

Bourgouin, France

Research Report

Corporate engagement in non-proliferation along the nuclear supply chain: Material stewardship and traceability in uranium procurement

DIIS Report, No. 2015:04

Provided in Cooperation with:

Danish Institute for International Studies (DIIS), Copenhagen

Suggested Citation: Bourgouin, France (2015) : Corporate engagement in non-proliferation along the nuclear supply chain: Material stewardship and traceability in uranium procurement, DIIS Report, No. 2015:04, ISBN 978-87-7605-743-5, Danish Institute for International Studies (DIIS), Copenhagen

This Version is available at:

<https://hdl.handle.net/10419/120402>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



DIIS REPORT

France Bourgoïn

Corporate engagement
in non-proliferation along the nuclear
supply chain

Material stewardship and traceability
in uranium procurement

DIIS Report 2015:04

© Copenhagen 2015, the author and DIIS
Danish Institute for International Studies, DIIS
Østbanegade 117, DK 2100 Copenhagen
Ph: +45 32 69 87 87
Fax: +45 32 69 87 00
E-mail: diis@diis.dk
Web: www.diis.dk

Layout: Allan Lind Jørgensen

ISBN 978-87-7605-743-5 (pdf)

DIIS publications can be downloaded
free of charge from www.diis.dk

*This report is part of the larger global 'Governing Uranium'
project led by DIIS which is made possible by support from
the John D. and Catherine T. MacArthur Foundation.*

About this Report

This synthesis was prepared by France Bourgouin with the research support of Roberta Pinamonti, Charlotte Bancelhon, Asako Nagai, and Julia Panzer. It was developed as part of the *Danish Institute for International Studies (DIIS)* research project *Governing Uranium*. Since, 2013, DIIS has been releasing a series of reports on the governance of the front end of the nuclear fuel-cycle which set forth the premise for the increased attention to the uranium mining sector in non-proliferation debates.

This research conducted by DIIS and its project partners serves as the foundation for this report. The analysis presented here takes as its point of departure the political and governance analyses developed by DIIS. It is important to note that BSR did not seek to interpret or analyze its contents, and the findings expressed in this report that are based upon this research are not necessarily those advocated by BSR. Rather, BSR aims to provide a complementary component to the *Governing Uranium* project by exploring the potential for corporate sustainability practices to contribute to the development of a non-proliferation and nuclear security culture which will bolster the current regulatory regime of the global uranium sector.

The report is based on the review of publicly available information as well as a series of interviews with representatives from companies along the nuclear value chain. Given the sensitive nature of commercial information, companies at times requested to remain anonymous. In this situation, information was used as a means of contextualizing publicly available information which aided the authors in data analysis and developing conclusions. The author would like to thank the interviewees and tool developers, for their review of this report for accuracy. Any errors that remain are those of the author. Support for the preparation of tables and figures were gratefully provided by Desislava Kavaldzhieva. Please direct comments or questions to France Bourgouin at fbourgouin@bsr.org.

Disclaimer

BSR publishes occasional papers as a contribution to the understanding of the role of business in society and the trends related to corporate social responsibility and responsible business practices. BSR maintains a policy of not acting as a representative of its membership, nor does it endorse specific policies or standards.

The views expressed in this publication are those of its authors and do not reflect those of BSR members.

About BSR

BSR works with its global network of more than 250 member companies to build a just and sustainable world. From its offices in Asia, Europe, and North and South America, BSR develops sustainable business strategies and solutions through consulting, research, and cross-sector collaboration. Visit www.bsr.org for more information about BSR's more than 20 years of leadership in sustainability.

Contents

1. Introduction	7
2. Industry Governance and Self-Regulation	11
Responsible Governance of Transnational Supply Chains	13
Vertical and Horizontal Governance	14
3. Corporate Engagement in Non-proliferation	17
Changing Supply Chains and new forms of governance	18
Uranium Governance and the Private Sector	21
Uranium Mining	24
Nuclear Utilities	27
Responsible Finance	32
Overview of Corporate Sustainability Approaches to Non-proliferations	35
Integrated Supply Chain Approach	37
Transparency of data and reporting	38
4. Industry in Uranium Governance: Developing a Nuclear Security Culture	40
Traceability: Foundation for the RGNSC	40
Collaborative Approach	43
5. Conclusion	45
6. References	47
7. Annexes	50



Photo: Conleth Brady / IAEA

I. Introduction

Companies throughout the nuclear value-chain have a unique opportunity to promote the control and security of nuclear material and technologies. These companies involved in the production and trade of nuclear, radiological, and dual-use commodities and technologies, including uranium and uranium ore concentrate, are in an ideal position to bolster existing governmental mechanisms to secure these operations and contribute to the prevention of proliferation and ensuring uranium is used for peaceful purposes.

While international agencies, as well as national laws and regulations, are largely in place to prevent unauthorized access to nuclear material, many countries that have recently begun developing nuclear programs to address their growing energy needs, lack the infrastructure to control and secure sensitive nuclear materials and technologies. In addition, as the nuclear industry expands, there will be a corresponding increase in the depth, breadth, and velocity of trade in critical commodities in the nuclear value chain – including uranium.

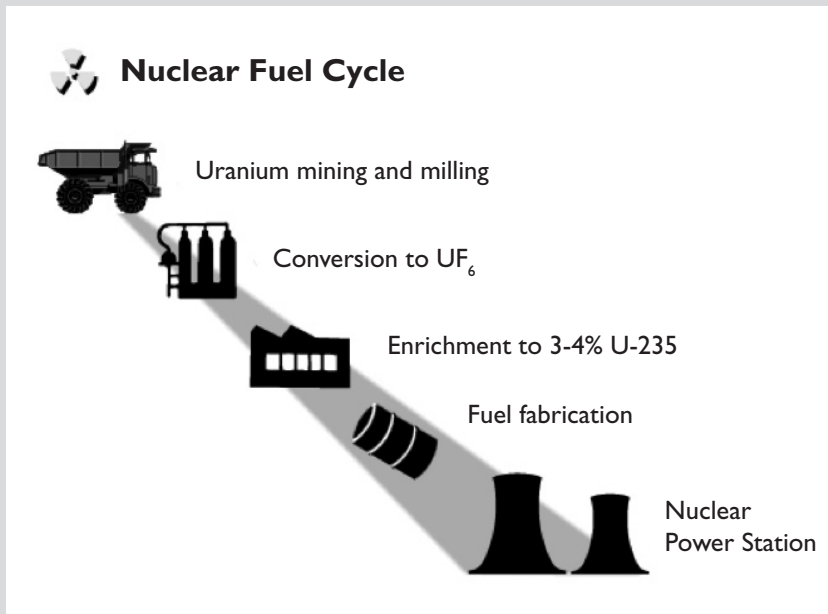
Together, these trends represent a significant challenge to the nonproliferation regime and, as argued by Young (2009), the resulting environmental, economic, technical and social interdependences they create, have led to a sharp rise in the demand for governance in a global context. Indeed, in global commodity markets, as with other industries, governments alone are unable to respond to this increasing demand and are, for various institutional reasons, slow to respond to the most pressing issues. Rapidly changing markets, such as that of uranium over past years, impinge on the capacity of governments to regulate organizations, which is particularly true regarding the regulation of flows of any product over long distances.

Nuclear value chains are globally dispersed and largely opaque to the general public and other stakeholders. In order to ensure a viable and sustainable nuclear industry, good governance measures are needed right from the front-end of the value-chain; that is, from the point of uranium and UOC production (see Box 1). Just as the management of any sustainability risks associated with products from global supply chains is a pressing task for today's society, so is the management of risk associated with civil nuclear industry. It is a task that involves public and private actors and as such poses great governance challenges.

Box I. The Nuclear Value Chain

While governing bodies usually refer to the front and back-ends of the nuclear fuel cycle; the corresponding business terminology applied to the production processes of the civilian nuclear industry are “upstream” and “downstream”. Several industries commonly use this terminology most notably the metals industry, oil, gas, biopharmaceutical and biotechnology industries. Upstream, downstream and midstream make up the stages of the production processes from the searching for raw materials, through the transformation processes of production, to its end use.

In order to align with the reference to the front-end and back-end of the fuel cycle, for the purpose of this report, the upstream stage of the nuclear production process thus includes the exploration and extraction of uranium as well as the milling into uranium ore concentrate. As such it represents the processes of the nuclear value chain up to the point where the material is supplied to the conversion facilities.



The midstream and downstream stages in the production process therefore involve processing the materials collected during the upstream stage into a finished product – in this case into UF₆, U-235, nuclear fuel and eventually nuclear energy. The downstream stage further includes the actual sale of that product (nuclear energy) to other businesses, governments or private individuals.

This report explores how governance arrangements relate to these challenges by focusing on the potential for nuclear supply chains to develop corporate mandatory and voluntary policy instruments. It builds upon the analysis of the risk associated with uranium production conducted by the Governing Uranium project at the Danish Institute for International Studies.¹ Specifically it focuses on sustainability practices associated with procurement in nuclear supply chains, and is based on findings from case studies of both upstream and downstream companies – that is from both: the uranium mining sector and nuclear utilities (see Box 1). This analysis is then complemented by the additional consideration of the potential role of the finance sector in contributing to corporate efforts of uranium governance through the implementation of socially responsible finance mechanisms.

The aim of this report is to posit what responsible governance of transnational nuclear supply chains (RGNSC) could look like. The focus is on the uranium industry, a sector that is highly globalized and which is inextricably linked to the nuclear fuel cycle and hence to debates on security and nonproliferation. Building on research by BSR on the current practices of the private sector in engaging with supply chain management, the first section presents an overview of the evolution of corporate self-regulation in recent years with a specific focus on transnational supply chains. The second section then highlights the potential for industry such as the nuclear suppliers, uranium suppliers, and financiers, to contribute to non-proliferation and nuclear security. This is then followed by a discussion on the opportunity for industry engagement and the eventual development of a culture of nuclear security within industry.

RGNSC, including responsible procurement and financing, is likely to be very demanding. The present report narrows the discussion about RGNSC to an analysis of regulations and policy instruments used by the three sectors and consider how these could be further developed and combined to form a robust governance structure. The research is based on a comparative case study approach, which allows for deeper understanding of the opportunities and challenges in this rather new field of activity and research. It focuses on a set of corporate approaches, policy instruments, including international standards such as the Equator Principles, the Global Reporting Initiative (GRI), and the UN Global Compact (see Annex A). These instruments are potentially of great importance for governing procurement along

¹ DIIS, Governing Uranium, <http://www.diis.dk/en/projects/governing-uranium>

the global nuclear supply chain as they are themselves global in scope and in many cases already recognized and implemented.

Through an analysis of current corporate governance practices of leading companies along the nuclear supply chain, the report shows how mandatory and voluntary policy instruments can – in various ways and combinations – assist in nonproliferation risk management, but also highlights the existence of considerable limitations and gaps, which users need to develop a reflective awareness about. The report reveals the need for a collaborative, multi-stakeholder approach to RGNSC and includes suggestions on how to bridge the gap between private and public actors. Finally, the report concludes that combinations for horizontal and vertical governance arrangements (HG and VG) for uranium promote constructive and feasible pathways towards RGNSC, but which need reflective and constructive efforts among actors with insight, willingness and capabilities to create strong governance linkages.

