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The Paris Climate Change Agreement: A New Stimulus for International Efforts to Promote Renewable Energy Development?

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Abstract: The article considers whether the Paris Climate Change Agreement strengthens the support provided by the international climate change regime for renewables, a key option for decarbonising energy supplies. It does this by comparing the position under the Agreement with that under the Framework Convention on Climate Change and Kyoto Protocol in four areas in which international law can contribute most effectively to overcoming barriers to the global growth of renewable energy production and consumption. It finds that the Agreement does not improve significantly on the support provided by its predecessors for renewable energy. However, it does create a serviceable structure for ongoing negotiations that may lead in the future to a strengthening of support for renewables by parties as part of their strategies for cutting carbon emissions. It is also clear from several initiatives for promoting renewable energy launched at the Paris Conference of Parties that it is recognised internationally as being central to achievement of the Agreement's goals.

1. Introduction

The various sectors involved with energy creation and consumption (e.g. the power industry, industrial, domestic) are collectively responsible for two thirds of the world's greenhouse gas emissions.¹ The decarbonisation of energy supplies over a short timescale is therefore central to

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climate change mitigation. The last two decades have seen significant growth in the production of low carbon energy from non-carbon emitting and carbon neutral renewable sources, but any comfort to be drawn from this information is quickly vanquished by statistics showing the continued dominance of fossil fuels. Oil, natural gas and coal still account for around 80% of the world's energy supplies.² Indeed, their usage has doubled since the 1970s in line with the doubling of the global total primary energy supply over the last forty years.³ Renewable sources remain a marginal contributor by comparison, meeting 19% of global energy consumption in 2014 with two thirds of that being made up by hydroelectric power and traditional uses of biomass.⁴ Only 6% of energy consumption was derived from newer technologies for exploiting renewable sources such as wind and solar.⁵

It is evident from these statistics that the international climate change regime has failed in the first 24 years of its existence to secure a shift away from high carbon emitting sources and towards lower carbon alternatives in the composition of its parties' energy mixes. The question I consider in this paper is whether the new climate change agreement, adopted at the 21st Conference of Parties to the Framework Convention on Climate Change in December 2015, is better equipped to drive a worldwide displacement of fossil fuels by energy from renewable sources.⁶ I seek to answer it by comparing the performance of the Paris Agreement with the Framework Convention on Climate Change (hereafter 'the Convention')⁷ and Kyoto Protocol⁸ in four areas in which the international law on climate change

¹International Energy Agency, 'Energy and Climate Change: World Energy Outlook Special Report', 2015, 20, available at <https://www.iea.org/publications/freepublications/publication/WEO2015SpecialReportonEnergyandClimateChange.pdf> accessed 17 September 2016.

² Ibid., 25.

³ International Energy Agency, 'Key World Energy Statistics 2015', 6, available at http://www.iea.org/publications/freepublications/publication/KeyWorld_Statistics_2015.pdf accessed 17 September 2016.

⁴ REN21, 'Renewables 2016: Global Status Report', 28, available at <http://www.ren21.net/status-of-renewables/global-status-report/> accessed 17 September 2016.

⁵ Ibid.

⁶ UNFCCC, 'Decision 1/CP.21 Adoption of the Paris Agreement' (29 January 2016) FCCC/CP/2015/10/Add.1, Annex (Paris Agreement).

⁷ United Nations Framework Convention on Climate Change (adopted 29 May 1992, entered into force 21 March 1994) 1711 UNTS 107 (FCCC).

⁸ Kyoto Protocol to the United Nations Framework Convention on Climate Change (adopted 10 December 1997, entered into force 16 February 2005) FCCC/CP/1997/7/Add.1 (Kyoto Protocol).

can contribute most effectively to the global expansion of renewable energy production and consumption. These are as follows: obliging the promotion of renewable energy by contracting parties; diverting investment and state support away from high carbon energy development including by sending a message that the fossil fuel era is drawing to a close; levelling the playing field between renewable and fossil fuel energy by placing a price on carbon emissions; and enhancing or creating capacity for low carbon development in the developing world through the provision of financial, technological and capacity building support. The Agreement quickly reached its threshold for entry into force of ratification by 55 parties to the Convention and by states collectively responsible for 55% of estimated global greenhouse gas emissions on 5 October 2016, and entered into force formally on 4 November 2016.

