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## DEPENDENCY AND COMPLACENCY IN THE ENERGY SECTOR: IMPLICATIONS FOR HUMAN SECURITY

Fossil fuel exploration and extraction can and have contributed to human insecurity on many dimensions – economic, health, community and environmental. This NTS Alert examines the human security threats arising from dependency on the oil and coal sectors in particular. It is argued that these threats are due to over-emphasis on economic rather than human security aspects in the development of the oil and coal industries, as well as mismanagement and complacency in those industries. Addressing these are vital as they have significant long-term implications for sustainable development.



Coal miners working in Lau Ye Temple Mine in China.

Credit: LHOON, flickr.com

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### Introduction

The need for higher levels of economic growth and development – in both developing and developed countries – has only served to increase the world's appetite for energy. The persistent dependence on traditional sources of energy in the form of fossil fuels such as oil and coal relegates the plan to develop renewable sources of energy to a long-term goal despite the desire for sustainable development and a low-carbon economy. Such dependency on these energy sources has sometimes come with a degree of complacency. Complacency sets in when profit-driven firms fail to take into account the socioeconomic and environmental implications of the development of traditional energy sources; these could indirectly affect production and operational processes as well as the firms' overall image. This complacency is reflected in ineffective management which can and has posed threats to human security.

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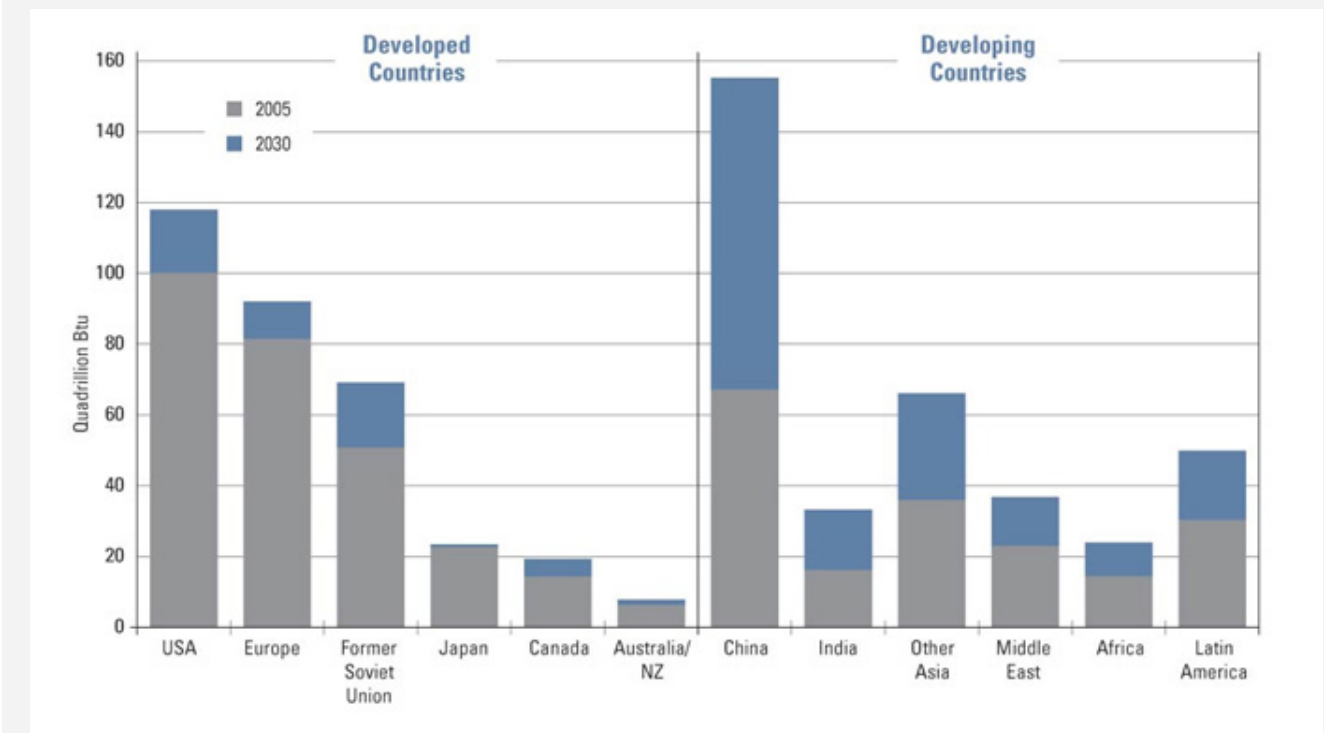
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This NTS Alert will demonstrate that even without considering their contribution to climate change, the development and/or mismanagement of the oil and coal sectors can and have posed a direct threat to four aspects of human security, namely, economic security, health security, environmental security and community security. While such insecurities from the traditional energy sectors occur in both developed and developing countries, this NTS Alert will focus on the latter for two reasons. Firstly, the estimated increases in future global energy demand come primarily from the developing rather than the developed world (see Figure 1), highlighting the developing world's significance in influencing energy markets. Secondly, the rapid pace of industrialisation in developing countries given the constant pursuit of economic

