several leading business players in the coal mining sector to show their commitment to addressing a range of concerns relating to threats to human security from the coal mining industry.

Of note is the International Council on Mining and Metals (ICMM), which grew out of the Global Mining Initiative (GMI). The GMI was seen as a significant example of multi-sectoral collaboration among governments, business, labour, non-governmental organisations and other stakeholders leading to sustainable development through responsible mining. The ICMM, an association of these various stakeholders, is engaged in formulating best practices for responsible mining, such as the closure of small-scale TVE coal mines which have been found to discharge higher levels of pollutants (Holdaway, 2010:3). Its most recent contribution is the release of a report on Mining and Biodiversity at the 2010 Conference of the Parties to the Convention on Biological Diversity (COP10) in Nagoya, Japan. The report included several case studies of private-public collaborations, including one from Indonesia, which highlighted the importance of the private sector in strengthening local government capacities, such as in sustainable land use planning and local conservation leadership at the village level (ICMM, 2010).

There have also been substantial cooperative efforts to facilitate improved mining safety. The Chinese government and the United Nations Development Programme (UNDP), for instance, jointly carried out a project called Strengthening Coal Mine Safety Capacity in China (CMS) from 2006 to 2010. The CMS was designed to assist China in ameliorating coal mine safety, particularly in small-scale mines. In addition to legal and institutional improvement, the project emphasised the participation of civil society groups and the private sector to increase public supervision. Education constitutes another integral module of the project. Education and training on safety procedures are not only provided for miners but also for coal mine managers and shift supervisors (Government of the People's Republic of China and UNDP, 2006:15). These institutions are thus crucial in inculcating the basic principles needed to address adverse incidents in the coal mining industry.

State legislation and regulations

The efforts of these new institutions must ultimately be reinforced by concrete action by governments themselves. Fortunately, there have been several policy changes in both China and Indonesia.

In China, laws and regulations setting the baseline for equipment and technology and stipulating penalties have been in place since the 1990s. The State Administration of Coal Mine Safety was established in 2000 to supervise work safety in coal mines. The most recent, and prominent, initiative by the central government in this regard has been the closure of 'irrational' small-scale mines. The criteria for closure are irrational locations, low recovery rates, poor safety standards and substantial environmental pollution (Andrews-Speed et al., 2005:39). Some TVE mines which exceeded the traditional definition of small-scale but had the abovementioned problems were also ordered to close. By the end of 2001, the number of TVE mines had been reduced to 23,000, and the annual output had been slashed to 200 Mt from 620 Mt (Andrews-Speed et al., 2005:42).

Why the Need to Regulate Mine Closure?
Early mining-related agreements and legislation mention very little about mine closure. It is in fact essential that attention is paid to the following when mines are closed:

1. The conditions are stable and safe, thus protecting public safety and health.
2. The area is left environmentally benign with no unacceptable or toxic discharges.
3. Any remaining infrastructure is sustainable.
4. Social sustainability is assured.
5. Future liabilities are minimised for all stakeholders.

If implemented efficiently with the necessary support policies, mine closure would be able to mitigate the spread of small-scale mines as well as additional costs associated with further land degradation. In Indonesia, the estimated costs of land reclamation for medium- to large-scale coal mines are between USD4 to 7 million a year, while land reclamation for small-scale mines comes up to USD117 million a year.

Source: Cesare and Maxwell (2003:42–5); McMahon et al. (2000:viii).

Indonesia also implemented new laws on mine closure. The means of doing so was clearly a multi-stakeholder process, in which the mining industry's consortium – the Industry Mine Closure Steering Committee (IMCSC) – played a significant role in engaging with government officials, local communities and environmental groups to provide recommendations to the national government on mine closure. The recommendations of the IMCSC specifically looked at four areas: mine closure planning, mine closure financing, contract of work agreements and social aspects of mine planning (Cesare and Maxwell, 2003:47). Legislation related to these areas would ensure proper management of the coal mining industry.

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Effectiveness of Existing Initiatives

While these initiatives are indeed commendable, there remain a number of challenges that require attention. China's coal mining fatality rate has declined but the total number is still high, while many local communities living around mining areas in Indonesia continue to experience adverse impacts from mining. This is likely due to the fact that the mining industry continues to face challenges as a result of 'the legacy of past practices and contemporary lapses' (Cesare and Maxwell, 2003:44).

