

Global Energy Policy:

Transforming Governance for the Transition to a Sustainable Energy Future¹

Paper to be presented at the 2009 International Energy Workshop, 17-19 June, Fondazioni Giorgi Cini, Venice, Italy

Sylvia I. Karlsson-Vinkhuyzen (PhD)

Academy Research Fellow, Turku School of Economics

(sylvia.karlsson@tse.fi)

Nigel Jollands (PhD)

(n.jollands@gmail.com)

Larry Staudt (BSc, MEng, Chartered engineer)

(Larry.Staudt@dkit.ie)

Director, Centre for Renewable Energy

Dundalk Institute of Technology

Introduction

As we embark into the 21st Century, there is little doubt that humanity faces daunting energy-related challenges. Access to energy sources is becoming more difficult and expensive, there is an urgent need to de-carbonise our energy future and billions of people still do not have access to even the basic energy services. Since the industrial revolution, humanity's harnessing of carbon-based fossil fuels has facilitated economic development on an unprecedented scale. However, that energy use has come at a price. Our societies have

¹ All three authors are members of the International Environment Forum (www.bcca.org/ief) which provided the forum for initiating the discussions that led to this paper. The views expressed in this paper are made in the authors' personal capacity. The authors welcome comments in all forms as they are eager to develop these ideas further.

become dependent on dwindling fossil fuels. And the combustion of those fuels has contributed to increased concentrations of CO₂ in our atmosphere – affecting global climate patterns and increasing the risk of dangerous climate change.

There is now increasing acknowledgement of the need for a transition to sustainable energy production and consumption patterns. In the words of the IEA (International Energy Agency 2008, p. 3) “What is needed is nothing short of an energy revolution”. Furthermore, this revolution has a degree of urgency. According to IPCC (2007), if global atmospheric concentrations of greenhouse gases are to be stabilised at 590 ppm (CO₂e), global greenhouse gas emissions need to peak by around 2030. However, the challenge is that an energy revolution requires the complete replacement of carbon intensive energy using capital infrastructure – and this infrastructure often has lifetimes spanning many decades. In order to address this urgency governments are investing in energy efficiency as a first line of defence. Energy efficiency reduces energy demand and essentially “buys time” to allow for capital replacement and investment in renewable energy sources and low-carbon fuels. In parallel, policies will have to be found that speed up the transition to renewable sources of energy, given that traditional economics renewable energy is expensive relative to fossil fuels. Another factor lending urgency to the transition is the fact that once renewable energy can ‘compete’ due to fossil fuel price rises, national economies may not be able to afford the huge capital investment required making the transition.²

In such a context we need to draw on all the tools at our disposal – our scientists and engineers need to come up with new technical solutions, our policy makers need to design incentives to encourage sustainable energy solutions, markets need to operate as efficiently as possible, and perhaps more challenging, individuals need to consider changing their lifestyles. How best to coordinate this unprecedented global action? Some actors and analysts moot that part of the answer lies in stronger global energy governance (ElBaradei 2008). There have already been several attempts to establish elements of international energy governance structures (for example, the International Atomic Energy Agency, the International Energy Agency, and the International Renewable Energy Agency). However, these institutions address only part of the energy agenda or do not have universal membership. Truly global governance has been stubbornly avoided. Why is this? Is it reasonable to expect more universal global energy institutions? Norms and policies are equally important elements of governance. Here, there is very limited development of global norms explicitly addressing

² This has for example been suggested by the in the ECCO model of the Irish economy.

energy use but indirectly Kyoto and post-Kyoto reduction commitments will lead to changed energy policies in participating countries, particularly Annex 1 countries. The degree to which these treaties will also influence the energy choices of developing countries, including in promoting energy efficiency and renewable energy technologies, will depend on several factors including the provisions for technology transfer and financial resources for domestic action, the volume of energy projects in flexible mechanisms and how the investment policies of International Financial Institutions change. So we have urgent global reasons to move toward a sustainable energy future which will not be addressed by market economics early enough. Against this background what could a global governance system for sustainable energy look like?

The purpose of this paper is to explore the potential role of global norms and cooperation to hasten the transition to a sustainable energy system. We approach this both in a more general analysis of global energy governance and in more detail in the case of global measures for supporting energy efficiency and renewable energy in their broad social context. In the next section we provide a theoretical framework for the ‘rationale’ for exploring energy governance at the global level provided within the theories of global public goods provision and multi-level governance. In the following sections we move to the empirical arena where we look at two global spheres of energy governance. The first of these focuses on the very ‘soft’ norm development on energy for sustainable development within the UN in the first decade of the 21st century, particularly in the Commission on Sustainable Development’s meetings in 2001, 2006 and 2006 and the World Summit on Sustainable Development in 2002. The second sphere of global governance is that of policy coordination in the area of energy efficiency and renewable energy as it is approached in, inter alia, the UN System, the G8, international renewable energy conferences and various other initiatives. The paper ends with a discussion linking the empirical analysis with the theoretical insights and concludes that viewing the sustainability of the energy system as a global public goods is a valuable entry point for analysing the support which both that the climate regime and the energy requirements for poverty reduction and economic development needs from more global energy policy and cooperation, and that the issue of creating global norms and institutions that support the worldwide transition to sustainable energy deserves considerably more academic and political attention.

2. Global public goods and the energy system: exploring a possible interface

There is considerable sensitivity around global energy governance which revolves around tensions between old taboos of the realm for global governance and new realities. Energy has increasingly been considered an issue of national security – particularly since oil became a strategic asset for both the military and for socio-economic development (Willrich 1976; Huntington & Brown 2004; Peters 2004). Governments have taken a very active role in this sector through national policy primarily to ensure security of supply but with a few exceptions have been reluctant to develop international norms and institutionalise cooperation around energy at the global level.

An underlying tone of this paper is that there are new realities, ‘the world’s energy use is at the epochal crossroads’ (Smil 2003). These new ‘realities’ call for a radically different approach to energy production and use. Everything from the technology we develop to energy governance systems need to be reviewed and reconfigured. As part of this process the pattern of international and global energy governance needs to be examined. Governance can be defined as the “sum of the many ways individuals and institutions, public and private, manage their common affairs” (Commission on Global Governance 1995, p. 2) and there are compelling functional and normative reasons for the international community to consider energy policy a highly important and common affair which demands action at the global level.

An analysis of the possible value of global energy governance needs to be grounded in theories of what constitutes effective and legitimate global governance and not be constrained by political barriers. Surprisingly, the academic and policy literature on energy has been largely silent on the possible role for global energy governance even in assessments with an explicit global scope such as the World Energy Assessment (United Nations Development Programme et al. 2000) and sections on energy policy in the Fourth Assessment Report of the IPCC (IPCC 2007).³ Still in the outline of the forthcoming IPCC special report on renewable energy there seems to be no plan to evaluate the role of international governance (IPCC 2008).

³ Notable exceptions are the development of a draft ‘Non-Legally Binding Statement of Principles for a Global Consensus on Sustainable Energy Production and Consumption’ as a normative framework, see Bradbrook and Wahnschafft (2005) which we will return to later in the paper; and the analysis of global international institutional arrangements to support renewable energy, see Steiner et al. (2006) and to support energy for sustainable development (Gururaja 2003).