development, coupled with poor regulatory bodies, often relegates human security to a position of unimportance. This Alert seeks to draw attention to the need for developing countries to be more sensitive to human security concerns within its energy sectors to prevent mismanagement and ensure sustainable development.

Figure 1: Global Energy Demand by Region: 2005 and 2030



Source: US Energy Information Administration (2008).

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## The Significance of the Oil and Coal Industries

Despite calls for the use of renewable energy, fossil fuels such as oil and coal remain the most widely consumed and demanded sources of energy, and the demand is growing. By 2030, three-quarters of the overall increase in energy consumption will come from fossil fuels. Oil remains the single largest source of fuel, with much of the growth in demand coming from non-OECD (Organisation for Economic Co-operation and Development) countries (IEA, 2009).

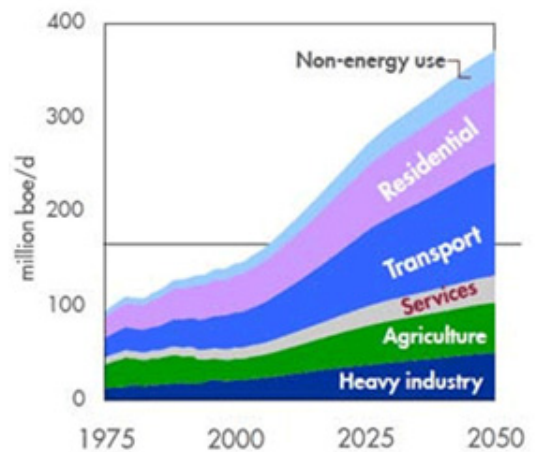
There are both demand and supply reasons for this. Firstly, the increased *Figure 2: Rising Global Energy Demand by Sector*

demand for oil and coal is fuelled by increasing energy needs for power generation and transport (see Figure 2). This is particularly so when economic growth is of utmost priority, especially in times of economic downturn. For instance, in China, the stimulus plan put in place to recover from the 2008 financial crisis led to greater electricity use. In the first three months of 2010, power consumption rose 24.2 per cent compared to the same period last year, and engines of China's economy such as the industries of steel, non-ferrous metals and petrochemicals recorded new highs in electricity use (Nie, 2010).

This, to some extent, leaves social and environmental concerns on the backburner.

