

Moving the Climate Change Regime Further Through a Hydrogen Protocol

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INTRODUCTION

The climate change regime is in the doldrums since key parties have not yet ratified the Kyoto Protocol. It is a unique regime in that it took only 2 years to negotiate a framework convention on climate change,¹ which, in turn, entered into force within another 2 years. Given the 'wicked' nature of the problem, i.e. the asymmetrical distribution of costs and benefits, it was all the more remarkable that 186 countries eventually ratified the agreement and supported the global framework for dealing with the problem. In 1997, the world was agreeably surprised by the adoption of the Kyoto Protocol,² which included binding quantitative commitments for developed countries.³ However, when in 2001, the US Government decided that it would not ratify the Protocol, entry into force of the Kyoto Protocol hinged very much on whether Russia would ratify the agreement or not. Although in May 2004 the Russian Government has announced that it will now speedily move towards ratification of the Protocol, the problem remains that one of the largest emitters of greenhouse gases remains outside the regime.⁴ This implies that even if the Protocol enters into force in the near future, the incentive to take far-reaching steps is somewhat diminished by the non-participation of the US.

The question that then arises is what other alternative paths can be explored that build on the existing momentum and also try to draw on areas that interest the more reluctant developed country parties. Hence, this article explores the question whether the new scientific interest in promoting the hydrogen economy⁵

as an alternative to the fossil fuel based economy provides a new framework for uniting countries within the climate change regime. This argument is supported by the fact that, although climate change is seen as a politically contentious issue, energy policy, as a priority subject in most countries of the world, is seen as less politically charged, and there are already a number of political and legal frameworks and platforms within which energy research and policy are being developed.

This article first briefly presents why energy is relevant to climate change and why it is a priority issue in many countries. The next section shows how energy issues have been prioritized in the context of environment and development discussions in the last decade or two, and the criteria developed from an environmental perspective on sustainable energy sources. The following section analyses the legal activities that States have undertaken in relation to the promotion of hydrogen as an alternative fuel. It highlights, in some detail, the efforts of States within the International Energy Agency (IEA), where hydrogen has been dealt with since 1977. It discusses the new US-initiated bilateral agreements on climate change and hydrogen, and, finally, it presents the efforts of some States to advance a hydrogen economy via the International Partnership for a Hydrogen Economy. The next section then returns to a discussion of whether a Hydrogen Protocol could end the current deadlock within the climate change regime before drawing some final conclusions in the last section of this article.

¹ United Nations Framework Convention on Climate Change (New York, 9 May 1992) (UNFCCC), printed in 31 *ILM* (1992), 822.

² Kyoto Protocol to the 1992 Framework Convention on Climate Change (Kyoto, 10 December 1997), printed in 37 *ILM* (1998), 22.

³ For a history of the Kyoto Protocol, see F. Yamin, 'The Kyoto Protocol: Origins, Assessment and Future Challenges', 7:2 *RECIEL* (1998), 113; M. Grubb, 'International Emissions Trading under the Kyoto Protocol: Core Issues in Implementation', 7:2 *RECIEL* (1998), 140.

⁴ The Kyoto Protocol enters into force only after 55 countries emitting 55% of the emissions of Annex I (developed) countries ratify the agreement (Kyoto Protocol, Article 25(1)). As of May 2004, it is vital that either Russia or the USA ratify the agreement for it to enter into force.

⁵ A hydrogen economy is a system in which energy needs, particularly the transportation and housing sectors, are provided primarily by hydrogen. Hydrogen has the advantage that it allows for efficient

storage of energy over time. Thus, it is possible to imagine a future scenario, which can be called the 'hydrogen dream', in which the average citizen could switch from being an energy consumer to an energy producer. In such a scenario, a family would have, for example, solar panels on the roof of their home. The panels would produce hydrogen energy, which would fulfil the energy needs for the house, and surplus energy could be stored in a fuel cell and used for the family's car. Any additional surplus energy could be sold 'back to the grid' for use by other consumers. For more information on the hydrogen economy, see J.O.M. Bockris, 'The Origin of Ideas on a Hydrogen Economy and its Solution to the Decay of the Environment', 27:7-8 *International Journal of Hydrogen Energy* (2002), 731; S. Dunn, 'Hydrogen Futures: Toward a Sustainable Energy System', 27:3 *International Journal of Hydrogen Energy* (2002), 235; and J. Rifkin, *The Hydrogen Economy: The Creation of the World-Wide Energy Web and the Redistribution of Power on Earth* (Tarcher/Putnam, 2002).

CLIMATE CHANGE AND ENERGY: ENERGY IS A PRIORITY ISSUE FOR MOST COUNTRIES

This section makes two points. The first is that policies in the energy sector have a significant influence on the problem of climate change. Second, energy policy is a priority for all countries in the world and, unlike climate change, countries have much stronger converging interests here.

The energy sector is the most important sector contributing to the emissions of greenhouse gases today. Energy is also a fundamental aspect of the life we enjoy today, and closely linked to the economic growth of countries. While future energy needs will increase even more, current energy trends are not environmentally friendly: in fact, production, consumption and distribution of energy alone are responsible for more than half of the world's greenhouse gas emissions. Nevertheless, the problems are not only environmental. In fact, it is assumed that the sources of energy that we depend on will end by the turn of this century. Official IEA statistics show that more than half of the world's energy production (59%) comes from oil and coal. Only 11% comes from renewable energies, while other relevant energy sources are natural gas (21%), nuclear (7%) and hydro (2%).⁶

It is not surprising then that the United Nations Framework Convention on Climate Change (UNFCCC) emphasizes the central role of energy in causing and, hence, addressing the problem of climate change. The treaty specifies the need for low greenhouse gas emitting energy technologies, the need to promote research and development in such energy sources, and emphasizes the need for technology cooperation between countries.⁷ However, it does not specifically mention hydrogen as an alternative approach. In 1997, the Kyoto Protocol to the UNFCCC was negotiated and focused on enhancing energy efficiency,⁸ and on new and renewable forms of energy.⁹ The Kyoto Protocol calls on countries to cooperate in the promotion of effective modalities for promoting, financing, developing, transferring environmentally sound technologies, know-how, practices and processes pertinent to climate change.¹⁰ The Marrakech Accords, negotiated in 2001,¹¹ elaborate on a number of rules for

undertaking technology transfer and capacity building, but do not enter into a discussion of which energy sources should be specifically promoted. From the climate change discussions, what is clear is that there is need for new and renewable energies with low greenhouse gas emissions.

The second point that needs to be emphasized is that energy policy is a top priority in almost all countries. This is because energy production and consumption is closely related to the national income of countries, and developing countries have based their arguments in the climate change regime on their right to grow, which would inevitably mean a rise in their emissions.¹² The UNFCCC accepts this point in its Preamble.¹³ Many countries sit, therefore, in a critical dilemma. Large developing countries, like China and India, face the problem that if they wish to develop nuclear, large hydro or fossil power projects, they run into tremendous criticism because all these have negative side effects and because there is a strong coalition of forces, national and international, opposing the development of some or all of these forms of energy generation.¹⁴ For those countries that have large fossil fuel reserves, shifting to other sources, either unilaterally or because of changing global demand, immediately implies a tremendous loss of income, a point that has been effectively made by the oil exporters and taken into account in the UNFCCC.¹⁵ For the large developed countries like the USA, the fossil fuel lobby is very powerful and there are major fears that prematurely shifting to other energy sources will cost the economy considerably.¹⁶

¹² See J. Gupta, *The Climate Change Convention and Developing Countries – From Conflict to Consensus?* (Kluwer Academic Publishers, 1997), at 256, and J. Gupta, *Our Simmering Planet: What to do About Global Warming* (Zed Publishers, 2001), at 178.

