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Governance Dimensions of Climate and Energy Security

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1 INTRODUCTION

For a long period 'security' was both a central, yet extraordinarily underdeveloped, concept in International Relations. Critical scholarly attention really dates from the pioneering work of Barry Buzan (1983). Since then varying security perspectives have proliferated. *Environmental* security became the subject of a long-running debate and the 1994 UN Human Development Report introduced the people-centred approach of *human* security (Dalby 2009). It is now commonplace not only to emphasize national border security, but also refer to food security, water security, and other 'sectoralized' security areas (Brauch et al. 2009). This expansive re-definition should alert us to the significance of the 'referent object' or, in other words, 'that which is to be secured'. In orthodox security studies, there is no doubt that the object of security policy remained the integrity of the state and its interests. There might be reference to people, but as Buzan (1983, p. 245) noted, there was always 'an unbreakable paradox' between state and individual security. In much recent security discussion notions of threat may have changed, as in the typical security triptych of 'terrorism, failed states and weapons of mass destruction', but the preservation of the state remains the essential object of policy. Energy security, often with overtones of control over contested scarce resources, is conventionally seen as a central component of the national interests of a state and not infrequently a *casus belli.* This is also true of the overwhelming bulk of environmental security discussions including those relating to the actual and possible conflict consequences of global climate change. However, the really radical move would be to shift the object of security from the state to human populations and then to the earth's climate upon which they depend.[1]

While there are several significant greenhouse gases (GHGs), current mitigation efforts concentrate on energy-related carbon emissions which, in 2005, accounted for around 61 percent of all GHG emissions (Baumert et al. 2005) and whose importance rises in line with increasing global energy consumption. In Europe, the figure is even higher at 80 percent (European Commission 2007, p. 3). This physical link lies behind the evolution of the UN Framework Convention on Climate Change (UNFCCC) over the past decade. It largely explains why energy and climate change agendas have become increasingly intertwined. The particular characteristics of the Kyoto Protocol meant that, for an extensive period, most Parties were able to avoid this conjunction. Non-Annex I developing countries were not required to make any reduction in their fossil fuel-based emissions and the EU could sustain its climate 'leadership' without having to make significant cuts in energy use through the fortuitous use of the 1990 baseline in its burden-sharing agreement. The United States, which would under the Protocol have had to make real and economically damaging energy-related reductions, simply opted out; while others either failed to meet their obligations or were able to take advantage of carbon offsets. In the post-2012 discussions, which followed entry into force of the Protocol in 2005, the energy-climate connection became all too painfully clear and dominated the international discussions leading up to the 2009 Copenhagen Conference of the Parties (CoP). At the highest level, climate politics became international energy politics and could be portrayed as a competition to secure shares in a diminishing ‘carbon space’ or, perhaps, to ensure that the burdens of reductions in energy use should be borne by others. Energy security has habitually been associated with ‘high politics’ and it was noticeable that, in this regard, the climate CoP at Copenhagen departed markedly from other analogous ‘low politics’ environmental regimes.

The primary purpose of this chapter is to understand the energy-climate nexus within a security framework. We proceed by initially analysing both domains in their own terms. The energy security agenda is characterized by (geo)political and material (scarcity) constraints, and governance responses have largely been confined to the national arena. By contrast, climate change has long been subject to multilateral, UN-related governance processes. Explicit security lenses have been applied to the potential short- and long-term impacts of climate change. Associated policy responses can be broadly categorized as *reactive* or *preventive*. Finally, the third section provides a conceptual and institutional comparison between energy security and climate security agendas and considers the important question of ‘synergies’ between them, leading perhaps to the elusive ‘win-win’ solution under which a progressively de-carbonized economy might provide for really comprehensive security in terms of climate stability, sustainable energy and the avoidance of the more disruptive traditional threats associated with rapid climate alteration.

2 ENERGY SECURITY

The standard definition of energy security was forged amidst the oil crises of the 1970s and remains a conceptual cornerstone: 'access to secure, adequate, reliable, and affordable energy supplies' (Bordoff et al. 2009, p. 214). It should also be remembered that for producers, energy security means continued demand and market access. Energy security represents a broad, if rather vague, placeholder for a range of policy-making priorities. Admittedly, it does not adequately address other important aspects of energy governance such as carbon emissions or overall environmental sustainability. To keep these concerns separate nonetheless reflects the reality of policy-making where successful policy integration is rare, whilst parallel, competing tracks are still the norm. But even according to the orthodox definition, there have been plenty of reasons in recent years to highlight growing energy insecurity. The rise of major energy-consuming economies, such as China and India, has lowered overall confidence in 'secure' and 'affordable' energy supplies. Affordability may be compromised due to an increasing imbalance between the demand and supply of fossil fuels and especially the widespread recognition of 'the end of easy oil'. Secure access may be at risk because increasing scarcity implies greater international competition and encourages a move away from market allocation towards 'statist' forms of energy security.