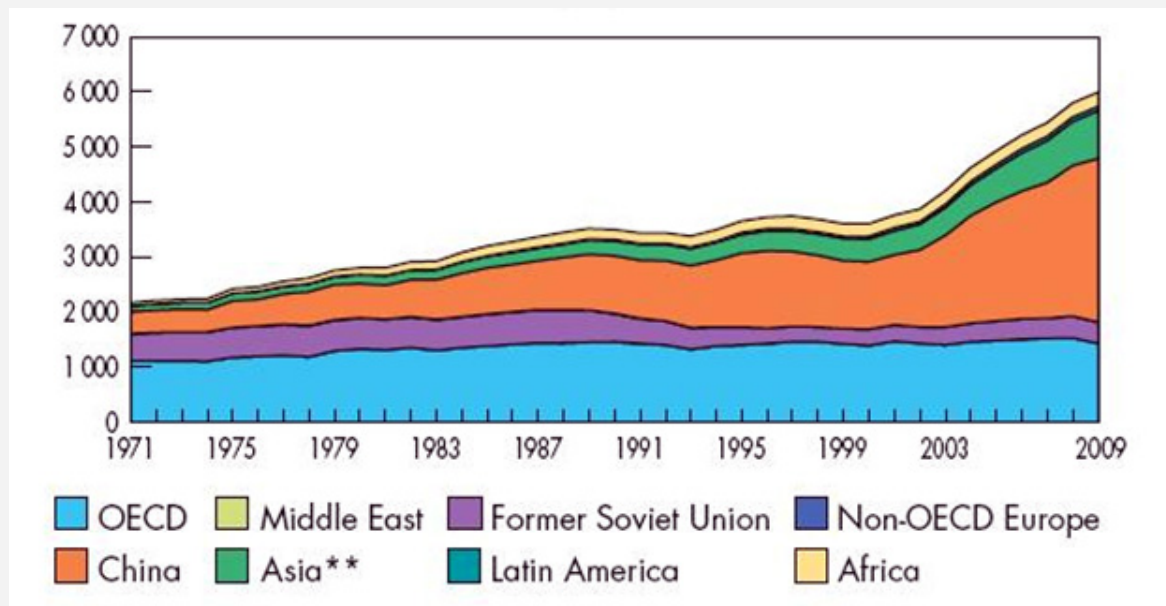
Secondly, given the existing supply and the discovery of new sites of oil and coal, there is little incentive to diversify beyond the fossil fuel sector. This is clearly the case in Asia, where China recorded a dramatic increase in its coal production between 1997 and 2009 (see Figure 3) and Indonesia's 2006 coal production

was double of that in 2000 (Resosudarmo et al., 2009:34). This was also in part due to the significant increase in the number of artisanal and small-scale mining (ASM) projects, as a result of China's growing economic demands and the decentralisation policies in Indonesia after the 1998 financial crisis which left small-scale miners largely unregulated. This coupled with the relatively less profitable renewable energy sector – due to the high costs of transforming public structures to incorporate renewable sources of energy – facilitates the use of fossil fuels in the mid-term. In light of these developments in the fossil fuel sector, there are adverse implications which need to be taken into account, even before considering their contribution to climate change.



Source: Brinded (2010).

Figure 3: Evolution of Hard Coal Production by Region from 1971 to 2009 (Mt)



\*\*Asia in this graph excludes China

Source: IEA (2010).

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## The Oil and Coal Industries' Effects on Human Security

According to the 1994 Human Development Report, the late Mahbub ul-Haq noted that human security can be divided into seven dimensions:

- Economic security – to ensure a basic source of income or livelihood.
- Health security – to ensure access to healthcare to address emerging diseases and ailments.
- Environmental security – to protect from adverse effects, such as a lack of clean water, as a result of a deterioration of the natural environment.
- Community security – to protect the rights and needs of indigenous peoples.

- Food security – to have both physical and economic access to basic food.
- Personal security – to be free from physical violence, whether from within or outside the state.
- Political security – to ensure the respect of people’s basic human rights.

Developments and incidents occurring as a result of mismanagement in the oil and coal industries can have implications for human security – particularly for the first four of the above-mentioned dimensions. Mismanagement in the oil and coal industries can be a threat to human security due to the lack of safety measures and protection for workers. This often leads to mishaps during resource exploration and extraction and has implications for sustainability (discussed further below).