There is an urgent need for more analysis of the potential role and relevant type and extent of global governance in the energy context. This is a considerable task and in this paper we can only aspire to make a first attempt of exploring these issues. Our analysis seeks to identify potential functional and normative criteria for strengthening governance at supranational levels (regional or global) and here we draw particularly on the theories around the provision of global public goods and multilevel governance. In the following two sections we discuss these theories in general and in relation to the energy sector — drawing particularly on aspects of energy efficiency and renewable energy as two of the most important policy fields for addressing climate change in the coming years.⁴

2.1 The theory on global public goods

The classical definition of a pure public good is for some ‘thing’ where there can be no rivalry among the beneficiaries of the good (nonrivalry) and there can be no exclusion of those who refuse to pay for the good to enjoy the benefits (nonexclusive) (Sandler 2003). In some cases the good is rather referred to as a public ‘bads’ for example climate change as a negative consequence of polluting the clean atmosphere which is a global public good. Kaul and Mendoza (2003, p. 80), however, argue that this definition has to be expanded as the properties of goods do not always match this definition because society can change the (non)rivalry and (non)excludability of the benefits streaming from goods. This means that any good with nonrival and nonexcludable properties are potential candidates for “actually being public and available for all to consume” (Kaul et al. 2003, p. 22). Their expanded definition in summary is the following (Kaul & Mendoza 2003, p. 87-88):

- Goods have special potential for being public if they have nonexcludable benefits, nonrival benefits, or both.
- Goods are de facto public if they are nonexclusive and available for all to consume.

There is thus a normative choice involved in assigning a good as public or private. Sometimes such goods have been private and the government decides to make them public, in other cases the provision of public goods has been privatized (Kaul et al. 2003). The theories around public goods have been centred in the context of national governance and the ‘global’ word has only gained considerable attention in the last few decades. The global attribute lifts

⁴ The World Energy Outlook estimates that 54% of mitigation strategy investments to achieve the 450 ppm scenario must come from end-use efficiency (International Energy Agency 2008).

the perspective to goods which yield benefits “that extend to all countries, people and generations” and “can be seen as a dimension of publicness” (Kaul et al. 2003, p. 10,12). In the end this means that globalness, just as publicness, is largely a “social human-made construct (Kaul et al. 2003, p. 12,15). Examples of pure global public goods include the moonlight, financial stability, peace and security food safety, and climate stability (Kaul & Le Goulven 2003; Kaul & Mendoza 2003). The theory of global public goods can be summarized in a two dimensional diagram (see Figure 1) with the degree of excludability and rivalry as the two axis. We have inserted a few examples of pure public, private and mixed goods.

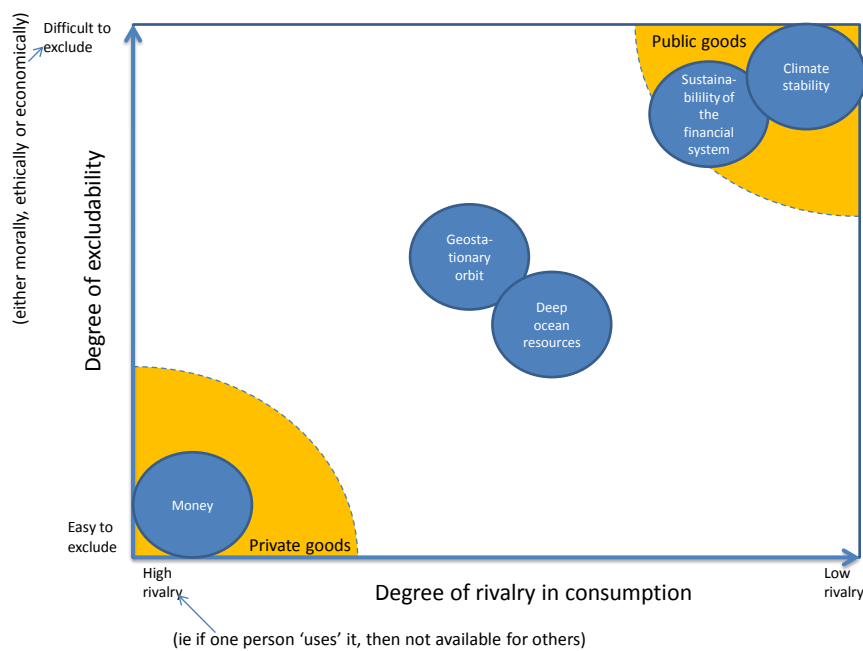


Figure 1. Schematic illustration of the nature of public goods.

2.2. The sustainability of the global energy system

Climate stability is a global public good closely linked with the world’s energy system because it generates more than half of the emission of greenhouse gases (WEHAB Working Group 2002). Nonetheless, the energy system itself has not been discussed as a global public good. Kaul and Le Goulven (2003) only considers sustainable elements of the energy system as national and regional public goods which support global climate stability.

Identifying what elements of the energy system are global public goods is difficult for several reasons. First, calling something a public good is problematic. Kaul and Mendoza (2003) make it clear that resources which are excludable can still be either private or public. Society often makes a resource private and excludable, for example land, in order to ensure

the sustainable use of certain goods”. For non-renewable energy sources excludability has certainly not ensured sustainable use over time, at least if one considers the enormous speed at which most nations are extracting their gas and oil supplies. Some of the renewable energy sources are, in contrast virtually non rivalry, such as sunlight and to a certain extent wind, wave and geothermal energy even if there may be a dimension of excludability for example for the most attractive sites to build a windturbine or geothermal plant. But renewable energy sources are certainly excludable as the services that flow from these go through the market system to those who have ability and willingness to pay for them.

At local levels it is quite clear that energy services are rival and excludable, unless they are subsidised and made more widely accessible in some way. But also at this level there are public good properties to the energy system; for example the local air pollution that result from the burning of coal or oil would produce a public bad and an energy system which favoured less polluting sources would thus have substantial public good properties. The same reasoning is applicable at the global level. An energy system that has low or no carbon intensity would be a clear public good for all humanity because it would reduce the risk of dangerous climate change and reduce reliance on carbon-based finite energy resources. Thus a *sustainable* energy system in the environmental dimension is a clear global public good. But there are also social and economic sustainability dimensions of the energy system which can be seen as a global public good. An energy system which both conserves energy and relies more on renewable energy sources will mean that more people will have access to modern energy services both now, but particularly in the far off future. We thus argue that the *sustainability of the energy system* is a global public good. This is a direct equivalent to looking at the stability of the financial system as a global public good (Griffith-Jones 2003).⁵ In this case it is also clear that once financial stability has been achieved it is nonrivalrous and nonexcludable and thus a global public good, but even if all can then consume it, this does not mean it is as useful for all actors (Griffith-Jones 2003). Poor countries and poor people are the ones suffering most during financial instability and thus have more to benefit from this global public good (Griffith-Jones 2003), and a similar argument holds also for the sustainability of the energy system. It is the poorer countries who have most to gain in the long run from being able to save energy and adopt more renewable energy sources and thus being less dependent on expensive fossil fuel imports. Furthermore, there are elements of the energy system which

⁵ Griffith-Jones (2003) sees both the stability of the market system as well as its efficiency as a global public good.

are both rival and easily excludable, such as local access to modern energy services. But also here there are growing discussions on the need to make such services widely accessible because of their importance e.g. to achieve many of the Millennium Development Goals.

