

Chapter 10

Energy security in an age of environmental change

Jonna Nyman

1. Introduction

Reliable energy supplies are crucial for the military, political, and economic survival of states, and as a result, it is widely agreed that energy *is* a security issue. Studies of energy security in IR usually focus on the national security aspect(s) of energy and its (geo)political implications. With fears of increasing competition for resources, energy is an issue of geopolitical tension: particularly for importing states, who have been the focus of most studies in IR. Consequently, the price, availability, and supply of fossil fuels, particularly oil, have remained at the centre of energy security discussions. But energy supplies are necessary for the survival of our societies more broadly, too. Equally, energy consumption is the single biggest cause of climate change and raises serious questions about our future existence. Energy choices affect the global environment and global environmental politics, but discussions of energy security often overlook environmental questions.

However, more recently this debate has come under scrutiny and critique. In this chapter I suggest that the energy security debate is changing as energy concerns become more closely linked with other agendas, including environmental politics. As it becomes increasingly difficult to ignore the impact of energy choices on the environment, a growing number of authors challenge IR's historical focus on energy importing states and the supply of fossil fuels. I also argue that the changing context of energy politics raises questions about the state system which go to the heart of the subject of IR.

First the chapter looks at energy security in International Relations, assessing the key ongoing debates and the impact of environmental change on these. It shows that unlike the study of the environment and climate, which has seen ongoing discussions about the concepts under study and debates over justice, human security and securitization (Floyd and Matthew 2013), energy security has only recently begun to face similar scrutiny. After illustrating the limits of the traditional understanding of energy security in IR, I point to some key emerging critiques, showing that the conversation is beginning to change. The chapter ends with a small case study of the changing energy security debate in China, highlighting the implications of such a change.

2. Energy as security in IR: competing realist and liberal logics

Energy security studies is a multidisciplinary field, spanning not just IR but also environmental studies, energy technology studies, energy policy, energy engineering, energy law and governance, planning and management. In IR, however, energy security became a serious focus of study with

the oil crises of the 1970s and the concept took on a specific meaning as a result. The classical definition comes from Yergin's 1988 article, which states that 'the objective of energy security is to assure adequate, reliable supplies of energy at reasonable prices and in ways that do not jeopardise major national values and objectives' (1988: 111). The oil crises saw supply shortages and price hikes, underscoring the vulnerability of energy importing states. As a result, study of what became known as 'energy security' centred around security of supply and stable prices from the 1970s onwards, and it is only in the last 5-10 years that we see IR concerning itself with other aspects of energy security in any significant way. As recently as 2010, Dannreuther suggested that the traditional definition remains largely 'unquestioned' in the mainstream literature on energy security (2010: 145).

The emphasis on energy supply and price indirectly assumes a focus on fossil fuels, and particularly oil, as the main energy resource traded internationally on a global market. What's more, because the concept itself stems from the oil crises, 'energy security is the theory and practice of securing energy *for the nation state*' (Barnett 2001: 34, emphasis added). The oil crises had a huge impact on economic and political stability, and the importance of continued supplies for sustaining military capability is well known. Deese suggests that while energy security has an internal (domestic) component, 'it is the external component – energy imports – that poses the most immediate problems for national security' (1979: 140). This link between energy and national security has been central in IR literature on the subject ever since. States play a vital and arguably increasing role in energy politics, with national oil companies and state intervention growing in importance. We are said to be living in a 'fossil fuel age', characterised by the continual struggle by states to secure supplies of scarce resources (Yergin 2011: 4).

Little attention has been paid to the question of *what* we are securing in energy security discussions for this very reason: the implicit, accepted focus on securing the survival of the sovereign state has made the question redundant. Mulligan analyses the link between energy and national security and argues that rather than being seen as part of the global commons 'fossil fuels have historically been seen in terms of "property", and as subject to states' sovereign right to exploit their natural resources' (2010: 89). He traces the removal of fossil fuels from the environmental agenda, showing that because of their association with industrialisation fossil fuels have become seen as 'part of the human (rather than the "natural") world' (Mulligan 2010: 86). Thus, in most discussions of energy security, both in IR and in political contexts, the implicit focus is on securing fossil fuel supplies for the nation state. In contrast, environmental questions are rarely considered.

IR itself has also affected how we understand energy security. In International Relations, security has traditionally been understood as protection from threats, usually of a military or geopolitical nature, and the referent object – the thing to be protected – has been the state. The state is presented as 'inside', and the thing to be protected, while the international is presented as anarchic, 'outside', and Other. Because of this distinction, the state has been seen as the necessary focus of security

and in need of protecting from an indefinite number of possible threats that exist in the anarchic realm, including Other states. The privileging of the state has set limits on the security debate, and in particular limits on how ‘we have been able to think about more desirable alternatives’ (Walker 1990: 7), including the very meaning of security.