### **The Lack of Safety Measures and Protection for Workers**

While the extraction of fossil fuels is primarily aimed at generating and sustaining economic growth and development, it can come at the expense of security for those working to ensure economic development. In other words, some companies in the fossil fuel industry have not paid enough attention to the socioeconomic needs and safety of their workers; devoting time and effort to ensuring these could incur extra costs or slow down operations. This is compounded by the lack of proper regulation in the industry. Working in the oil and coal industries does come with risks if necessary safety measures are not in place. This was clearly seen from the Dalian oil spill in China where the official investigation report revealed that untested and unsafe practices were adopted as a cost-cutting measure.

Several studies have noted the high rate of accidents occurring in the coal mining industry (Hirschberg et al., 2004; Burgherr and Hirshberg, 2008), with China having one of the worst records worldwide. The number of coal mining accidents in 2009 was 1,616, which caused 2,361 deaths (China’s Coal Mine, 2010). The actual numbers could be higher as many small-scale private coal enterprises often go undocumented and unmonitored. For instance, in November 2001, five gas explosions occurred within a span of nine days in small, unregistered and illegal coal mines in China’s Shanxi province and killed 99 miners (Guo, 2002:17). In that same year, only less than 25 per cent of the 4,000 small coal mines in Hunan, China had on-site safety monitoring (Liu, 2002:42).

Aside from threatening the security of coal mine workers, accidents can also have serious consequences for their dependants. Many coal miners come from poverty-stricken rural areas and are normally the sole breadwinners of their families. Losing their lives or sustaining critical injuries as a result of on-site accidents would lead to unstable or no income flow for the families, threatening their survival. Small-scale private mines with low levels of mechanisation and poor safety standards are perhaps the most vulnerable to accidents such as coal fires (Kuenzer et al., 2007:48). The lack of concern for the economic security of these workers by firms is further reflected in the low pay and low amounts of monetary compensation offered to workers affected by these accidents. In Indonesia, monthly worker salaries range from USD10 to a maximum of USD43 (Aspinall, 2001:10). In China, prior to 2004, compensation for the death of a miner was no more than RMB50,000 (around USD7,000), which made the coal mining industry the second lowest paymaster in terms of work accident compensation among 49 industries in China (Tu, 2007:43).

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### **Mishaps during Resource Exploration and Extraction**

Mishaps in the course of resource exploration and extraction – such as oil and tailings spills (see Table 1) – can have adverse implications for all of the first four above-mentioned dimensions of human security. China’s oil spill at the northeastern port of Dalian, for instance, caused by an explosion of two crude oil pipelines, led to the release of an estimated 11,000 barrels (1,500 tonnes) of crude oil into the ocean. The effects of these spills can even be transnational, as seen from the recent spill from the Montara oil rig near the coast of Western Australia which found its way into Indonesian waters.

The impact of oil spills on economic security is enormous. The cost of cleaning up the Dalian oil spill is estimated at USD147.5 million (Dalian Oil Spill, 2010). Oil spills also inflict serious consequences on local fishing and tourism industries which in turn lead to economic insecurity for some local residents. The volume of visitors to the popular beaches of Dalian decreased drastically after the accident, which affected the incomes of local people living on tourism-related businesses. The seafood farming community was also economically threatened. The spilled oil poisoned seafood in the contaminated sea area and reduced the output of local seafood farms. In addition, worries of poisoning led to a drop in the price of shellfish of 15 per cent in six days (Oil Spill, 2010). In the case of the Montara oil spill, thousands of Indonesian fishermen were forced to leave for other parts of Indonesia to find new livelihoods because the spill had drastically reduced their fish catch (Timor Sea Oil Spill, 2010). The Indonesian government has since sought compensation of USD2.2 billion from the company responsible for this accident.