2. Industry Governance and Self-Regulation

Recent policy research² on the governance structures regulating the global production and trade of uranium points to the relevance for industry to engage in the topic of non-proliferation. But what form industry engagement should take remains to be debated. Should corporate governance approaches consider uranium mining companies only, or would a supply chain management approach along the entire nuclear value chain be more appropriate? In what ways can banks and finance institutions investing in uranium mines or other companies along the nuclear value chain support and compliment current public governance structures through the elaboration of their SRI practices? How can recent trends in sustainability reporting help inform the corporate engagement practices for the uranium sector?

Over past decades, industry governance and self-regulation has proven to be a powerful tool for improving operational performance in a variety of domains, including environmental protection, occupational and public safety, and health. Corporate self-regulation³ could provide a complementary form of governance to help mitigate against variations and discrepancies among different national and regional governance systems as well as for components of the uranium industry, such as sea transport, that are covered by different regulatory regimes, further increasing the complexity of transparency and accountability and increasing the likelihood of loopholes. Given the current gaps in the global regulatory environment on uranium mining, it behooves us to explore the need and potential for [additional] industry self-regulation for strengthening the overall non-proliferation regime.

In general, industries are likely to pursue a self-regulation approach in response to a triggering event that was detrimental to a specific company or caused a ripple effect to the whole industry. For example, in the aftermath of the “Raza Plaza” factory collapse in Bangladesh in April 2103, a variety of international multi-stakeholder initiatives were created. These brought together global brands, trade unions, NGOs and the International Labour Organization (ILO), in order to improve the building

² As of 1 April 2015, DIIS has published six country reports under the Governing Uranium project, specifically on China, France, India, Russia, United Kingdom and United States. See: Governing Uranium, <http://www.diis.dk/en/projects/governing-uranium> See also Bourgooin (2015)

³ Self-regulation can be defined as a systematic voluntary program of actions undertaken by an industry or by individual companies to anticipate, implement, or supplement regulatory requirements, generally through the adoption of best practices.

and fire safety codes of textile factories in Bangladesh, as well as to compensate Raza Plaza survivors and victims' families. Similarly, following Union Carbide's accident in Bhopal, India, the chemical industry implemented Responsible Care, a program that promotes information sharing among companies and involves a rigorous system of checklists, performance indicators, and verification procedures to improve operations and address concerns about the manufacture, distribution, and use of chemicals (see Box 2).

In the case of uranium supply, such a trigger could be for instance the diversion of material that led to a terrorist attack. Were such an event to occur, it would likely

Box 2. Chemical Industry Responsible Care Initiative

The Responsible Care Initiative, launched by Chemistry Industry Association of Canada, is part of the International Council of Chemical Associations (ICCA) and is identified as a main focus area of the chemical industry, including Chemicals Policy & Health and Climate Change & Energy. The Responsible Care network consists of around 60 national chemical manufacturing associations, which are responsible for implementation of the Responsible Care core principles at national level.

The chemical industry's Responsible Care program has promoted safety and security practices that safeguard workplaces, communities and the broader environment. It has become the industry's global signature program for the safe management of chemicals. Responsible Care initiatives, such as "Know-your-Customer" Codes of Practice, have been launched to help companies identify suspicious inquiries and prevent precursors and toxic chemicals from being used maliciously. This is consistent with the industry's support to the Chemical Weapons Convention, now implemented by the Organization for the Prohibition of Chemical Weapons, which bans all chemical weapons.

As part of the chemical industry's commitments to health, safety, environmental performance and improved chemicals management, the industry has also committed to accomplish the objectives of the Chemical Weapons Convention and ensure non-proliferation of weapons of mass destruction.

Sources: <http://www.icca-chem.org/en/Home/Responsible-care/>
<http://www.opcw.org/news/article/the-chemical-industrys-responsible-careR-programme-reflects-its-commitment-to-non-proliferation/>

have a crippling effect on the company that supplied the material, knowingly or not and on the entire industry, including any finance institutions providing investment.

In addition to preventing a trigger event, industry has many incentives for taking a more proactive role in nonproliferation. Industry could avoid losses in profits and reputation if an incident occurs, preempt the imposition of more restrictive regulations by proactively participating in a voluntary program, and potentially gain expedited clearance of goods. Another potential for companies would be improved relations with regulators and stakeholders and more robust and transparent cooperation between industry and government. Demonstrating conscientious corporate citizenship could also result in positive gains in corporate ratings and reporting, as well as increased earnings and market share.

Responsible Governance of Transnational Supply Chains

The literature on commodity chains (or supply chains, or value chains) provides a robust foundation for elaborating on issues of relevance for RGNCS. Chain governance, or the governance of and in chains, is a rather recent topic within commodity chain analyses (Gibbon et al, 2008; Bair, 2009; Sturgeon, 2009). It relates to a variety of issues and activities: the institutional context defining the rules of the game, coordination mechanisms, driving forces, the exercise of control of suppliers and buyers, power relations, auditing, control of information etc. This approach could be seen as a criticism to conventional approaches that center on the role of states for understanding development of economic and other activities (Hamilton and Gereffi 2009). However, as many commodity chains, such as that of uranium, span national borders, governments face serious challenges to their management.

The literature focuses on forces, organizational efforts and power struggles that affect the shape of product chains, the flow of products, and the distribution of costs and rewards (e.g. see Bair, 2009). To the extent that buyers have power to take a leading position in the supply chain and control key resources, it could be argued that they also have responsibility to do that in a way that is socially and environmentally sustainable (cf. Seuring and Muller, 2008; Andersen and Skjeott-Larsen, 2009). Such issues of responsibility are emphasized in the current trend towards taking corporate social and environmental responsibility (CSR or CR) (Laudel, 2010), as well as within the increasing research focus on governmental and public organizations as 'political consumers' (Micheletti 2010: 196-201).

Notable examples of buyer-driven supply chain management systems within the minerals industry include, coal (BetterCoal⁴), conflict minerals (iTSCi⁵), diamonds (Kimberly Process⁶), and gold (World Gold Council Responsible Gold Sourcing Tool⁷). However, contrary to these mineral value-chains, the nuclear sector and the purchase of uranium can be considered as predominantly *supplier-driven*. In terms of market power for nuclear utility companies, there are few ‘big players’ while uranium supply is concentrated among a few dominant companies. In addition contracts are usually cast in a long-term perspective and the nuclear industry as a whole is seen to be highly regulated. In other words, companies seeking nuclear fuel are limited in their choice of uranium companies to choose from. This could put into question the extent to which buyers of uranium can exert influence from a supply-chain perspective to develop means to engaging in responsible procurement and contribute to RGNSC.

Bostrom et al. (2011, 2012) have developed a theoretical framework that helps to define and analyze a responsible approach to procurement, which includes communicative, reflective, systematic, preventive, dynamic, monitoring and integrative elements in addition to meeting minimum legal requirements. Accordingly, there are a number of aspects in the development of RGNSC that are essential for procuring companies, such as communication methods and arrangements, motivations and organizational capabilities (e.g. resources and expertise) (cf. de Bakker and Nijhof, 2002; Seuring and Muller, 2008). However the present report does not aim to discuss the full spectrum of potential mandatory or voluntary corporate policies that could be relevant for uranium governance elements that are relevant for non-proliferation. Rather, we narrow our discussion of RGNSC to a focus on policy instruments and a combination of VG and HG for nuclear supply chains as they relate to supply chain management, sustainability reporting initiatives, as well as socially responsible finance mechanisms.

Vertical and Horizontal Governance

Over past years, increased interdependencies of global markets throughout the world have led to a sharp and unmet rise in the demand for governance on a global scale. As such, the management of a global complex problem will require the involvement

⁴ Bettercoal website <http://bettercoal.org/>

⁵ ITRI, Project Overview, https://www.itri.co.uk/index.php?option=com_zoo&task=item&item_id=2192&Itemid=189

⁶ Kimberly Process, <http://www.kimberlyprocess.com/>

⁷ World Gold Council, <http://www.gold.org/gold-mining/responsible-gold-sourcing>

of a plurality of arrangements and rule-setting authorities (Rosneau, 2003). This is certainly the case for nuclear value chains.

Given the aims of this report, we find it useful to make a distinction between VG and HG. VG normally refers to territorially bounded governance within a hierarchical authority structure. The key example is the nation-state that relies on representative democracy and which uses various kinds of hard and soft regulation in its efforts to govern society. Established nuclear governance organizations such as the International Atomic Energy Agency (IAEA), the Nuclear Nonproliferation Treaty (NPT) or the Euratom Supply Agency (ESA) generally function in this way.

HG, by contrast, is neither structured according to a formal hierarchy or authority, nor necessarily delimited territorially. It always involves several autonomous organizations. It refers to voluntary policy-making and rule-setting initiatives among hybrids or networks of actors, i.e. organizational, political and regulatory arrangements that 'crosscut formerly distinct divisions of tasks among state, market, and civil society actors' (Spaargaren et al., 2006: 7). These actors, at least in a formal sense, operate on an equal level, although informal power is usually important in practice.

In these arrangements there is thus no single authority in the center, but multiple and fluid authorities (cf. Rosenau, 2003). These arrangements could take the form of public-private partnerships, because in such partnerships state actors are not necessarily at the core. Governance along and surrounding global product chains would be such an example. Corporate policy instruments such as codes of conduct, labelling and certification schemes, various information tools, as well as voluntary agreements and contracts between actors are examples that make HG possible.

Horizontal and vertical dimensions have been discussed in previous literature on environmental governance, although not commonly connected to a chain perspective. They have been used in various studies of institutional interplay or of integration of environmental policies in other sectors. The term vertical is connected to relations within sectors, institutions or regimes at different levels of social organization, whereas the term horizontal denotes relations across sectors, institutions or regimes at a similar level of social organization (e.g. Young, 2002; Lafferty and Hovden, 2003; Selin and Van Deveer, 2003).

Policy instruments are 'tools of governance' that can take a variety of forms: legal, financial, informational, partnering and hybrid (Steurer, 2011; see also Taylor et

al., 2012). In the last decades we have seen a rapid increase in this policy toolbox of all kinds of standards, which, according to Brunsson and Jacobsson (2000), are defined as written, explicit (compared with norms) and voluntary (compared with directives). These standards are often established and used for HG, and they derive their authority from sources such as expertise and moral reflections (cf. Jacobsson, 2000), and can be effective through 'persuasion' (Steurer, 2011). A key question, for the development of RGNNSC, and more specifically responsible procurement of uranium for non-proliferation, is whether policy instruments for VG (e.g. legislation) can be combined with policy instruments for HG (e.g. labelling, codes of conduct).

3. Corporate Engagement in Non-proliferation

Industry actors of the nuclear supply chain have continued to highlight their role in energy generation or improvements in medical technologies, and stressed the low risk of their operations to global security threats given the highly regulated nature of their industry. Generally, issues of global security and proliferation have largely been left out of broader sustainability debates by key industry actors. Upstream, uranium mining has historically not been seen as an activity that presents a significant proliferation risk – although there is little publicly documented evidence of this, and several uranium hotspots in the world are increasingly based in high risk areas.⁸ Downstream, utility engage in the issues of proliferation by emphasizing their compliance with debate relying on established regulatory systems and maintaining the civilian purpose of their use of uranium and other nuclear material.