¹³ UNFCCC, n. 1 above, Preamble, para. 23.

¹⁴ J. Gupta, J. Vlasblom and C. Kroeze (eds), with contributions from K. Blok, M. Hisschemoller, C. Boudri and K. Dorland, *An Asian Dilemma: Modernising the Electricity Sector in China and India in the context of Rapid Economic Growth and the Concern for Climate Change* (Netherlands Research Programme on Climate Change (NOP), National Institute of Public Health and the Environment, Bilthoven, NOP Report No 410200097, 2002).

¹⁵ UNFCCC, n. 1 above, Article 4(10).

¹⁶ See, for example, the Byrd-Hagel Resolution (US Senate Resolution 98) of 12 June 1997, which stated: 'Whereas the Senate strongly believes that the proposals under negotiation, because of the disparity of treatment between Annex I Parties and Developing Countries and the level of required emission reductions, could result in serious harm to the United States economy, including significant job loss, trade and disadvantages, increased energy and consumer costs, or any combination thereof, . . .'. The US Senate adopted this resolution in July 1997. Subsequently, in October 1997, Senator Hagel made a speech to Congress stating, among other things: 'Many of my colleagues and I fear the current treaty negotiations will shackle the United States' economy – meaning fewer jobs, lower economic growth and a lower standard of living for our children and our future generations. This treaty would do so without any meaningful reduction in greenhouse gases because – because – it leaves out the very nations who will be the world's largest emitters of greenhouse gases, the more than 130 developing nations including China, India, Mexico, South Korea, and many others'; source: Congressional Record (3 October 1997) (Senate), at S10308–S10311, available at <<http://www.microtech.com.au/daly/hagel.htm>>.

⁶ IEA, *Key World Energy Statistics* (IEA, 2003), available at <<http://www.iea.org/statist/key2003.pdf>>.

⁷ UNFCCC, n. 1 above, Article 4(1)(c).

⁸ Kyoto Protocol, n. 2 above, Article 2(1)(a)(i): 'Enhancement of energy efficiency in relevant sectors of the national economy'.

⁹ *Ibid.*, Article 2(1)(a)(iv): 'Promotion, research, development and increased use of new and renewable forms of energy, of carbon dioxide sequestration technologies and of advanced and innovative environmentally sound technologies'.

¹⁰ *Ibid.*, Article 10(c).

¹¹ See *Report of the Conference of the Parties on its Seventh Session* (FCCC/CP/2001/13, 21 January 2002).

Thus, energy policy is vital for countries. One of the critical reasons why the climate change regime is in a state of deadlock is also because, on the assumption that shifting to other energy sources is expensive and hence not viable, this implies that any effective solution to the climate change problem inevitably calls for reducing emissions and that these emissions need to be subsequently shared between countries. The sharing of these emissions is a politically sensitive issue because of the implications for economic growth. On the other hand, if a promising alternative energy source can be developed in a cost-effective manner, and if new actors can rally behind this new source, the whole issue of sharing emission rights can be bypassed, and the need to question the science of climate change becomes less urgent.

There is, therefore, an urgent need from the climate change perspective to switch to more sustainable sources of energy, and to more responsible consumption and distribution patterns. This is so also because energy investments are long-term investments and if States do not invest in new or renewable options this might cause a technology lock-in on old and unsustainable energy sources.

SUSTAINABLE DEVELOPMENT AND ENERGY

This section moves to the following issue: what criteria or advice do other environmental and developmental agreements specify in relation to energy issues? International documents of the last 15 years have emphasized the need for sustainable energy. In 1987, when the World Commission on Environment and Development explored the environmental and economic challenges facing the world, it saw the climate change problem as extremely serious, but did not explicitly mention the hydrogen economy as a potential alternative to the fossil-fuel economy.¹⁷ The Commission, however, did emphasize that all available energy forms had their advantages and disadvantages and that 'choice[s] must be made, but in the certain knowledge that choosing an energy strategy inevitably means choosing an environmental strategy'.¹⁸ The document included an annex with a list of important legal principles, and these principles emphasize that, *inter alia*, energy strategies need to be based on the precautionary principle, environmental impact assessments and strict liability.¹⁹

In 1992, the United Nations Conference on Environment and Development (UNCED) adopted Agenda 21,

a programme of action that deals with a broad range of issues.²⁰ Chapter 9 deals with the protection of the atmosphere and energy-related issues. This chapter, *inter alia*, points out, first, that States agree that current energy production, distribution and consumption patterns are unsustainable.²¹ Second, energy-related issues must be dealt with by all stakeholders, which implies the participation of States, UN bodies,²² non-government organizations, intergovernmental organizations and private parties.²³ The role of business and of civil society in the energy sector must be underlined because it marks a trend that will probably continue in the following years. Third, the Agenda focuses on the importance of the promotion and development of renewable energies as one of the ways to reduce negative effects on the atmosphere coming from the energy sector.²⁴ Fourth, States are encouraged to use economic measures to promote clean energies but these must take the environmental and social priorities of the country concerned into account.²⁵ Finally, Agenda 21 stresses that developing country needs in the implementation of a global energy strategy need to be considered.²⁶ The Rio Declaration adopted at UNCED also specifies that countries need to take precautionary measures,²⁷ undertake environmental impact assessments²⁸ and are liable for harm caused.²⁹

In 2001, the United Nations Commission on Sustainable Development (UNCSD) dealt with energy-related issues during its ninth session.³⁰ Its final report included a decision entitled 'Energy for Sustainable Development',³¹ which specifies that 'current patterns of energy production, distribution and utilization are

²⁰ Agenda 21 (A/Conf.151/26, 1991) is important because it links, for the first time, economic, environmental, poverty and development issues stressing the need to integrate environment and development. For more information on Agenda 21, see P. Birnie and A. Boyle, *International Law and the Environment*, 2nd edn (Oxford University Press, 2002), at 43 and D. Hunter, J. Salzman and D. Zaelke, *International Environmental Law and Policy*, 2nd edn (Foundation Press, 2002), at 202–204.

²¹ Agenda 21, para. 9.9.

²² The importance of the UN system and of multilateralism as a framework in which to discuss energy-related issues is underlined in Agenda 21. This position is stressed by T. Maraun, 'A Global Energy Strategy as a Viable Means for Redressing Climate Change', 63:2 *Heidelberg Journal of International Law* (2003), 281, at 285.

²³ Agenda 21, n. 20 above, para. 9.12.

²⁴ *Ibid.*, para. 9.12(d).

²⁵ *Ibid.*, para. 9.12(h).

²⁶ *Ibid.*, paras 9.11 and 9.12(a), (b), (c), (d), (e).

²⁷ Rio Declaration on Environment and Development (A/CONF.151/26 (Vol. 1), 12 August 1992), Principle 15.