Firstly, the availability of international mechanisms to address mining issues is a relatively recent phenomenon in the developing world. Successful efforts are mostly concentrated in more developed countries, such as those in Europe. As such, it would take some time for these ideas and initiatives to take root in developing Asian countries and for these initiatives to accommodate to the varying circumstances specific to Asia. The ICMM database mentions some efforts in this area in Indonesia. However, there is hardly any word of collaborative efforts in China.

Secondly, delays within the legislative process reduce the effectiveness of initiatives. This could be seen in cases of TVE mine closures in China. As there are no legal provisions in China specifically dealing with the compensation and re-employment of miners in those mines, the closures were met with strong resistance from the miners themselves. Also, existing laws may be outdated, having been mostly enacted in the 1990s. For instance, in China, the compensation for injury and death at the workplace which was set in 1996 is too low to support affected miners and their families. In Indonesia, statutes and regulations which have been codified are not implemented effectively, with a significant time lag between when laws are made at the national level and when they are translated into action at the provincial and local levels. A new policy would generate a ripple effect of subsidiary pronouncements, but usually only a year or two later (Hamilton, 2005:25).

Thirdly, the actions of local and provincial governments may not be in tandem with that of the national government. The irony is that while the process of decentralisation in Indonesia since 2001 provided a means of forcing mining companies to engage directly with local communities through consultations with and through local governments, it would not be surprising to see local governments not taking account of the communities' interests (Cesare and Maxwell, 2003:49). Instances of corruption are still rampant, as observed in Kalimantan, where a recent report by JATAM (2010:21) identified local government officials who are said to be corrupt.

Finally, policies must be supported with the necessary resources and capacity to cushion the impacts of any new measures. In particular, mine closure policies need to ensure the provision of alternative livelihoods for affected miners. The inability to do so could result in strong resistance from local groups, or even the burgeoning of unregulated illegal small-scale mines. In the case of China, it was reported that local miners in Shanxi organised sit-ins and disturbances in protest against closures (Wright, 2004:644). The resistance was a result of insufficient attention being given to potential negative socioeconomic impacts during the closure process. Due to closure initiatives being carried out hastily, barely any support plan was in place to create employment for the miners or prepare them for re-employment. Consequently, closure meant unemployment and suspension of income for the coal miners who often did not have any alternative means of livelihood.

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Conclusion

In light of these developments, there is clearly a need for more human-centred policies that seek to strengthen the capacity of local governments and coal miners. Such strengthening is critical given that the demand for coal to meet energy needs will continue to increase for at least the short- to medium-term.

To build the capacity of local governments, there has to be effective cooperation between local governments and coal mining companies. While local governments can pass legislation on mining standards, they need to also provide incentives to mining companies to abide by these safety standards. Primary incentives could include providing social safety nets for local communities dependent on coal mining and sharing the costs of capacity building among coal-related business entities. This would ensure that mining companies have a vested interest in maintaining the health and well-being of coal miners.

In terms of capacity building for miners, the incentive structure could also encompass skills training and work safety awareness. Such training and awareness would contribute to improving safety standards in mines, regardless of their scale. Moreover, in the event of a coal mine closure – which is more likely in small-scale mines – miners with upgraded skills would be better equipped to enter large-scale mining concerns. This strategy will thus facilitate a continued source of economic livelihood for miners.

Finally, regional and international cooperation efforts need to continue to institutionalise these high safety standards and precautionary measures in the mining industry. Establishing global norms would serve to spur action, with the sharing of knowledge and technology transfer playing a significant role in capacity building. More importantly, there needs to be a greater emphasis on how these initiatives – which on the surface would be seen primarily as measures for enhancing industrial productivity and workers' safety – are in fact significant in ensuring overall environmental sustainability and in turn the security of local communities that depend on these environments. When these links are emphasised, it would become clear that multi-sectoral and multilevel cooperation would be essential in addressing the

interdependent dimensions of human insecurity stemming from the coal mining industry.

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