Two of the key elements of making the energy system sustainable is the wide adoption of energy efficiency and renewable energy technologies which also contribute to the other dimensions of a sustainable energy system: “Climate change policies related to energy efficiency and renewable energy are often economically beneficial, improve energy security and reduce local pollutant emissions” (IPCC 2007, p. 22)

Significant reductions in greenhouse gas emissions can be achieved by wide adoption of already existing technologies in these two fields but this is not happening by far at the necessary rate. Such clean technologies can be considered a transnational or global public good which is nonrival but where exclusion is currently practiced through the patent system and the market (see Figure 1). Many countries are thus excluded from using these technologies because they are not able or willing to pay for the knowledge (Sandler 2003). This is one example of the obstacles to provide a sustainable energy system. There are many others related to the various components of policy, institutions, economic and legal frameworks that are needed. The next step is therefore to look at what global public goods theory can tell us about provision problems and opportunities.

2.3 Who is, could or should provide global public goods?

Just as with all types of public goods (national, local) global public goods are usually underprovided as a result of the collective action problem which their publicness generates (Conceição 2003). But the provision problems for global public goods can be of varying character. There can be problems on the consumption side when the good is available but is not consumed by all because of lack of access due to absence of means or formal restrictions (Conceição 2003). On the production side a global public good may either not exist or be insufficiently provided because of undersupply, malprovision or overuse (Conceição 2003). Finally, if the provision of a global public good is very scattered “it may suffer from both underuse and underprovision”(Conceição 2003, p. 156). An example of this is ‘the global stock of knowledge’ which in many cases is “so scattered that consuming it is difficult or impossible”. This means that “supply of the good is incomplete, and extra steps may be needed to make it accessible” (Conceição 2003, p. 156). Non-commercial knowledge — for

example, about how to undertake effective policy reforms — may have to be systematically collected, analyzed, categorized, and referenced so that interested users can locate and benefit from it” (Conceição 2003, p. 156). An example of this is ‘the global stock of energy efficiency knowledge’ which in many cases is scattered so that consuming it is difficult. Energy efficiency indicators — for example, which provide information that underpins effective policy development — may have to be systematically collected, analyzed and made available so that interested users can locate and benefit from them.

The sustainability of the energy system is clearly not recognized as a global public good and is obviously in considerable undersupply. As much in undersupply are the various elements of global energy policy and collaboration that could complement national or regional efforts to provide this good because the production of the global public goods can be seen as “the sum of national public goods plus international cooperation” (Kaul et al. 2003, p. 12). Countries can clearly contribute considerably to this global public good by their own national efforts but in this paper we focus on what countries could, and perhaps need to, do in collaboration and here we can draw on theories of multi-level governance to identify possible criteria for global governance.

2.4 How much global provision of global public goods?

Clearly, the global level cannot provide any goods or protection without engagement of sub-global governance levels (Princen 1998). Kaul et al (2003, p. xvi) give considerable attention to the ‘who’ and ‘how’ dimensions of producing global public goods and they particularly stress the need for an open and participatory debate on which global public goods needs to be produced jointly, and we hope this paper will contribute to such a debate for a sustainable energy system.

Our theoretical starting point here comes from the literature on multilevel governance and the concept and application of the principle of subsidiarity which has been particularly rich in the study of the European Union. Subsidiarity is about the allocation of authority, power and tasks in a political order and about determining at what level of government — or governance which is the term used throughout the paper — these should reside (Føllesdal 1998). The concept is based on the assumption that ‘no single level of organization is appropriate for all social functions’ (Trachtman 1992, p. 468). The key question is how to identify the most appropriate level/s of governance according to certain criteria. These criteria

can usually be linked to legitimacy and/or effectiveness. Subsidiarity is mostly used in the EU to argue for preserving the authority of lower levels against higher levels but it can also be used to require intervention by a higher governance level (Føllesdal 2000).

The principle of subsidiarity has been institutionalised in the European Union through the Maastricht Treaty where both as a substantive principle prescribing that decision-making should be made as close as possible to the citizens in its Preamble (Scott et al. 1994), and as a procedural principle, prescribing that the European Community shall only take action if Member States cannot achieve the intended objectives and these ‘can, therefore, by reason of the scale or effects of the proposed action, be better achieved by the Community’.⁶ In the later Protocol on its application it was also stipulated that EU action was required if the issue had transnational aspects beyond the control of Member States (Føllesdal 2000). The two aspects of subsidiarity as they appear in the Maastricht Treaty, the substantive and procedural can be linked to the legitimacy and effectiveness dimension of the concept respectively. The substantive principle aims to ‘close the democratic deficit’ and the procedural principle is to ensure that effectiveness ‘rules’ rather than the constraining principle of sovereignty.

While most analysis of subsidiarity in the EU has focused on the procedural principle, Føllesdal (1998) focuses on the substantive principle and sees as the central element for the allocation of authority the condition of comparative efficiency. He identifies as one interpretation of this that action should be taken at the level where it is most effective, the effectiveness condition; and the other that action at the higher level should be taken when lower levels cannot achieve the set goals in isolation, the necessity condition. The latter may occur either because lower levels do not have the capacity or because they are not willing to take action due to different priorities. The effectiveness of action taken at a governance level relates partly to capacity and capacity is partly dependent on access to various types of resources (human, financial etc.). If higher levels of governance consistently have more capacity and resources a non-reflective application of subsidiarity would lead to centralisation. Similarly, it has been argued (Blichner & Sangolt 1994) that if the effectiveness test concerns economies of scale the subsidiarity principle would imply that it is sufficient for some of the smaller countries in the EU to be unable to reach the objective on their own in order for the EU to take over. But others, such as Blichner and Sangolt (1994, p.

⁶ Article 3b (2), Treaty of the European Community.

289) argue that such situations can/should be approached by higher levels taking a more active role in giving lower levels resources (capacity) and autonomy.

The EU is of course a very special case of governance but it is the only one where politicians and scholars have so systematically discussed the allocation of governance to levels above the nation-state. When we transfer this to the global level, the political context is entirely different (international anarchy, national sovereignty principle rules) but leaving that aside and considering the effectiveness and legitimacy dimensions of global governance we can use the analysis around the subsidiarity principle in the EU for our purpose here.

A direct parallel argument can then be made for when the global level needs to become more involved in the provision of global public goods; when it is more effective or necessary to do so but it does not necessarily mean centralization of decision-making, it can also partly be achieved by re-allocation of resources.

Another effort to identify criteria for allocating governance to the global level was made by Held (1995) who suggests a three stage test for deciding whether to allocate powers to the global level; the test of extensiveness, intensity and comparative efficiency. The first two concern how many are affected, where, and to what degree by a certain policy issue. The last test is an application of the principle of subsidiarity with the focus being on at what level governments need to take action in order to effectively address the issue, see also Held (2003). Carozza (2003) contend that subsidiarity is applicable whenever a community is incapable of achieving a common good in a self-sufficient manner. He contrasts the subsidiarity approach and its model of assistance and cooperation among various levels of governance with the sovereignty-oriented paradigm where one sees larger and more universal forms of human association to be in competition with the smaller and more local ones. In addition, he maintains that the best approach to explore the usefulness of the concept is to apply it to real world problems.

In the case of norms and collaborative action to achieve a worldwide sustainable system of energy production and consumption, it is clear that these criteria would mandate a strong involvement of the international community. Firstly, in a very unequal world many countries have very limited resources to adopt and much less develop sustainable technologies, standards for energy efficiency for appliances, or undertake educational campaigns for energy savings. Thus there is need for a lot of support and reallocation of resources to enable these countries to produce their part of this global public good. Secondly, the scale of the task to move the world's energy system through a transition towards being

much more sustainable is a daunting task that will require every possible contribution in form of research and development, redesigning infrastructures, trade and transport systems etc. We will return to more detailed examples of this in sections 4 and 5 below.