My analysis of the Agreement reveals that its substantive provisions do not improve significantly on the support provided by its predecessors for renewable energy. It does not promote alternative energy forms directly or place more onerous binding obligations than the Convention and the Protocol on its contracting parties to combat climate change and support mitigation efforts. It does differ significantly from its predecessors in its expectation, expressed in several non-binding normative statements, that parties ought to progressively reduce their greenhouse gas emissions collectively (and by implication displace unabated fossil fuel generation with renewable energy and other low carbon alternatives) in line with the goal of achieving a balance between emissions and removals by sinks in the second half of the century. However, the strength of the message that it sends to producers and consumers of carbon-emitting energy is weakened both by the significant leeway given for parties to determine what, if anything, they will contribute to the global mitigation effort, and by the Agreement's dependence, given the preponderance of non-binding provisions on mitigation and the lack of an enforcement mechanism, on the political will of contracting parties, and, where this is not present, on peer pressure from other states or the influence of consumers and civil society if it is to attain its goals.

As a result, the Agreement itself is unlikely to prompt a switch to renewable energy in the short term. It is only through a consistent pattern of behaviour by its parties, evidencing that statements in their nationally determined contributions (hereafter NDCs) were not made idly, that energy investors, producers and consumers will be persuaded to alter their allegiance from fossil fuels to low carbon alternatives. In this regard, the Agreement's main achievement lies not in its substantive provisions, but in its replacement of the broken Kyoto model with a repeatable structure for on-going negotiations that will hopefully bear more potent fruit over time under the stimulus of growing evidence of a changing climate. The difference that this new approach may make is compromised however by a failure to address fundamental problems with the provision of climate finance and technology transfer under the Convention and the Protocol that developing states have used over the last decade as justification for refusing to strengthen their contribution to the global mitigation effort. By failing to lance the boil of developed to developing world transfers, the international community has stored up obstacles to the progress in future negotiations that must be made if the Agreement is to spur improvement both in international efforts to combat climate change and to pursue renewable energy development as part of this. It has also missed an opportunity to enhance the support provided for low carbon energy in developing states by removing obstacles to the effective functioning of arrangements for climate finance and technology transfer under the international climate change regime.

1.1. Structure

Section 2 of the article considers obstacles to the worldwide spread of energy from renewable sources, and identifies four main areas in which international law could contribute to overcoming them. Sections 3 to 6 then go on to examine whether the Agreement strengthens the international climate change regime in each of those areas by comparing provision made for them under the new instrument with the position under the Convention and the Protocol. Section 7 restates the main conclusions drawn from the comparative analysis, and notes some initiatives announced at COP 21

which, irrespective of the lack of express support for renewables under the Agreement, suggest that its parties regard renewable energy development as the principal means by which the Agreement's goals for mitigating climate change can be advanced.

2. Displacing Fossil Fuels with Renewable Energy: Challenges and Responses

Renewable energy can struggle to gain a foothold in energy markets and supplies despite its environmental advantages over fossil fuels. Factors preventing its diffusion vary depending on the circumstances of different states, but some commonly occurring obstacles can be identified which must be overcome in order to accelerate the switch from high carbon energy sources to lower carbon alternatives. This section identifies the most prominent constraints to the global growth of a renewables sector in connection with decarbonisation, and considers how legal action at the international level could assist with their alleviation. The barriers examined are grouped under four categories capturing types of restriction that retard low carbon energy development: investor reluctance to finance relevant projects because they perceive renewable energy projects and technologies as being risky; the entrenchment of fossil fuel energy in the socio-economic systems of developed and some developing states; the non-integration of the environmental costs of greenhouse gas emissions in energy prices; and a lack of financial, technological, and institutional capacity for supporting low carbon energy in developing states.