²⁸ *Ibid.*, Principle 17.

²⁹ *Ibid.*, Principle 13.

³⁰ For more information on the UNCSD ninth session, see the website available at <<http://www.un.org/esa/sustdev/csd/CSD9.htm>>. See also T. Maraun, n. 22 above, at 286.

³¹ *UNCSD Report on the Ninth Session* (E/CN.17/2001/19, 5 May 2000 and 16–27 April 2001), Decision 9/1, 'Energy for Sustainable Development'.

¹⁷ World Commission on Environment and Development, *Our Common Future* (Oxford University Press, 1987).

¹⁸ *Ibid.*, at 2.

¹⁹ *Ibid.*, Annex 1, at 348–351.

unsustainable',³² thereby repeating what Agenda 21 had maintained almost 10 years before. The report lists future key energy issues,³³ such as accessibility of energies,³⁴ energy efficiency,³⁵ renewable energies,³⁶ and energy and transport.³⁷ Sustainable energy is defined as reliable, affordable, economically viable, socially acceptable and environmentally sound energy.³⁸

The UNCSO report fosters multilateralism³⁹ and a multi-stakeholder approach.⁴⁰ Specific importance is given to providing a regulatory framework that provides incentives for private sector participation⁴¹ within well-functioning markets.⁴² It says that financial help, technology transfer and capacity building should be made available to developing countries to facilitate their participation in the development and use of modern environmentally friendly technologies.⁴³ Finally, the international community strongly maintains the importance of the promotion of renewable energies.⁴⁴

Similar views were echoed at the 2002 World Summit on Sustainable Development (WSSD), although the issue was not further articulated. The Johannesburg Declaration on Sustainable Development specifies the global community's commitment 'to a humane, equitable and caring global society,⁴⁵ ... free of indignity and indecency occasioned by poverty, environmental degradation and patterns of unsustainable development'.⁴⁶ The Declaration recalls the previous agreements and then concludes that the only way forward is multilateralism. The Plan of Implementation of the WSSD does not discuss the issue of energy in a specific chapter, nor does it mention hydrogen. However, many chapters refer to energy-related issues, and the need for affordable and environmentally sustainable energy.⁴⁷

The above brief history reveals that from a sustainable development perspective, there is considerable

emphasis paid to the need to develop sustainable energy within a multilateral and multi-stakeholder framework, based on the precautionary principle, the environmental impacts principle and the liability principle.

INTERNATIONAL COMMUNITY AND THE HYDROGEN ECONOMY

Deciding new or alternative energy policies implies risks and many costs at the beginning. As mentioned earlier, both for developed countries and even more for developing countries, 'choosing an energy strategy inevitably means choosing an environmental strategy'.⁴⁸ One of the most interesting options for States currently is to develop hydrogen as an energy carrier. Especially in the motor vehicle sector, this could be very important because hydrogen-powered vehicles would emit only water vapour instead of carbon dioxide. Not everybody, though, agrees completely on the benefits of hydrogen. While some scientists insist that hydrogen will be able to deal with major environmental concerns, starting with climate change,⁴⁹ others are more reluctant to support this new energy option.⁵⁰ Nevertheless, it can be argued that scientists agree that hydrogen is an optimal solution if it is produced mainly from renewable energy sources.

While the global energy discussions have focused on alternative sources of energy in general, it is becoming apparent that specific discussions on hydrogen are developing rapidly. The subsection below presents and analyses the existing international agreements related to hydrogen, namely within the IEA. It covers the bilateral agreements that the USA has promoted with various countries on the promotion of hydrogen research and development, and the forthcoming International Partnership for a Hydrogen Economy.

INTERNATIONAL ENERGY AGENCY

The IEA was established in 1974 and is an autonomous agency linked with the Organization for Economic Cooperation and Development (OECD). There are 26 member countries and its main goals are to

³² *Ibid.*, para. 2.

³³ *Ibid.*, para. 11. Other key energy issues are advanced fossil fuel technologies (para. 18), nuclear energy technologies (para. 20) and rural energy (para. 22).

³⁴ *Ibid.*, paras 12 and 13.

³⁵ *Ibid.*, para. 14.

³⁶ *Ibid.*, paras 16 and 17.

³⁷ *Ibid.*, para. 24.

³⁸ *Ibid.*, para. 3.

³⁹ *Ibid.*, paras 5, 10(i), 13(a), 17(a), 35 and 36.

⁴⁰ *Ibid.*, para. 32.

⁴¹ *Ibid.*, paras 3, 10(k), 13(g) and 13(c).

⁴² *Ibid.*, para. 31.

⁴³ *Ibid.*, paras 7, 8, 13(i), 17(i) and 36(c).

⁴⁴ *Ibid.*, paras 13(d), 13(h), 16 and 17.

⁴⁵ Johannesburg Declaration on Sustainable Development (A/CONF.199/20, 4 September 2002), para. 2.

⁴⁶ *Ibid.*, para. 3.

⁴⁷ See, for example, *ibid.*, chapter 2, para. 9(a), chapter 3, paras 20–21, chapter 8, para. 62 and chapter 9, paras 73–76.

⁴⁸ See World Commission on Environment and Development, n. 17 above, at 168.

⁴⁹ See M.J. Prather, 'An Environmental Experiment with H₂', 302:5645 *Science* (2003), 81 and M.G. Schultz *et al.*, 'Air Pollution and Climate-Forcing Impacts of a Global Hydrogen Economy', 302:5645 *Science* (2003), 624, at 625.

⁵⁰ T.K. Tromp *et al.*, 'Potential Environmental Impact of a Hydrogen Economy on the Stratosphere', 300:5626 *Science* (2003), 1740 focus primarily on the increase of hydrogen in the atmosphere that would moisten the stratosphere and would lead to a negative cooling of the lower stratosphere and to a disturbance of the ozone chemistry.

share energy information, to coordinate energy policies and to cooperate in the development of rational energy programmes.⁵¹ The IEA works by facilitating international cooperation through programmes that are called 'Implementing Agreements'. Within this framework, the organization has dealt with hydrogen since 1977 when the IEA Implementing Agreement for a Programme of Research and Development on the Production and Utilization of Hydrogen (IEA Hydrogen Agreement) was signed.⁵² Before analysing the latter, it is useful to make some remarks on the legal framework of the Implementing Agreements as a whole.

IEA Framework for International Energy Technology Cooperation In 2002, the IEA undertook a thorough review of the legal basis of the different programmes established within its mandate. This led to the IEA Framework for International Energy Technology Cooperation (IEA Framework).⁵³ According to this document, an Implementing Agreement is:

a contractual relationship established by at least two IEA Member countries, and approved by the Governing Board, . . . to enable IEA Member countries to carry out programmes and projects on energy technology research, development and deployment.⁵⁴

Participants in Implementing Agreements are divided into two categories: contracting parties⁵⁵ and sponsors.⁵⁶ By analysing Article 3(2)(4)⁵⁷ and 3(3)(4)⁵⁸ of the IEA Framework, it could be argued that some participants in an Implementing Agreement enjoy more rights than others. Sponsors, for example, are not allowed to be designated chair or vice chair of an executive committee and OECD country based entities seem to have more rights than non-OECD country based entities.