3. Providers of sustainable energy system at the global level

Barrett identifies three providers of global public goods; states, treaties and civil engagement (informal institutions) while Kaul et al (2003) consider the provision of global public goods as the sum of national public goods and international cooperation. Combining these two perspectives we can identify three types of sources of global public goods in global governance: development of norms in the form of hard law (treaties) and soft law (non-binding normative documents); collaboration, for example through international organizations or more *ad hoc* arrangements, and various types of actions by non-state actors. We will here give a brief overview of the role of these three sources of the good of a sustainable energy system with emphasis on the first two sources; norm development and state-based collaboration. This focus on global level providers does not imply that the national production of this good is not important, quite the opposite. The nature of the energy issue has made national policy the most decisive on influencing the transition to a sustainable energy system, but we simply argue that national provision is not enough, for reasons of scale (necessity) and effectiveness (efficiency).

Starting with looking at the development of norms, there are a few international documents which address energy in normative terms and those that do are not treaties but rather fall into the category of soft law.⁷ The first intergovernmental conference that negotiated a text was held in Nairobi in 1981. Its theme was new and renewable energy sources with a special focus on the needs of developing countries to access these since they had suffered significantly from the oil shocks of the 1970s (Schechter 2005). Sustainable energy, or rather energy for sustainable development, emerged as a theme in environment oriented summits, sparingly in Agenda 21 adopted at the Earth Summit in Rio de Janeiro in 1992, but much more in the Johannesburg Plan of Implementation (JPOI) from the World Summit on Sustainable Development (WSSD) in 2002. The JPOI primarily confirmed the Decision on energy for sustainable development adopted at the 9th Commission on Sustainable Development (CSD) which makes very general recommendations in the fields of

⁷ For an elaboration of soft law its various forms see e.g. Chinkin (1989) and Shelton (2000).

energy efficiency, renewable energy, rural energy, transport etc (Commission on Sustainable Development 2001). The JPOI, for example, contain the aspirational goal to ‘substantially increase the global share of renewable energy sources...and regularly evaluate available data to review progress to this end’ (United Nations 2002). This CSD was the first time that this theme had been discussed in a high-level intergovernmental setting and the CSD returned to the same topic in its 2006/2007 meetings. This time however, disagreements were so substantial, particularly on how to institutionalise a review of the implementation of the decision that negotiations failed and no decision was adopted. This makes a rather meagre collection of normative text adopted by the international community and what has been adopted is very vague and lacking accompanying implementation plans with division of responsibilities. It is thus difficult to refer the existence of any global norms around energy based on these texts. Nevertheless, CSD decisions build up a standard of acceptable behaviour (Freudenschuss-Reichl 2002) and become ‘agreed language’ which can then be inserted into other UN fora with more authority (Wagner 2003). It is therefore possible to talk about early signs of norms ‘in the making’ around, for example, access to modern energy as a human right and the need for a transition to low-carbon technologies in the energy sector.

Another possible source of norms for a sustainable energy system is the climate regime. The United Nations Framework Convention on Climate Change (UNFCCC) did not address energy explicitly, the choice of specific sectors, ‘policies and measures’ to reduce greenhouse gas emissions were left to countries’. The Kyoto Protocol includes some flexible mechanisms that enable investment and technology transfer in the energy sector but this is still rather narrow and indirect. The post-2012 agreement that one hopes will be adopted in Copenhagen in December 2009 may include some more sectoral elements that could be influential for the energy sector but this is very uncertain.

Moving on to international collaboration on building a more sustainable energy system, there have been growing number of activities in this direction both within and outside the UN system. What exists of, for example, assistance to developing countries to adopt more energy efficient and renewable energy technologies is very scattered indeed. Almost all UN organizations, agencies and programmes have some activities related to energy; the coordination mechanism across the UN System — UN Energy — which was created in 2004 has 20 members. The degree of coordination within the UN system is however quite low.⁸

⁸ There have been several attempts to evaluate and enhance the system-wide cooperation and coherence over the past decades but these were generally of a temporary character (United Nations Economic and Social

This mechanism (UN energy) was created to ameliorate this but it is very weak, it takes the shape of a non-organization, with no staff and no finances. It has started a few small activities of coordination and collaboration and is well aware that it is treading sensitive ground; it has received almost no political backing from member governments.

Outside the UN system there are many recent efforts by the IEA, G8, and various regional intergovernmental organizations to both discuss and more concretely collaborate on certain elements of sustainable energy measures, and in 2009 a new intergovernmental organization was established on renewable energy (see below). There are also many multistakeholder initiatives to contribute to more sustainable systems of energy production and consumption; a number of public-private partnerships and NGOs seek to promote energy access, energy efficiency and renewable energy in both industrialized and developing countries. For example, in the CSD partnership database there were in the year 2007, 58 which had energy as a primary theme (yet only 24 of them were active).⁹ Numerous as these initiatives are, they are scattered with no coordination mechanism and risk for overlap and missing vital areas of action. While lack of coordinated action and even institutional competition is nothing unusual in the international community it is nonetheless a source of inefficiency in the system and makes wasteful use of scarce resources.

Altogether these efforts of international collaboration still constitute very recent and humble efforts in comparison to the need for enabling the transition of the energy system. But we shall now look a bit more in detail on some of the measures to support energy efficiency and renewable energy respectively, and identify further opportunities for strengthening global governance in these.

4. Emerging global policy coordination on energy efficiency

Energy efficiency could perhaps be considered one area where greater international cooperation is achievable. Energy efficiency itself has many advantages. It can reduce energy

Council 1996; Commission on Sustainable Development 1997). In 1997 under UNDESA an informal Inter-Agency Group on Energy was started which in 1998 was formally established as the Inter-agency Task Force on Energy. This task force met seven times between 1999 and 2002 and its mandate was also centred on supporting the preparations of CSD-9 and then WSSD (UNDESA 2003). Yet these attempts seem to have achieved little more than inventory documents of activities. A number of inventories of UN activities on Energy has been made over the years (United Nations Economic and Social Council 1994; 1996; UN Energy 2006).

⁹ See <http://webapps01.un.org/dsd/partnerships/public/welcome.do>

The criteria for considering an energy partnership to be active was that it had a direct focus on energy, had submitted a report to the CSD within the last three years, had reported some progress on their self defined targets (in most cases) and that they have a functional website.

costs for manufacturers and contribute towards energy development. It can also reduce a country's reliance on imported energy and reduce greenhouse gas emissions per unit of activity. And all of these benefits carry few political costs both nationally and in cooperation with other countries, it is a win-win situation for everyone involved. In other words, cooperating on energy efficiency is at best politically advantageous, and at worst politically benign. Global cooperation on energy efficiency has the advantage of providing the economies of scale; countries can learn from one another and more effectively design and implement policies. It increases every country's energy security and reduces overall emissions.¹⁰ As a result, many countries have recognized that energy efficiency could be a fruitful area for international cooperation.