2.1. Creating Investor Confidence in Renewable Energy

Renewable energy generating plant has quickly become the most attractive option for investment in the electricity sector, attracting more than half of the monies invested globally in electricity production in 2015.⁹ This is partly due to financial support by states, but is increasingly the result of rapidly decreasing costs of producing electricity from renewable sources, particularly onshore wind

⁹ Vaughan, A., 'Renewables made up half of net electricity capacity added last year', The Guardian, 25 October 2016, available at <<https://www.theguardian.com/environment/2016/oct/25/renewables-made-up-half-of-net-electricity-capacity-added-last-year>> accessed 26 October 2016.

and solar energy, with projects using these technologies often being cost competitive with all forms of fossil fuel generation.¹⁰ However, investment in generation from coal and gas still continues due to on-going state support and to wide disparities within regions and even within states in the cost competitiveness of energy sources with fossil fuels sometimes remaining by far the cheaper energy source.¹¹ The appeal of renewable energy is also dampened by two respects in which it compares unfavourably with coal and gas power plants. The first is that it can be difficult to integrate distributed renewable electricity into networks designed for centralised generation because systems were designed only to convey electricity directly from centralised power plants to consumers and as the best renewable resources are often in remote areas far distant from grids serving communities.¹² The expense of connecting generating plant to networks can add substantially to a project's cost profile, and particularly if developers are expected to bear 'deep' connection charges covering the cost of associated network modifications.¹³ Secondly, initial development costs for fossil fuels are usually recovered more quickly than those for renewable energy for which project costs are largely fixed and incurred at the outset.¹⁴

In addition, it is important to remember that renewable energy is a heterogeneous category made up of multiple technologies for extracting energy from different sources, and of different technologies for each source (e.g. the constant drive to develop new turbines capable of extracting more power from the wind than current models). Only the better established technologies have become cost competitive whilst newer technologies such as wave, tidal, offshore wind and concentrated solar

¹⁰ International Renewable Energy Agency, 'Renewable Power Generation Costs in 2014', January 2015, available at <<https://www.theguardian.com/environment/2016/oct/25/renewables-made-up-half-of-net-electricity-capacity-added-last-year>> accessed 26 October 2016.

¹¹ Ibid., Bloomberg New Energy Finance, 'Wind and Solar boost cost-competitiveness versus fossil fuels', 5 October 2015, available at <<https://about.bnef.com/press-releases/wind-solar-boost-cost-competitiveness-versus-fossil-fuels/>> accessed 26 October 2016.

¹² Madrigal, M. and Stoft, S., *Transmission Expansion for Renewable Energy Scale-Up: Emerging Lessons and Recommendations* (The World Bank, 2012), 3-13.

¹³ Ibid.

¹⁴ Intergovernmental Panel on Climate Change, 'Renewable Energy and Climate Change', 194, available at <<http://www.ipcc.ch/report/srren/>> accessed 27 October 2016.

power remain more expensive both than fossil fuels and renewable sources of longer standing.¹⁵ All such technologies are likely to be needed to replace the four/fifths share of global energy consumption for fossil fuels, to prevent a future return to high carbon energy under the duress of growing energy demands from an increasing global population, and to enable an increase in electricity supplies from their current level in connection with decarbonising transport, industry and heating. The failure of some supported technologies is a preferable risk to that of runaway climate change which every unit of additional fossil fuel consumption heightens.