This particular understanding of security, anarchy and the international has coloured the study of energy security in IR. It also underpins the traditional energy security debate, which is characterised by a divide between realist and liberal understandings of the international system. Here, I use Shepherd’s ‘logics of security’ as an analytical framework for understanding the mainstream energy security literature, to highlight problems with the concept of energy security and its ties to a traditional understanding of security and the international system. Shepherd suggests that every security discourse is ‘organised around a particular logic of security’:

each competing conceptualisation of security has a distinct primary focus, referent object and perspective on the arrangement of the international system...The ways in which these claims are made, the assumptions that inform them, and the policy prescriptions that issue from them, are what I refer to as “logics of security” (Shepherd 2008: 294)

The realist logic focuses largely on the state level, and authors emphasise the anarchic nature of the international system as inevitably and irrevocably leading to competition between states. The liberal logic focuses on the state and/or the global level, with the state or global economy as the referent object of security. While such authors emphasise anarchy, they stress economic interdependence and assume that states can overcome anarchy through cooperation. In practice, the claims these logics make about energy security are both linked to a ‘highly conventional logic of security’ (Shepherd 2008: 294). There is agreement between authors that energy security is about security of supply, and that security of supply is a national security issue, but they propose different solutions or methods for achieving energy security. The rest of this section surveys the mainstream literature on energy security through the lens of these logics. Much of the literature considered is focused on energy security more broadly, but some focuses specifically on the United States and/or China, as the two largest energy consumers and the focus of much of the literature.

What I call the realist logic here is sometimes labelled the ‘strategic’ approach. Dannreuther describes it as the ‘neomercantilist and realist tradition, which sees the international struggle for energy security as a zero-sum game’ (2010: 145). Here energy security is ensured by controlling supplies via state owned companies, focusing on energy independence/self-sufficiency, political links with, and investment in, energy-exporting states, and by using military force (Andrews-Speed 2004: 340). There is a large body of literature on resource wars which feeds into the ominous predictions of the realist logic (Klare 2002). The thing to be secured here is always the state, and the state is the central actor in an anarchic world with scarce energy resources: ‘we are seeking more, but finding less’ (Klare 2008: 39). Here we see a world where the strategic interests of selfish

states competing to ensure their autonomy and survival trumps the power of the international market and international cooperation.

Energy security is considered a key part of foreign policy and key to national security interests. Vitally, in the realist logic securing the state involves ensuring strategic autonomy in the international system, so here security necessitates ‘reducing vulnerability to being subject to the power of others’ (Lee 2005: 289). It is central to discussions of power: ‘ever since the industrial revolution, energy and the need to secure its supply have been fundamental to any position of power in the world’ (Schlesinger 2005: xiii). Strategy and military thinking are closely linked to how energy security is understood:

traditional energy security concern is about the supply of and demand for energy...A state is said to be insecure if it has to rely on external sources of strategic materials which contribute to its ‘war potential’ or if the supply of the strategic materials is under threat (Lee 2005: 266)

Ultimately, energy security is about ensuring secure access to the energy resources ‘required for the continued development of national power’ (Kalicki and Goldwyn 2005: 9).

The autonomous state and national security are the central organising principles around which the realist logic represents energy security:

Chinese oil executives are told to put their country’s oil security above the economics of their business. US Generals are told to expand their bases in order to project power into regions containing United States’ energy interests. Clearly, energy security is national security (Boekestein and Henderson 2005: 80)

The international system is said to be characterised by a ‘resource race’, a zero-sum game where a growing China needs increasing energy supplies which can only be satisfied ‘at the expense of other energy-starved nations’ (Klare 2008: 12). Following this logic, ‘every barrel of oil China buys in the Americas means one less barrel available for the US’ (Luft 2005). The possibility of disrupted supply is continually highlighted as a geostrategic vulnerability. The logic presents a world characterized by intense inter-state competition and perpetual possibility of conflict. Optimistic realists suggest cooperation is possible, but the more common conclusion is that ‘it is likely that oil wars, instead of oil, are in the pipeline’ (Lee 2005: 289).

Turning now to the liberal logic, this has also been referred to as the ‘market’ approach to energy security. Rather than political-military solutions or independence, it focuses on liberalising energy markets, integration and interdependence as the solution to energy security (Andrews-Speed 2004: 340). Energy security remains understood as reliable and adequate supply of energy at ‘reasonable prices’ (Bielecki 2002: 237). It is a specific, economic form of neoliberalism that is emphasized here, and the international system is generally still seen as anarchic. However, cooperation is thought not only possible but likely, as the world is becoming increasingly interdependent. Here

energy security ‘is *not a zero-sum effort*; if appropriate policies are instituted, the improvement of one country’s energy security need not be at the expense of other countries’’ (Gault 2006: 9, emphasis added).

The thing to be secured here is usually the economy, but it can vary from securing the national economy or economic growth of particular states through economic integration, to focusing on securing the stability of the global economy (sometimes as a means to achieve the former). Some studies move completely above the state-level, emphasising globalisation and removing the state as a referent object of security. For example, in a 2006 article titled *Ensuring Energy Security*, Yergin suggests ‘(t)here is only one oil market, a complex and worldwide system that moves and consumes about 86 million barrels of oil every day. For all consumers, security resides in the stability of this market. Secession is not an option’ (2006: 76).