The institutional structure of an Implementing Agreement provides for an executive committee constituted of representatives of all participants.⁵⁹ This body is in charge of the main activity of the Implementing

Agreement, which is the promotion of research and development of a specific energy-related issue. It approves the annual programme and budget, and must annually submit a report to the IEA.

In sum, an Implementing Agreement is a binding legal agreement that brings together all stakeholders interested in promoting the research and development of specific energy sectors.⁶⁰ What is important to underline is the nature of this agreement; in fact, Article 7 maintains that it is 'binding on all participants'.

IEA Implementing Agreement for a Programme of Research and Development on the Production and Utilization of Hydrogen⁶¹

The IEA Framework is also relevant to the specific IEA Hydrogen Agreement,⁶² as underlined in Article 10(c) of the latter.⁶³ The scope of this agreement is clearly outlined in Article 1(a), which reads as follows:

The Programme to be carried out by the Contracting Parties within the framework of this Agreement shall consist of cooperative *research, development, demonstrations and exchanges of information* regarding the production and utilization of hydrogen.⁶⁴ (emphasis added)

Therefore, the main goal of this agreement is the promotion of hydrogen research and development. Since the IEA did not consider it feasible to deal with all hydrogen-related issues at once, it identified specific tasks⁶⁵ that were included in annexes to the agreement,⁶⁶

⁶⁰ Ibid., Article 7.

⁶¹ IEA Hydrogen Agreement, n. 52 above.

⁶² IEA Implementing Agreement for a Programme of Research and Development on the Production and Utilization of Hydrogen (as amended on 1 May 1995) (IEA Implementing Agreement). For more information on the agreement as to 1999, see C.C. Elam (ed.), *IEA Agreement on the Production and Utilization of Hydrogen, 1999 Annual Report* (Doc. IEA/H2/AR-99, 1999), available at <http://www.eere.energy.gov/hydrogenandfuelcells/hydrogen/iea/pdfs/1999_annual_report.pdf>.

⁶³ In fact, Article 10(c) establishes that the participants must take into account the *Guiding Principles for Cooperation in the Field of Energy Research and Development* (Doc. IEA/GB(91)79, 9 December 1991) and any modification thereof, such as the IEA Framework.

⁶⁴ Emphasis added by authors.

⁶⁵ Current and completed annexes of the IEA Hydrogen Implementing Agreement are Annex 1, Thermochemical Production (1977–1988); Annex 2, High Temperature Reactors (1977–1979); Annex 3, Assessment of Potential Future Markets (1977–1980); Annex 4, Electrolytic Production (1979–1988); Annex 5, Solid Oxide Water Electrolysis (1979–1983); Annex 6, Photocatalytic Water Electrolysis (1979–1988); Annex 7, Storage, Conversion and Safety (1983–1992); Annex 8, Technical and Economic Assessment of Hydrogen (1986–1990); Annex 9, Hydrogen Production (1988–1993); Annex 10, Photoproduction of Hydrogen (1995–1998); Annex 11, Integrated Systems (1995–1998); Annex 12, Metal Hybrids for Hydrogen Storage (1995–ongoing); Annex 13, Design and Optimization of Integrated Systems (1999–ongoing); Annex 14, Photoelectrolytic Production of Hydrogen (1999–ongoing); Annex 15, Photobiological Production of Hydrogen (1999–ongoing).

⁶⁶ IEA Hydrogen Agreement, n. 52 above, Article 1(b).

⁵¹ For more information on the IEA, see the website available at <<http://www.iea.org>>.

⁵² IEA Implementing Agreement for a Programme of Research and Development on the Production and Utilization of Hydrogen (Paris, 6 October 1977) (IEA Hydrogen Agreement). It was amended on 1 May 1995 and recently it was modified in order to take into account the Implementing Agreements' legal framework set up in the IEA Framework for International Energy Technology Cooperation. The last version of the IEA Hydrogen Agreement document is not a public document and cannot be found on the Internet.

⁵³ IEA Framework for International Energy Technology Cooperation (IEA/GB(2003)6/REV2/ANN1, 3 April 2003).

⁵⁴ Ibid., Article 1.

⁵⁵ Ibid., Article 3(2).

⁵⁶ Ibid., Article 3(3).

⁵⁷ Ibid., Article 3(2)(4).

⁵⁸ Ibid., Article 3(3)(4).

⁵⁹ Ibid., Article 1(4).

which are binding only upon the participants therein.⁶⁷ The parties are free, once they enter into the agreement, to engage in the tasks that they are interested in and new tasks can be established following a specific procedure.⁶⁸ The parties agree to disseminate publicly the results of the hydrogen research undertaken in the different tasks; nevertheless, these results will be protected by intellectual property rights.⁶⁹

Participants in the agreement can be divided into three categories: contracting parties; associate contracting parties; and sponsors. Contracting parties can be governments or government-designated entities coming from either IEA Member States or from OECD Member States that are not part of the IEA.⁷⁰ Their main obligation is to carry out and implement the programme.⁷¹ They will have to incur any cost involved in implementation⁷² and they must foster the widest possible dissemination of the results.⁷³ Contracting parties also enjoy several rights such as the right to designate one member of the Executive Committee,⁷⁴ jointly appoint an operating agent for each task in which they are involved⁷⁵ and to appoint the arbitrators of the tribunal, which decides on disputes that may arise between parties.⁷⁶ Associate contracting parties come from non-OECD countries and can also be governments or government-designated entities.⁷⁷ Rights and obligations of associate contracting parties are similar to the ones that contracting parties enjoy, and will be specified in an agreement between the Executive Committee, acting by unanimity of the contracting parties, and the associate contracting party itself.⁷⁸ Finally, and only in exceptional cases, sponsors can be invited to adopt the IEA Hydrogen Agreement. Sponsors will be either OECD-based entities, who have not been designated by their respective governments, or non-government international organizations in which OECD-based entities participate.⁷⁹ In this case, the rights and obligations of the sponsors will be decided by the Committee on Energy Research and Technology of the IEA on the basis of a proposal from the Executive Committee.⁸⁰ The sponsor's discipline in the IEA Hydrogen Agreement differs from the IEA Framework because it is not stated clearly that non-OECD-based entities may be admitted as sponsors.

In sum, participants to the IEA Hydrogen Agreement can be governments, national agencies, public organizations, private corporations, companies or other entities designated by such governments. Currently, member countries of the agreement are Canada, the European Community, Japan, Hungary (observer), Iceland, Lithuania, the Netherlands, Norway, Spain, Sweden, Switzerland, the UK and USA.

The institutional structure of the IEA Hydrogen Agreement constitutes an Executive Committee, the Secretary and Operating Agents. The Executive Committee is in charge of the management of the agreement⁸¹ and every contracting party is entitled to appoint one member of the Committee.⁸² In order to fulfil the IEA Hydrogen Agreement's goals, the Executive Committee has the power to take decisions⁸³ and make rules and regulations⁸⁴ that will be binding on the contracting parties and the Operating Agents.⁸⁵ The agreement also covers other financial, technical and administrative aspects of the Executive Committee's work.⁸⁶

The rest of the IEA Hydrogen Agreement's institutional structure is completed by the Secretary⁸⁷ and by the Operating Agents.⁸⁸ The latter are designated for each task and are responsible for their administration. They submit an annual report to the Executive Committee and to the IEA.