Historically, realist theoretical assumptions have dominated thinking on energy security. Widespread recognition of the role of energy resources during the build-up and conduct of the Second World War ensured the status of energy as an issue belonging to the 'high' politics of national security. The role of energy as a 'strategic good' par excellence is not only related to its essential function in 'fuelling' military activities. Its price level and availability also play a fundamental role in a country's economic performance and socio-political stability (Lesage et al. 2010, p. 183). A realist interpretation of energy security was further reinforced by events in the 1970s when a trend towards the nationalization of energy supplies and the sporadic use of oil embargoes, orchestrated by the Organization of Petroleum Exporting Countries (OPEC), highlighted the dangers of energy dependence. Even today the privileged position of major energy-exporting countries still represents a constraint on the foreign policy agenda of major importers (Müller-Kraenner 2008, p. 27).

Market expansion and low energy prices from the 1980s until the mid-2000s encouraged the development of liberal approaches to energy security. Greater diversification of sources and a gradual shift to coal and natural gas all but eliminated the threat of an effective use of the 'oil weapon'. Well-functioning global markets for oil – and potentially for liquefied natural gas – have been increasingly promoted as effective mechanisms to provide cheaper energy inputs in an increasingly competitive, global economy and guard against both structural undersupply and short-term supply disruptions (Goldthau and Witte 2009). Realist notions of energy security, however, have not been superseded. On the contrary, Brazil, Russia, India, and China – the so-called BRIC states – are not just consuming increasing amounts of fossil fuels. They also employ the traditional, statist tools of energy security policy such as bilateral contracts and the promotion of national energy champions (Lesage et al. 2010, p. 27). China and India have struck numerous energy deals with oil- and gas-exporting countries from around the world, even if this has meant giving economic and military aid to 'pariah' states in Africa and Latin America (Müller-Kraenner 2008, p. 72). While this has served to raise rather than lower the availability of fossil fuels on global markets, it demonstrates that – given an uncertain future – no major power will rely exclusively on the market allocation of energy supplies.

When it comes to natural gas, a commodity still largely reliant on pipeline infrastructure and long-term supply contracts, overtly political considerations have remained dominant. The European Union, for example, has yet to produce a coherent energy policy or to perfect a ‘real internal energy market’ (European Commission 2007, p. 6). There are very significant differences in the energy mix and strategies of member states whose perspectives remain stubbornly national. Thus the Commission’s principal approach has been to seek energy security through the perfection of a properly functioning, interconnected and transparent internal energy market. There has also been a largely unsuccessful attempt to extend EU liberalising regulatory practices to the EU’s gas suppliers in its eastern neighbourhood. Failure was demonstrated in the twin Ukrainian gas crises of 2006 and 2009 which were only resolved through EU mediated political agreement between Russia and Ukraine.

Russia, having rejected the EU’s invitation to subscribe to the Energy Charter Treaty, increasingly relies on its economic power derived from natural resources and energy services. It uses the mechanism of ‘pipeline politics’ to compensate for its loss of superpower status and to preserve its zone of influence, particularly in the Caspian region and Central and Eastern Europe (Müller-Kraenner 2008, pp. 47–56). The EU counterpart is the suggestion that security of supply can be achieved through diversification involving new pipelines circumventing Russian territory, Nabucco providing the best known example. Youngs (2009) suggests that the EU is in fact caught on the horns of a dilemma, between attempts to install market-based governance of energy supplies and an essentially realist approach to the geopolitics of pipelines. In the US, by contrast, new shale gas discoveries over the last few years have – for now – made the country virtually independent from imports. The situation is, of course, completely different for oil supplies, even though the US, if it was minded to incur the costs, could achieve a degree of autarchy in this sector too.

The uncertain future evoked by realist commentators is not merely concerned with ‘above-ground’, political-economic factors, but intimately bound up with the status of ‘below-ground’ energy reserves. While the momentous increase in energy prices during 2004–2008 may have been partly caused by the growing ‘financialization’ of energy markets and an upsurge in speculation (Bradshaw 2010, p. 276), there is now a strong chorus of voices pointing to underlying factors of supply and demand. Data problems caused by failure to report or intentional misreporting cannot conceal a general pattern of stagnant reserves (Owen et al. 2010). The possibility of a significant future shortfall in oil supplies is supported by a raft of additional arguments. First, significant additional demand will come from emerging economies, especially India and China, and may result in global energy demand growth of 36 percent by 2035, with demand for oil projected to grow by 15 percent (IEA 2010). Second, considerable investments will be needed to expand (or even maintain) supply because there will be growing reliance on non-conventional, more expensive oils from tar sands, enhanced oil recovery, or even coal liquefaction. Such investments, however, will be hindered by short-term price volatility.

Third, even those countries with the capacity to ramp up production of fossil fuels will struggle to increase exports. Many energy-rich countries – for example Saudi Arabia, Iran, Venezuela – are dominated by state-owned companies which frequently lack the capital or expertise to substantially increase production. Moreover, substantial energy subsidies have long been employed by these and other governments to reduce energy poverty and secure the consent of their populations. Expectations of cheap energy and a lack of interest in energy efficiency are now so entrenched in most energy-rich countries that a continued rise in energy demand, which could ultimately cancel out increased production, is entirely possible (Rubin 2009).