Here the market itself is given agency, moving and consuming oil. It is this market that both provides security and needs to be secured, while individuals only exist as consumers. Some authors take a macroeconomic approach, emphasising the ‘impacts of high energy prices and the danger of economic losses resulting from potential shortfalls in energy supply’ (Bielecki 2002: 237). Here ‘the meaning of reliable and adequate supply is rather straightforward: it simply means uninterrupted supply that fully meets the needs of the global economy’ (2002: 237). However, despite the emphasis on securing the global economy, it is secured ultimately in order to secure states – it is ‘consuming countries’ that are ultimately ‘vulnerable’ – and states, together with industry, are key actors to minimise risks of supply disruptions and their possible negative impact on the global economy (Bielecki 2002: 236-49).

Authors in the liberal logic present international markets and multilateral initiatives or institutions as the solution to energy insecurity. Markets are central, and states remain secure by staying ‘integrated into a global system of energy consumption’ (Yergin 2006). In other words, states must integrate into the neoliberal energy market to ensure security. This kind of thinking is institutionalised, with International Energy Agency energy security indicators emphasising ‘firm trust in the functioning of (liberalised) energy markets’, while other security of supply indicators, including depletion of resources, are disregarded (Kruyt et al. 2009). The logic is underpinned by a belief in liberal interdependence: we are told there is a need for ‘national, regional, and international energy strategies that foster cooperation on energy issues’ (Pascual and Zambetakis 2009: 32). Cooperation is presented as the natural response to energy security concerns, as the world becomes increasingly ‘energy-interdependent’ (Verrastro and Ladislav 2007: 95). A similar logic endures in the global energy governance literature, which emphasises the need for institutionalised global energy governance with a working energy agency regulating the global energy market (Helm 2002: 184; Florini and Sovacool 2009). The liberal logic of energy security presents a globalised and inter-dependent international system where cooperation over energy is likely, though economic competition remains a key principle. The emphasis is on neoliberal

macro-economics, with liberalisation of markets and multilateral initiatives as solutions to energy security issues. It rarely recognises the limitations of relying on markets.

Many authors sit between the realist and liberal logics, pursuing various hybrid approaches (for example, see Tunsjø 2010). While various combined approaches present interesting analyses of energy security issues, the state and/or the national/global economy is/are still the referent/s of security, and the claims made about the international system and the assumptions that underpin these claims remain the same. Lastly, it is important to recognise that energy security needs vary between countries, and at the international level. The International Energy Agency was originally founded to help responses to major disruptions in oil supply, but today also engages with environmental awareness, sustainability and climate change. However, it still officially defines energy security as ‘the uninterrupted availability of energy sources at an affordable price’ (IEA 2015).

The narrowness of traditional IR and its particular understanding of security, anarchy and the international has produced a limited energy security debate where energy security is assumed to equal ensuring supplies and stable prices for the state. Authors share a similar understanding of the organisation of the international system and the objects worthy of study. State competition is privileged, whether strategic or economic. Throughout, the focus remains on fossil fuels, particularly oil security.

This hitherto dominant debate leaves many questions unanswered. Crucially, it fails to examine or recognise the impact of environmental change on energy politics. Energy security is changing and it has important implications both for environmental politics and for International Relations. This chapter now turns to look at more recent challenges to this debate.

3. A changing debate: conceptual and normative critiques

Despite the dominance of the traditional debate, there is an emerging discussion over the meaning and focus of energy security: one study found as many as 45 different definitions of energy security in the literature (Sovacool 2010: 3-6). Kruyt et al also note a growing number of potential energy security indicators used in the literature, but find that most are not actually used in policy-making, where the emphasis remains on security of supply (2009). Over the last five years, however, studies of energy security have continued to push the boundaries. Some challenges come from critical security studies, others from political geography, law, energy or environmental policy studies. This section outlines some key challenges posed, and is followed by a small case study to illustrate the changing debate and some of the implications.

Firstly, the concept of energy security has been critiqued. Valentine highlights the problem of ontological and epistemological ‘blindness’ in the existing literature on energy security, which works to obscure underlying assumptions and choices in terms of how energy security is

represented. Most energy security studies ‘fail to acknowledge critical assumptions that skew or bias the findings’ and present assessments ‘as if they reflect absolute objectivity’: in practice, the concept of energy security is notoriously ‘fuzzy’ (Valentine 2010: 70). Ciută notes that ‘energy security clearly means many different things to different authors and actors, and even at times to the same author or actor’ (2010: 127). This becomes a serious problem when ‘some politicians refuse to define energy security at all’ (Sovacool 2010a: 2).

Chester argues that the concept itself is slippery as it is ‘polysemic’ in nature (2010: 893) – that is to say, it has multiple, *related*, meanings. Ultimately, energy security ‘takes on different specificities depending on the country (or continent), timeframe or energy source to which it is applied’ (Chester 2010: 893). Similarly, Knox-Hayes et al. studied attitudes towards energy security in ten countries, finding that energy security is context-dependent and ‘best understood from a nuanced and multi-dimensional perspective’ (2013: 609). Ciută develops an in-depth analysis of the concept, noting that ‘abundant analyses of pipeline politics stand in stark contrast to the very few attempts to make sense of energy security conceptually’ (2010: 124). While the mainstream literature suggests ‘there simply is no need to debate what energy security is, because we know both *that* energy is a security issue and *what* security is’ (2010: 124), he suggests that the concept is in practice multiple and context-dependant.