The growing interest in energy efficiency cooperation is partly due to the understanding that all countries can still significantly improve their energy efficiency. Even relatively energy-efficient economies such as Japan have identified that it can extract energy efficiency improvements of at least another 30% in terms of final energy consumption per unit of GDP by 2030 compared with 2003. For a global perspective, the International Energy Agency has recently identified 25 priority energy efficiency policy actions which if implemented without delay could deliver 8.2Gt of CO₂ savings per year by 2030 (International Energy Agency 2008).

Achieving energy efficiency improvements is not straightforward. Energy efficiency is 'invisible', difficult to quantify and the subject of several pervasive barriers. Many studies (see for example IPCC (2001), International Energy Agency (2007), Sathaye (2004), Productivity Commission (2005), Brown (2001), and the IEA (2005)) have analyzed and confirmed the existence of a range of market barriers to energy efficiency, including the low priority many consumers and businesses place on reducing energy costs through energy efficiency improvements and access to capital and market failures including principal-agent problems, insufficient information, and externalities (costs that are not reflected in energy prices, such as the environmental and health damages associated with energy production and use). Some elements of energy efficiency are clearly not public goods, such as patented efficient technologies, while others can more easily be made public such as information and knowledge on best policy options and technologies, and these latter ones are therefore more

¹⁰ There is a discussion, however, on the potential double effects of strong action on energy efficiency; this can help all countries by reducing demand for fossil fuels and thus reducing their price which at the same time creates negative incentives for further efficiency measures and emission reductions.

amenable for international cooperation, Figure 2 captures some of the elements of energy efficiency that are more private vs. more public in the two dimensional space of rivalry and excludability. The location along these dimensions are however, as pointed out earlier, not static but can often be influenced by societal choice.

Energy efficiency has been the subject of global cooperation in many forms and in many fora. The International standards organisation (ISO) and International Electro-Technical Commission (IEC) have been active for decades setting standards that directly influence energy efficiency policy. For example, ISO has around 20 Technical Committees concerned with energy efficiency and has published more than 100 ISO Standards covering energy efficiency of buildings, industrial products and processes, fuel consumption of vehicles, methods for analysis and energy management¹¹

At the policy level, and the International Energy Agency's Energy Efficiency Working Party has been meeting for almost three decades. This forum provides senior government officials of IEA member countries an opportunity to share information and experience relating to energy efficiency policy development and implementation. Recently, these meetings have been open to representatives from China and India. Similar fora have also existed in regional fora such as the Energy Charter (PEREEA)¹² and APEC¹³ (EWG) for many years.

More recently, there has been increased attention focusing on global energy efficiency cooperation. This attention was spearheaded by the G8 Gleneagles Plan of Action (2005)¹⁴ which focused significant attention on energy efficiency. The most recent development in the energy efficiency cooperation on the international stage has been the recent establishment of the International Partnership for Energy Efficiency Cooperation (IPEEC). It is worth quoting parts of the text of the Declaration establishing IPEEC:

“Considering ... [the] Declarations of the Gleneagles, St. Petersburg and Heiligendamm Summits, which emphasize the need for global cooperation in the field of energy efficiency

...3. that all countries, both developed and developing, share common interests for improving their energy efficiency performance, there is abundant potential for

¹¹ This information was obtained from a presentation by Rob Steele, ISO Secretary-General, to IEA-ISO IEC Workshop 'International Standards to promote energy efficiency and reduce carbon emissions'. Paris, 16 March 2009).

¹² The Energy Charter Treaty strongly supported by the EU seeks to provide a basis for applying WTO principles on energy so as to create an open international energy market in the future (Westphal 2005). It has been ratified by 46 states and the European Communities.

¹³ The Asia-Pacific Economic Cooperation.

¹⁴ <http://www.number10.gov.uk/Page7882>

international cooperation among them and developed countries need to play an important role in cooperation with developing countries, accelerating dissemination and transfer of best practices and efficient technologies and capacity building in developing countries, which will contribute to improvement of energy efficiency at global level;

...Canada, the People's Republic of China, France, Germany, India, Italy, Japan, the Republic of Korea, the Russian Federation, the United Kingdom, the United States of America, and the European Community, represented by the European Commission, united by their common interest in promoting energy efficiency and energy savings decide to establish an International Partnership for Energy Efficiency Cooperation... ”.

This cooperation agreement is significant. It draws together many countries and attempts to cover many areas of cooperation previously not included in cooperation agreements including exchanging information on standards/codes/norms and labels for buildings, energy-using products and services, methods for energy measurement, tools for financing energy efficiency, public procurement policies, best practice guidelines, technology development etc. However, it is early days, and it is too early to tell the extent to which IPEEC will succeed in bringing these countries together.

Despite the amenability of aspects of energy efficiency to broad international cooperation, there are still gaps – and significant potential for greater global governance. This is particularly the case in one area that exhibits strong global public good characteristics; international standards. There are three specific benefits with international standards (IS) which standards developed in isolation within individual countries would not have and they are linked to both the effectiveness and necessity condition of subsidiarity for allocating governance to a supranational level.. First, they help to avoid duplication of effort. In particular, they assist by supporting scientific cooperation and possible harmonization of public policies. This in turn leads to the second benefit – enabling the functioning of world markets for energy efficient technologies. Without IS, the trade in energy efficient goods and services is hampered by an important barrier – the lack of trust in the veracity of the energy efficiency claim. This trust is particularly important in the energy efficiency field because energy efficiency is ‘invisible’. Finally, IS also allow for interoperability of goods across national boundaries. Since many of our goods and appliances operate in a global market, this interoperability is essential.

International standards have strong global public goods characteristics. It is not possible or desirable to exclude countries from these IS. Nor is there any rivalry in the use of these standards. Thus, we contend that greater global governance is needed in the area of

global energy efficiency standards. But what does this mean in practice? There are three areas that we suggest international standards need greater global governance and cooperation:

- Product energy efficiency performance definitions, measurement and test methods;
- Codification of energy efficiency best practices and management systems;
- Energy efficiency design checklists and guides.

While these measures seem quite obvious candidates for international collaboration there are clearly obstacles that remain. For example, while many countries referred to the value of harmonizing efficiency standards regionally or even internationally when making their statements to the CSD in 2006 and 2007, later in the negotiations the most contentious issue in the paragraph on energy efficiency was the one on international-level measures; whether there should be “cooperation”, “efforts” or even “an international agreement” on energy efficiency, and whether cooperation should include information and research or also labelling and even regulatory cooperation, or whether reference should be made to the energy efficiency work within IEA and the G8. Most of this remained bracketed when negotiations stopped. In the paragraph on efficiency standards and labelling the regional or international cooperation asked for by a number of governments had been reduced to an agreed text on “international support for national efforts to adopt standards and labelling for energy-efficient appliances and consumer equipment” (2007:17j). The negotiations at CSD-15 in 2007 in the end only discussed the harmonisation of testing procedures for energy efficiency at the international level but even that proposal never made it to the text. This shows that it will not be easy to identify the 'who' and 'what' of stronger international norms and actions on energy efficiency.

Despite the challenges to establishing international standards it is worth exploring how it could be possible to expand such standards for energy efficiency. Given the international reach of IEC and ISO these two organisations need to be in the lead. They should be supported by the technical expertise by organizations like the UN and the IEA as well as industry representatives. Influential political groupings like the G8 can also play a role in promulgating such standards. In short, what is needed is the development and implementation of such standards in a setting of international cooperation. Such cooperation may not remove all the barriers associated with collective action (e.g. protectionist policies aimed at securing advantage for domestic manufacturers), but they will contribute to paying the way for effective global governance of energy efficiency.