Critics of such projections highlight a decade-long history of erroneous predictions of scarcity. They argue that the supply of fossil fuels will be ensured by technological change, which can unlock previously unprofitable reserves, and higher prices triggering increased investment and exploration. At most, they acknowledge the potential for politically created supply crises through increasing resource nationalism and insufficient investment (Radetzki 2010). This riposte, however, is less forceful now than in the past. Even the traditionally conservative IEA has accepted the tenor of the end of ‘easy oil’ (Bradshaw 2010, p. 277) and conceded that crude oil production will never again reach its ‘all-time peak’ of 2006 (IEA 2010, p. 48). Because this entails a switch to non-conventional oils and a progressively lower ‘energy return on investment’, it is likely to contribute to rising oil prices.

Besides oil supplies, the general picture for fossil fuels is even more contested. Given recent technological advances in shale gas production and underground coal gasification, it remains very uncertain when tangible scarcities will materialize. With regard to oil, however, the significance of the ‘peak oil’ thesis is that both materially and politically induced supply shortages may well occur. The combined effect of uncertainty and price volatility cements the high status of energy security on governments’ agendas because it suggests serious implications for economic development and heightened international competition for scarcer energy resources.

2.1 The Pursuit of Global Energy Security

Given the revitalized interest in energy issues, there is now a burgeoning literature both on *national* and on *global* energy governance, including the security dimension. In institutional terms, however, the idea of collective energy security has only made very limited progress over the last few decades. Continuing international discord is underpinned by the fundamentally divergent interests of fossil-fuel exporting and importing countries. For OPEC member states and other important exporters, energy security is primarily a question of stable and predictable demand from industrialized economies. The latter, on the other hand, created the International Energy Agency (IEA) in 1974 to coordinate their response to future oil crises and provide information and expertise for national energy policy. For importing countries, energy security hence equates to security of supply.

Although the fierce producer-consumer clashes of the 1970s are unlikely to return, the bifurcated structure of energy security policy has proved persistent. The establishment of the International Energy Forum (IEF) in 1991 was intended to signal a new era. It provides a basis for enhanced producer-consumer cooperation and already features initiatives on improving the transparency of oil and gas data with regard to production and investment levels. But a legacy of conflict and 'deep-rooted mutual suspicion' has so far stood in the way of major governance breakthroughs (Lesage et al. 2010, p. 62). The EU is a supporter of multilateralism but the approach of its member states to energy security is often to secure a network of bilateral deals with neighbours.

To bolster the case for global cooperation, commentators have underlined the high degree of interdependence (Yueh 2010) which typifies global energy relations. In theoretical terms, this condition has long applied in a globalising world. The drive towards an efficiently functioning global energy market (primarily for fossil fuels) is nothing less than an institutionalization of economic interdependence. But in practical terms, shared vulnerability was brought to the fore by surging energy prices during 2004–2008. From 2005 onwards, several G-8 meetings treated energy as a high priority and initiated a number of assessments and action plans by drawing on the IEA's expertise (Lesage et al. 2010, Ch. 7).

A minimal common ground between consumer and producer countries is the avoidance of extreme price volatility because it makes planning for the future exceedingly difficult. For example, the budgets of fossil fuel exporting countries were initially buoyed by rising revenues, then shrank suddenly when the financial crisis hit and prices collapsed. Given the nature of energy policy, however, it is unlikely that UN institutions will take the lead in this venture. Even though many UN organizations and programmes also pursue energy-related activities, the envisaged central organizational node, UN-Energy, is currently no more than an embryonic focal point. Therefore, in a 'business-as-usual' scenario of global energy governance, serious coordination will remain the preserve of 'coalitions of the willing', while broader multilateral processes are most likely to proceed through the UN climate change regime (UNFCCC) (Karlsson-Vinkhuyzen 2010, p. 193). As we argue in the final section of this chapter, this regulatory dynamic would likely increase the compatibility of energy security and climate change mitigation. To substantiate this point, however, we first turn towards the notion of climate security.

3 CLIMATE SECURITY

Climate security has its roots in the environmental security debate. The critical questions raised and empirical results first offered in the early 1990s are equally valid for today's discussions.[2] Unsurprisingly, in theoretical terms the precise meaning of climate security therefore remains contested. Understandings range from the adaptive capacity and resilience of societies in the face of extreme weather events to ambitious mitigation which reduces the risk of catastrophic consequences. Yet, in the realm of international climate governance, political consensus has developed around a precise number to distinguish 'manageable' from 'dangerous' climate change: this is the famous 2˚C threshold. While the concept of *environmental* security has long been present in discussions about environmental governance, the related notion of *climate* security is a relative newcomer. This process of 'securitization' may be understood as a gradual and mainly discursive accomplishment from a constructivist perspective or as an inevitable and necessary development from a rationalist standpoint.

A constructivist approach would trace the rise of the climate security discourse over the past few years. Some have pinpointed the year 2002 as the point at which the political mainstream acknowledged potential security implications. According to Dupont (2008, p. 30), a report commissioned by the Pentagon (Schwartz and Randall 2003) helped trigger a learning process through which climate change 'metamorphosed from a boutique environmental concern to a first-order foreign-policy and national-security problem that is now being ranked alongside terrorism and the proliferation of weapons of mass destruction.' The following years did indeed witness a flurry of similar, if more sophisticated, assessments, most prominently a 2007 report by a US think tank (CNA Corporation), a 2008 EU report on 'Climate Change and International Security', and an explicit recognition by the 2010 US Quadrennial Defense Review and by the 2010 UK Strategic Defence and Security Review.