Secondly, various normative arguments critique the narrow focus of the traditional debate and suggest alternatives. The current focus on the needs of states that import fossil fuels neglects a number of issues. Dannreuther suggests the concept needs to be broadened beyond ‘the interests of the rich, primarily Western, energy-importing states’ (2010: 145). He emphasises the human security dimension of energy security, arguing that only the richest third of the world’s population enjoys reliable and affordable supplies of energy, while a quarter of the world’s population lacks access to electricity and their experiences and interests remain ignored (Dannreuther 2010: 147; see also Wirth et al. 2003: 133). The focus on supply security also ignores demand security: oil producing states depend on ‘stable and secure revenues for development’, a difference in interests that he labels the ‘North-South dimension of energy security’ (Dannreuther 2010: 150).

In a related critique, Simpson notes the state-centric, US or European focus of the vast majority of the energy security literature. He shows that rather than secure oil supplies, citizens of the global South still largely rely on fuel wood for energy (2013: 249). His critique of the traditional focus on fossil fuels points not just to a Eurocentric bias but also an ‘intrinsic bias given to energy technologies’, which is not neutral: ‘fossil fuel and nuclear technologies all favour large-scale industrial development and have centralising political and economic consequences’ (Simpson 2013: 254). He suggests that ‘a critical energy security perspective relates more to the ability of individuals, particularly in marginalised or deprived communities, to secure sufficient access to energy for their personal needs’ (Simpson 2013: 250). He also highlights the importance of critical approaches focusing on justice and sustainability in providing ‘an antidote to the traditional

definitions of energy security that are associated with militarism, wars and unsustainable, unnecessary and inappropriate levels of industrial development’ (Simpson 2013: 260).

Hildyard et al. present a similar human security-focused critique of energy security, suggesting that policies securing fossil fuel supplies

are triggering a cascade of new insecurities for millions of people – whether as a result of the everyday violence that frequently accompanies the development of frontier oil and gas reserves, or because the pursuit of “energy security” through market-based policies denies many people access to the energy produced. Indeed, the more that the term “energy security” is invoked, the less clear it is just what is being “secured” (Hildyard et al. 2012: 5)

Comparable gaps in current energy security policies are noted by Wirth et al., who also note ‘the danger to political and economic security posed by the world’s dependence on oil’ (2003: 133). Lastly, Sovacool et al. look at energy equality and justice, making an important normative argument about access to energy and developing principles of energy justice (2014).

A somewhat separate set of normative arguments is raised by critiques of the continued focus on fossil fuels as problematic specifically because of their impact on the climate. Political geographers and scholars of environmental policy have been particularly significant in developing this important line of critique. Bradshaw argues that the mainstream literature on energy geopolitics ‘still fails to engage with the potential consequences of climate change’ (2010: 281). Environmental sustainability remains separated from concerns over security of supply (Kruyt et al. 2009; Umbach 2012). Bradshaw emphasises globalisation and the need to address energy security concerns above the state level, arguing that energy security and climate change are global problems that cannot be solved by a single state or region (2010: 287). Framing energy as a state security issue serves to separate it from environmental concerns more generally, and as a result it remains prioritised above environmental concerns (Nyman 2016)

Meanwhile, if we consider environmental security, it becomes clear that energy security ‘...also concerns the ecological impact of burning fossil fuels’: following this, the solution is not maximising fossil fuel supply, but rather renewable energy or great reduction in energy use (Barnett 2001: 35; Vanderheiden 2011). This literature points to air pollution and global warming as major threats to health and political stability, which cannot be dealt with without changes in the energy sector (Jacobson 2009: 149). Such critique often goes hand in hand with criticism of the human security implications of fossil fuel dependency. Large-scale changes to the energy sector are also needed ‘to secure an undisrupted energy supply for a growing population, particularly as fossil-fuels become more costly and harder to find/extract’ (Jacobson 2009: 149-50).

Such critiques raise important concerns with market-centred thinking on energy security, which has clear implications for the field of IR more broadly. Problematically, ‘fossil fuels are cheap and

relatively easily deployed sources of energy, largely due to market failures that fail to take account of their social and environmental externalities' (Vanderheiden 2011: 609). The emphasis on economic competition over fossil fuels drives up consumption and is not sustainable. When liberal understandings of energy security focus on the global level they emphasise securing the international economy and current standards of consumption, which is not sustainable for people or planet. While collapsed energy markets would clearly be problematic, markets should not be the primary focus of energy security policy. Overall, this group of critiques argue in favour of a more sustainable or ecologically informed approach to energy security.