Indeed, for decades, the market for uranium was managed by a small number of actors and regulated by an evolving, complex set of international, regional, and national regulations aimed mostly at limiting the risk to worker or environmental safety rather than a focus on proliferation. However, in the past years, the global market and technology for uranium processing has evolved and we are seeing new suppliers and consumers of uranium for civil power generation, medical technologies, and other manufacturing. As the spot market price rose from US\$ 21.00 per pound in January 2005 to a high of US\$ 136.00 per pound in June 2007, the promise of good returns on investment led to the exploration and extraction of uranium in countries which had not yet ratified core conventions regarding the nuclear industry, presenting a new set of risks associated with uranium mining. Following this period, the commodity price downturn of 2014-2015 has since slowed this trend and we are again seeing a stability of uranium production in countries with an extensive uranium mining history (see table 1). In this regard, incorporating non-proliferation into wider corporate sustainability debates is all the more relevant to the maintenance of a robust non-proliferation regime and part of industry's quest to uphold ethically, socially and environmentally responsible practices in the nuclear supply-chain.

⁸ Cf. the IAEA International Trafficking Database (ITDB) at the IAEA, <http://www-ns.iaea.org/security/itdb.asp>. However details on specific cases are not made public. Rukhlo and Gregoric (2008) state that between 1993 and 2007, a total of 92 incidences were attributed to the illicit trafficking of natural uranium. See: Rukhlo, V. and M. Gregoric (2008), 'Uranium production: best practice of nuclear security measures', presented at IAEA Technical Meeting on Implementation of the Sustainable Best Practice in Uranium Mining and Processing, 15-17 October 2008, IAEA, Vienna. See also C. Vestergaard 'Uranium Security' (forthcoming 2015) for an overview of uranium security, which highlights that there are known cases of theft of small amounts of UOC.

In 2004, the revelation of the illicit trafficking network headed by Pakistani nuclear scientist Abdul Qadeer Khan provided an impetus to strengthen international efforts to prevent nuclear proliferation. Nonetheless momentum for developing better regulations has slowed perhaps because there has been no overt act of nuclear or radiological terrorism linked to uranium diversion or sabotage⁹, limiting the pressure for companies or the entire industry to act. Also limiting the pressure on regulatory authorities to revise and expand current practices.

The research conducted by DIIS reveals that the established global regulatory regime, as seen as the combination of existing national, regional and international structures, as robust as it is, still leaves potential loopholes which constitute a potential proliferation risk through undetected sabotage or diversion of material.¹⁰ Not all aspects of uranium and UOC production, storage, and transport are addressed by the different regulatory systems to the same extent. The global nature of the industry and of the risk of proliferation requires a consistent and robust transnational regulatory system. Through different sustainability risk management mechanisms, corporate actors can complement and strengthen the current regulatory regime.

Changing Supply Chains and new forms of governance

Over the last two decades, two significant changes in the global economy of nuclear material took place which ought to be considered when looking at the relevance of non-proliferation for companies along the nuclear value-chain. These are 1) the globalization of supply chains and growing need for nuclear energy from emerging economies (notably: China, Brazil, India, South Africa), and related to it, 2) an opening of uranium supply from regulated markets to states with relatively weak governance and little regulation (e.g. Malawi, Tanzania). Together, these dynamics bring into question the strength of the current nuclear governance regime and potentially place additional responsibility on multinational companies mining uranium in these areas.

Today's buyers of nuclear energy include several different client profiles. Some, such as South Africa and Turkey, aim to eventually build their own nuclear industries.

⁹ Specifically, the risk of sabotage was underscored on 23 May 2013 in Niger when coordinated car bombings thirty minutes and 250km apart targeted the military barracks in Agadez and the Somair uranium mine in Niger. See: "Areva's Niger mine back at full production after Islamist attack," *Reuters*, 7 August, 2013..

¹⁰ The full list of country reports published can be found on DIIS' Governing Uranium website: <http://www.diis.dk/en/projects/governing-uranium>. See also the final Governing Uranium report, forthcoming June 2015.

Others, such as Saudi Arabia and the United Arab Emirates, are seeking efficient solutions to the challenges of soaring energy demands. India is currently a client and integrator of nuclear technology, but aims to also become a vendor in the future.

Since 1993, the output of uranium mining has been ever rising while uranium supply chains have evolved to include new jurisdictions and new countries entering the global market. Between 2002 and 2013, uranium production in traditional uranium countries has largely declined (-10% change in Canada and -16% change in Australia) whereas since the turn of the century production has emerged in new countries such as China, Malawi, Namibia, Uzbekistan, and the world's leading producer Kazakhstan, have at least doubled their share of global production (see table 1).

Table 1. Change Uranium Production 2003-2012/2013

Country	Production (tU)		% change
	2002	2013	2002-2013
Australia	6854	6350	-7%
Brazil	270	198	-27%
Canada	11604	9332	-19%
China	730	1450	99%
Czech Rep	465	225	-52%
France	20	0	-100%
India	230	400	74%
Kazakhstan	2800	22567	706%
Malawi	0	1132	113200%
Namibia	2233	4315	93%
Niger	3075	4528	47%
Pakistan	38	41	8%
Romania	90	80	-11%
Russia	2900	3135	8%
South Africa	824	540	-34%
Ukraine	800	1075	34%
USA	883	1835	108%
Uzbekistan	1860	2400	29%

Source: <http://www.world-nuclear.org/info/Facts-and-Figures/Uranium-production-figures/>

While international guidance on uranium governance for non-proliferation remains limited, IAEA safeguards are moving forward to capture more of upstream material. At the national level, regulatory frameworks can be robust, particularly on issues of safety which in practice can provide a form of industry engagement on non-proliferation. Nevertheless, these changing geographies of uranium extraction bring into question the extent to which compliance with current regulations is sufficient to mitigate proliferation risks throughout the nuclear supply chain. What are the implications of uranium ore extraction and uranium ore concentrate (UOC) production in weak governance states for the overall strength of the non-proliferation regime?

The analysis by DIIS on the different governance regimes for 15 uranium producing countries¹¹ demonstrate how the different national, regional, and international regimes do not all maintain the same standards when it comes to key aspects of the security regime such as inventory controls, reporting requirements, conducting risk assessments, or the physical protection of uranium ore or uranium ore concentrate. Companies operating in these countries have by and large not identified non-proliferation as a material issue to their risk portfolio. Rather, the issue is seen as being the remit of states and companies pledge their compliance to currently existing regulatory structures.

Yet, states with limited capacity to oversee the uranium sector are increasingly relying on the practices of mining companies to comply with international regulations. For example, in analyzing the expansion of uranium exploration and extraction activities throughout Africa, Anthony and Grip (2013) analyze the potential limitations of the current non-proliferation regime and highlight the increased responsibility of global mining corporations. Moreover, smaller mining companies as well as developing exploratory mining projects are increasingly found in such countries as Algeria,¹² Cameroon, Somalia, and Zambia. Information on safeguard measures in place in countries of operation is important for corporate and public risk assessments. While the World Nuclear Association (WNA) provides information on regulation in uranium rich countries,¹³ it does so far not provide country profiles for the upcoming

¹¹ The countries studied under the Governing Uranium project at the Danish Institute for International Studies include: Australia, Brazil, Canada, China, France, India, Kazakhstan, Malawi, Namibia, Pakistan, Russia, South Africa, Tanzania, UK and US.

¹² Certainly, the raid of a British Petroleum gas production field in Algeria in 2013 by Islamist militants brings to the fore some of the salient concerns regarding security of operations and safety of workers for extractive industry companies. <http://www.economist.com/blogs/pomegranate/2013/01/algerias-hostage-crisis>

¹³ Cf. <http://www.world-nuclear.org/info/Country-Profiles/>

countries that are weaker in uranium governance from the state level, such as Central African Republic, Malawi, Morocco, or Tanzania.¹⁴

Regulation alone cannot stop all illicit procurement (Kurzork and Hund 2013). It is increasingly clear, that even full compliance with regulations does not always prevent the transfer of goods to countries that are under sanctions. Proliferators are dynamic and responsive, reacting to the controls in place to find ways of circumventing them and duping exporters into unwittingly doing so (ibid.). As the control point for the flow of international manufacturing, shipping, and banking, each element of the supply chain that deal in proliferation-sensitive technologies and hence are most likely to be targeted by proliferators. Conditions need to be created in which the industry as a whole is resistant to illicit trade. The creation of these conditions relies on better coordination and understanding between governments and the private sector.

Uranium Governance and the Private Sector

The nuclear industry as a whole is characterized by several types of regulations, meaning that companies must deal with a multitude of standards. However a consistent approach to uranium governance is lacking and corporate involvement in non-proliferation is largely limited to compliance with international and national regulations. At the international level safeguard measures on uranium and uranium ore concentrate are limited and reporting can be limited and national level measures are uneven across states. Together this results in an inherent weakness in the overall governance regime at the front-end of the fuel-cycle. At the national level, the mining, milling and transport of uranium and UOC have been overlooked by non-proliferation policy and regulations in a number of countries. This is largely because the general perception that the quantity of uranium and UOC required to fabricate a nuclear device for illicit purposes is so large and requires sophisticated technologies at each processing stage, that these materials are considered to present a low risk to proliferation. A question that remains to be explored is what additional forms of corporate engagement in non-proliferation could potentially help address weaknesses in the global uranium governance regime?

The corporate approach to non-proliferation is varied and depends on the industry and its relations to the nuclear supply chain, as well as the level of sophistication of

¹⁴ Regulatory structures for Malawi and Tanzania are under currently under government review See the DIIS-CSIS Governing Uranium website: <http://uranium.csis.org/>

the company's sustainability programs. The review of corporate profiles for companies along any part of the civilian nuclear supply chain reveals the conspicuous absence of the mention of the military use of nuclear material. Nor is non-proliferation identified as a key issue in materiality assessments, stakeholder engagement process, nor is the company's performance in their commitment to non-proliferation measured through key indicators, monitored, and reported on.

Certainly, some companies sourcing nuclear material, including nuclear power utilities as well companies involved in the design, servicing, and provision of advanced technology for the nuclear industry (such as GE Hitachi for example) are aware of the risk of proliferation to their company's operations. These companies will have specific policies and declarations regarding their business operations, their compliance with nuclear laws and regulations in their jurisdictions, as well as official corporate policies or statements regarding the peaceful and civilian use of their products.

GE Hitachi is one company that has explicitly identified proliferation as a sustainability risk in its overall sustainability materiality assessment, recognizing the risk of diversion of nuclear-based material it produces. However, while the inclusion of non-proliferation in the GE Hitachi materiality assessment is an important step forward for corporate engagement in the issue, it is important to note that this risk is not considered to be due to its supply chain practices and the sourcing of uranium/UOC based products. Rather it is directly linked to the manufacturing and transport of its products.¹⁵ We still have yet to see companies highlight non-proliferation in connection with the production and sourcing of uranium/UOC material as a material sustainability issue. In this way, corporate governance of uranium mirrors that of the international governance system. Just as the different nuclear regulatory bodies do not include the front-end of the fuel-cycle, companies along the nuclear value chain do not systematically include the upstream activities of UOC production and sourcing as a risk related to the nuclear industry.

Certainly, as the analysis in this report demonstrates below, various companies along the nuclear supply-chain mention and openly discuss "non-proliferation." However, few companies actually have active systems or programs aimed at "non-proliferation performance" or have incorporated non-proliferation into their wider sustainability

¹⁵ Cf. <http://www.nti.org/gsn/article/closely-held-report-discounts-proliferation-risk-lasers-making-nuclear-fuel/>

risk assessments. Rather, most companies make regular mention of their compliance to national and international regulations and agreements. Similarly, the World Nuclear Association (WNA) includes a strong focus on uranium stewardship but has not yet seen an explicit need to include “non-proliferation” into its programs. In the context of RGNSC for uranium, we are interested in understanding the potential for companies to go “beyond compliance” and acknowledge the importance of “non-proliferation” to both key stakeholders and to their business success and its relevant to uranium.¹⁶

Be it a strategic omission in crafting public image or wide-spread corporate denial, the lack of reference to today’s nuclear proliferation concerns seems as unnecessary as it does a contradiction to sustainable best practice. Certainly, transparency and acknowledgement of the issues pertaining to dual-use material ought to be seen as within the corporate world as a practice of “responsible leadership” (Maak and Pless, 2006; Maak, 2007) and be a catalyst to “triple bottom line” benefits (Hubbard, 2009) that come with performing “beyond compliance” (Kurzrok and Hund, 2013).