5. Emerging global policy coordination on renewable energy

Renewable energy provides about 18% of the world's energy, and this will increase substantially over the coming decades as oil and gas production decline. Europe has in general led the way in renewable energy technology development and adoption, particularly such countries as Germany, Denmark and Spain. This has come through far-sighted national policies such as capital grants, tax incentives and favourable feed-in tariffs for renewable electricity. Other countries have not been as active in developing renewable energy, and for a very practical reason: it is expensive compared to fossil fuels. .

The early-adopter countries have been motivated by a combination of green (ethical) politics, security of supply concerns, and the desire to create a new industry with its associated benefits to the economy. These early-adopter countries have benefited greatly from their foresight, with hundreds of thousands of jobs created and billions of Euros of business, most of which is export-oriented (REN21 2009). Given that renewable energy is still a relatively small part of the world energy business, there are still huge commercial opportunities in the industry. However, poor countries are effectively excluded from this opportunity due the cost of technology development and implementation. Barriers and opportunities beyond the relatively high cost of renewable energy include(International Renewable Energy Agency 2008): low public awareness, subsidies for conventional energy sources, ineffective political frameworks, inadequate value given to environmental damage (e.g. carbon emissions), inadequate technical know-how, and misinformation. Furthermore, established energy industries have fully developed technology, strong market structures, powerful companies and considerable financial subsidies. Authoritative information is lacking with regard to efficient energy policies in terms of legislation, market incentives and institutional frameworks. In general access to comprehensive, unbiased, useful information related to renewable energy is lacking.

There is also a general lack of technical know-how, given the early stage of development of the industry. Achieving a high share of renewable energy in the total energy supply requires new approaches to the design and management of energy systems and grids (e.g. the Irish All-Island Grid Study (Department of Enterprise 2008). Developing nations cannot easily access renewable energy with regard to manufacturing and maintaining the equipment (although it is generally more accessible than current large-scale technology).

While all of the above are barriers, these will necessarily be overcome in the long run. It is a question of effectively removing barriers and exploiting opportunities and to do so in a

way that benefits all countries and not just a few. The cost of renewable energy has been dropping rapidly in percentage terms, and in 2008 there was more wind energy capacity installed in Europe than any other power generation technology (combined-cycle gas was second)(European Wind Energy Association 2009). Investment in renewable energy now exceeds USD100 billion annually. This can be viewed as the beginning of the massive business of making the transition to a sustainable energy future. There are huge business and technology opportunities that are only just beginning to be seen. It is conceivable that developing nations can bypass the need for massive investments in “old” energy technology and move right into large-scale use of sustainable energy, developing local industries and reducing dependence on energy exporting countries. But if this is to happen, a number of measures have to be taken to support this early transition which would contribute significantly to a faster emergence of a sustainable energy system in the world. Much initiative and political will has to stem from within countries and governments, industrialised and developing, to initiate such a transition but there is a clear role for global norms and collaboration to support this.

In numerous countries resources — financial, human etc. — are not available to accomplish this on their own and drawing on the principle of subsidiarity it then falls as a necessity on the international community and those who have the knowledge and resources to support these countries. There are also a number of efficiency gains to be made, as in the field of energy efficiency, to share information, knowledge and best practices and even to enter joint research collaborations and benefit from economies of scale from growing markets for these technologies.

The global landscape of actors supporting renewable energy policy is quite complex and involving a large number of actors and initiatives. An excellent overview of international renewable energy policy initiatives is given by Suding and Lempp (2007) of the Renewable Energy Policy Network for the 21st Century (REN21).¹⁵ However, there is far from unison agreement on the need to promote these technologies. This was clear in the negotiations at the 15th session of the CSD in 2007. Many countries spoke warmly in favour of renewables, particularly the EU, least developed countries and small island developing states. But in every paragraph referring to energy sources and technologies throughout the text there was a battle over the balance between fossil fuels and renewables. Nonetheless, while the fossil fuels and

¹⁵ REN21 is a ‘global policy network’, intended to create an environment in which ideas and information are shared, and action to promote renewable energy is encouraged.

associated technologies achieved a strong presence, the agreed text on renewable energy from WSSD was included, and with the exception of certain concerns on the sustainability of biofuels, there was no controversy on the various types of renewable sources which were added to the text.¹⁶ The negotiations failed in the end and perhaps the main dividing line clearly ran between fossil fuel exporters and other countries.

The aftermath of the WSSD which was for the first time had included a qualitative goal to increase the share of renewable energy in the global energy mix (see above) saw a number of international initiatives on energy, such as the Bonn Renewables conference in 2004 announced by the German government in Johannesburg where the EU also initiated the Johannesburg Renewable Energy Coalition (JREC) as a response to its disappointment of the weak text on renewable energy in the JPOI. This conference has then become a series, with subsequent ones held in Beijing (2006) and Washington D.C (2008), drawing together considerable governmental delegations and other stakeholders. To some extent this is a reflection of the fact that there are many committed parties who feel the urgency to promote the sustainable energy agenda and are doing something about it. One of the most promising initiatives is IRENA – the International Renewable Energy Agency.

IRENA was established in January 2006 in Bonn after an extensive formation process. While Germany pushed for this organization for many years it took time to get other countries onboard such a radical step as establishing a new intergovernmental organization. Mandated by more than 81 countries, IRENA aspires to become the main driving force for promoting a rapid transition to widespread global renewable energy use. It envisages giving practical advice and support for all nations, facilitating access to all necessary information such as resource potential, best practice, effective financial and policy mechanisms, and technological expertise. The organization is a coalition of the willing, and thus has a quite different starting point from the UN arena where consensus-based decision-making meant very weak outcomes when countries opposing renewables were at the table. On the other hand it will have fewer possibilities to influence those countries that remain outside.

IRENA's activities will include: developing a comprehensive knowledge base, providing policy advice, promote technology transfer and provide advice on financing, enhance capacity building, stimulating research, and promoting networking with other organisations, institutions and networks.

¹⁶ One country inserted a text proposal on the need for monitoring the pollution resulting from producing and using renewable energy, but this was not supported (2007).

Renewable energy needs to be seen as part of the global energy picture. As the move toward energy sustainability progresses, renewable energy will become the global energy picture, barring breakthroughs e.g. in fusion technology. This vision is still becoming clear to various governments and institutions, and global norms and policy co-ordination could significantly speed up this process. Organisations such as REN21 and IRENA are beginning to address these questions and other actors are also stepping in.