Another line of critiques suggests that IR has struggled to grasp the wider complexity of energy systems. Posthuman theorising emphasising the complex interdependence of social and physical worlds has pointed to further ways in which traditional understandings of security are limited (Mitchell 2014). Similar thinking, often rooted in energy policy or technology literatures, has been applied to energy security. Cherp and Jewell advocate a shift from viewing various components of energy security in isolation to studying whole energy systems. They define energy security as 'low vulnerability of vital energy systems' (Cherp and Jewell 2014: 420). Here, it is the security of vital energy systems themselves that is the focus: defined as energy systems which 'support critical social functions' (2014: 418). This definition clearly decouples energy security from the state. While recognising that energy systems are 'delineated by sectoral or geographical boundaries', regional and global geographical boundaries are as important as national ones here, while sectoral boundaries divide systems not by geography but by energy source, end uses or by supply/production processes (carriers and infrastructure) (Cherp and Jewell 2014: 419, 2013; for another example, see Johansson 2013).

Lastly, there has been growing interest in using securitization theory to study energy, highlighting the political implications of labelling energy a security issue. Elsewhere I examine a case of energy securitization in US-China relations, and highlight the potential policy impact of energy securitization as well as the wider political implications of securitizing energy (Nyman 2014). In the case studied, securitizing energy hampered cooperation and harmed bilateral relations. The EU, meanwhile, presents interesting challenges as attempts to securitise energy have not helped integration. Instead, securitising calls for a 'Common Energy Policy' have increased member states' unwillingness to give up sovereignty over energy (Natorski and Herranz Surrallés 2008). Leung et al examine securitization of energy supply chains in China, suggesting that China securitizes oil supply chains at the expense of improving the reliability of domestic electricity supply (2014). It is clear that the policy implications of securitizing energy are potentially severe: an issue completely overlooked in dominant debates which fail to reflect on what it means to consider energy as a security issue and what the implications are. However, the consequences can also be potentially positive: Mulligan suggests peak oil, or 'energy descent', is highly amenable to securitization. He argues that casting peak oil as a security issue *can* be beneficial, in particular if it's understood as a problem not of state security, but of human ecology (Mulligan 2011: 645).

It is clear that a number of challenges to the traditional debate are emerging. The energy security conversation is beginning to change, and the following section develops a small case study to illustrate the changing debate in practice and its implications.

4. From critique to practice: the gradual transformation of China's energy security politics

China is now the world's largest energy consumer and pays increasing attention to energy security. The opening up of the Chinese economy in the 1980s led to a surge in energy demand, but it was in 1993, when China shifted from being a net oil exporter to becoming a net oil importer, that energy became a key focus. With continuing growth in demand energy security has risen up the agenda, and since the doubling of oil imports in 2000 'energy security' (能源安全, *nengyuan anquan*) has been a key 'buzzword' (Leung 2011: 1330-1). China's solution to the question of supply security has been to focus on self-sufficiency, which remains at around 90 per cent as a result of policies encouraging domestic production of energy. In this sense, at least on paper China remains largely energy independent – and thus 'energy secure' in the sense of the realist logic. However, the preoccupation with self-sufficiency placed much of the attention during the 1990s and the early 2000s specifically on oil, as concerns grew over rising oil imports and the impact of potential import dependence on China's security of supply. China's early experience of energy security concerns and its early debate largely reflects the traditional IR security of supply discussions (for more detail on this, see Nyman and Zeng 2016).

However, the focus on oil imports overshadowed what is now becoming a core concern: the centrality of coal in China's energy mix. During China's rapid industrialization, coal provided an ideal energy solution. It was not only comparatively cheap, it was easily available domestically and raised no supply concerns. Coal still provides China with a secure source of energy under the terms of the traditional energy security debate and criteria. Today China is 'the world's top coal producer, consumer, and importer and accounts for almost half of global coal consumption', but because of coal, it is now also 'the world's leading energy-related CO₂ emitter' (EIA 2015). The growing impact of coal consumption on China's environment and climate has led to more and more merging of energy and environmental questions in the last five years. Here, the impact of energy choices on the environment is not just tangible in an academic sense, it is literally visible in the smog that envelops China's megacities each winter. The scale of the problem came to international attention in what media organisations rapidly dubbed the 'airpocalypse' of 2013, as air pollution ratings went through the roof. It also serves to illustrate the absurdity of separating energy and environmental questions.

Beijing itself serves as a good example. In 2014, a study by the Shanghai Academy of Social Sciences found that pollution has made Beijing almost 'uninhabitable for human beings' (Li 2014). To put this in context, during 2012 I spent the winter in Beijing. I rapidly developed a 'Beijing

cough' from the pollution and learnt to judge whether or not I should open the window based on a combination of how clearly I could see the buildings across the street and by looking at the AQI (Air Quality Index) pollution data every morning. On the AQI scale, readings above 100 are deemed unhealthy for sensitive groups and anything above 150 is deemed unhealthy for the general population. Levels occasionally go 'beyond index' (above 500), and in 2013, they surged above 750. Much of Beijing's pollution derives from burning coal: it is not only surrounded by coal-burning power plants (see West 2013), it also has coal power stations in the city itself (though at the time of writing these are scheduled for closure) (Bloomberg 2015).