The IEA Hydrogen Agreement provides for a response against non-compliance and for a dispute-settling system. In fact, on the one hand, if the Executive Committee considers that a contracting party is not fulfilling its obligations related to the agreement or to a specific task it may, acting by unanimity, exclude that contracting party from the agreement.⁸⁹ On the other hand, the dispute-settling system provided for in the IEA Hydrogen Agreement maintains that, if negotiations are not capable of resolving a dispute that arises over the interpretation or the application of any provision of the agreement, arbitration will be arranged. If the parties do not agree on the members of the tribunal, the President of the International Court of Justice will form the tribunal and its decision will be binding on the contracting parties.⁹⁰

⁶⁷ *Ibid.*, Article 2(c).

⁶⁸ *Ibid.*, Article 2(b).

⁶⁹ *Ibid.*, Article 8.

⁷⁰ *Ibid.*, Article 11(a).

⁷¹ *Ibid.*, Article 1(a) and (b).

⁷² *Ibid.*, Article 7(a).

⁷³ *Ibid.*, Article 8(b).

⁷⁴ *Ibid.*, Article 3(b).

⁷⁵ *Ibid.*, Article 5(a).

⁷⁶ *Ibid.*, Article 10(d).

⁷⁷ *Ibid.*, Article 11(b).

⁷⁸ *Ibid.*, Article 11(b).

⁷⁹ *Ibid.*, Article 12.

⁸⁰ *Ibid.*, Article 12(1).

⁸¹ *Ibid.*, Article 3(a).

⁸² *Ibid.*, Article 3(b).

⁸³ *Ibid.*, Article 3(a).

⁸⁴ *Ibid.*, Article 3(c)(2).

⁸⁵ While it has the power to take legally binding decisions, it has never used this option up to today.

⁸⁶ See IEA Hydrogen Agreement, n. 52 above, Article 3(c)(1), (f) and (e).

⁸⁷ *Ibid.*, Article 4.

⁸⁸ *Ibid.*, Article 5.

⁸⁹ *Ibid.*, Article 11(f); according to this provision withdrawal from the agreement or from a specific task can also be voluntary.

⁹⁰ *Ibid.*, Article 10(c).

In conclusion, the IEA Hydrogen Agreement constitutes a multilateral framework that brings together the main stakeholders (national governments, international organizations, civil society actors, private parties) that believe in the need for promoting hydrogen research and development. The agreement is not only a political programmatic declaration but, since its establishment in 1977, is meant to be a binding legal agreement.⁹¹

UNITED STATES BILATERAL AGREEMENTS

The IEA Hydrogen Agreement reflects broad political support within IEA countries on the need to develop hydrogen-related technology. In fact, since 2001, it appears as if promoting hydrogen research and policy internationally has also become an important part of American foreign policy. Since the US Government's withdrawal from the Kyoto Protocol in 2001,⁹² the USA has signed 17 agreements with developed and developing countries on climate change issues,⁹³ and has signed three agreements with Brazil, the EU and Italy focusing on the promotion of a hydrogen economy.⁹⁴

⁹¹ The possibility for the Executive Committee to take binding decisions in order to fulfil the agreement's goals; the power to exclude from the agreement or from a specific task a party which has not complied with its obligations; and the establishment of a dispute-settling system demonstrate how developed the legal framework of the IEA Hydrogen Agreement is.

⁹² See press statement of the US State Department, *Remarks by President Bush on Global Climate Change* (11 June 2001), available at <<http://www.state.gov/g/oes/rls/rm/4149pf.htm>>.

⁹³ According to the US State Department website on the US Global Climate Change Policy <<http://www.state.gov/g/oes/climate/>>: 'Since June 2001, the United States has engaged in bilateral partnerships with Australia, Canada, China, seven Central American countries (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama), the EU, India, Italy, Japan, New Zealand, Republic of Korea, and the Russian Federation on issues ranging from climate change science to energy and sequestration technologies to policy approaches'; see US Department of State Fact Sheet, Bureau of Oceans and International Environmental and Scientific Affairs, *United States Global Climate Change Policy* (27 February 2003), available at <<http://www.state.gov/g/oes/rls/fs/2003/18055pf.htm>>.

⁹⁴ Memorandum of Understanding between the Department of Energy of the United States of America and the Ministry of Mines and Energy of the Federative Republic of Brazil for the Establishment of a Mechanisms for Consultations on Energy Cooperation (Washington DC, 20 June 2003) (USA–Brazil Memorandum), available at <http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/brazil_us_mou_statement.pdf>; Joint Statement by President George W. Bush, European Council President Konstandinos Simitis, and European Commission President Romano Prodi on the Hydrogen Economy (Washington DC, 25 June 2003) (USA–EU Joint Statement), available at <<http://www.eurunion.org/partner/summit/Summit0306/HydroEconStatement.htm>>; Joint Statement by Secretary Spencer Abraham of the United States of America and Minister Antonio Marzano of the Republic of Italy on Cooperation in Energy Technologies (Rome, August 2003) (USA–Italy Joint Statement), available at <http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/italy_joint_statement.pdf>.

The bilateral agreements on climate change are, in general, quite vague but stress the need for stronger collaboration in the efforts to tackle climate change; identification of sectors that will be covered by the agreements; research and development; instruments such as carbon sequestration; capacity building in developing countries; the use of carbon sinks; the use of market-based mechanisms; instruments that may reduce CO₂ emissions; and private party participation in addressing the problem of climate change.

A study of the bilateral hydrogen agreements and some of the climate change agreements that include hydrogen (US agreements with Canada, India, the Republic of Korea, New Zealand, Russia, China, Australia, Mexico, South Africa and Japan)⁹⁵ show that the three main goals in the agreements analysed are to enhance security of energy supply; to increase diversity of energy sources; and to improve local and global environmental quality.⁹⁶

The agreements concentrate on economic instruments and legal instruments to achieve these goals. On the