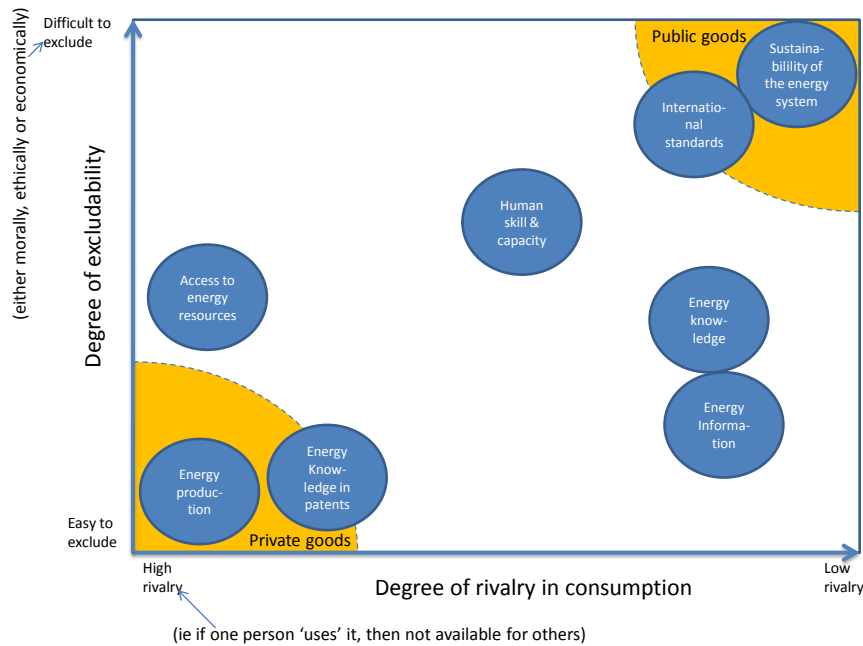


Figure 2. Schematic illustration the public vs. private nature of elements of the energy system.

6. Conclusions

The arguments for strengthening global energy governance supported by the theories on global public goods and multilevel may have been less palatable during times when energy policy was primarily an issue of national security, but the need to urgently address the sustainability of our energy system provides a new incentive to enquire into global energy governance.

Each global public good has a unique provision path (Kaul & Le Goulven 2003), and this will certainly be the case for energy should the international community start seeing and addressing the sustainability of the energy system as a global public good. It will be a long road to make this issue as comfortable issue in global governance as global epidemics, environmental pollution or financial stability. Researchers can provide ideas and explore

ingredients for such governance. In this paper we have looked at the slow but yet emergence of very soft global norms and policies for sustainable energy as well as cooperative action for the same purpose. Both these elements are important and need more academic and political scrutiny following initial efforts in that direction. For example, Bradbook and Wahnschafft (2005) provides an ambitious exploration of what a non-legally binding statement of principles on sustainable energy production and consumption could look like, arguing that such a soft law agreement is important as a first step and does exert influence. . Similarly, an analysis of the comparative strengths and weakness of international organizations in relation to supporting renewable energy was commissioned by the JREC Secretariat prior to the CSD-15 (Johannesburg Renewable Energy Coalition Secretariat 2007). While none of these reports have led to any political action, they constitute valuable first steps for an open global discourse on how the international community could proceed towards securing the sustainability of its energy system, and we hope this paper may stimulate this as well.

References

- ElBaradei, M. (2008). A Global Agency is Needed for the Energy Crisis. *Financial Times*.
- G8 (2008). G8 Hokkaido Toyako Summit Leaders Declaration. 8 July Hokkaido Toyako, Group of 8. http://www.mofa.go.jp/policy/economy/summit/2008/doc/doc080714_en.html 23 October
- Karlsson, S. I. (2007). "Allocating Responsibilities in Multi-level Governance for Sustainable Development." *International Journal of Social Economics* 34(1/2): 103-126.
- Kaul, I., P. Conceição, K. L. Goulven, et al., Eds. (2003). Providing Global Public Goods. Managing Globalization. Oxford, Oxford University Press.
- Brand, F., Farrel, D., et al., (2007). Curbing Global Energy Demand Growth - The Energy Productivity Opportunity. McKinsey Global Institute.

-
- (2007) 11 May 4:00 am. A. Energy for Sustainable Development. 11 May Commission on Sustainable Development, New York
- Blichner, L. C. and Sangolt, L. (1994) The Concept of Subsidiarity and the Debate on European Cooperation: Pitfalls and Possibilities. *Governance: An International Journal of Policy and Administration* 7 (3), 284-306.
- Bradbrook, A. J. and Wahnschafft, R. D. (2005) International Law and Global Sustainable Energy Production and Consumption. In: Bradbrook, A. J., Lyster, R., Ottinger, R. L. and Xi, W. (eds) *International Law and Global Sustainable Energy Production and Consumption*, pp. 181-201. Cambridge University Press, Cambridge.
- Brown, M. 2001. Market failures and barriers as a basis for clean energy policies. *Energy Policy* 29:1197-1207.
- Carozza, P. G. (2003) Subsidiarity as a Structural Principle of International Human Rights Law. *The American Journal of International Law* 97 (1), 38-79.
- Chinkin, C. M. (1989) The Challenge of Soft Law: Development and Change in International Law. *International and Comparative Law Quarterly* 38:850-866.
- Commission on Global Governance (1995) *Our Global Neighbourhood: The Report of the Commission on Global Governance*. Oxford University Press, Oxford.
- Commission on Sustainable Development (1997) Fifth Session, 7-25 April 1997. Overall Progress Achieved Since the United Nations Conference on Environment and Development. Report of the Secretary-General, Addendum, Science for Sustainable Development. E/CN.17/1997/2/Add.25. Retrieved 24 January, 2001, from <http://www.un.org/documents/ecosoc/cn17/1997/ecn171997-2add25.htm>.
- Commission on Sustainable Development (2001) Report on the Ninth Session (5 May 2000 and 16-27 April 2001) United Nations, New York
- Conceição, P. (2003) Assessing the Provision Status of Global Public Goods. In: Kaul, I., Conceição, P., Goulven, K. L. and Mendoza, R. U. (eds) *Assessing the Provision Status of Global Public Goods*, pp. 152-184. Oxford University Press, Oxford.

- Department of Enterprise, T. a. I., UK, and Department of Communications, Energy and Natural Resources, Republic of Ireland, (2008) All Irsand Grid Study
- ElBaradei, M. (2008) A Global Agency is Needed for the Energy Crisis. *Financial Times*.
- European Wind Energy Association (2009) Retrieved 28 May, 2009, from www.ewea.org.
- Føllesdal, A. (1998) Survey Article: Subsidiarity. *The Journal of Political Philosophy* 6 (2), 190-218.
- Føllesdal, A. (2000) Subsidiarity and Democratic Deliberation. In: Eriksen, E. O. and Fossum, J. E. (eds) *Subsidiarity and Democratic Deliberation*, pp. 85-110. Routledge, London.
- Freudenschuss-Reichl, I. (2002) Agreement Making and Implementation: An Analysis of International Negotiations. *Non-State Actors and International Law* 2119-139.
- Griffith-Jones, S. (2003) International Financial Stability and Market Efficiency as a Global Public Good. In: Kaul, I., Conceição, P., Le Goulven, K. and Mendoza, R. U. (eds) *International Financial Stability and Market Efficiency as a Global Public Good*, pp. 435-454. Oxford University Press, Oxford.
- Gururaja, J. (2003) Energy for Sustainable Development: Review of National and International Energy Policies. *Natural Resources Forum* 2753-67.
- Held, D. (1995) Democracy and the Global Order. From the Modern State to Cosmopolitan Governance. Polity Press, Cambridge.
- Held, D. (2003) Cosmopolitanism: Globalisation Tamed? *Review of International Studies* 29465-480.
- Huntington, H. G. and Brown, S. P. A. (2004) Energy Security and Global Climate Change Mitigation. *Energy Policy* 32715-718.
- International Energy Agency. 2005. Experience with Energy Efficiency Policies and Programmes in IEA Countries Learning from the Critics. Paris: OECD/IEA.
- . 2007. Mind the Gap: Quantifying Principal-Agent Problems in Energy Efficiency. Paris: OECD/IEA.
- . 2008. Energy efficiency policy recommendations prepared by the IEA for the G8 under the Gleneagles Plan of Action. Paris: OECD/IEA.
- International Energy Agency (2008) World Energy Outlook. OECD/IEA, Paris.
- International Renewable Energy Agency (2008) Founding an International Renewable Energy Agency IRENA. www.irena.org
- IPCC. 2001. Summary for policy makers - a report of Working Group 1 of the Intergovernmental Panel on Climate Change. Geneva: Intergovernmental Panel on Climate Change.
- IPCC (ed) (2007) Climate Change 2007: Mitigation of Climate Change. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge, United Kingdom and New York, NY, USA.
- IPCC (2007) Summary for Policymakers. In: Metz, B., Davidson, O. R., Bosch, P. R., Dave, R. and Meyer, L. A. (eds) *Summary for Policymakers*, pp. 851. Cambridge, United Kingdom and New York, NY, USA.
- IPCC (2008) Scoping Paper - IPCC Special Report. Renewable Energy Sources and Climate Change Mitigation (Submitted by the Co-Chairs and Mr Hohmeyer, Vice-Chair of WGIII) Intergovernmental Panel on Climate Change, Geneva
- Johannesburg Renewable Energy Coalition Secretariat (2007) Towards an Effective Arrangement to Review Progress on Increasing the Global Market Share of Renewable Energy. Draft Discussion Paper, Version 7. Prepared by international team of experts with logistical support from JREC Secretariat. 22 February JREC
- Kaul, I., Conceição, P., Goulven, K. L. and Mendoza, R. U. (2003) How to Improve the Provision of Global Public Goods. In: Kaul, I., Conceição, P., Goulven, K. L. and