Although there are still some doubts about the extent and durability of the securitization process[3] (Scott 2008; Mobjörk et al. 2010), the debate on climate change and security in the UN Security Council (April 2007) may come to be seen as a genuine watershed. While most developing countries resisted the security framing and favoured environment/development discourses, small-island developing states (SIDS) – ranking among the most vulnerable nations – sided with industrialized countries to support an active role for the Council in climate change governance (Detraz and Betsill 2009, p. 312). In July 2011, Germany reintroduced the issue at the Council. There was agreement on the significance of climate change, but no consensus on the appropriate international forum for its discussion. China and Russia, supported by G-77 members argued that the Council was ill equipped to cover a topic that was the proper responsibility of the UNFCCC (MacFarquhar 2011). Despite the session ending without tangible results, these high-level diplomatic discussions have arguably ensured the presence of climate security considerations on the agendas of governments and international organizations.

A rationalist approach places greater emphasis on the expected impacts of climate change and the likely gamut of security responses they are likely to trigger. One of way of developing such predictive capacity is to construct scenarios based on the best available climate science. Another is to study historical instances in which climatic factors seem to have played a critical role, for example the decline or collapse of ancient civilizations (Dupont 2008, p. 31). Quantitative methodologies can equally be applied. Lewis (2009, p. 1199) thus cites a Chinese study concluding that 70–80 percent of 'peak war activity' in China's history took place during unusually cold or warm climatic periods which sharply reduced land productivity.

A combination of these analytical pathways holds insights for all major strands of security thinking. For proponents of national security priorities, climate change fits into the category of unconventional, destabilising ‘threat multipliers’ that could cause state failure, foment extremism, trigger migratory waves, and physically endanger military installations at home and abroad. This was the thrust of the 2008 paper developed, with special emphasis on climate change and the Arctic, by the EU’s Javier Solana (European Council 2008). For advocates of human security approaches, climate change impacts pose grave challenges to the twin objectives of ‘freedom from fear’ and ‘freedom from want’ by undermining stable livelihoods and imposing significant and costly adjustments on frequently vulnerable communities.

Third, what marks out climate change from other non-conventional security threats is its disruptive effect on ecological, ‘planetary’ security. By adversely affecting the capacity of the atmosphere to render the ‘ecosystem service’ of providing a stable climatic system, rapid (and potentially abrupt) human-induced climate change may pose an existential threat to the biosphere, including human civilization itself. To use the terminology of the Copenhagen School, what is evident here is a shift in the referent object of security from the nation state, to the individual in society and finally to the planetary biosphere itself.

3.1 Reactive Climate Security

The argument about fundamental ecological security and climate change impacts has been implicit in the literature since the 1970s. But now that attention to the security implications of climate change is growing, the focus is often re-adjusted onto reactive policies, such as coping mechanisms and adaptation measures. This strategic shift in policy formulation is justified by two weighty arguments. First, the inertia of the climate system implies that the current concentration of CO_2 in the atmosphere is already sufficient to generate a significant degree of global warming over the coming decades. Second, the recognition of inevitable impacts is joined by pragmatic motivations. As David Keith (2009, p. 56) describes it, in contrast to globally coordinated mitigation measures, 'the self-interest of nations, firms and individuals will work to drive measures to ease adaptation to the changing climate since the benefits of adaptation can be captured locally where money is spent.'

Apart from positive results for human security, such benefits can equally be understood as the avoidance of violent conflict. Certainly, the causal connection between climate change and conflict remains hotly contested. Yet, a broad-based, if minimal, consensus has emerged around the proposition that violent conflict rests on numerous, complex socio-economic and political – as well as climatic – processes and that the latter may constitute a 'non-essential' causal factor (Mazo 2010, p. 40).

Among the expected consequences of climate change are sea-level rise, altered precipitation patterns, an increase in extreme weather events, melting glaciers, increasing burdens of infectious diseases, and the progressive acidification of the oceans (Dupont 2008, p. 32). When set against a number of separate trends, such as population growth, it is evident that climate change will contribute to increasing water and food insecurity around the world.[4] Whereas profound societal destabilization will not necessarily translate into inter-state warfare, it will harm the prospects for human well-being and may trigger unprecedented waves of migration, both within and across national territories. Some estimates suggest there may be 200 million environmental refugees by 2050 (Mazo 2010, p. 129). Furthermore, failing states could unwittingly 'export' insecurity well beyond their borders by becoming havens for international criminal or terrorist networks.

If security responses to such instabilities were designed by traditional military planners, one may expect the whole gamut of coping and containment tools to be applied. Individual states or alliances of states are likely to step up border security and the policing of major migratory routes (Rogers 2010). The beginnings of these trends can, for instance be discerned in the EU's Immigration, and Neighbourhood Policies. Active intervention in failed states, under the Common Security and Defence Policy, for the purpose of conflict prevention, conflict resolution or humanitarian assistance may also appear on the agenda alongside EU counter-terrorism efforts. However, many of these measures may also strengthen the widespread perception of an 'uncaring West'. This could bolster support for extremist groups[5] and perhaps provoke radical civic mobilization within developed countries themselves (Mabey 2008, p. 94).