Spills in the coal mining industry take the form of tailings which can often occur in medium- and large-scale mining operations and result in acid rock drainage (ARD) – the outflow of acidic water from abandoned mines – that could last several decades. The environmental security concerns are similar to those of oil as tailings spills can taint clean sources of water, and worse still, river systems. In Indonesia, ensuring economic security after a tailings spill would be costly as such a spill could cost the Republic an estimated USD100 million in clean-up and



Table 1: Definition of Spills in the Traditional Energy Sector

	Oil spill	Coal tailings spill
<b>Definition</b>	Oil, discharged accidentally or intentionally, that floats on the surface of water bodies as a discrete mass and is carried by the wind, currents and tides.	Fine waste discharged primarily into waterways and the sea.
<b>Trigger factors</b>	Burst pipelines, oil well blowouts, sabotage, etc.	Ineffective disposal/storage of tailings in a mining area.
<b>Main effects</b>	Pollutes the waters and beaches, upsets the ecosystem and threatens the economic security of local people engaged in farming and fishing activities in the vicinity of the accidents.	Pollution of water sources, threatening primarily health and environmental security.

Source: Compiled from United Nations (1997:54), Okogu (1994:393) and Tailings.info (n.d.).

## Implications for Sustainability

In terms of sustainability, dependence on these traditional sources of energy would be a clear threat to human security in the mid- to long-term. This is played out in three ways. Firstly, activities involving the extraction of limited resources often result in land degradation (Kuenzer et al., 2007). Ordos, which is located in China's Inner Mongolia, for instance, is experiencing severe land degradation and desertification due to excessive energy exploitation conducted without appropriate environmental protection measures (Wu et al., 2008:855). Without substantive funding for land rehabilitation, such land would be uninhabitable or unsafe for future use. In Indonesia, for instance, the estimated reclamation costs for medium- to large-scale mining areas range from USD3 to 34 million (McMahon et al., 2000:15). Firms would be unwilling to bear these high costs.

Secondly, the process of resource extraction may put local communities at a disadvantage. Literature on mining-induced displacement and resettlement (MIDR) notes that the long-term impacts of MIDR include reduced opportunities for sustainable development (Downing, 2002:8). Furthermore, resource extraction activities could lead to decay in community security, where indigenous peoples see these projects as impeding their traditional ways of life. China's exploration of new coal-rich areas such as Xinjiang province and Indonesia's coal mining ventures in Kalimantan have in some respects caused concern amongst the Uighur and Dayak communities respectively. They are concerned that their way of life is gradually being eroded by business initiatives or state policies that relegate them to minority status and that force them to give up their traditional forms of livelihood for work in the industrial sector. Uighur rights groups have expressed their concern that the increasing resource exploration in Xinjiang would only exacerbate the socioeconomic inequalities in the region, where Chinese state-owned companies and Han Chinese migrants benefit far more than Uighurs who receive little backing for farming or business initiatives, and where Uighurs are often discriminated against because of their cultural and linguistic differences (Jamil and Chia, 2009). In the case of Indonesia, although some community development programmes have been undertaken in Kalimantan, these have largely been done as superficial 'add-on' measures with minimal expenditure on socioeconomic needs by the companies involved.

Thirdly, in terms of health security, the operations of these industries exact negative effects not only on their workers but also on neighbouring local populations. For instance, it is estimated that the volume of sulphur dioxide emissions in Shanxi – the largest coal-producing province of China – is 2.8 times the average amount nationwide. Moreover, five cities in the province were ranked among the most polluted cities in China in 2004 (NILU, 2005:10). Fires and air pollution as a result of coal production can lead to long-term respiratory problems due to the high concentration of carbon monoxide and other toxic fumes in the air (Kuenzer et al., 2007:52).

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## Conclusion

It is argued that the above human security concerns with regard to the oil and coal industry are not new. However, if this is so, one question remains: why do these problems still persist? Common root causes are the lack of regulation and oversight, ineffective decision-making, and a clear disregard for the vulnerabilities of individuals within the industry and for the environment. These practices continue due to the pursuit of economic gain. In China, since coal production is a prime source of revenue for major coal-producing provinces that are economically less developed, higher standards of safety in the workplace are often sacrificed for immediate economic returns.