- Mendoza, R. U. (eds) *How to Improve the Provision of Global Public Goods*, pp. 21-58. Oxford University Press, Oxford.
- Kaul, I., Conceição, P., Goulven, K. L. and Mendoza, R. U. (eds). (2003) *Providing Global Public Goods. Managing Globalization*. Oxford University Press, Oxford.
- Kaul, I., Conceição, P., Goulven, K. L. and Mendoza, R. U. (2003) Why Do Global Public Goods Matter Today? In: Kaul, I., Conceição, P., Goulven, K. L. and Mendoza, R. U. (eds) *Why Do Global Public Goods Matter Today?*, pp. 2-20. Oxford University Press, Oxford.
- Kaul, I. and Le Goulven, K. (2003) Institutional Options for Producing Global Public Goods. In: Kaul, I., Conceição, P., Le Goulven, K. and Mendoza, R. U. (eds) *Institutional Options for Producing Global Public Goods*, pp. 371-409. Oxford University Press, Oxford.
- Kaul, I. and Mendoza, R. U. (2003) Advancing the Concept of Public Goods. In: Kaul, I., Conceição, P., Goulven, K. L. and Mendoza, R. U. (eds) *Advancing the Concept of Public Goods*, pp. 78-111. Oxford University Press, Oxford.
- Peters, S. (2004) Coercive Western Energy Security Strategies: 'Resource Wars' as a New Threat to Global Security. *Geopolitics* 9 (1), 187-212.
- Princen, T. (1998) From Property Regime to International Regime: An Ecosystems Perspective. *Global Governance* 4 (4), 395-413.
- Productivity Commission. 2005. *The Private Cost Effectiveness of Improving Energy Efficiency - Report No. 36*. Canberra: Australian Government Productivity Commission.
- REN21 (2009) Renewables Global Status Report - 2009 Update REN21. www.ren21.net
- Sandler, T. (2003) Assessing the Optimal Provision of Public Goods: In Search of the Holy Grail. In: Kaul, I., Conceição, P., Goulven, K. L. and Mendoza, R. U. (eds) *Assessing the Optimal Provision of Public Goods: In Search of the Holy Grail*, pp. 131-151. Oxford University Press, Oxford.
- Sathaye, J., and S. Murtishaw. 2004. Market failures, consumer preferences, and transaction costs in energy efficiency purchase decisions. California: Public Interest Energy Research (PIER) Program.
- Schechter, M. G. (2005) United Nations Global Conferences. Routledge, London.
- Scott, A., Peterson, J. and Millar, D. (1994) Subsidiarity: A 'Europe of the Regions' v. the British Constitution? *Journal of Common Market Studies* 32 (1), 47-67.
- Shelton, D. (ed) (2000) Commitment and Compliance. The Role of Non-Binding Norms in the International Legal System. Oxford University Press, Oxford.
- Smil, V. (2003) Energy at the Crossroads: Global Perspectives and Uncertainties. The MIT Press, London.
- Steiner, A., Wälde, T., Bradbrook, A. and Schutyser, F. (2006) International Institutional Arrangements in Support of Renewable Energy. In: Aßmann, D., Laumanns, U. and Uh, D. (eds) *International Institutional Arrangements in Support of Renewable Energy*, pp. 152-165. Earthscan, London.
- Suding, P. and Lempp, P. (2007) The Multifaceted Institutional Landscape and Processes of International Renewable Energy Policy. *International Association for Energy Economics* Second Quarter (), 4-9.
- Trachtman, J. P. (1992) L'Etat, C'est Nous: Sovereignty, Economic Integration and Subsidiarity. *Harvard International Law Journal* 33 (2), 459-473.
- UN Energy (2006) Energy in the United Nations: An Overview of UN-Energy Activities. April United Nations

- UNDESA (2003, 24 March 2003) Ad Hoc Interagency Task Force on Energy. Retrieved 26 September, 2005, from <http://www.un.org/esa/sustdev/sdissues/energy/intergov/iaenr.htm>.
- United Nations (2002) Report of the World Summit on Sustainable Development. Johannesburg, South Africa, 26 August - 4 September United Nations, New York
- United Nations Development Programme, United Nations Department of Economic and Social Affairs and World Energy Council (eds). (2000) *World Energy Assessment. Energy and the Challenge of Sustainability*. UNDP, New York.
- United Nations Economic and Social Council (1994) Committee on New and Renewable Sources of Energy for Development. First Session. 7-18 February 1994. Item 4 of the Provisional Agenda. Coordination in Energy. Energy Programme Activities Within and Outside the United Nations System. Report of the Secretary-General. 21 January 1994 United Nations, New York
- United Nations Economic and Social Council (1996) Committee on New and Renewable Sources of Energy for Development. Second Session, New York, 12-23 February 1996. Item 5 of the Provisional Agenda. Medium-term Planning and Coordination in Energy. Energy Activities of the United Nations System. Report of the Secretary-General. 6 February 1996 United Nations, New York
- United Nations Economic and Social Council (1996) Resolution 1996/44. Coordination of Activities of the Organization of the United Nations System in the Field of Energy. 52nd plenary meeting. 26 July 1998 United Nations. <http://www.un.org/documents/ecosoc/res/1996/eres1996-44.htm>
- Wagner, L. M. (2003) A Commission Will Lead Them?: The UN Commission on Sustainable Development and UNCED Follow-Up. International Studies Association Annual Convention. Portland, Oregon.
- WEHAB Working Group (2002) A Framework for Action on Energy. August United Nations, New York
- Westphal, K. (2005) The EU-Russian Relationship and the Energy Factor: A European View. In: Westphal, K. (ed) *The EU-Russian Relationship and the Energy Factor: A European View*, pp. 1-36. Peter Lang, Berlin.
- Willrich, M. (1976) International Energy Issues and Options. *Annual Reviews* 1743-772.