One challenge is that the specific details of nuclear supply chains are generally opaque to the public – that is, it is unclear to know the extent to which companies have knowledge or traceability of their supply chains. That said, the uranium mining industry is dominated by a small set of large suppliers, which also means that there is potential for management of the most material flows should a robust governance framework, which combined public and private actors, was established thus facilitating the potential impact of RGNSC. Of course, if one considers all potential sources of uranium, including the so-called unconventional sources¹⁷ (such as phosphates, tantalum concentrates, coal flyash and mineral sands), then the supply chains begin to look much more complex, with a much greater number of producers, suppliers, traders, and end users involved. Yet, as the volumes of production for these sources represents only a small fraction of overall global uranium supply, their inclusion in governance programs is more a question of developing prudent controls to be able to evaluate the risk that uranium will be extracted for nuclear purposes, than it is about addressing material flows.

¹⁶ Letts and Cunningham (2009) provide arguments as to why engagement into non-proliferation makes business sense.

¹⁷ which are resources from which uranium is only recoverable as a minor by-product and are generally not considered economically viable sources of uranium

Uranium Mining

The review and analysis of sustainability practices of eight major global uranium producers¹⁸ provides an overview of the current levels of corporate engagement in issues of non-proliferation. Together, in 2012, these eight companies provided 82% of world uranium production.¹⁹ The practices of each company were reviewed to ascertain the different ways by which they engage with non-proliferation and included a thorough review of all publicly-available sustainability material, including materiality assessments, stakeholder engagement activities, and governance materials. An overview of the findings is available in Annex B.

Of the eight companies, six mention “non-proliferation” in their sustainability material. These included Areva (1 count), BHP Billiton (2 counts), KazAtomProm (2 counts), Paladin (5 counts) and Rio Tinto (1 count). However, only three actually elaborated upon the company’s position towards issues of non-proliferation issues in their sustainability report: Areva; ARMZ-Uranium One;²⁰ and Paladin. In terms of materiality assessments, none of the companies highlight non-proliferation as a key sustainability risk. That said, Paladin and Rio Tinto both refer to product stewardship in their materiality assessments. Paladin actually mentions product stewardship “throughout the lifecycle of product”,²¹ and while Rio Tinto refers to the importance of product stewardship in its materiality analysis, there is no explicit mention of uranium.²² With the extensive mention of non-proliferation in its sustainability material, Paladin can be seen as having one of the most robust approaches to this issue among all eight leading mining companies (see Box 3).

The issue of non-proliferation however is taken up more thoroughly, in corporate governance material. Only Paladin²³ and Navoi had a visible absence of references to issues of non-proliferation in their corporate governance material. AREVA, for instance includes nonproliferation as a control principle in its value charter, which

¹⁸ This review included the following companies: AREVA, ARMZ -Uranium One, BHP Billiton, Cameco, KazAtomProm, Navoi, Paladin, and Rio Tinto

¹⁹ Cf. <http://www.world-nuclear.org/info/Nuclear-Fuel-Cycle/Mining-of-Uranium/Uranium-Mining-Overview/>

²⁰ Note: in the case of ARMZ-Uranium One, the review was of their integrated report which did not make mention of non-proliferation per se, but did nonetheless make mention of the company’s compliance with the laws of the Russian Federation of the countries of operation, while taking into account international best practice and the OECD corporate governance principles.

²¹ <http://www.paladinenergy.com.au/default.aspx?MenuID=222>

²² Rio Tinto, Our Business, <http://www.riotinto.com/our-business-75.aspx>

²³ Again, Paladin was the company which included the issue of non-proliferation the most extensively in its sustainability material. As such, the absence of mention of the issue on publicly available governance material is not an indication of corporate oversight.

Box 3. Paladin Energy Ltd: Setting the example on Uranium Stewardship

Paladin is a uranium production company with projects currently in Australia and two mines in Africa who does make reference to “Material Stewardship” in its governance material. Corporate material explains that the uranium sourced in Namibia and Malawi, is transferred under the strict compliance with safeguards agreements between the respective countries, and the International Atomic Energy Agency (IAEA). Paladin also acknowledges that uranium stewardship involves management of the material through its life cycle. Paladin further states on its webpage focusing on stewardship that it is a participating member of the Australian Uranium Association (AUA) and is committed to implement the terms of the AUA Industry Code of Practice, as well as to observe the AUA’s Charter and Principles of Uranium Stewardship.

Source: <http://www.paladinenergy.com.au/default.aspx?MenuID=222>

suggests a growing recognition of industry’s critical role and responsibility in promoting nonproliferation worldwide.

In addition, two notable examples of corporate approaches to uranium governance are offered by BHP Billiton and KazAtomProm. In the case of the first, the company reconciles records of uranium production, transfers, receipts, stakes at overseas facilities and sales from the overseas facilities to BHP Billiton customers in countries that are signatories to the Nuclear Nonproliferation Treaty (NPT) on a six-month basis. These reports are submitted to the Australian Safeguard and Non-proliferation Office (ASNO) as well as the Department of Resources, Energy and Tourism (DRET). In this regard, BHP Billiton appears to be the only mining company among those reviewed explicitly defining uranium product as nuclear material.²⁴ In the second case, KazAtomProm corporate documentation mentions its participation in an IAEA pilot project on natural uranium accounting and control, directed to further strengthening the region of the treaty of non-proliferation of nuclear weapons.

Overall, the interest by uranium suppliers to take a more proactive role in nonproliferation remains limited. It is important to note that this assessment is based only

²⁴ See for example the BHP Billiton Case Study (2012) *Mining the Life Cycle of Uranium* available at <http://www.bhpbilliton.com/home/society/reports/Documents/2012/ManagingTheLifeCycleOfUranium.pdf>

on information that companies are comfortable making publicly available. As such, this report is unable to make further claims regarding corporate practices, if any, that are kept confidential.

The principle areas of focus remain in compliance with domestic and international laws and regulation. Further, any sustainability reporting activity for these companies is usually guided by international best practice as provided by the UN Global Compact or the GRI.²⁵ At the moment, neither of these principle sustainability reporting mechanisms stipulate for companies operating with dual-use material how to report on indicators relating to non-proliferation performance.

For today's leading uranium mining companies, the issue of non-proliferation is largely taken up in corporate governance material as it is not seen as a key sustainability risk. Companies see their role as complying with international regulations regarding uranium production as set up by the relevant policies and laws. We are thus entering into a circular argument - if uranium is not part of proliferation governance structures, then companies seeking to comply with regulation will not need to consider uranium a material that presents an important proliferation risk. However, we are interested in seeing how companies can go beyond compliance. The Paladin example demonstrates well, that the inclusion of non-proliferation as a sustainability issue is a more effective way to stimulate corporate engagement in the issue than when it is solely seen as a political issue and addressed in corporate governance material only. In other words, by excluding non-proliferation as a material sustainability issue, mining companies are missing an opportunity to use effective sustainability practices already in place (such as sustainability reporting) towards building an industry-wide culture of security. The further consideration of the relevance of non-proliferation to corporate sustainability would thus encourage the development of corporate practices for the promotion of nuclear security.

It is critical to also bear in mind the effects of the uranium market structure on the consideration for further corporate engagement in non-proliferation. Firstly, the market is dominated by a small set of reputable mines. This means that uranium supply is highly concentrated, and monopolized by a set of mining companies with strong sustainability performance, include safety and security. Secondly, it is not in the commercial or legal interest of any mining company not to take adequate due

²⁵ See <https://www.globalreporting.org/Pages/default.aspx> and <https://www.unglobalcompact.org/> for further information. Cf also Annex A.

diligence in ensuring its product reaches its customer. As such, while reporting and disclosure of uranium trade may not be fully transparent, the industry perspective is that a risk of sales to rogue customers is very low. The argument can be further related to the trade and transport of material, with the commercial and legal imperative for companies to deliver material to their customers providing an incentive to only engage with established and reputable transport companies. Given these practices as well as mining company compliance with the regulations that exist, industry has seen little need to extend efforts further, but rather continue to participate in the issue of non-proliferation in collaboration with governments as it has until now.

Key findings sustainability practices of uranium suppliers

- General absences of non-proliferation in sustainability materiality and programs
- Reason offered largely because uranium not considered “risk” material
- Non-proliferation is an issue companies mention in their governance material and thus follow an approach of corporate compliance
- Uranium suppliers can get more involved through either, stricter regulations, and/or requirements from industry (such as supplier codes of conduct, supply traceability schemes etc.)

Nuclear Utilities

The engagement of civilian nuclear utility companies in issues of non-proliferation overall is more consistent than it was found to be with the uranium mining sector. The review and analysis of the sustainability and governance practices of nine global leading nuclear energy companies²⁶ allows for building an understanding of the breadth of corporate involvement in non-proliferation and the extent to which companies seek to go “beyond compliance” when it comes to non-proliferation. The selection of companies was deliberately made to ensure a global representation of companies from different regions of the world, and hence who are subject to different regulatory standards. This included consideration for country of ownership as well as countries where nuclear assets are located. Additional selection criteria included the reported total and percentage power production from nuclear in terawatt-hours (Twh) for 2013. The idea was to review companies where the nuclear production was most material in terms of their overall operations. Consideration was also given

²⁶ This review included: EdF, Fortum, E.ON, Vattenfall, Ontario Power Generation, Exelon, Duke Energy, Korea Hydro and Nuclear Power, Tokyo Electric Power Co.

to the uranium sourcing countries and mining companies (if known and publicly available) as well as countries of conversion and enrichment (if known and publicly available) as a way to see if any patterns in corporate behaviors can be correlated with sourcing of uranium from companies operating in different countries with different nuclear regulatory regimes.

Overall, there is a wide spectrum of corporate approaches to traceability in fuel supply chains. It is important to re-emphasize that this analysis is based only on information companies were willing to share. For instance, a company may list one or several of its known fuel suppliers, but there is no way to ascertain if there are others which are not mentioned publicly, or not known. In addition, there was little transparency provided in the actual supply chain – that is, which are the different actors at each stage, how many different actors there are, and what the implications are for the chain of custody of the uranium product in the initial stages of the supply chain, especially once it reaches the point of conversion. Nevertheless, most companies are able to demonstrate that they know, to varying degrees of detail their suppliers and are willing to make this information publicly available.

Eight of the nine companies reviewed declare [some of] their suppliers in their publicly available corporate material.²⁷ Overall, the nine companies do state publicly the countries from which the uranium they source originates from as well as the countries of conversion and enrichment. These major utility companies know their main fuel supplier(s) and state which companies have mined the uranium in their supply chain. Exelon and Duke Energy even specify that they also source fuel from the recycling of nuclear weapons. However, the extent to which these nine companies are transparent about the actual mines the uranium they use comes from is varied. That is, for example, EdF, Vattenfall and Duke Energy state that their main supplier is AREVA, yet only EdF and Vattenfall are aware of the different mines from which the uranium originates. Moreover, the mention of the actual mining sites are generally not included in the contracts; only country of origin of the uranium material.