In the case of Indonesia, these problems have been exacerbated by the way in which decentralisation policies were implemented after the fall of President Suharto in 1998. While providing local governments with power could be seen as an ideal way to facilitate demands at the local level, the process of decentralisation must include the necessary funding for local governance. Unfortunately, this aspect is often not given enough thought. Further, not only do national development strategies need to be strengthened with an emphasis on human security concerns, they also need to be strengthened with genuine multisectoral collaborative partnerships amongst government officials, business entities and local peoples.

To conclude, it is important that developing countries demonstrate more sensitivity to the long-term impacts of their economic development strategies. That said, developed countries are not excluded from this responsibility as improvements in the safety capacities and sustainability of their own existing projects are highly desired. The next NTS Alert will examine the responses and initiatives taken to address these human insecurities stemming from the ongoing dependency on and complacency in the traditional energy sector, with a focus on recent mishaps in the oil industry.

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#### Reference List:

'2009 Analysis Report on the Output of the Country's Top 50 Coal Enterprises' (2009全国煤炭企业产量50强分析报告), 2009, CoalChina (中国煤炭工业网), 24 August. [http://www.coalchina.org.cn/page/info\\_im.jsp?id=11963](http://www.coalchina.org.cn/page/info_im.jsp?id=11963)

Aspinall, Clive, 2001, *Small-Scale Mining in Indonesia*, MMSD Working Paper No. 79, International Institute for Environment and Development. <http://www.iied.org/pubs/display.php?o=G00725>

Australian Maritime Safety Authority, 'The Effects of Maritime Oil Spills on Wildlife including Non-Avian Marine Life'. [http://www.amsa.gov.au/Marine\\_Environment\\_Protection/National\\_plan/General\\_Information/Oiled\\_Wildlife/Oil\\_Spill\\_Effects\\_on\\_Wildlife\\_a-Avian\\_Marine\\_Life.asp](http://www.amsa.gov.au/Marine_Environment_Protection/National_plan/General_Information/Oiled_Wildlife/Oil_Spill_Effects_on_Wildlife_a-Avian_Marine_Life.asp)

Barboza, David, 2006, 'Coal Mining in China: The Not So Good Earth', *The New York Times*, 23 June. <http://www.nytimes.com/2006/06/23/world/asia/23iht-web.0623coal.2034282.html>

Brinded, Malcolm, 2010, 'The Future of Global Energy and the Role of the Middle East', Speech delivered at the American University, Cairo. [http://www-static.shell.com/static/media/downloads/speeches/brinded\\_egypt\\_14042010.pdf](http://www-static.shell.com/static/media/downloads/speeches/brinded_egypt_14042010.pdf)

Burgherr, Peter and Stefan Hirshberg, 2008, 'Severe Accident Risks in Fossil Energy Chains: A Comparative Analysis', *Energy*, Vol. 33, No. 4, pp. 538–53. <http://dx.doi.org/10.1016/j.energy.2007.10.015>

'China's Coal Mine Accidents, Fatalities Drop in 2009', 2010, *People's Daily*, 20 January. <http://english.peopledaily.com.cn/90001/90776/90882/6874115.html>

'China Mine Fire Kills 16 People; 61 Die this Month', 2010, *Bloomberg News*, 7 August. <http://www.businessweek.com/news/2010-08-07/china-mine-fire-kills-16-people-61-die-this-month.html>

'Dalian Oil Spill Successfully under Control, China Says', 2010, *The China Post*, 27 July. <http://www.chinapost.com.tw/china/local-news/other/2010/07/27/266286/Dalian-oil.htm>

Downing, Theodore E., 2002, *Avoiding New Poverty: Mining-Induced Displacement and Resettlement*, Report No. 58, London: International Institute for Environment and Development. [http://displacement.net/members/images/stories/PDFs/AvodingNewPovMMSD\\_Downing.pdf](http://displacement.net/members/images/stories/PDFs/AvodingNewPovMMSD_Downing.pdf)