The air pollution affects daily lives, as well as longer term health. Smartphone air quality apps have grown in popularity, as have increasingly high-tech face masks: all to enable citizens to venture outside more safely. It has been linked to increases in lung cancer (Wang and Shan 2014), and Richard Muller from Berkley Earth considers breathing the air in Beijing as equivalent to smoking nearly 40 cigarettes a day, suggesting that air pollution is a cause of 1.6 million deaths in China annually (Economist 2015). It also affects the global environment: China's energy consumption has made it the world's biggest greenhouse gas emitter and therefore a major cause of global warming. Smog from China's East coast also regularly travels across the Pacific to hit the US West coast (Reklev 2014).

On a more positive note, the very scale of the problem has made it difficult to ignore and China's energy security debate is beginning to change in response. China faces a difficult dilemma: in many ways the stability of the country is tied to continued economic development, which demands energy. Consequently, energy security has long taken priority over environmental questions. But now energy itself is causing instability, as a source of growing popular discontent with environmental degradation. As a result, the government is beginning to take environmental questions more seriously: this can be seen in the shift in the 11th and 12th Five Year Plans (covering 2006-2010 and 2011-2015 respectively). Here, there is increasing focus on changing energy consumption patterns and reducing energy intensity, with the 12th Five Year Plan introducing quantitative targets. The most recent white paper on energy (from 2012) also goes significantly further than its predecessor on environmental questions. It emphasizes 'environment-friendly and low-carbon development', together with sustainability (PRC Central Government 2012: part II). In 2014, China's prime minister Li Keqiang declared a 'war on pollution', and while energy and resource security remain important president Xi Jinping has also stressed the concept of 'ecological security' (Renmin Ribao 2014). New targets for cutting coal consumption have also been introduced.

At the same time, international climate and power politics have aligned in a way that plays well with China's need to tackle domestic environmental challenges. Driven by domestic environmental concerns, China is no longer considered to be 'obstructing' a global climate agreement (a narrative that emerged during and after the Copenhagen summit in 2009). Instead, it

has played an increasingly important role in international climate change negotiations, including making a major bilateral climate agreement with the United States ahead of the Paris climate summit in 2015. This has allowed China to take on what is increasingly considered to be a leadership role: a role that is unlikely to diminish with Donald Trump as president of the United States, given his outspoken statements against the Paris agreement and his publicly ambiguous position on the existence of climate change. Indeed, in the wake of Trump's election many have placed their hopes for progress in the global climate negotiations with China. So China's changing environmental and energy politics could work as a driver for growing international engagement, and perhaps even leadership.

While some mixed messages remain, when China released figures for 2014 they indicated a decline in annual coal consumption for the first time. It is too soon to tell if this is a temporary blip attributable to slowing economic growth, or a result of China's shift towards cleaner sources of energy. However, policy documents show clear indications of a fundamental shift in China's approach to energy security, driven by environmental concerns and air pollution in particular. The 'airpocalypse' and growing public discontent with China's air quality is shifting China's energy security debate and policy. Energy security and environmental questions are increasingly merged in policy discussions, though much remains to be done. As part of this, understandings of energy as a security issue are also changing: while the focus on securing state energy supplies remains, the meaning of energy security is expanding to include environmental and health concerns (Nyman and Zeng 2016).

This illustrates some of the flaws in the traditional debate, and shows that in practice the energy security debate is changing with changing environmental realities. China could be seen to be energy secure in the traditional sense, as it suffers no serious energy supply vulnerabilities. However, growing air pollution from burning fossil fuels is producing ecological and human *insecurity*.

5. Conclusion

While the traditional energy security debate reifies the discipline's traditional categories of analysis and prioritization of state over international and security over environment, the changing debate and reality poses important challenges to IR. Traditional IR cannot comprehend or explain contemporary energy security realities, and it cannot provide satisfactory answers on how to deal with these new realities. Energy security increasingly overwhelms classifications like state/international and security/environment, crossing boundaries and refusing to be neatly categorized. The global implications of the changing climate make it difficult to see a place for state-centred solutions. However, as illustrated above the energy security conversation is beginning to change, with growing acknowledgement of these difficult questions. This is perhaps the biggest contribution of energy security studies to the discipline of IR.

This chapter has outlined a number of challenges to the dominant debate: from normative arguments about equality, justice and sustainability, to conceptual critiques and securitization studies questioning what we ‘do’ when we call energy a security issue. Posthuman and energy systems literature undermine the state-centric focus of the mainstream debate, and when we shift from national security to human security it becomes clear that protecting sovereignty is not the same as making people secure. The environmental and climate implications of energy policies, meanwhile, show the limits of a market-focused liberal logic. The illustration of China’s changing energy security politics shows the practical significance of these questions, too. It is clear that *how* we understand and study energy resources or resource scarcity has profound implications for environmental politics and the Earth as well as for International Relations. Context matters: we can no longer base our theories of the world on abstract logics that derive from particular (Eurocentric) assumptions and historical experiences, and treat these abstract logics as ‘neutral’, objective, and universally applicable. Rather, IR needs to be situated within and recognise specific historical and cultural conditions of possibility.