Certainly knowing the country of origin of uranium supply is a common practice in the civilian nuclear utility sector, but knowledge of the actual mines depends on the established relationship with the supplier. Such a relationship will be largely

²⁷ E.ON was the only company from whom it was unable to ascertain if they know their suppliers from publicly available information. That said, the industry structure is such that nuclear utilities usually know who their suppliers are (though perhaps not to mine level). As such, this is a comment on disclosure practices and not meant to imply that the company is unaware of who its suppliers are.

dependent on the overall history of the buyer-supplier relationship as companies' leadership and the balance of contractual powers evolve over the years. In general, these utility companies tend to hold great trust in both the national regulation and their counterparty having adequate safeguards such as book-keeping, security measures, licenses and so on, and in the adequacy of any control or monitoring by the relevant national radiation and nuclear safety authorities. Of course, given that uranium is fungible, and the physical separation of uranium material is not always practical, traceability to mine could be challenging.

A consideration which is of critical commercial importance to nuclear utility companies is the security of fuel supply. As such, companies are interested in maintaining longer-term contracts with suppliers as a way of mitigating against the risk of insufficient supply of natural uranium for maintaining their levels of nuclear energy production. What is not clear however, based on the information companies are willing to provide, is who are the different actors involved along the value chain (such as agents, brokers, transporters) and what practices are employed to ensure chain of custody. As such, the transparency of uranium supply is not a given. Utilities (usually) disclose the country of origin of the uranium, but not the actual counterparty. The non-disclosure of counterparties is due to confidentiality clauses in contractual arrangements. So while such information is likely to be known by the market itself, there is limited transparency and disclosure to the public.

All companies exercise some form of due diligence on their suppliers, including the implementation of supplier codes of conduct and auditing of mines. One notable example of supplier due diligence is provided by German-based company E.ON (see Box 4). E.ON declared engaging in a "proactive response to procurement challenges" program whereby companies along their supply chain, including mining companies, need to comply with the company's "Responsible Procurement Policy". In addition, to minimize risks, E.ON claims to only source uranium from established suppliers that generally produce in politically stable countries. Generally speaking the criteria of importance predominantly relate to issues of ethics, environmental management and health and safety. Concerns of corporate activities aimed at managing risk of proliferation do not feature on the supplier due diligence programs.

What is not always clear however is the type of due diligence that utilities perform. Some companies such as E.ON and Edf maintain additional special requirements for nuclear purchases compared to their other suppliers. Overall, the process of due diligence is largely biased by the perceived sustainability risks in the uranium mining

Box 4. E.ON – Upstream traceability on uranium procurement

E.ON is one of the few utilities companies that seems to have safeguards and policies in place which monitor the origins of the mined uranium that ends up in their supply chain. Even though E.ON's program does not specifically state 'non-proliferation' as such, the company named its program "Proactive Response to Procurement Challenges".

Further E.ON states that its suppliers along the supply chain, from mining, conversion, and enrichment need to fulfil the outlined criteria in E.ON's Responsible Procurement Policy. In addition, E.ON minimizes risks related to the source of uranium by procuring from suppliers that are audited, but also produce in "politically stable countries." The company further refers to the ongoing process led by the World Nuclear Association (WNA) which established an international working group to define minimum standards for uranium mining.

Source: <http://www.eon.se/Upload/dokument/Nuclear-Fuel-Policy.pdf>

sector. From the perspective of utility companies, mines represent their highest risk "blind spot" in their supply chains that they need to address²⁸ as they consider the other aspects to be well covered by regulation and their counterparties. This means that due diligence at the mine level is largely limited to the standard concerns of environmental management, health and safety. Unless the proliferation risk of uranium is brought forward by stakeholders, or there is a triggering-event where uranium diversion is connected to an important negative event, it will not feature as part of corporate supply chain due diligence practices by nuclear utility companies.

Again considering that uranium is a supplier driven market, the opportunity for nuclear utility companies to impose additional code of conduct requirements for proliferation remain limited. As such, they often opt to trust the counterparty and the regulation, and in the case of non-proliferation and the uranium sector, the perception is that the risk is minimal and the regulation strong. Further, the negotiation and renegotiation of such longstanding contracts represents an important effort and investment for a utility company. Translated into corporate terms:

²⁸ This is not unique to nuclear utilities and uranium mining. Indeed, the advent of BetterCoal lies precisely in imperative for coal-based utility companies to manage the high sustainability risks associated with the coal-mining sector.

companies must prioritize what issues to focus on in the negotiation of contracts. As such, they will prioritize on those issues which are associated with the most risks or which they have more leverage. Any risks in their supply chain will be determined either by internal business priorities or in response to stakeholder concerns. As the production of uranium has until very recently been largely left out of proliferation debates, such issues have simply been deemed irrelevant in contract negotiations regarding the sourcing of uranium.

Similarly to uranium mining companies, nuclear utilities companies do not report on “non-proliferation” a part of their sustainability reports. Further, only a handful address issues of “responsible sourcing” as part of the sustainability reporting efforts. That is, companies do not necessarily highlight supplier due diligence as an important sustainability risk mitigation practice and none of the companies identify non-proliferation in their materiality assessments. E.On and Vattenfall have identified “responsible supply chains” as a material sustainability issue. In addition E.On mentioned that minimum standards for uranium mining are in the process of being approved by the World Nuclear Association (though again the focus is on developing protocols for evaluating issues of health, safety, and environmental (HSE) management systems).

In-line with good ethical, social and environmental principles, standards and business practices, companies operating downstream in the nuclear supply-chain should pay increased attention to environmental, social, and corporate governance (ESG) compliance of upstream operators. That is, downstream companies should be increasingly aware of the environmental and social impacts of their suppliers, including those of uranium mines, in order to assess the integrity of their supply chain.

Key findings Nuclear Utility Companies

- Lack of a standardized industry approach by nuclear utilities to engaging in non-proliferation debates. Companies engage with the issue in different ways and have not established a link between uranium procurement and proliferation risk.
- Opaque supply-chains to the public and other stakeholders difficult to assess degree of transparency in the supply chain.
- No supply-chain management practices implemented relevant to non-proliferation – while there is some supply chain management issues (environment and health and safety) such approaches direct attention to these key issues, but are seldom sufficient to guide management of uranium from a proliferation risk perspective.

- Corporate engagement of non-proliferation linked to different activities, such as:
 - ♦ companies buying uranium from US program of dismantling nuclear weapons from Russia (now ended)
 - ♦ marketing a new type of reactors that can use dismantled weapons fuels (CANDU)
 - ♦ downstream commitment and due diligence on customers states to the ‘nuclear power plant exporters’ principles of conduct (see KEPCO)

Responsible Finance

Social Responsible Investing is an investment discipline that considers environmental, social and corporate governance (ESG) criteria to generate long-term competitive financial returns and positive societal impact. Banks and asset manager will set and implement policies outlining the criteria which inform their approach to financing projects for various different industries. The criteria established will be based on the perceived levels of risk for different social, environmental, political, and economic, issues associated with a particular industry. In the review of the policies for the top 15 banks by assets (2014),²⁹ eight³⁰ have policies specifically aimed at either the nuclear power sector or the uranium mining sector, or both. It is important to note that for most banks, uranium mining, or the upstream processes of the nuclear value chain, is not included in the company’s nuclear policy. Rather these will fall under the overall mining and metals policies. As such, the consideration of financing uranium projects is not systematically linked to issues of non-proliferation.

The mining and metals sector policies usually applies to all the banking and financial services provided by the banks in terms of exploration and mine development planning, mine operation, as well as mine closure and reclamation. At times the policies also include the phases of primary processing of minerals, including concentrating. The finance of uranium mining projects will be subject to the general mining policy criteria, and in some cases such as with HSBC Holdings, there are additional provisions for uranium mining specifically. HSBC Holdings specifically indicates that it will not provide financial services to mining companies that directly support the

²⁹ Industrial and Commercial Bank of China; HSBC Holdings; China Construction Bank Corporation; BNP Parisbas; Mitubishi UFJ Financial Group/Bank of Tokyo-Mitsubishi MUFG; JPMorgan Chase & Co.; Agriculture Bank of China; Bank of China; Credit Agricole Group; Barclays PLC; Deutsche Bank; Bank of America; Japan Post Bank; Citigroup; Société Générale

³⁰ HSBC Holdings; BNP Parisbas; JPMorgan Chase & Co.; Credit Agricole Group; Barclays PLC; Deutsche Bank; Citigroup; Société Générale.

mining, processing, and/or sale of uranium for nuclear weapons. In addition, the bank expresses it has restricted appetite for financing uranium for the power sector where IAEA standards are not met.

In addition to the standard ESG criteria on environmental protection, biodiversity, protected areas, social performance, communities and relocation (etc.), mining policy criteria can also include for instance a provision that the mine is not located in an area with active armed conflict (BNP Parisbas) or in countries with financial sanctions from France, the European Union, or the United Nations (BNP Parisbas). Similarly companies often outlay the set of international standards and initiatives which provide guidance for the bank (e.g Société Générale) often citing: IFC, World Bank Group, the Organisation for economic Co-operation and Development (OECD), the Extractive Industries Transparency Initiative (EITI) standard, and include specific reference to mineral specific initiatives such as Bettercoal Code, the Kimberly Process Certification. This is often extended to include the Voluntary Principles on Security and Human Rights, the International Cyanide Management Code, and the Equator Principles.³¹

Financing projects in the nuclear sector are often challenging given the levels of risk associated with downstream activities. Firstly, they are capital intensive and the high risk levels are an important obstacle to gain the confidence of investors. Nuclear power plants projects are complex and highly capital intensive, they are sensitive to interest rates, have long lead times, long payback periods, construction costs are often uncertain, and they are associated with regulatory and policy risks. As such the costs of financing of nuclear power plants are often higher than for other types of power plants. As such, global leading banks and asset managers have developed various policies which highlighting their positioning on taking enhanced due diligence regarding financing of specific high risk projects. The nuclear sector is no exception here; with many of the top banks currently implementing a specified nuclear policy which outlines the criteria that will determine if a bank is willing to finance a project or not. These policies are also relevant for evaluating clients' activities in terms of decommissioning and end of life of the nuclear power facility, the recycling, storage, treatment, transport, and disposal of all radioactive materials and waste.

³¹ Unlike some other voluntary sustainability initiatives, there are no agreed certifying organizations or actual certifications that a project meets Equator Principles standards (SEE ANNEX A); rather each institution that adopts the Principles will individually declare that it has or will put in place internal policies and processes that are consistent with the Equator Principles.

The consideration for issues of non-proliferation is unsurprisingly much more developed for the nuclear power sector than it is for the [uranium] mining sector. Here, banks specifically highlight their consideration for criteria that relate specifically to nuclear security. For instance, HSBC Holdings specifies that it approves projects on a case by case basis taking into consideration factors such as: the plant is not linked to weapons production; the implementation of IAEA safeguards; and the proven track record of operators. Similarly BNP Paribas or Credit Agricole Group provide good examples of companies that have set minimum requirements for financing nuclear facilities in terms of (inter alia): the proper legal framework of the company, the power plant must be located in a country that is a signatory to the NPT and not subject to international sanctions; the power plant will not be built in a conflict zone and is used exclusively for peaceful purposes.

The research reveals a good level of inclusion of an approach to non-proliferation as a principle into international lending practices. Certainly, the impact to reputation for a company to be seen as complicit in the proliferation and use of weapons of mass destruction would be devastating. Yet, as mentioned above, because there is no publicly reported case of the illicit diversion of large amounts of source material³² and because uranium is considered to pose such a limited risk, that even if material is lost or unaccounted for, it is nearly impossible to formalize any connection to illicit activity. Accordingly, the incorporation of criteria related to non-proliferation in project finance evaluations for companies operating at the very front end of the fuel cycle, has been limited.