Energy Watch Group, 2007, *Coal: Resources and Future Production*, Ottobrunn. [http://www.energywatchgroup.org/fileadmin/global/pdf/EWG\\_Report\\_Coal\\_10-07-2007ms.pdf](http://www.energywatchgroup.org/fileadmin/global/pdf/EWG_Report_Coal_10-07-2007ms.pdf)

Guo, Sizhi, 2007, *The Business Development of China's National Oil Companies: The Government to Business Relationship in China*, Policy Report, Houston: James A. Baker III Institute for Public Policy, Rice University. [http://www.rice.edu/energy/publications/docs/NOCs/Papers/NOC\\_Guo%20China.pdf](http://www.rice.edu/energy/publications/docs/NOCs/Papers/NOC_Guo%20China.pdf)

Guo, Tingjie, 2002, 'On the Policy towards Solving the Problem of Small Illegal Coal Mines' (解决非法小煤矿问题的政策探讨), *China Coal* (中国煤炭), Vol.28, No. 4, pp. 17–18.

International Energy Agency (IEA), 2010, *Key World Energy Statistics 2010*, Paris, [http://www.iea.org/textbase/nppdf/free/2010/key\\_stats\\_2010.pdf](http://www.iea.org/textbase/nppdf/free/2010/key_stats_2010.pdf)

International Energy Agency (IEA), 2009, *World Energy Outlook 2009: Executive Summary*, Paris.

[http://www.worldenergyoutlook.org/docs/weo2009/WEO2009\\_es\\_english.pdf](http://www.worldenergyoutlook.org/docs/weo2009/WEO2009_es_english.pdf)

Hirschberg, Stefan, Peter Burgherr, Gerard Spiekerman, et al., 2004, 'Severe Accidents in the Energy Sector: Comparative Perspective', *Journal of Hazardous Materials*, Vol. 111, Issues 1–3, pp. 57–65. [http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B6TGF-4C52NW4-4&\\_user=10&\\_coverDate=07%2F26%2F2004&\\_rdoc=1&\\_fmt=high&\\_orig=search&\\_origin=search&\\_sort=d&\\_docanchor=&view=c&\\_searchStrId=1492554134&\\_rerunOrigin=go](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TGF-4C52NW4-4&_user=10&_coverDate=07%2F26%2F2004&_rdoc=1&_fmt=high&_orig=search&_origin=search&_sort=d&_docanchor=&view=c&_searchStrId=1492554134&_rerunOrigin=go)

Jamil, Sofiah and Roderick Chia, 2009, *Lifting the Lid Off Xinjiang's Insecurities*, NTS Insight, September Issue 1, Singapore: Centre for Non-Traditional Security Studies, S. Rajaratnam School of International Studies. <http://www.rsis.edu.sg/nts/resources/nts-insight/NTS%20Insight%20Sept%202009%201.pdf>

Kennedy, Andrew B., 2010, 'China's New Energy-Security Debate', *Survival*, Vol. 52, No. 3, pp. 137–58.

Kuenzer, Claudia, Jianzhong Zhang, Anke Tatzlaff et al., 2007, 'Uncontrolled Coal Fires and Their Environmental Impacts: Investigating Two Arid Mining Regions in North-Central China', *Applied Geography*, Vol. 27, No. 1, pp. 42–62. <http://dx.doi.org/10.1016/j.apgeog.2006.09.007>

Liu, Quli, 2002, 'On the Difficulties in the Full Implementation of Work Safety Supervision in Small Coal Mines' (关于小煤矿安全监察难到位的思考), *China Coal* (中国煤炭), Vol. 28, No.12, pp. 41–3.