Electricity is the low hanging fruit of decarbonising energy supplies. Reducing emissions from transport, industry and heating is more challenging due to there being fewer and less well established low carbon alternatives, and limited progress has been made with moving away from high carbon energy in these sectors.¹⁶ For road transport, responsible for over two thirds of greenhouse gas emissions from transport,¹⁷ this is due to a combination of: the much lower price of fuels that have benefitted from 100+ years of experience with their production and distribution compared to newer alternatives such as advanced biofuels that are still being readied for commercial application or that have not yet achieved economies of scale in production; the lower price of vehicles consuming petrol and diesel than those using alternatives, again due to the long experience with their use and resulting learning efficiencies and economies of scale; the lack of infrastructure for refuelling alternative fuel vehicles; and, for all of these reasons, the lack of popular demand for alternatives that would be required to prompt change in manufacturing sectors.¹⁸ The much lower cost and easy availability of fossil fuels and related technologies are also the key obstacles to decarbonising marine and air transport.¹⁹ The lack of progress with decarbonising heating and industry is partly due to cost, but also

¹⁵ International Renewable Energy Agency, 'Renewable Power Generation Costs in 2014' (n 10).

¹⁶ International Renewable Energy Agency, 'Roadmap for a Renewable Future 2016 Edition', 106-120, available at <http://www.irena.org/DocumentDownloads/Publications/IRENA_REmap_2016_edition_report.pdf> accessed 26 October 2016.

¹⁷ International Energy Agency, 'Key CO₂ Emissions Trends', 2016, available at <<https://www.iea.org/publications/freepublications/publication/co2-emissions-from-fuel-combustion---2016-edition---excerpt---key-trends.html>> accessed 26 October 2016.

¹⁸ International Renewable Energy Agency, 'Roadmap' (n 16), 106-111.

¹⁹ Ibid.

to a lack of awareness of the alternative options.²⁰ The weakness of state support for renewable energy compared to the strength of backing for renewable electricity contributes to the slow rate of decarbonisation in all of the above sectors.²¹

The most direct way in which an interstate agreement on climate change could assist with securing the further growth of renewable electricity and jumpstarting the spread of renewables in other areas is by requiring its contracting parties to increase their consumption of renewable energy as part of their strategies for progressive greenhouse gas reduction. Obligations to provide active support would require states to adopt measures that will attract investment in renewable energy despite the obstacles to its growth outlined above. Commentators on renewable energy and international law call for the inclusion of targets for the proportion of renewables in energy supplies and other deliberately supportive measures (e.g. obligations to adopt favourable policies), whether in a climate change agreement or a separate protocol to the Convention, as the best means by which international law can stimulate the global growth of a renewables sector.²² However, this may be difficult due to the reluctance of states in practice to compromise their sovereignty over the content of energy supplies by taking on obligations that expose their decision-making on energy policy to external scrutiny and interference. This is borne out by the dearth of legally binding provisions requiring that renewable or other low carbon energy forms should be supported in international legal instruments.²³

2.2. Disestablishing Fossil Fuel Energy

²⁰ Ibid., 112-120.

²¹ Ibid., 106-120.

²² Bruce, S., 'International Law and Renewable Energy: Facilitating Sustainable Energy For All?', (2013) 14 *Melbourne Journal of International Law*, 1, 30-5; Bradbrook, A. J., 'The Development of Renewable Energy Technologies and Energy Efficiency Measures Through Public International Law' in Zillman, D., Redgwell, C., Omorogbe, Y., and Barrera-Hernandez, L., (eds) *Beyond The Carbon Economy: Energy Law in Transition* (Oxford University Press, 2008), 128-131; Bradbrook, A. J., 'Sustainable Energy Law: the Past and Future', (2012) 30 *Journal of Energy and Natural Resources Law*, 511, 517-520.

²³ Bruce, 'International Law and Renewable Energy' (n 22), 11-17; Citelli, M., Barassi, M. and Belykh, K, 'Renewable Energy in the International Arena: Legal Aspects and Cooperation' (2014) 2 *Groningen Journal of International Law*, 1, 1-6.