The research does reveal however that the finance sector could be seen as potentially adding an additional layer of corporate engagement in non-proliferation which is often overlooked. Stakeholders tend to focus primarily on those companies operating within the nuclear value chain itself; and do not always consider the finance sector as inextricably linked to the nuclear sector. Yet, the implementation of mining and metal policies, especially those which specifically call out uranium, as well as nuclear policies, which inform project finance activities, can be seen as strengthening the current regulatory regime. They can also be seen as potentially addressing some of its current weaknesses by thwarting the provision of finance to such capital intensive

³² There are cases of theft reported in the news however, but only of very small amounts. See for example: "Man arriving at JFK accused for trying to export uranium to Iran," New York Times, 23 August 2013; "700 Pounds of Uranium Ore Stolen from AREVA Mine in Namibia, Four Suspects Arrested with the Material," NTI, 24 April 2012: <http://www.nti.org/analysis/articles/700-pounds-uranium-ore-stolen-areva-mine-namibia-four-suspects-arrested-material/>; and 'Brazil police seize black market uranium ore,' Reuters, 25 August 2004: <http://forests.org/shared/reader/welcome.aspx?linkid=34512&keybold=nuclear%20AND%20%20uranium>

projects as uranium mining in specific locations or by ensuring that uranium mines only sell to legitimate civilian end-users of the uranium material. That said, the role the finance sector plays in this area could be further enhanced with the inclusion of a reference to non-proliferation in the Equator Principles as well as by incorporating uranium mining into the banks' nuclear policies.

Key findings Finance Sector Companies

- Inconsistent engagement in nuclear issues, nonproliferation across the world's leading banks by assets. Leading Chinese banks make no provisions for finance of projects related to the nuclear value chain.
- Nonproliferation not mentioned in the Equator principles
- Those banks with nuclear policies when providing project finance to companies along the nuclear supply chain mention non-proliferation; but there are no performance standards to accompany such evaluation
- Uranium is not included in financial sector nuclear policies; rather it falls solely under relevant mining and resource extraction policies.

Overview of Corporate Sustainability Approaches to Non-proliferations

The vendors and buyers and financiers of uranium in today's nuclear market hold different viewpoints on the state of the industry. While it might be expected that rationalization and shared global practices would encourage consistency, the positions of different players vary markedly – engagement of companies in nonproliferation varies. Generally speaking however, the inclusion of uranium in non-proliferation debated mirrors the political governance and regulatory system. Just as there are inconsistencies in how different countries or nuclear regulatory bodies include or not uranium in its nuclear policies, the inclusion of uranium in sustainability and corporate governance activities by companies along the nuclear value chain is not a standard practice.

Certainly if the patterns of uranium importing and exporting countries are seen to highlight gaps in the non-proliferation regulatory framework, then non-proliferation should be seen as a material sustainability issue and be incorporated into understandings of corporate best practice throughout the supply chain. Industry consideration of non-proliferation should mirror the structures and frameworks of non-proliferation regulation already in place. That is, just as a robust non-prolif-

eration regulation framework needs to address both the front and the back end of the fuel cycle adequately, global corporate sustainability infrastructure needs to be expanded to include non-proliferation both upstream and downstream along the nuclear value-chain.

The overview of current sustainability practices of both uranium suppliers and buyers, as well as financial services companies, indicate where the systems and structures are in place for the development of HG practices towards non-proliferation. Current corporate practices, the uranium market structure, the criteria for financing uranium mining projects, the stable long-term nature of supply contracts, contribute to best practice. However, these are not interpreted as corporate engagement in non-proliferation. Rather they are seen as material stewardship, due diligence, risk mitigation, and good business practice. Benchmarking these to any risks identified by the DIIS Governing Uranium research could allow companies to better express their commitments to non-proliferation. In other words, it is not that the HG structures that would help contribute to a RGNCS need to be developed, but rather, that current structures addressing identified sustainability risks need to be elaborated to include an approach to non-proliferation. Simply put, proliferation needs to be addressed as a sustainability risk for companies throughout the nuclear value chain.

Companies along the nuclear supply chain largely maintain internal compliance programs, whose implementation relies on a designated set of employees (usually a sustainability team or compliance team). What is often missing however is for the entire company staff to be aware of the full implications of their actions with respect to enabling a nuclear security culture throughout the company and nonproliferation and to consider these issues in all of their operations. Companies could explicitly include a new tenet that considers the control and security of nuclear commodities and technology of as part of their corporate social responsibility structures. Companies could also establish a plan for strengthening the exchange of information that would provide sufficient, consistent and timely information to key stakeholders, including the public as well as establishing channels (such as supply chain and regional networks) to share information. Companies could then preferentially buy goods from suppliers who adopted similar approaches in their corporate governance structure, extending the impact of a self-regulation approach throughout the supply chain.

A robust RGNCS approach would thus require that companies along the full nuclear value chain - from uranium mining to civilian use of nuclear material – be aligned and coordinated in including non-proliferation as a material sustainability issue for

the nuclear industry as a whole. The findings reveal two critical aspects that would need to be addressed before a foundation for the RGNSC can be established:

1. Developing a full supply chain approach to corporate sustainability on non-proliferation
2. The lack of transparency in data and reporting

Integrated Supply Chain Approach

In order to develop a RGNSC approach, actors throughout the nuclear value chain would need to align and coordinate their efforts. At the moment, supply chain traceability is strengthened by the fact that utility companies and uranium mining companies have long term binding contracts. The challenge lies in the limited transparency to external stakeholders of the different counterparties that could be involved at critical points along the chain (such as in the resale of material, transport, or in the change of custody). The lack of transparency does not need to imply that this is not known to the market players. On the contrary, the market of uranium supply is dominated by a small number of well-established companies. It only implies that further analysis is required on confidential data in order to better assess the risk areas throughout the value chain.

In keeping with contemporary sustainability trends, the continuity and reliability of supply on all ESG issues is a primary concern. In other words, end-users should be as wary of suppliers' employee code of conduct and safety, as they should be of their suppliers' environmental impacts, or indeed, their non-proliferation performance. Non-proliferation needs to be treated just as any other key ESG sustainability issue by all companies involved in the manufacturing, transport, or end-use of dual-use material. The combination of the recognition of the importance of reputation and the role that large conglomerates along the nuclear supply chain play as important customers of at-risk firms puts them in a perfect position to implement a self-regulated non-proliferation program and uphold the beyond-compliance principles.

The crucial challenge thus lies in motivating the entire nuclear value chain to improve its capacity to conduct due diligence and implement non-proliferation programs of relevant as part of their overall sustainability strategy. This would have the benefit of both increasing transparency and accountability in the supply chain on all pertinent ESG issues, as it would provide a global governance structure that would complement existing regulation and ensure the integrity and acceptability of the industry. There is

a real opportunity for exploiting supply chain linkages and business relationships to spread beyond-compliance practices and make supply chains resistant to illicit procurement. One critical aspect of this would first be to assess how current sustainability programs support the non-proliferation regime. It is not because non-proliferation is not an explicit sustainability issue that it presents a risk or that corporations are being negligent in any way. Current sustainability practices of due diligence, supplier codes of conduct, and the prioritization of safety and security could be examples of adequate compliments to the non-proliferation regime – they however need to be fully analyzed through the lens of any proliferation risk associated with the front-end of the fuel cycle.

Transparency of Data and Reporting

A key finding from the review of corporate sustainability practices of both uranium mining and civilian nuclear utility companies concerns the lack of data and reporting on non-proliferation efforts. Why this lack of corporate data on non-proliferation? Both supply and demand drive the market for sustainability data. On the supply side, companies track performance to support internal decision making, and publish this data to distinguish themselves from their peers. On the demand side, investors and consumers use information about corporate ethics to make investment and purchase decisions. Many elements of the corporate responsibility infrastructure facilitate this information exchange, but two of the most crucial are (voluntary) sustainability reporting (SR) and socially responsible investing (SRI).

The logic behind the “non-materiality” of non-proliferation is in way then two-fold. On the one hand, there simply has not been the demand. Companies further down the nuclear supply chain are not considering non-proliferation as an important ethically and socially responsible corporate practice on which to demand transparency from actors within its supply chain. Investors and brokers, often conscious about the environmental and societal performance of companies, have been an impetus to companies to improve performance in these areas, but no pressures have been imposed in relation to global security. Further, as the review of SRI approaches of leading banks and finance institutions towards the nuclear industry highlights, uranium mining is not included as part of the nuclear industry that organizational nuclear policies are aimed at.

SR frameworks, even with elaborate industry-specific guidelines, have omitted global security and non-proliferation as key issues for companies operating with dual-use

material. As global security and non-proliferation were seen by both public and private actors as a political issue, key actors in the realm of sustainability such as the GRI, the UN Global Compact, or SRI initiatives, or civil society, did not raise it either. Companies have neither been compelled nor asked to be involved in the governance of dual-use material, even if they are a uranium mining company or a transporter of uranium ore concentrate.

While there has been no demand for corporate transparency on self-regulation in relation to non-proliferation, little has been done on the supply-side as well. Be it companies involved in uranium recovery, transporters (sea, rail, road carriers, port operators, freight forwarders, etc.) or users of nuclear fuel for peaceful purposes (utility companies, medical medicine companies, or other), corporate actors along the entirety of the nuclear supply chain do not see the need to voluntarily report on non-proliferation performance. In fact, companies are not seeking to complement compliance with government regulation and international standards with self-regulatory measures.

There is currently no global standard for uranium mining and performance varies significantly across the world and from company to company. Certainly if utility companies or buyers of enriched uranium can collectively adhere to robust ethical, social, and environmental performance standards to integrate into their individual uranium-based product purchasing decision, it would strengthen the sustainability standards for the entire industry and not just non-proliferation.

A good starting point would be to require as a condition of business that companies that export sensitive goods, in addition to a non-proliferation statement in their corporate governance structures, have a proliferation-resistant compliance system in place on which they report, including perspective of external critical constructive stakeholders in the review process. Corporate performance on non-proliferation endorsement should reported and monitored for the entirety of the nuclear supply chain.

4. Industry in Uranium Governance: Developing a Nuclear Security Culture

The concept of a broader and more proactive role for the private sector in promoting nonproliferation is attracting growing interest among international nonproliferation entities, government, NGOs, and academia. As demonstrated by the findings in this report there is the potential for the private sector to take specific actions to address challenges associated with both uranium governance and non-proliferation. Industry is often best placed to address risks associated with its business operations (such as the production and trade of dual-use commodities). While such information is not necessarily publicly disclosed, companies intimately know the potential uses of sensitive materials and technologies, are familiar with its users, and in many cases, have better information than the government on suspected illegitimate end-users.

Individual companies would benefit from proactively supporting and strengthening existing governmental mechanisms to prevent proliferation. While the set of international, regional, and national policies – or the structures of VG – could be strengthened further with the comprehensive inclusion of the uranium sector, the RGNSC necessarily requires improved corporate performance on non-proliferation through the development of HG systems.