McMahon, Gary, Elly Radiani Dubdibjo, Jean Aden et al., 2000, *Mining and the Environment in Indonesia: Long-Term Trends and Repercussions of the Asian Economic Crisis*, EASES Discussion Paper Series 21438, East Asia Environment and Social Development Unit (EASES), East Asia and Pacific Region of World Bank. [http://www.commdev.org/files/877\\_file\\_mining\\_and\\_the\\_environment.pdf](http://www.commdev.org/files/877_file_mining_and_the_environment.pdf)

Nie, Peng, 2010, 'Power Use by Energy Guzzlers Hit a New High', *China Daily*, 22 April. [http://www.chinadaily.com.cn/business/2010-04/22/content\\_9762990.htm](http://www.chinadaily.com.cn/business/2010-04/22/content_9762990.htm)

Norwegian Institute for Air Research (NILU), 2005, *Master Plan against Air Pollution in Shanxi*, Oslo.

<http://www.cleanairnet.org/caiasia/1412/article-60362.html>

'Oil Spill Severely Damages Dalian's Travel and Farmed Seafood Industries', 2010, Greenpeace, 22 July.

<http://www.greenpeace.org/china/en/press/release/dalian-oil-spill-travel-shellfish>

Okogu, Bright Erakpoweri, 1994, 'Oil Spill Hazards at the Upstream Level: A Risk Management Paradigm for a Developing Country', *Energy Policy*, Vol. 22, No. 5, pp.393–402. [http://dx.doi.org/10.1016/0301-4215\(94\)90168-6](http://dx.doi.org/10.1016/0301-4215(94)90168-6)

Resosudarmo, Budy P., Ida Aju Pradnja Resosudarmo, Wijayono Sarosa et al., 2009, 'Socioeconomic Conflicts in Indonesia's Mining Industry', in Richard Cronin & Amit Pandya (eds), *Exploiting Natural Resources: Growth, Instability and Conflict in the Middle East and Asia*, Washington: The Henry L. Stimson Center. [http://beta.stimson.org/rv/Natural\\_Resources/Exploiting\\_Natural\\_Resources-Chapter\\_3\\_Resosudarmo.pdf](http://beta.stimson.org/rv/Natural_Resources/Exploiting_Natural_Resources-Chapter_3_Resosudarmo.pdf)

Rosen, Daniel H. and Trevor Houser, 2007, *China Energy: A Guide for the Perplexed*, Policy analysis, Washington: Center for Strategic and International Studies and the Peterson Institute for International Economics. <http://www.iie.com/publications/papers/rosen0507.pdf>

Tailings.info, n.d., 'What are Tailings? – Their Nature and Production'. <http://www.tailings.info/tailings.htm>

'Timor Sea Oil Spill Forcing NTT Fishermen to Migrate', 2010, *Jakarta Globe*, 24 June. <http://www.thejakartaglobe.com/home/timor-sea-oil-spill-forcing-ntt-fishermen-to-migrate/382331>

Tu, Jianjun, 2007, 'Coal Mining Safety: China's Achilles' Heel', *China Security*, Vol. 3, No. 2, pp. 36–53. [http://www.wsichina.org/cs6\\_3.pdf](http://www.wsichina.org/cs6_3.pdf)

United Nations, 1997, *Glossary of Environment Statistics*, Studies in Methods, Series F, No. 67, New York.

[http://unstats.un.org/unsd/publication/SeriesF/SeriesF\\_67E.pdf](http://unstats.un.org/unsd/publication/SeriesF/SeriesF_67E.pdf)

US Energy Information Administration, 2008, *International Energy Outlook 2010*, Table a1. <http://www.eia.doe.gov/oiaf/ieo/ieorefcase.html>

Wu, Weichen, Eddy De Pauw and Claudio Zucca, 2008, *Land Degradation Monitoring in the West Muus, China*, Paper prepared for Commission VIII for International Society for Photogrammetry and Remote Sensing (ISPRS) Congress in Beijing.

[http://www.isprs.org/proceedings/XXXVII/congress/8\\_pdf/9\\_WG-VIII-9/01.pdf](http://www.isprs.org/proceedings/XXXVII/congress/8_pdf/9_WG-VIII-9/01.pdf)

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