In addition to factors retarding investment in renewable energy, its diffusion is hampered by the entrenchment of fossil fuels. Their 80% share in global energy consumption reflects enormous sunk investment in infrastructure for energy generation, in the extraction, refining and distribution of resources, in the design and manufacture of vehicles consuming fossil fuels, in building stock designed for fossil fuel heating, and in general into the more than a century's worth of learning and knowledge and skills acquisition that has fed into creating and maintaining the fossil fuel economy. Businesses, their shareholders and governments have corresponding vested interests in the continued utilisation of fossil fuel assets and related revenue streams and tax receipts. Economies that have become dependent on the availability of easily distributable, dense and inexpensive energy balk at the thought of disruption to its supply. Societal practices such as commuting are based on the easy availability and affordability of fossil fuels and of vehicles that consume them whilst attitudes derived from accustomisation to the receipt of remotely produced energy without knowledge of its origins informs hostility toward renewable energy development in areas that have only been recipients of energy produced elsewhere in recent decades.

All of the above factors contribute to the lock-in of socio-economic systems to fossil fuel energy that must be undone to create space for renewable energy development.²⁴ Combinations of measures are therefore required that weaken the hold of fossil fuels alongside promoting alternative energy sources. The most immediate means available to states of destabilising the high carbon energy sector would be to follow through on commitments already made to withdraw subsidies that are currently at four times the level of the much complained of support for renewable energy.²⁵ As discussed further in the following section, measures for integrating the environmental costs of greenhouse gas emissions into energy prices would also assist with dispelling the perception of renewable energy as an expensive alternative and with persuading manufacturers to invest in low carbon alternatives.²⁶

²⁴ Unruh, G. C., 'Understanding carbon lock-in', (2000) 28 *Energy Policy*, 817.

²⁵ International Energy Agency, 'World Energy Outlook: Energy Subsidies', available at <<http://www.worldenergyoutlook.org/resources/energysubsidies/>> accessed 26 October 2016.

²⁶ International Renewable Energy Agency, 'Roadmap' (n 16), 128-9.

Much broader policy and legal intervention is also required at all levels of government to enable economic and social transition and adaptation to a post-fossil fuel era.

The international climate change regime has a major role to play in the destabilisation of high carbon fuels by deterring further investment in the fossil fuel sector, and necessitating the early retirement of assets dependent on the exploitation of oil, gas and coal if commitments for reducing greenhouse gas emissions are to be met. The inclusion of clear normative statements in an agreement on how carbon-dependent economies should evolve and corresponding obligations requiring contracting parties to give effect to the vision presented can be used to send a signal, whether to energy companies or states possessing oil, gas and coal resources, that the international community is committed to moving away from high carbon energy with attendant risks that monies invested in fossil fuel extraction and consumption may not be recovered. Whilst there is no guarantee that monies will flow to renewable energy under such an approach, the hope is that states will turn to support the renewables sector as one of the main means available to them of maintaining energy security and supporting economic activity whilst decarbonising energy supplies, and that energy companies will alter their investment strategies accordingly. The stronger the resolve shown by the international community to wean itself from its carbon addiction, the more likely it is that renewable energy development will be seen as a first option rather than lower carbon fossil fuels (e.g. exchanging coal for gas).

Such statements must receive backing from binding obligations and from credible mechanisms for holding parties to account if they are to influence global patterns of energy consumption. Of particular importance are obligations placed on contracting parties to formulate and implement programmes for effecting their commitments as it is through the development of supportive policy and legal frameworks at national levels that the appeal of renewable energy to investors will best be enhanced. The principal role of international law in this regard is to enhance the credibility of the commitments

to decarbonise that it requires parties to make by underpinning them with mechanisms for international scrutiny and enforcement.

2.3. Levelling the Playing Field for Energy Sources

Another means by which international climate change instruments can be used to enhance investor confidence in renewable energy is by establishing mechanisms which place a price on greenhouse gas emissions at the international level. This reduces investor perception of renewables as comparatively risky by improving their cost competitiveness. Agreements under which parties take on obligations to meet targets for reducing their emissions allow the creation of arrangements under which emissions allowances can be traded between parties that need to purchase units to offset emissions exceeding their promised reductions and those which have allowances to spare because they have reduced emissions below their targets. Allowances acquire a value representing the scarcity of legally permissible emissions that will increase over time as targets for emission reductions become more stringent. From a state's perspective, such a mechanism operating at the international plane may prompt the adoption of policies to stimulate low carbon energy production with a view either to avoid rising carbon costs or to benefit from reducing emissions below its committed level by offsetting the proceeds of selling allowances against the cost of supporting domestic renewable energy development.