Traceability: Foundation for the RGNSC

In the context of sustainability, traceability is the ability to identify and trace the history, distribution, location and application of products, parts and materials, to assure and verify sustainability claims associated with commodities and products, ensuring good practice and respect for people and the environment all along the supply chain. The concept originated in the 1930s when European countries wanted to prove the origin of high-quality foods. The importance of traceability in the agrifood sector has been highlighted over past years with the outbreak of various food scandals such as “mad cow” disease” or “Asian bird influenza”. Today, traceability is considered to be an important tool for companies to advance sustainability and prove claims and attributes of sustainable products and has expanded beyond agrifoods to include a wide array of products including timber, cotton, as well as various metals and gemstones to name but a few.

Traceability is quite specific in the context of sustainability – it is more than simply tracking of material, but actually being able to ensure sustainability claims. In the context of this research, the idea is that as non-proliferation becomes further integrated into corporate sustainability culture, a traceability scheme could be an effective form of HG that could help verify corporate non-proliferation performance.

Traceability is becoming more of an accepted practice, and one that companies increasingly embrace as part of their sustainability activities. For example, the Forest Stewardship Council (FSC) described its certification as a “license to trade” for businesses. In addition, traceability certifications are becoming validated as proof of sustainability requirements. One significant recent development is that the EU voted [in January 2014] for a set of revised public procurement directives that refer to robust certification programs as proof that a company meets sustainability requirements set out in calls for tenders. As more governments and companies adopt this stance, traceability becomes a viable and appealing way for companies to meet the sustainability requirements and expectations of their customers.

In order to ensure traceability along the supply chain – that is, all reference a process by which a product moves from its original raw material extraction and production phase to the final customer - a system is needed that records and follows the trail as products, parts, and materials come from suppliers and are processed and ultimately distributed as end productions. Such traceability systems provide information on the components of products, parts, and materials as well as information on transformations throughout the value chain. At the end, traceability ensures the accuracy of this information, such as product quality, safety, and labeling. For example, schemes ensuring that minerals are not sourced from conditions of armed conflict (commonly known as ‘conflict minerals’) aim to address the human rights infringements in conflict affected areas and avoid purchasing materials that can directly or indirectly finance and increase the intensity of those conflicts. There are numerous examples within industries with complex supply chains, such as agriculture or retail, which have developed global multi-stakeholder initiatives in order to trace commodities collaboratively. For example, the Forest Stewardship Council (FSC), the Marine Stewardship Council (MSC) or UTZ certified, have engaged with stakeholders along the entire value chain in order to develop credible and robust chain of custody standards and certification for products from the raw material to the final use phase.

The most successful traceability schemes are multi-stakeholder, involving business, government, and other stakeholders and civil society organizations who have an

interest in the sustainability of the said commodity. Multi-stakeholder initiatives are complex and require careful governance to manage often very divergent points of view. Traceability schemes are proving able to bring – and keep – these players together. The focused purpose of making a specific commodity more sustainable is a powerful and uniting force for the participating companies and stakeholders.

There are three principle limitations to achieving full supply chain traceability which are known from the experience of companies operating in other mineral sectors or commodities which will need to be addressed to increase the impact of traceability. The first is supply chain transparency. It can be difficult for companies to trace each and every step in the journey of a given product. Multiple actors with different systems and requirements may contribute to production across international borders, and some areas in a supply chain may be especially opaque. As such it is difficult to establish the level of complexity of nuclear supply chains right to source as the lack of transparency in publicly available information does not enable the analysis of the inter-relationship of different counterparties involved. This is a complex issue as traceability requires the engagement and collaboration of actors along the entire supply chain to trace a product's history. Developments in technology and demands for greater transparency from both business and government sectors are making this increasingly more manageable.

The second is the costs for supply chain actors. Traceability requires substantial investment in technology and processes aimed at tracking goods along the supply chain. In addition coordination between different supply chain actors requires time and willingness on all sides. These costs are a concern for many actors pursuing traceability. Alignment around tools helps reduce costs to individual actors. When collaboration is widespread, there is greater incentive for actors to work together, which lowers cost overall.

The third concerns the need for further developments in technology in order to support traceability schemes. In order to achieve full traceability, various levels of verification are needed at all stages throughout the supply chain. This means that supply chain actors need to collect and validate data and commit to chain of custody standards. Technological platforms, bar codes, and chips represent some technological advances; however, mastering these technologies for traceability purposes is a challenge. Since suppliers are located throughout the world, sometimes in remote areas, there are language, skill and access barriers to fully using technology. In addition, there are also challenges around ensure that data systems are secure for all users.

This discussion on traceability in light of the analysis of current sustainability practices of companies along the nuclear value chain is perhaps more about transparency to the public. As said, there are established market mechanisms that can easily facilitate traceability of uranium material to its end user. However, a more robust standardized traceability practice, that was more transparency to the public and other stakeholders, would enable better analysis regarding how corporate practices can support the non-proliferation regime. It would also allow for an industry standard for any eventual new entrants in to the market.

Collaborative approach

Companies and stakeholders have realized that they must work together in collaboration towards achieving the traceability of commodities. Interviews with companies during the development of this research disclosed that their attempts to establish company-specific traceability schemes were unsuccessful. The roadblocks were due to two key factors: the reluctance of suppliers to share information, and the fact that there was a particularly opaque section of the supply chain, as was when there are agents or distributors not prepared to share sources, or a large number of small producers that are difficult to track.

BSR research on traceability reveals a best-practice model for traceability

1. One independent multi-stakeholder Global Collaborative Scheme. This organization provides guidance and works on commodities to advance traceability
2. Focus: The traceability scheme is focused on a limited number of issues, both in terms of the number of commodities and the sustainability attributes that must be traced
3. Appropriate collaboration along the supply chain. The supply chain actors along the way are participating in the scheme in a manner appropriate to their position in the supply chain, and are communicating with their immediate business partners.

Collaboration among companies within an industry committed to implement key principles focused on “non-proliferation compliance” could help improve the visibility of current corporate engagement on this issue of non-proliferation. A collaborative approach could incite companies to develop non-proliferation program requirements, risk assessments, training and communication, monitoring and internal controls, due diligence, reporting. This in turn could help identify risks, as well as help industry

develop tools and share best practice for the development of a RGNSC framework. Furthermore, a collaborative approach increases an individual company's impact. Strategically, using collaboration approaches can be a tangible way for a company to demonstrate its commitment to many of the principles underlying corporate social responsibility and "effective" compliance program activities. Thus, collaboration enables a company to build on best-practice in the industry rather than trying to build their own system and tools – which allows for the development of a recognized, standardized approach.

5. Conclusion

This report presents an overview of current corporate engagement on the issue of non-proliferation for three key sectors to nuclear value-chains: uranium mining, civilian nuclear power, and finance. The analysis presented here is based on publicly available information and thus does not draw any conclusions as to what companies are doing, but rather, what companies are publicly revealing they are doing. In this regard, a main conclusion of this research is that the increased transparency of current corporate engagement to key stakeholders is needed in order to fully ascertain the potential for the development of a RGNSC approach. Moreover, a key finding of this research is that corporate sustainability approaches in terms of supply chain due diligence, attention to safety and security, and corporate risk mitigation are systems that in many ways strengthen the non-proliferation regime even if not companies are not presenting them in this way. As such, should a risk to proliferation in relation to upstream processes of the nuclear value chain be established, a first step would be to benchmark current corporate best practice in relation to any identified risk in order to ascertain what corporate practices that could support a RGNSC framework already exist.

It is important to re-emphasize that the current uranium market itself provides a form of additional safeguard. Firstly, there are a handful of key suppliers, who maintain long-term established relationships with their end-users. This facilitates traceability of the most material flows throughout the global nuclear industry. Secondly, companies have a commercial and legal interest to only sell uranium products to reputable companies and make use of reputable transporters in order to ensure that the material reaches its rightful customer. Thirdly, the attention to safety and precautions taken in the production, storage, and handling of uranium materials could be seen as mechanism which could support non-proliferation. By ensuring that material is properly handled limits the risk of diversion or illicit use. Fourth, leading world banks implement a set of policies regarding the financing of both uranium mining and nuclear policies. This will help ensure that as uranium mining and milling activities only occurs in countries which have established non-proliferation regimes.

However, increased transparency of information could contribute the development of a RGNSC system. At present, there is limited information that is publicly available regarding the different counterparties, how material changes hands at the point of conversion. In addition, there is no reporting on “non-proliferation” as it is

not identified as a key sustainability issue, nor is non-proliferation a featured issue in key international standards such as the Equator Principles or the GRI. Indeed, to be a fully effective tenet of corporate sustainability, non-proliferation will need its own set of committed companies, standards-based performance indicators, and knowledgeable investors and consumers. Without this infrastructure, dual-use manufacturers, shippers, brokers, and financiers may lack the market mechanisms that reward superior non-proliferation performance.

A way to address the issue of transparency would be to review current corporate practices through the lens of non-proliferation. In other words, it is not to say that industry is not adequately engaged on this issue, but that as there is limited discussion of the issue within industry, and limited transparency on certain key corporate practices, it is difficult to draw any reliable conclusions. By explicitly including non-proliferation in the policies, systems, and practices that already exist, could help reveal how industry is already contributing to a robust non-proliferation regime while revealing any gaps that could then be addressed through a collaborative approach.

6. References

- Andersen M, Skjoett-Larsen T. 2009, "Corporate social responsibility in global supply chains", *Supply Chain Management: an International Journal* 14(2): 75–86.
- Anthony, I and Grip L. November 2013, "Africa and the Global Market in Natural Uranium. From Proliferation Risk to Non-proliferation Opportunity", SIPRI Policy Paper 39
- Bair J. 2009. *Global commodity chains: genealogy and review*. In *Frontiers of Commodity Chain Research*, Stanford University Press: Stanford; 1–34.
- Bair, J., Hamilton G, Gereffi G. 2009, "Global commodity chains, market makers, and the rise of demand-responsive economies", In *Frontiers of Commodity Chain Research*, Stanford University Press: Stanford; 136–161.
- Bourgouin, F. 2015. "Governing Uranium and Nuclear Supply Chains: Why Private Engagement is needed" DIIS Policy Brief, November 2014. Available at: <http://www.diis.dk/en/node/4675>
- Boström M, Börjeson N, Gilek M, Jönsson AM, Karlsson M. 2011, "Towards responsible procurement in relation to chemical risks in textiles? Findings from an interview study", *Södertörn's working report series*. 2011:2. Södertörn University: Huddinge. <http://www.diva-portal.org/smash/record.jsf?searchId=3&pid=diva2:404864>
- Boström M, Börjeson N, Gilek M, Jönsson AM, Karlsson M. 2012. Responsible procurement and complex product chains: the case of chemical risks in textiles. *Journal of Environmental Planning and Management* 55(1): 95–111.
- Brunsson N, Jacobsson B (eds). 2000, "A World of Standards", Oxford University Press: Oxford.
- De Bakker F, Nijhof A. 2002, "Responsible chain management a capability assessment framework. *Business Strategy and the Environment*", 11: 63–75.
- Delmas, MA, Young O. 2009, "Governance for sustainable development in a world of rising interdependencies. In *Governance for the Environment. New Perspectives*", Cambridge University Press: Cambridge; 12–40.
- Gibbon P, Bair J, Ponte S. 2008, "Governing global value chains: an introduction. *Economy and Society*" 37: 315–338.
- Hubbard, G. 2009, "Measuring organizational performance: beyond the triple bottom line", *Business Strategy and the Environment* Volume 18, Issue 3, pages 177–191, March 2009
- Jacobsson B., Brunsson N 2000, "Standardization and expert knowledge. In *A World of Standards*", Oxford University Press: Oxford; 40–49.