⁹⁵ The following are the 13 agreements which have been analysed in this section of the article: USA–Brazil Memorandum, n. 94 above; USA–EU Joint Statement, n. 94 above; USA–Italy Joint Statement, n. 94 above; US Department of State Press Statement, *Climate Coordination Announced Between the United States and Canada* (Washington DC, 7 March 2002) (USA–Canada Press Statement), available at <<http://www.state.gov/r/pa/prs/ps/2002/8678pf.htm>>; USA–India Joint Statement on Climate Change: Statement on the Visit of Mr Harlan Watson, US Climate Change Negotiator and Special Representative (New Delhi, 6 May 2002) (USA–India Joint Statement), available at <<http://www.state.gov/g/oes/rls/prsr/press/jan/9964pf.htm>>; USA–Republic of Korea Joint Statement on Enhanced Bilateral Climate Change Cooperation (Washington DC, 27 August 2002) (USA–Republic of Korea Joint Statement), available at <<http://www.state.gov/r/pa/prs/ps/2002/13088.htm>>. Joint Statement: New Zealand and the United States to Pursue Enhanced Bilateral Climate Change Cooperation (Washington DC, 24 October 2002) (USA–New Zealand Joint Statement), available at <<http://www.state.gov/r/pa/prs/ps/2002/14632pf.htm>>; Joint Statement of the USA–Russian Inter-Ministerial Climate Change Policy Dialogue (Moscow, 17 January 2003) (USA–Russia Joint Statement), available at <<http://www.state.gov/r/pa/prs/ps/2003/16782pf.htm>>; Joint Statement of the USA–China Working Group on Climate Change (Beijing, 16 January 2003) (USA–China Joint Statement), available at <<http://www.state.gov/r/pa/prs/ps/2003/16785pf.htm>>; 2002–2003 Australia–USA Climate Action Partnership (27 February 2002) (CAP) Activities (USA–Australia CAP), available at <<http://www.state.gov/g/oes/climate/rmks/11788pf.htm>>; Joint Statement of Enhanced Bilateral Climate Change Cooperation Between the United States and Mexico (Washington DC, 18 March 2003) (USA–Mexico Joint Statement), available at <<http://www.state.gov/r/pa/prs/ps/2003/18801pf.htm>>; United States–South Africa Joint Statement on Climate Change (Pretoria, 28–29 July 2003) (USA–South Africa Joint Statement), available at <<http://www.state.gov/g/oes/rls/or/22912pf.htm>>; Joint Statement of the United States and Japan High-Level Consultations on Climate Change (Washington DC, 7 August 2003) (USA–Japan Joint Statement), available at <<http://www.mofa.go.jp/policy/environment/warm/cop/joint0308.html>>.

⁹⁶ See the USA–EU Joint Statement and the USA–Italy Joint Statement, n. 94 above. On this point the two instruments repeat practically the same wording.

one hand, the agreements foster the development of an economic scenario where private parties can participate as fundamental actors in the promotion of hydrogen thanks to market-based mechanisms⁹⁷ that would favour investments. Business is encouraged to enter public-private partnerships and energy trade⁹⁸ is considered to be an instrument to promote hydrogen use. On the other hand, this economic field must be based on solid legal foundations. The agreements call for the establishment of codes, standards and regulations that can make this economic scenario work efficiently.⁹⁹

The study of the US hydrogen bilateral agreements shows some possible flaws. In the first place, while assistance to developing countries and capacity-building issues are taken into account in most climate change bilateral agreements,¹⁰⁰ this does not happen in the hydrogen bilateral agreements. In the second place, the production of hydrogen from renewable energies is not a crucial point. This is controversial because there is consensus about the fact that hydrogen is an optimal solution to achieve sustainable energy only if, especially from a long-term perspective, its production derives mainly from these kinds of energy sources.¹⁰¹ Instead of taking into account developing country needs and the importance of renewable energies, the US hydrogen bilateral agreements seem to be more interested in finding consumers for this new technology.¹⁰²

But what is the legal nature of these bilateral agreements? The lack of transparency related to these

documents does not help to determine their legal nature. Nevertheless, they seem to be nothing more than programmatic declarations. They constitute elements of State practice but do not create legally binding obligations between the parties to the agreements. The US-Brazil Memorandum is the clearest on this issue. It reads as follows:

The participants understand that these consultations are not intended to create legally binding obligations between them.¹⁰³

The bilateral agreements that the USA has signed promoting a hydrogen economy are soft law instruments that do not create binding legal obligations among the parties. They set the foundations for a future multi-lateral framework, the International Partnership for a Hydrogen Economy (IPHE), which, according to the US position, should help advance the hydrogen economy.

INTERNATIONAL PARTNERSHIP FOR A HYDROGEN ECONOMY

The IPHE was launched at a meeting in Washington that took place from 18 to 21 November 2003, where ministers from 15 countries¹⁰⁴ dealt with the creation of an organization focusing on the development of a hydrogen economy.¹⁰⁵ Delegations committed themselves¹⁰⁶ to sign terms of reference for the IPHE (Terms of Reference),¹⁰⁷ and agreed that these will be the charter of the new partnership.

The IPHE is being built upon the conviction that hydrogen can improve the local and global energy supplies, and economic and environmental security. The IPHE has two main goals. On the one hand, as Article 1 of the Terms of Reference states, the first purpose is:

To serve as a *mechanism* to *organize* and *implement* effective, efficient, and focused *international research, development, demonstration* and *commercial utilization* activities related to hydrogen energy technologies. (emphasis added)

⁹⁷ On the importance of the private parties and market-based mechanisms see the USA-Italy Joint Statement, *ibid.*; USA-EU Joint Statement, n. 94 above; USA-Japan Joint Statement, n. 95 above; USA-Australia CAP; and the USA-Canada Press Statement, n. 95 above.

⁹⁸ Investments and energy trade are cited explicitly in para. 1 of the USA-Brazil Memorandum, n. 94 above.

⁹⁹ See USA-EU Joint Statement and USA-Italy Joint Statement. See n. 94 above.

¹⁰⁰ Developing country needs are considered, for example, in the USA-Japan Joint Statement; USA-Australia CAP; USA-Canada Press Statement; and in the USA-New Zealand Joint Statement, n. 95 above.

¹⁰¹ Only the USA-EU Joint Statement underlines clearly this link by saying: 'In this context we see the potential of the hydrogen economy in establishing a secure energy supply through clean and environmentally sound systems'. US bilateral climate change agreements focus more specifically on the promotion of renewable energies: see the USA-Japan Joint Statement; USA-Canada Press Statement; USA-India Joint Statement; USA-South Africa Joint Statement; and the USA-Republic of Korea Joint Statement, n. 95 above.

¹⁰² See the USA-EU Joint Statement, n. 94 above, which states: 'Our cooperation will lay the technical, legal, and commercial basis needed to accelerate the commercial penetration and trade of emissions-free hydrogen technology worldwide, in cars, buildings and power generation, . . .'. This trend in the US policy is stressed also in the goal of the IPHE: 'The ultimate goal of the IPHE will be to enable Partner countries' consumers to have by 2020 the practical option of purchasing a competitively priced hydrogen powered vehicle that can be refuelled conveniently'.

¹⁰³ USA-Brazil Memorandum, n. 94 above, para. 3.

¹⁰⁴ The countries and regional organizations that have sent a delegation to the IPHE Ministerial Meeting in Washington are Australia, Brazil, Canada, China, France, Germany, Iceland, India, Italy, Japan, Republic of Korea, Russia, the UK, the USA and the European Community.

¹⁰⁵ Information about the meeting is available at <<http://www.usea.org/iphe.htm>>.

¹⁰⁶ This is what is pointed out at the beginning of the *Non-Paper on Activities and Operations of the IPHE Committees* (31 October 2003). This document is available at <<http://www.usea.org/Concept%20Paper%20for%20Committees.pdf>>.

¹⁰⁷ *The Revised Draft of the Terms of Reference for the IPHE* (31 October 2003) is available at <<http://www.usea.org/Revised%20Terms%20of%20Reference.pdf>>. The analysis of the IPHE present in this article is based on the study of this document.