The existence of international commitments to reduce emissions can also provide a stimulus for the spread of mechanisms that allow the trade of carbon by private actors.²⁷ Permitting allowances acquired from an emissions trading scheme operating in one state to be taken into account when calculating whether another state has met its climate change commitments can incentivise states to link national trading systems.²⁸ Emissions trading promotes economic efficiency in theory by allowing

²⁷ Jevnaker, T., and Wettestad, J., 'Linked Carbon Markets: Silver Bullet, or Castle in the Air?' (2016) 6 *Climate Law*, 142.

²⁸ Ibid.

actors to choose the least cost available option to them of covering their emissions.²⁹ Investment in renewable energy will only be stimulated when a scheme creates confidence that carbon prices will rise to and remain at a level that make this a lower cost option than acquiring allowances or pursuing cheaper technological fixes.³⁰ Emissions trading is not therefore guaranteed to promote renewable energy in the short term, but it is hoped that the prospect of rising carbon prices as scheme caps are tightened will begin to have this effect as emitters come to appreciate that this will become a cheaper option than carbon emitting energy in the not too distant future.³¹

The establishment of mechanisms that afford states the flexibility to meet their commitments by earning credits from activities leading both to greenhouse gas emission reductions and to sustainable development in other states provides a third means by which agreements to reduce emissions under international law can be used to drive renewable energy development. Such approaches can be used to attract private investment in renewables by providing an additional revenue stream for projects from the sale of credits awarded for avoided emissions at the international level (e.g. selling to states that are unable to meet targets for reducing emissions domestically or can do so only at high cost) or in national/regional schemes that recognise the credits awarded internationally as valid offsets for excess emissions or as acceptable alternatives to domestic reduction by the purchasing actor.

2.4. Enabling Renewable Energy Development in the Developing World

The avoidance of dangerous anthropogenic interference with the climate will involve more than action by developed states to decarbonise. It also requires developing countries that are growing economically and the least developed countries that are yet to undergo significant economic growth to follow a different developmental pathway based on non-carbon emitting and carbon neutral energy sources. The Convention recognises this by obliging all parties to participate in the global response to

²⁹ Woerdman, E., 'The EU greenhouse gas emissions trading scheme' in Woerdman, E., Roggenkamp, M., and Holwerda, M., (eds) *Essential EU Climate Law* (Edward Elgar, 2015), 43, 44-8.

³⁰ Ibid.

³¹ Ibid.

risks posed by climate change whilst allowing initial license for developing states to increase their greenhouse gas emissions in meeting “their social and development needs”.³² However, it failed to provide direction on the emissions trajectory that states should follow including when the emissions of developing countries should peak. The need for developing countries to embark on a low carbon energy transition or simply to avoid a fossil fuel- based stage in their development is now much greater as a result of carbon intensive growth since the early 1990s in some developing states that were in the early stages of their development when the Convention was agreed.

A range of challenges need to be overcome to enable or persuade those countries classed as developing to follow a different route to that taken by countries classed as developed under the climate change regime during the 19th and 20th centuries. The more economically advanced developing states may have acquired abilities to develop and deploy renewable energy technologies themselves, but may be unwilling to do so because it would hand competitive advantages to those states that have developed on the back of cheaper and well-established fossil fuel technologies. They may also regard making commitments to replace fossil fuels with renewables as being incompatible with the equitable argument that the states primarily responsible for causing the climate crisis in the first place should take responsibility for addressing it by cutting their emissions to the extent necessary to allow others to have the same opportunities for economic and social development.³³ For those countries, the provision of financial and technological support by developed state parties as compensation (although developed states would not agree to such a description) for their consumption of much of the safe climate space may be viewed as a precondition to taking on obligations to mitigate climate change.³⁴

³² FCCC (n 7), preamble, 3rd para.