- Kurzrok, A. and Hund, G. Beyond Compliance, “Integrating non-proliferation into corporate sustainability”, *Bulletin of the Atomic Scientists* Volume 69, page 31-42. May 2013.
- Kurzrok, A. and Hund, G., May 2013, “Beyond Compliance: Integrating non-proliferation into corporate sustainability”, *Bulletin of the Atomic Scientists* Volume 69, page 31-42.
- Lafferty W, Hovden E. 2003, “Environmental policy integration: towards an analytical framework”, *Environmental Politics* 12(3): 1–22.
- Laudal T. 2010, “An attempt to determine the CSR potential of the international clothing business”, *Journal of Business Ethics* 96: 63–77.
- Letts, M. and Cunningham, F., “The role of the nuclear industry in preventing proliferation and in managing the second nuclear age”, Paper prepared for the Second Meeting of the International Commission on Nuclear Nonproliferation and Disarmament, February 2009
- Lydenberg S., Rogers J., and Wood D., June 2010, “From transparency to performance: Industry-based sustainability reporting on key issues”, Report, Hauser Center for Nonprofit Organizations, Available at: hausercenter.org/iri/wpcontent/uploads/2010/05/IRI_Transparency-to-Performance.pdf
- Maak, T. 2007, “Responsible Leadership, Stakeholder Engagement, and the Emergence of Social Capital”. *Journal of Business Ethics* 74:329-343.
- Maak, T. and Pless, N.M. 2006. “Responsible Leadership in a Stakeholder Society – A Relational Perspective”, *Journal of Business Ethics*. 66: 99-115.
- Micheletti M. 2010, “Political Virtue and Shopping. Individuals, Consumerism, and Collective Action”, 2nd edn. Palgrave Macmillan: New York.
- MWC News. US Indicts Two, Parviz Khaki and Zongcheng Yi, July 16, 2012, “In Iran Nuclear Export Scheme. Nuclear Export Controls”. Available at: <http://nuclearexportcontrols.blogspot.dk/2012/07/us-indicts-two-parviz-khaki-and.html>
- Nuclear Power Plant Exporters 2011. Principles of Conduct: The Principles as corporate responsibility. Available at: www.nuclearprinciples.org/about/the-principles-as-corporate-responsibility
- Rosenau J. 2003, “Distant Proximities. Dynamics beyond Globalization”, Princeton University Press: Princeton, NJ.
- Rubinstein, R. A Keynote, August 2003, “Triple Bottom Line Investing”, *International Journal of Business Performance Management*. Volume 5, page 109-115
- Rukhlo, V. and M. Gregoric, 2008, “Uranium production: best practice of nuclear security measures”, presented at IAEA Technical Meeting on Implementation

- of the Sustainable Best Practice in Uranium Mining and Processing, 15-17 October 2008, IAEA, Vienna.
- Selin H, VanDeveer SD. 2003, "Mapping institutional linkages in European air pollution politics", *Global Environmental Politics* 3(3): 14–46.
- Seuring S, Muller M. 2008, "From a literature review to a conceptual framework for sustainable supply chain management", *Journal of Cleaner Production* 16: 1699–1710.
- Squassoni, S. 2008, "Nuclear renaissance: is it coming? Should it?", Policy brief. Carnegie Endowment for International Peace.
- Spaargaren G, Mol APJ, Buttel FH, Bruyninckx H. 2006, "Introduction: governing environmental flows in global modernity", In *Governing Environmental Flows. Global Challenges to Social Theory*, MIT Press: Cambridge, MA; 1–36.
- Steurer R. 2011, "Soft instruments, few networks: How 'new governance' materializes in public policies on corporate social responsibility across Europe", *Environmental Policy and Governance* 21: 270–290.
- Sturgeon TJ. 2009, "From commodity chains to value chains. Interdisciplinary theory building in an age of globalization", In *Frontiers of Commodity Chain Research*, Stanford University Press: Stanford; 110–135.
- Taylor C, Pollard S, Rocks S, Angus A. 2012, "Selecting policy instruments for better environmental regulation a critique and future research agenda", *Environmental Policy and Governance* 22: 268–292.
- United States District Court. Case: 1:12-cr-00061, July 12, 2012, Superseding Indictment (B). US District Court, District of Columbia. Available at: http://content.govdelivery.com/attachments/USDHSICE/2012/07/13/file_attachments/141298/Khaki%2B_Yi_Superseding_Indictment.pdf
- Young O. 2002, "The Institutional Dimensions of Environmental Change: Fit, Interplay, and Scale", MIT Press: Cambridge, MA.

7. Annexes

Annex A. Key International Standards

The Equator Principles

The banking industry has already become involved in an array of voluntary mechanisms in recent years, such as those that address concerns about environmental and labor policy. The Equator Principles, which originated with the World Bank, provide guidelines for lending to countries that have not historically shown a great deal of concern about maintaining environmental or social standards in large projects. The Equator Principles ask lenders to require that such standards be maintained in a project as a condition of lending. An increasingly wide array of banks subscribe to the principles in their lending practices, management of reputational risk.

Promulgated in 2003 and then revised in 2006, the Equator Principles are the mechanism that allows the imposition of social and environmental procedures and standards across a range of the world's industries and development activities. The impetus for such an approach was the recognition that increased global reach and entry into the development market of private banks. The privatization of public and state-owned services such as energy, water, resource extraction, and basic industries required by World Bank and International Monetary Fund structural adjustments in the 1980s and 1990s set the stage for private banks to play a much larger role in infrastructure investment than previously. Simultaneously, the World Bank Group and other multilateral public development banks began to withdraw from large infrastructure investment, including such high-profile projects as the Three Gorges Dam project in China and the Narmada Valley series of dams in India, having been battered by effective activism by environmental non-governmental organizations (NGOs).

These trends were viewed with dismay by those same NGOs largely because these organizations had worked assiduously, and successfully, throughout the late 1980s and early to mid-1990's to require public funding agencies such as the World Bank, the International Finance Corporation (IFC), various regional development banks, and Export-Import Credit agencies to incorporate explicit social and environmental standards for projects being funded with development finance.

Today, the Equator Principles represent a voluntary agreement encompassing a set of industry-wide standards for assessing and managing environmental and social risk

that was taken directly from IFC standards. The Principles apply only to project finance, which is the method used to provide capital to develop large infrastructure projects, including mines, power plants, and infrastructure. These are non-recourse loans, meaning that the lenders are repaid only through the revenues generated by the project. As a result, even where the project sponsor (the borrower) is one of the world's most profitable companies (such as extractive industry companies), the banks have particularized financial risk from anything that might slow down or derail the project. Accordingly, the banks need to be concerned by human rights issues, labor issues, community relationships, environmental issues, political turmoil: anything that might lead to destruction of assets or production being shut down or slowed down by social problems.

The Global Reporting Initiative (GRI)

The Global Reporting Initiative (GRI) is a non-profit organization that promotes economic sustainability. It is one of the most prevalent standards for sustainability reporting, providing companies with a comprehensive framework for reporting on their economic, environmental, social and governance performance. The GRI seeks to make sustainability reporting by all organizations as routine as, and comparable to, financial reporting.

The GRI Sustainability Reporting Guidelines provide organizations with specific direction on the preparation of sustainability reports by organizations, regardless of their size, sector or location. They were developed through a global multi-stakeholder process involving representatives from business, labor, civil society, and financial markets, as well as auditors and experts in various fields; and in close dialogue with regulators and governmental agencies in several countries. These Guidelines offer an international reference for the disclosure of governance approach and of the environmental, social and economic performance and impacts of organizations.

In addition, companies are issued an application level score. Application Levels indicate the extent to which the Guidelines have been applied in sustainability reporting. They communicate which parts of the Reporting Framework have been addressed - which set of disclosures. By confirming the amount of Reporting Guidelines content that has been addressed, Application Levels aim to reflect the degree of transparency against the GRI Guidelines in reporting. However, they do not give an opinion on the sustainability performance of the reporting organization, the quality of the report, or on formal compliance with the G3 or G3.1 Guidelines.

The United Nations Global Compact (UNGC)

The United Nations Global Compact is a policy initiative that encourages businesses worldwide to adopt sustainable and socially responsible policies, and to report on their implementation.

The Global Compact is the largest voluntary corporate responsibility initiative in the world. To join the Global Compact, businesses commit to aligning their operations and strategies with ten universal principles in human rights, labor, environment and anticorruption.

The Global Compact is not a regulatory instrument and the UN does not certify that companies have fulfilled their obligations under the Compact's principles. Rather, the Global Compact serves as a forum for discussion and is a network for communication for governments, companies, labor organizations, and civil society

<i>Theme</i>	<i>Universal principles</i>
<i>Human Rights</i>	<ul style="list-style-type: none"> • <i>Principle 1:</i> Businesses should support and respect the protection of internationally proclaimed human rights; • <i>Principle 2:</i> make sure that they are not complicit in human rights abuses.
<i>Labor</i>	<ul style="list-style-type: none"> • <i>Principle 3:</i> Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining; • <i>Principle 4:</i> the elimination of all forms of forced and compulsory labor; • <i>Principle 5:</i> the effective abolition of child labor; • <i>Principle 6:</i> the elimination of discrimination in respect of employment and occupation.
<i>Environment</i>	<ul style="list-style-type: none"> • <i>Principle 7:</i> Businesses should support a precautionary approach to environmental challenges; • <i>Principle 8:</i> undertake initiatives to promote greater environmental responsibility; • <i>Principle 9:</i> encourage the development and diffusion of environmentally friendly technologies.
<i>Anti-Corruption</i>	<ul style="list-style-type: none"> • <i>Principle 10:</i> Businesses should work against corruption in all its forms, including extortion and bribery.

organizations. The goals outlined in the Global Compact are intentionally broad, and provide companies the flexibility to implement them according to their unique circumstances.

Companies participating in the Global Compact are expected to undertake the following³³

- Make changes to business operations so that the Global Compact and its principles become part of strategy, culture and day-to-day operations;
- Publicly advocate the Global Compact and its principles via communications vehicles such as press releases, speeches, etc.; and
- Communicate with their stakeholders on an annual basis about progress in:
 - ♦ Implementing the ten principles and
 - ♦ Undertaking partnership projects in support of broad UN goals.

³³ <http://www.unglobalcompact.org/AboutTheGC/faq.html>

Annex B. Overview of uranium mining companies

Criteria	AREVA	ARMZ	Uranium One	BHP Billiton	Cameco	KazAtomProm	Navoi	Palladin	Rio Tinto
Country of Ownership	France	Russia	Canada	Australia	Canada	Kazakhstan – 100% government owned	Uzbekistan – 100% government owned	Australia	Australia
Countries of Production	Canada, Niger and Kazakhstan	Russia	US, Kazakhstan and Australia*	Australia	US, Canada, Kazakhstan	Kazakhstan	Uzbekistan	Namibia, Malawi*	Namibia, Australia
Countries of exploration	Mongolia, Gabon and Namibia	Russia	Tanzania, Kazakhstan	Australia	US, Canada, Kazakhstan and Australia	Kazakhstan	Uzbekistan	Australia, Canada, Namibia and Niger	Canada, Australia
GRI Application level	0	B	B	A+	B	0	0	B	A+
Non-Proliferation Count in material	1	0	0	2	0	2	0	5	1
References	International provisions in force relative to non-proliferation, IAEA safeguards and export controls	International accepted standards active in IAEA (annex)	International Non-proliferation treaty	International Non-proliferation treaty	0	IAEA safeguards nuclear non-proliferation treaty	0	Material stewardship in strict compliance with the safeguards agreements in force between those countries, IAEA	0

*Suspended mines