On the other hand, Article 1 underlines the second purpose, which is to provide:

... a forum for advancing policies, and international codes and standards that can accelerate the cost-effective transition to a global hydrogen economy. (emphasis added)

Therefore, the IPHE's overall goal is to foster a cost-effective transition to a hydrogen economy.¹⁰⁸

How does the IPHE intend to achieve this goal? The Terms of Reference point out the need to identify areas in which research and development are most urgent and, hence, where bilateral and multilateral cooperation should focus. Second, the Terms of Reference stress the need for large-scale, long-term public-private cooperation¹⁰⁹ and for uniform international codes and standards.¹¹⁰ The importance of private parties and market-based instruments is not clearly outlined, but can be read between the lines of Article 2 of the Terms of Reference.

But achieving a hydrogen economy is not only about promoting research and establishing public-private collaborations. There are many other issues at stake. There is a whole range of technical, financial, legal, market, socioeconomic, environmental, and policy issues that must be taken into account. The IPHE is aware of these issues and it maintains that it will address those that have not been dealt with elsewhere.¹¹¹ The IPHE acknowledges the IEA's work, considering it to be complementary to the promotion of a hydrogen economy.¹¹²

The Terms of Reference establish an institutional structure that includes a Planning Committee, an Implementing Committee, a Liaison Committee and Secretariat.¹¹³ The Planning Committee will provide direction, governance and management for the IPHE. It will focus mainly on the second IPHE goal, by developing policies, plans and strategies to advance

a hydrogen economy, and by working on uniform international codes and standards.¹¹⁴ The Implementation Committee will assist the Planning Committee and will focus mainly on the first IPHE goal of organizing and implementing research, development, demonstration and commercial utilization activities related to hydrogen energy technologies.¹¹⁵ One of its first tasks will be to identify three topics on which to focus international research and development. The Liaison Committee¹¹⁶ will be in charge of keeping relations with international stakeholders interested in hydrogen research and development from non-IPHE partners.¹¹⁷ Finally, the Secretariat will coordinate the Committee's activities and will focus on administrative issues.¹¹⁸

The Terms of Reference maintain that research and development results should be open and non-proprietary; nevertheless, it also says that intellectual property rights that may arise from the research and development undertaken will be defined in future arrangements.¹¹⁹

Article 4(1) of the Terms of Reference states the legal nature of the Partnership:

These Terms of Reference, which are administrative in nature, do not create any legally binding obligations between or among its Partners. Each Partner will conduct the activities contemplated by these Terms of Reference in accordance with the laws under which it operates and the international instruments to which it is a party. (emphasis added)

In conclusion, the IPHE is not a binding legal agreement. It does not establish legal obligations among its parties. The partners only commit themselves to participate together in the promotion of a hydrogen economy.¹²⁰

¹⁰⁸ The ultimate goal of the partnership has been defined very precisely in the introduction to the Terms of Reference: 'The ultimate goal of the IPHE will be to enable Partner countries' consumers to have by 2020 the practical option of purchasing a competitively priced hydrogen powered vehicle that can be refuelled conveniently'; see Terms of Reference, *ibid.*

¹⁰⁹ *Ibid.*, Article 2(4).

¹¹⁰ *Ibid.*, Article 2(3).

¹¹¹ *Ibid.*, Article 2(6).

¹¹² The relationship between the IPHE and the IEA is clearly outlined in Article 3(10) of the Terms of Reference: 'The IPHE will coordinate its activities with the International Energy Agency, the hydrogen efforts of which are an important complement to the IPHE and which the IPHE views as a valuable institution in the transition to the hydrogen economy'; *ibid.*

¹¹³ For more information on the institutional structure of the IPHE see *Non-Paper on Activities and Operations of the IPHE Committees*, n. 106 above.

¹¹⁴ According to the Terms of Reference, Article 3(5), the Planning Committee will meet at least once a year and decisions will be taken by consensus. It will, according to *ibid.*, Article 4(2), decide by consensus about inviting new partners to join the IPHE and it will emit a report about the IPHE activities every 2 years. Finally, according to Article 3(3), the Committee will be composed of up to two senior-level government representatives appointed by each partner listed in Appendix A but each partner will have only one vote. The IEA will sit as observer. See Terms of Reference, n. 107 above.

¹¹⁵ *Ibid.*, Article 3(6).

¹¹⁶ Membership of both the Implementation Committee and the Liaison Committee resemble the Planning Committee.

¹¹⁷ See Terms of Reference, n. 107 above, Article 3(8).

¹¹⁸ *Ibid.*, Article 3(11). The US Department of Energy will serve as a temporary secretariat.

¹¹⁹ *Ibid.*, Article 6.

¹²⁰ It is quite significant that the Terms of Reference do not provide for any non-compliance mechanism or dispute-settling system, but this is understandable taking into account that the partners are not legally obliged to follow the IPHE rules.

HYDROGEN ECONOMY AND THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

Let us then draw the different strands of the arguments presented in this article together. This article has argued that energy policy is closely and intricately linked to climate change policy and that an energy policy solution that has reduced greenhouse gas emissions is thus also a solution to the climate change problems. Furthermore, unlike climate change, which is a highly politically charged issue, energy policy is a top priority of all countries, whether rich or poor, and is on their national agendas. It has been argued that an examination of international sustainable development resolutions, declarations and plans of action indicates that there is global agreement that current patterns of energy production and consumption are unsustainable, and that there is need to develop new and renewable forms of energy, taking into account the precautionary, the environmental impact assessment and the liability principles. Furthermore, such energy forms need to be developed within multilateral fora and with multi-stakeholder involvement.

This article then followed with the argument that, among the new sources of energy, hydrogen appears to be particularly promising, especially when it is generated by using renewable sources of energy. With 25 years of history in energy research and from all the international initiatives, it would appear that the time is ripe for pushing hydrogen as a commonly used source of energy.

This analysis was followed in the article by a presentation of evidence of the international community's interest in hydrogen, as evinced in international agreements to advance a hydrogen economy. The documents analysed include hard law instruments, such as the IEA Hydrogen Agreement, and soft law instruments, such as the US bilateral agreements and the IPHE. The trend seems to be to favour soft law instruments over hard law choices. Given that the promotion of a hydrogen economy is a relatively new agenda item, it is logical that the initial steps will be possibly taken in soft law instruments; and these soft law instruments can be seen as a first step towards a hard law instrument in the future. This is in line with the climate negotiations in 1992, which were preceded by several soft law instruments, such as the 1988 Toronto Statement and the 1989 Hague and Noordwijk Declarations, to name a few.¹²¹

¹²¹ See *Conference Statement of the Conference on the Changing Atmosphere: Implications for Global Security* (Toronto, 27–30 June 1988); the Declaration of the Hague, adopted by the Meeting of the

The documents also show that it is not only developed countries who are involved in hydrogen research and policy, but that, increasingly, via the bilateral agreements and the IPHE, developing countries, including Brazil, China, India and the Republic of Korea, are engaged in these discussions. This would imply that many of the major greenhouse gas emitters are considering hydrogen as a potential alternative fuel.