The changing energy security debate also has important implications for understanding environmental politics. Energy choices cause increasingly serious environmental problems. Most importantly, we cannot take action on climate change without major changes to the energy sector. However, it is clearly not enough to incorporate energy into environmental discussions: environmental questions need to be central to discussions on energy. Here, China’s experience provides interesting potential for future study.

Energy politics is thus central to the future of IR and environmental politics: it raises crucial environmental questions and serious questions about how we understand and study international relations and the state system, the appropriate units of analysis, international institutions and the central aims and means of security politics itself. Most importantly, it indicates that business as usual concerning energy security is running into conceptual, practical and political challenges that are likely to lead to profound transformations in the coming years and decades.

References

Andrews-Speed, P. (2004) *Energy Policy and Regulation in the People's Republic of China*, The Hague, London, New York, Kluwer Law International.

Barnett, J. (2001) *The meaning of environmental security: ecological politics and policy in the new security era*, Zed Books.

Bielecki, J. (2002) 'Energy security: is the wolf at the door?', *The Quarterly Review of Economics and Finance*, 42(2), 235-50.

Bloomberg (2015) 'Beijing to Shut All Major Coal Power Plants to Cut Pollution', Bloomberg News, published online at <http://www.bloomberg.com/news/articles/2015-03-24/beijing-to-close-all-major-coal-power-plants-to-curb-pollution>, accessed on 17 September 2015

Cherp, A. and Jewell, J. (2013) Energy security assessment framework and three case studies. in H. Dyer and M. J. Trombetta (eds) *International Handbook of Energy Security*. Cheltenham UK: Edward Elgar, pp. 146–73.

Cherp, A. and Jewell, J. (2014) 'The concept of energy security: Beyond the four As', *Energy Policy*, (75), 415-21.

Chester, L. (2010) 'Conceptualising energy security and making explicit its polysemic nature', *Energy Policy*, 38(2), 887-95.

Ciută, F. (2010) 'Conceptual Notes on Energy Security: Total or Banal Security?', *Security Dialogue*, 41(2), 123-45.

Dannreuther, R. (2010) Energy Security. in J. P. Burgess (ed) *The Routledge Handbook of New Security Studies*. Abingdon: Routledge, pp. pp144-53.

Deese, D. A. (1979) 'Energy: Economics, Politics, and Security', *International Security*, 4(3), 140-53.

Economist (2015) 'Mapping the invisible scourge', *Economist*, published online at <http://www.economist.com/news/china/21661053-new-study-suggests-air-pollution-even-worse-thought-mapping-invisible-scurge>, accessed on 17 September 2015

EIA (2015) 'China overview', Energy Information Administration, published online at <http://www.eia.gov/beta/international/analysis.cfm?iso=CHN>, accessed on 17 September 2015

Florini, A. and Sovacool, B. K. (2009) 'Who governs energy? The challenges facing global energy governance', *Energy Policy*, 37(12), 5239-48.

Floyd, R. and Matthew, R. A. (2013) *Environmental security: approaches and issues*, Routledge.

Gault, J. (2006) 'Energy Security, Globalization and Global Security', *GCSP Policy Brief* 8, 1-17.

- Helm, D. (2002) 'Energy policy: security of supply, sustainability and competition', *Energy Policy*, 30(3), 173-84.
- Hildyard, N., Lohmann, L. and Sexton, S. (2012) 'Energy Security: for whom? for what?', The Corner House, published online at <http://www.thecornerhouse.org.uk/resource/energy-security-whom-what>, accessed on 22 July 2013
- IEA (2015) 'Glossary', International Energy Agency, published online at www.iea.org/aboutus/glossary, accessed on 19 May 2015
- Jacobson, M. Z. (2009) 'Review of solutions to global warming, air pollution, and energy security', *Energy & Environmental Science*, 2(2), 148-73.
- Johansson, B. (2013) 'Security aspects of future renewable energy systems—A short overview', *Energy*, 61, 598-605.
- Klare, M. (2002) *Resource wars: The new landscape of global conflict*, Holt Paperbacks.
- Klare, M. (2008) *Rising powers, shrinking planet: how scarce energy is creating a new world order*, Oxford, Oneworld.
- Knox-Hayes, J., Brown, M. A., Sovacool, B. K. and Wang, Y. (2013) 'Understanding attitudes toward energy security: Results of a cross-national survey', *Global Environmental Change*, 23(3), 609-22.
- Kruyt, B., van Vuuren, D. P., de Vries, H. J. M. and Groenenberg, H. (2009) 'Indicators for energy security', *Energy Policy*, 37(6), 2166-81.
- Lee, P. K. (2005) 'China's quest for oil security: oil (wars) in the pipeline?', *The Pacific Review*, 18(2), 265 - 301.
- Leung, G. C., Cherp, A., Jewell, J. and Wei, Y.-M. (2014) 'Securitization of energy supply chains in China', *Applied Energy*, 123, 316-26.
- Leung, G. C. K. (2011) 'China's energy security: perception and reality', *Energy Policy*, 39, 1330-37.
- Li, J. (2014) 'Pollution makes Beijing almost 'uninhabitable for human beings'', South China Morning Post, published online at <http://www.scmp.com/news/china/article/1426587/pollution-makes-beijing-almost-uninhabitable-human-beings>, accessed on 17 September 2015
- Luft, G. (2005) 'In search of crude China goes to the Americas', Institute for the Analysis of Global Security, published online at <http://www.iags.org/n0118041.htm>, accessed on 17 July 2013

Mitchell, A. (2014) 'Only human? A worldly approach to security', *Security Dialogue*, 45(1), 5-21.