On the other hand, reactive security responses need not be confined to military approaches. Following a human security perspective, there will also be increasing interest in emergency adaptation measures and, crucially, in 'pre-adaptation' strategies such as fostering resilience and 'climate-proofing' of critical infrastructures (Adger 2010; Mazo 2010, p. 102). Much of the climate aid for developing countries – projected to reach $100 billion annually by 2020 – is likely to be earmarked for this category of actions. Initial projects from late 2010, such as combating coastal erosion in Senegal or flood prevention in northern Pakistan, give an indication of what resilience and 'pre-adaptation' mean in practice.

3.2 Preventive Climate Security

While few would dispute the need for reactive security policy and adaptation measures, the central question is whether these will compete with the requirements of climate change mitigation. Given the slow progress of international climate regulation, adaptation funding – one of the few issues gathering widespread support – might well be employed for policies that further increase carbon emissions. On the other hand, the accompanying capacity-building may also serve to improve the effectiveness of mitigation policies (Mazo 2010, p. 132). Overall, a broad consensus exists that 'sustainable security' (Dalby 2009, p. 166) can only be achieved if both policy objectives are designed for compatibility. The governance arrangements for avoiding deforestation (REDD+), currently under discussion in the UNFCCC and affiliated fora, represent a test case for this integrated conception.

Regarding mitigation, ambitious reductions in greenhouse gas emissions are essential not only to curb the need for risky and expensive reactive security policies. Moreover, it is becoming increasingly clear that the process of climate change may not conform to the linear assumptions embodied by relatively conservative modelling exercises. Although the IPCC's Fourth Assessment Report states that climate change is very likely caused by human activity (IPCC 2007), detailed knowledge about the precise mechanisms of an enormously complex climatic system remains a work in progress. This is reflected by the broad ranges of possible temperature change given in the IPCC's scenarios. Rather than taking scientific uncertainty as a reason for hesitation, however, many commentators have pointed out that the probability functions of mainstream climate models could be too linear because the climate's sensitivity to GHGs might unexpectedly turn out to be much stronger. Recent developments – such as unprecedented reductions in mid-year Arctic sea ice in 2010 and 2012, sustained sea-level rises, and higher GHG emissions than projected – have bolstered these concerns (Mobjörk et al. 2010, p. 42ff.).

Unexpectedly rapid or strong climatic changes are not the only scientifically grounded scenarios that would likely have severe security consequences. It is equally possible that there are non-linear climatic dynamics scientists do not yet understand and which therefore cannot be integrated into their models. There are likely to be thresholds or 'tipping points' which could shift the global or, more likely, regional climate system into a new state. Mabey (2008, p. 22) presents a typology of such climatic events, distinguishing between 'high impact reversible events' (e.g. changing Asian monsoons, a weakening Gulf Stream), 'irreversible impacts' (e.g. melting glaciers, species extinction), and 'runaway climate change' whereby feedback loops – triggered by events such as melting permafrost soils releasing large quantities of methane – would push the climate system into an uncontrollable warming spiral.

Such 'high impact/low probability' scenarios are no mere figment of imagination, as the geological record shows that they have occurred in the distant past (Mabey 2008, p. 13; Mazo 2010, p. 29). These scenarios are now frequently recognized in the scientific and policy literatures. Innovative economic analysis has equally cast doubt on conservative 'median' damage functions commonly employed by mainstream 'gradualism'. Weitzman (2010, p. 24) thus proposes a 'fat-tailed' probability distribution of climate sensitivity to higher greenhouse gas concentrations. This implies a distinct chance (1 percent) of 10 or more degrees of global warming and suggests that ambitious mitigation targets would represent an insurance policy against catastrophic climate change.

Discourses of preventive security strike a similar note. The core argument here is that security analysts and military planners have been trained to rely on prudence and foresight which may lead them to consider worst-case scenarios rather than mere 'best guesses' (Dupont 2008; Mabey 2008; Rogers 2010). By implementing this form of assessment, analysts may come to recognize that reactive security responses cannot adequately deal with scenarios of extreme or abrupt climate change. First, every society has a limited adaptive capacity to profound perturbations. Second, as Mabey (2008, p. 13) puts it, 'while climate change raises many hard security problems, it [ultimately] has no hard security solutions.' In policy terms, both preventive security and risk-averse economic thinking point towards two major undertakings: a rapid transition towards an ultra-low carbon economy and enhanced international cooperation on climate governance.

4 GOVERNING ENERGY AND CLIMATE SECURITY

The first two parts of this chapter have come to different conclusions regarding the challenges of energy security and climate security. For the former, strong international governance mechanisms are desirable but difficult; for the latter, such advances are very challenging indeed, but ultimately indispensable. Energy security is largely subject to the vagaries of the market and the geo-political manoeuvres of major producers and consumers. Institutions such as the International Energy Agency, set up in 1974 by OECD countries, or agreements such as the EU-sponsored 1991 Energy Charter Treaty have not been able to fundamentally change this dynamic.