It would perhaps not be out of place here to dwell briefly on the ambiguous role of the USA. The USA has been an active researcher in the area of climate change and was also actively engaged in developing international policies on the climate change issue until 1997 when the Kyoto Protocol was adopted. Since 1997, the USA has been reluctantly participating in the climate change regime and, in 2001, it withdrew its support for the protocol because 'for America, complying with those mandates would have a negative economic impact, with layoffs of workers and price increases for consumers'.¹²² Then, after shutting the door to the international community, the Bush Administration started bilateral negotiations on climate change that ran parallel to the efforts of other countries in the Kyoto framework. Meanwhile, the USA maintained in its climate change policy that it would reduce its greenhouse gas emissions by 18% in a 10-year period starting in 2002.¹²³ Within its climate change policy, the USA wants to foster international cooperation in hydrogen as part of the cooperation on bilateral climate agreements. This leads to the following question: what strategy is the USA following? It is clear that the USA prefers a bilateral path to a multilateral path. But if that is the case, why is it then pushing for the IPHE? One can argue that the US hydrogen research and development strategy is based on the consolidation of a multilateral framework, the IPHE, which stands on previous bilateral agreements. One could go a step further and argue that, assuming this is not a red herring strategy of the USA, the steps taken by the US Government indicate that it sees hydrogen as a potentially strong alternative to other fuels, that the USA is willing to develop this energy source in cooperation with other countries, and that having made some bilateral agreements, it is willing to engage in multilateral agreements on this issue. However, it is not clear if the

Heads of State, hosted by the Prime Minister of the Netherlands (The Hague, 11 March 1989); and the *Noordwijk Declaration on Climate Change*, adopted by the 67 countries attending the Atmospheric Pollution and Climatic Change Ministerial Conference (Noordwijk, 6–7 November 1989).

¹²² See US State Department, n. 92 above.

¹²³ See US Department of State Fact Sheet, Office of the Press Secretary, *US Climate Change Policy* (30 September 2003), available at <<http://www.state.gov/g/oes/rls/fs/2003/25758.htm>>: 'In February 2002, President Bush committed the United States to a comprehensive strategy to reduce the greenhouse gas intensity of the American economy (how much we emit per unit of economic activity) by 18 percent over the next 10 years'.

USA would be willing to focus efforts on developing hydrogen in a sustainable manner, since it has not made any explicit commitments to that effect.

Russia, too, as a participant in the IPHE, has indicated its interest and willingness to engage in discussions on hydrogen. Although Russia has not ratified the Energy Charter,¹²⁴ the purpose of which is to establish a legal framework 'in order to promote long-term cooperation in the energy field, based on complementarities and mutual benefits, in accordance with the objectives and principles of the Charter',¹²⁵ it applies it 'provisionally'.¹²⁶ This would indicate that Russia too is interested in developing this path.

Given that the US is not participating in the Protocol, it might give the US an elegant re-entry option into the regime, but on an issue that it and other countries seem to think is a fruitful area of co-operation. For Russia, this might be an added reason for going ahead with the Kyoto Protocol.

Of course one may be tempted to ask at this point, why are such initiatives already not visible? One answer could be that the negotiations are so politically charged and the role of the oil-exporting countries in preventing mention of new sources of energy is so dominant, that the countries involved feel that it might be more politically expedient to undertake measures outside the regime. The other explanation could be that countries are promoting hydrogen outside the context of climate change in order to undermine the multilateral efforts being undertaken in the field.

Assuming that the latter is an unworthy way of reasoning, now that the groundwork has been undertaken in the IEA Hydrogen Agreement, in the bilateral agreements and in the IPHE, it is time, possibly, for the EU to undertake a serious initiative in this field. Such a serious initiative could include drafting a protocol on hydrogen to the UNFCCC.

The overall goals of such a protocol should be similar to the previous hydrogen-related instruments and, therefore, they should focus on the promotion of hydrogen research and development. Nevertheless, the UNFCCC Hydrogen Protocol should have two

more specific goals. On the one hand, it should take into account that hydrogen is considered to be an optimal solution only if produced from renewable energy sources. One of the most important UNFCCC goals should be to achieve, over a period of 10 years, hydrogen production mainly from these kinds of energy sources. On the other hand, the protocol should take into account that energy is crucial for developing countries. Their need for energy is urgent in order for them to develop. Therefore, another requirement of a hydrogen protocol should be to consider developing country needs when advancing a hydrogen economy. The proposed protocol would foster north-south cooperation and be inclusive of all like-minded countries. Parties would therefore be divided into active parties (those from north and south interested in developing hydrogen as an energy carrier), and passive parties (other countries), who have the right to be informed and, if appropriate, to influence the discussion. The protocol would have a preamble that would take into account previous hydrogen-related efforts within the international community, such as the IEA Hydrogen Agreement and the IPHE. The objectives of the protocol would be to foster research and development, to increase technology cooperation and to explore the practicalities of switching to hydrogen within 10–20 years. The protocol's principles would reflect those present in Article 3 of the UNFCCC. Active parties to the protocol would have four main obligations: first, to foster hydrogen research and development; second, to foster technology cooperation; third, to study the feasibility of switching to hydrogen in a 10–20-year framework; and, finally, to present a report every 2 years in which they underline their efforts in order to fulfil the protocol's goals. In 2010 the parties could gather and decide whether the timeframe of the obligations has to be modified. The protocol does not imply the end of the Kyoto Protocol. In fact, it would be the opposite: the two protocols would work together and strengthen each other. The negotiations of such a protocol, once such a draft text is prepared, would then be in the hands of the Conference of the Parties to the UNFCCC. Possibly three committees need to be set up: a committee for renewable energies; a committee for developing countries; and an implementation committee. The committees could provide advice about how the protocol can be strengthened while the negotiations are taking place.

In sum, the UNFCCC Hydrogen Protocol would be an instrument to address energy concerns where they are most urgent: in the climate change regime. Such a protocol should be a multilateral binding legal instrument that takes into account the need to produce hydrogen from renewable energies and the special needs of developing countries. These concerns would be reflected both in the goals that the protocol would set itself and in its institutional structure.

¹²⁴ Energy Charter Treaty (The Hague, 17 December 1991). Although the agreement does not specifically mention hydrogen, it applies to renewable energy sources and cleaner fuels. Thus, it does provide a framework for cooperation in the area of hydrogen. Although Russia has not yet ratified the agreement, Russia passively supports this and one may infer that Russia has interests in developing and promoting clean energy.

¹²⁵ *Ibid.*, Article 2.

¹²⁶ According to the official Energy Charter Treaty website, available at <<http://www.encharter.org/index.jsp?psk=0502&ptp=tDetail.jsp&pci=24&pti=21>>.

CONCLUSIONS

This article has argued that there is a current deadlock in the climate change negotiations and that one way out of the deadlock is to seek areas of common interest between key countries that are not participating in the regime – such as the USA and Russia – and the key countries that are participating in the regime – such as the EU, China, India and Brazil – that can also contribute to addressing the climate change problem. International policy documents negotiated over the last decade indicate that global agreement exists on the need to develop and promote sustainable energy sources. Although there is a quarter of a century of work promoting research on hydrogen within a binding legal framework, in the last 2 years hydrogen as an energy carrier has become a prominent alternative and seems to be one of the most effective options if it is produced from renewable sources of energy. A number of bilateral agreements have been initiated by the USA and an international partnership to promote hydrogen has been established that includes Russia, India and China. This article concludes that, since energy policy and especially policy on hydrogen seems to be a fruitful option, discussing the possibility of a

hydrogen protocol to the UNFCCC may be a diplomatically elegant option for bringing the USA and Russia back into the discussions and pushing the regime incrementally forward.

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