Mulligan, S. (2010) 'Energy, Environment, and Security: Critical Links in a Post-Peak World', *Global Environmental Politics*, 10(4), 79-100.

Mulligan, S. (2011) 'Energy and human ecology: a critical security approach', *Environmental Politics*, 20(5), 633-50.

Natorski, M. and Herranz Surrallés, A. (2008) 'Securitizing Moves To Nowhere? The Framing of the European Union's Energy Policy', *Journal of Contemporary European Research*, 4(2), pp. 70-89.

Nyman, J. (2014) 'Red storm ahead: securitisation of energy in US-China relations', *Millennium*, 43(1), 43-65.

Nyman, J. (2016) 'Rethinking energy, climate and security', *Journal of International Relations and Development*, forthcoming.

Nyman, J. and Zeng, J. (2016) 'Securitization in Chinese energy and climate politics', *WIREs Climate Change*, 7(2).

Pascual, C. and Zambetakis, E. (2009) The geopolitics of energy: from security to survival. in C. Pascual and J. Elkind (eds) *Energy Security: economics, politics, strategies and implications*. Brookings, pp. 9-36.

PRC Central Government (2012) '2012.10.01 White paper: China's energy policy 2012', PRC Central government, published online at http://english.gov.cn/official/2012-10/24/content_2250497.htm, accessed on 30 November 2012

Reklev, S. (2014) 'Pollution From China Is Hitting America's West Coast', Business Insider, published online at <http://www.businessinsider.com/china-pollution-is-blanketing-americas-west-coast-2014-1?IR=T>, accessed on 12 March 2015

Renmin Ribao (2014) '走中国特色国家安全道路 [Xi Jinping's speech to National Security Commission]', Renmin Ribao 16 April 2014, published online at http://paper.people.com.cn/rmrb/html/2014-04/16/nw.D110000renmrb_20140416_2-01.htm, accessed on 22 February 2016

Schlesinger, J. R. (2005) Foreword. in J. H. Kalicki and D. L. Goldwyn (eds) *Energy and security: toward a new foreign policy strategy*. Woodrow Wilson Center Press, pp. xiii-xxiii.

Shepherd, L. J. (2008) 'To save succeeding generations from the scourge of war': the US, UN and the violence of security', *Review of International Studies*, 34(2), 293-312.

- Simpson, A. (2013) Challenging inequality and injustice: a critical approach to energy security. in R. Floyd and R. A. Matthew (eds) *Environmental security: approaches and issues*. London and New York: Routledge, pp. 248-63.
- Sovacool, B. K. (2010) Introduction: defining, measuring and exploring energy security. in B. K. Sovacool (ed) *The Routledge Handbook of Energy Security*. Routledge, pp. 1-42.
- Sovacool, B. K., Sidortsov, R. V. and Jones, B. R. (2014) *Energy security, equality and justice*, London and New York, Routledge.
- Tunsjø, Ø. (2010) 'Hedging Against Oil Dependency: New Perspectives on China's Energy Security Policy', *International Relations*, 24(1), 25-46.
- Umbach, F. (2012) 'The intersection of climate protection policies and energy security', *Journal of Transatlantic Studies*, 10(4), 374-87.
- Valentine, S. V. (2010) The fuzzy nature of energy security. in B. K. Sovacool (ed) *The Routledge Handbook of Energy Security*. Routledge, pp. 56.
- Vanderheiden, S. (2011) 'The politics of energy: an introduction', *Environmental Politics*, 20(5), 607-17.
- Verrastro, F. and Ladislaw, S. (2007) 'Providing energy security in an interdependent world', *The Washington Quarterly*, 30(4), 95-104.
- Walker, R. B. J. (1990) 'Security, sovereignty, and the challenge of world politics', *Alternatives*, 15(1), 3-27.
- Wang, Q. and Shan, J. (2014) 'Lung cancer cases linked to air quality', China Daily, published online at http://www.chinadaily.com.cn/china/2014-02/27/content_17308023.htm, accessed on 17 September 2015
- West, J. (2013) 'Chart: The Black Triangle Suffocating Beijing', Mother Jones, published online at <http://www.motherjones.com/blue-marble/2013/01/beijing-coal-smog-crisis-chart>, accessed on 17 September 2015
- Wirth, T., Gray, C. B. and Podesta, J. D. (2003) 'The future of energy policy', *Foreign Affairs*, 82(4), 131-55.
- Yergin, D. (1988) 'Energy Security in the 1990s', *Foreign Affairs*, 67(1), 110-32.
- Yergin, D. (2011) *The Quest: energy, security and the remaking of the modern world*, Penguin UK.