A range of existing governance mechanisms have extended their remit to cover climate change – typically viewed as a 'threat multiplier'. They provide numerous frameworks for collaborative international efforts to react to the effects of climate change. The climate issue has permeated the international institutional architecture from development organizations interested in adaptation to UN peacekeeping and the EU's Common Security and Defence Policy. Those who oppose a modification of the UN Security Council's activities prefer to keep the Climate Change Convention as the appropriate forum and to assert that climate security must be considered as a sustainable development issue. Despite recent growing concern with adaptation, the UNFCCC, therefore, remains the institutional location for efforts at preventive climate governance. Although hailed as a success, the Durban 2011 CoP extended the date for a comprehensive new agreement out to 2020. Given this delay and continuing uncertainty about the eventual agreement, many major economies have resolved to enact domestic climate and energy policies that pursue 'win-win' solutions, such as fuel-switching to low- and ultra-low-carbon sources, greater energy efficiency, demand reduction, and the development of cost-efficient carbon capture and storage (CCS) technology (Froggatt and Levi 2009).

4.1 'Synergistic' Climate and Energy Security Policy

The popularity of 'synergistic' approaches is reflected in policy developments in major economies around the world. For instance, emerging economies such as China and India continue to pursue traditional energy policy centred on diversification of energy sources, expansion of fossil-fuel-based energy generation, and the reduction of energy poverty. But they are also implementing 'win-win' energy-and-climate policies.

With Chinese oil imports predicted to rise from about half to well over 80 percent of domestic needs by 2030 (IEA 2007a), a target of reducing the energy intensity of its economy by 20 percent until 2010 has been raised to 40–45 percent by 2020. This goal is to be achieved primarily through energy efficiency measures, but is flanked by an ambitious programme of investment in low-carbon energy generation which might lead to renewable energy providing one third of total energy generation by 2020. India is projected to face an even greater degree of energy dependence, with up to 90 percent of oil and a rapidly growing share of natural gas and coal to be imported by 2030 (IEA 2007b). India's 2008 'National Action Plan on Climate Change' emphasizes significant future investments in solar energy and energy efficiency.

Even a high-income country such as the US has until now followed a similar policy pattern. US energy and climate policy has often depended on traditional notions of energy security emphasising domestic production of oil and gas. Yet, a temporary confluence with supporters of climate change mitigation brought about the 2007 'Energy Independence and Security Act' which yielded policies on biofuels,[6] energy efficiency and low-carbon energy generation (Bang 2010). However, there are some mid- and high-income countries which have committed to more ambitious and target-based action on climate mitigation. Mexico, for example, plans to reduce its GHG emissions by 30 percent below a business-as-usual scenario by 2020 and 50 percent from 2000 levels by 2050. Japan has pledged to reduce its emissions in the same period by 25 percent below 1990 levels, although this target will be difficult to achieve. And the EU proposed a 20–30 percent cut below 1990 levels, but made the upper figure conditional on stronger international reciprocity.[7] If current policies on renewable energy and energy efficiency are fully implemented, the EU might achieve a 30 percent reduction by 2030, but that still leaves a considerable gap to the long-term objective of cutting GHG emissions by 80 percent until 2050 (European Commission 2011).

By extrapolating from intra-European differences, one can try to deduce the main reasons behind the divergent ambitions of these two groups of countries. Marques et al. (2010) thus found that investment in renewable energy sources increased in line with an EU member state's dependence on energy imports. Unlike the US, most European states – as well as Japan and Mexico – do not currently have the option of expanding domestic production of fossil fuels in a cost-effective manner. The EU as a whole is projected to see its total import dependency increase from 82.6 percent for crude oil and 60.3 percent for natural gas (in 2007) to around 93 percent and over 80 percent by 2030 (Comolli 2010). In the wake of the 2005–2006 Russia-Ukraine dispute over natural gas deliveries, political momentum resulted in the 2008 'EU Climate and Energy Package'. The Commission has taken a synergistic view:

<quotation>Action on renewables and energy efficiency, besides tackling climate change, will contribute to security of energy supply and help limit the EU's growing dependence on imported energy. It could also create many high-quality jobs in Europe and maintain Europe's technological leadership in a rapidly growing global sector. (European Commission 2006, p. 10)</quotation>

This is matched by calls for cooperation with other players US, China, India, Canada and Japan on energy efficiency and renewables, global market access and investment trends to achieve better results in multilateral fora such as the UN, the IEA and the G-8. 'If these countries reduce the use of fossil fuels, it will also be beneficial for Europe's energy security' (European Commission 2006, pp. 16–17). 'Indeed energy must become a central part of all EU external relations; it is crucial to geopolitical security, economic stability, social development and international efforts to combat climate change' (European Commission 2007, p. 17). Existing momentum for climate policy was fuelled by newly salient energy security concerns which, in turn, were stoked by a more prolonged Russia-Ukraine gas dispute in January 2009 which caused severe gas shortages in several EU member states. An emerging European energy strategy focuses on investments in the diversification of import sources (e.g. alternative gas pipelines), the creation of a common internal energy market and exploiting untapped potential for energy efficiencies (European Commission 2010). Although significant potential for synergies remains, energy security considerations have by now largely replaced climate policy objectives as the main driver of regulatory evolution.

How do these various policies fare when compared with the overarching objectives of energy and climate security? The cautious energy-and-climate policy packages enacted by China, India, and the US score highly on affordability and reliability, while the latter economies benefit from enhanced security of access. Moreover, in the longer run, if predictions of rising energy prices come true, first-movers in energy efficiency and 'decarbonization' will reap substantial benefits: they will have already reduced their consumption of oil and thus improved their economic competitiveness.

In terms of preventive climate security, however, most policies are still inadequate. Although the US intends to cut GHG emissions by 17 percent between 2005 and 2020, the US Energy Information Administration (EIA) estimates that energy-related carbon emissions will grow by 0.2 percent annually until 2035 (EIA 2010, p. 128). In both China and India, domestic (carbon-heavy) coal will continue to play a dominant role in energy generation. EIA figures predict annual growth rates in energy-related carbon emissions of 2.7 percent (China) and 1.8 percent (India). By contrast, the EIA expects an annual reduction in energy-related carbon emissions in OECD-Europe and Japan by 0.2 percent and 0.6 percent respectively. Collectively, the climate and energy policies announced by major economies imply very limited progress on climate mitigation and in many other developing or emerging economies, the carbon intensity of power generation has in fact continued to rise (Tandon 2012). In November 2010, the UN Environment Programme calculated that targets and other pledges by major economies only amount to 60 percent of the GHG reductions needed to stay below the 2˚C threshold.[8]

5 CONCLUSION: THE GOVERNANCE DILEMMA

According to the then EU Energy Commissioner, 'climate change and energy security are two sides of the same coin. The same remedies must be applied to both problems' (Piebalgs 2009, p. 2). There is certainly a conceptual overlap between energy and climate security. Not only are they both, to various degrees, concerned with the transition away from a carbon-heavy, fossil-fuel based global economy. They also have to confront fundamental scarcities: the scarcity of affordable and readily accessible fossil energy or the scarcity of atmospheric 'carbon space'. Both the energy and the climate challenge can therefore benefit from demand reduction as well as from supply-side measures which diminish both types of scarcity, such as low-carbon energy technologies. There is no denying the underlying attraction of this proposition and the way in which a 'synergistic' approach provides what must be the ultimate 'win-win' solution neatly addressing energy and climate security concerns through a move to a decarbonized economy.

The problem is, of course, making the political fit between climate and energy security. The orthodox vision of enhanced global energy security, grounded in economic globalization and increasing interdependence, still depends on a compromise between producers and consumers of fossil fuels. The sole likely benefit for climate governance would be reduced price volatility and hence greater predictability for alternative energy investments. Overall, strategies prioritising either national or global energy security are likely to result in incremental climate policy and a resort to *reactive* climate security. For such an approach the referent object will continue to be the state.

Furthermore, while the various benefits of energy security measures can be captured at the national or even regional- or EU-level and are not necessarily dependent upon international cooperation, the public good of climatic stability can only be attained by concerted efforts at the global level. This is because the global atmosphere can be regarded as having the characteristics of a commons. Climatic security defined in terms of stability is frequently understood as non-rival and non-excludable public good. It requires collective mitigation efforts amongst the largest emitters and mechanisms to ensure compliance and avoid 'free-riding'. The atmosphere also represents a finite 'common sink' for GHG emissions. Most current economic activities constitute a rival consumption of 'carbon space'. And strict international targets would partially enclose or 'privatize' this resource in order to limit ruinous over-consumption. However, the very notion of carbon space, which has become in recent years a key negotiating concept for some developing countries, illustrates the extent of the problem of arriving at an effective agreement beyond the first commitment period of the Kyoto Protocol.[9] The point here is that much of the world's limited carbon space has already been occupied by the industrialized countries and that justice demands that the remainder be used to realize the development objectives of the South. In the climate negotiations from Copenhagen (2009) to Durban (2011), the objective of the key players has been to avoid being trapped in an agreement that might imperil short-run national energy security.

The widespread preference for incremental policy reform signifies that national energy security will continue to be a 'far stronger policy driver' (Froggatt and Levi 2009, p. 1141) than climate security. Regardless of the progress made through synergistic measures, this 'gradualism' contains considerable structural bias. First, it permits the 'lock-in' of fossil- or biofuel-intensive infrastructures, which has important consequences for emission trajectories in rapidly industrialising countries. Second, it relies on domestic 'win-win' policy scenarios which – similar to local benefits derived from climate adaptation measures – favour outcomes consistent with *reactive* climate security. Furthermore, integrated global or regional markets for fossil fuels imply that national energy-and-climate policies result in 'carbon leakage' by lowering global/regional energy prices and stimulating energy demand elsewhere.

A different set of national and international policies would be required if governments were to pursue *preventive* climate security in earnest. At the national level, energy and climate policy would prioritize longer-term objectives – security of supply, greater foreign policy autonomy and ultra-low carbon emissions – without wholly ignoring short-term considerations of affordability, reliability, and political feasibility (Compston 2010). There are formidable difficulties here, where developed country governments need to overcome the incentives to operate on a short-term basis and to work with public opinion.

In terms of the latter there are mixed messages. For the European Union, '[a]n EU level solution to the climate problem has served as a convincing narrative to persuade EU citizens that there is a need to continue the process of European integration' (Adelle and Withana 2010, p. 331). There are also significant similarities in attitudes in the EU, the US, and other advanced countries. These include concern about climate change laced with some scepticism about the science and an unwillingness to make personally costly changes with the requirements of economic growth being placed above climate protection. While there is support for renewables in general, significant opposition exists to particular technologies such as wind farms (ibid., p. 327). One key difference which may help to explain divergence between EU and US policy and which is hardly merited by their respective situations is that 'energy security is considered a much more important factor in the US than in EU and is given greater priority than environmental protection by a significant number of Americans' (ibid., p. 329). Thus, 'for governments faced with tough policy choices, the public's reluctance to accept costly policy choices could limit the use and range of policy solutions in the transition to a low-carbon economy' (ibid., p. 328). Amongst the BASIC countries the demands facing policy-makers are bound to be more extreme, with energy priorities for development dominating other concerns and indeed being fundamental to the continuing legitimacy of governments.

There is also the question of the interaction between national and international climate and energy policies. Is it possible that international commitments could provide momentum for domestic policy reform? There is some evidence that the search for short-term national energy security does not always prevail and that international norms and commitments can have a significant effect, especially if the prestige and credibility of governments is engaged. The adoption of the Emissions Trading Scheme by the EU provides a case in point. This particular 'flexibility mechanism' had been opposed prior to Kyoto but became the bedrock of the Union's approach to climate, driven like the 'burden sharing' agreement before it by the requirements to maintain its leading position at the international level. The evidence is not as strong, but Chinese and Indian policy changes, involving the announcement of energy efficiency targets, were certainly stimulated by the need to generate a credible position in advance of the 2009 Copenhagen CoP. It remains the case, however, that more often than not energy security drives climate policy, although the result may not always be negative. In this regard the EU's 2006 gas crisis was one of the incentives to agree the 2008 'Climate and Energy Package' that provided the policy basis for the implementation of the Union's 20/30 percent emissions reduction commitment.

If global climatic stability became an actual policy priority, it would not only deliver important 'co-benefits' for global energy security, but would also provide a genuine basis for implementing a *preventive* climate security strategy. To dilute both domestic and international obstacles to ambitious climate policy, advanced industrialized countries would have to engineer an 'energy revolution' – through enormous investments, technology transfer, and capacity-building in developing countries. The necessary coalitions would have to be forged among major energy-consuming countries and not rely on older practices of producer-consumer conciliation (Mabey 2008, p. 68).

Energy and climate are thus not only materially intertwined, but also interdependent politically. Without increased availability of practical and affordable energy technologies to enable climate-friendly economic development, international climate governance will not progress substantially. What the public goods analysis makes clear is that the regulatory 'direction of travel' should still lead from climate to energy – rather than vice versa – because only this arrangement could ensure that long-term strategic foresight prevails over short-term pragmatism.

NOTES

[1] The substantial literature on environmental security was stimulated in particular by the ending of the Cold War. In general, it attempts to tease out the relationship between environmental degradation and conflict as in the extensive work of Homer-Dixon (1994). Deudney and Mathews (1999) explore some of problems of securitizing the environment.

[2] For an excellent survey of different IR perspectives on climate security during this period, see Stripple (2002).

[3] The reference here is of course to the Copenhagen School (Buzan et al. 1998). To some extent, this process of 'securitization' amplifies ideas proposed in the 1970s when natural resources and the environment were first recognized as security issues. In this sense, energy security and climate security, the core issues of this article, have merely been recast as critical components of security thinking in the twenty-first century.

[4] The 2011 Climate Change Vulnerability Index by the British consultancy Maplecroft rates 16 countries as being at 'extreme risk', with Bangladesh, India and Madagascar among the top three.

[5] Several southern diplomats have already described climate change as an 'act of aggression' and even extremist groups such as al-Qaeda have specifically referred to Western responsibility for climate change and the US refusal to sign the Kyoto Protocol (Scott 2008, p. 607; Mazo 2010, p. 129).

[6] US biofuels such as corn-based ethanol, however, have been accused of producing higher GHG emissions than imported oil.

[7] A significant proportion of Japanese and European emission reductions will likely be achieved by international offset procedures such as the Clean Development Mechanism.

[8] See the UNEP Emissions Gap Report at www.unep.org/publications/ebooks/emissionsgapreport (accessed 21 February 2013). The outcomes of the 2010 Cancún and 2011 Durban climate change conferences have not altered the validity of these calculations.

[9] 'Carbon space' is a special case of the more general concept of 'environmental utilization space' (Opschoor 1995). Calculated on a historical basis, it has become part of the negotiating position of India China and the BASIC group at international climate conferences (see Tata Institute of Social Sciences 2010). Calculations are made on a national basis, but it would be equally possible to arrive at a different outcome on the basis of individual carbon entitlements.

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