³³ Cullet, P., ‘Common but differentiated responsibilities’ in Fitzmaurice, M., Ong, D., and Merkouris, P., (eds), *Research Handbook on International Environmental Law* (Edward Elgar, 2010), 169-170.

³⁴ Ibid. Gaines, S., ‘International Law and Institutions for Climate Change’ in Sarnoff, J., (ed) *Research Handbook on Intellectual Property and Climate Change* (Edward Elgar, 2016), 33, 38-39.

Whilst certain developing countries may have some choice over how development is conducted, the reality for many of them, and particularly the least developed countries, is that they do not have the capacity to initiate low carbon energy development. States may lack any of the factors required to exploit renewable resources including access to relevant technologies, knowledge of how they operate and are maintained, awareness of the resources available to them, a capacity to conduct or support research on development, the infrastructure required for enabling access to energy for their peoples, or the institutions needed to support the growth of a renewables sector including appropriate policy and legal frameworks.³⁵ States lacking a supportive policy and legal environment for renewable energy development will also struggle to attract investment even where funding is available.

Interstate agreements can play a major part in addressing these challenges by arranging flows of finance and technology, both hardware and software, from developed states and their actors possessing wealth and knowhow to those in need.³⁶ Obligations to provide financial and technological support are also the principal means by which equitable objections to contributing to climate change mitigation can be overcome with assistance from developed states amounting to recompense for the negative environmental consequences of historic actions as much as a stimulus for the adoption of low carbon energy supplies.³⁷ However, the experience with such arrangements under the Convention and Protocol, discussed at section 7.1 below, shows that they must be carefully designed if they are to realise these potential benefits. If they are to set states on a low carbon energy pathway then parties with established technological capabilities, whether developed or developing, must also commit to provide the long-term support required for building capacities in states that lack the capabilities required to adopt, adapt, and develop renewable energy technologies domestically. Risks

³⁵ Intergovernmental Panel on Climate Change, 'Renewable Energy and Climate Change' (n 14), 195; Ockwell, D., and Mallett, A., 'Introduction: Low-Carbon Technology Transfer – From Rhetoric to Reality' in Ockwell, D., and Mallett, A., (eds) *Low-Carbon Technology Transfer – From Rhetoric to Reality* (Routledge, 2012), 3, 3-18.

³⁶ Wilder Am, M., and Drake, L., 'International Law and the Renewable Energy Sector' in Carlane, C, Gray, K., and Tarasofsky, R., (eds) *The Oxford Handbook of International Climate Change Law* (Oxford University Press, 2016) 358, 359-60.

³⁷ Gaines, International Law and Institutions' (n 34), 38-9.

arise that support provided to host states lacking indigenous capacities to innovate and without contemporaneous efforts to support capacity-building will not have any long-term benefit.³⁸ Provision for capacity building under the international climate change regime is considered at section 7.3 below.

3. Supporting Renewable Energy

The Convention and the Protocol are largely silent on the potential contribution of renewable sources to combating climate change. The former contains only a general commitment by parties to promote and cooperate on the development, application and diffusion of technologies, practices and processes that “control, reduce or prevent” greenhouse gas emissions from the energy sector among others.³⁹ The Kyoto Protocol makes only a marginal advance beyond this position, suggesting that parties should research, develop, promote and increase the use of new and renewable forms of energy in an indicative list of actions that developing country parties should take, but not obliging them to do so.⁴⁰ Commentators have criticised this failure to promote perhaps the most effective means available to parties of reducing their greenhouse gas emissions in either instrument, and have called for the promotion of renewable energy as a main focus of any future instrument with some suggesting that a protocol specifically concerned with this would offer a more effective route for greenhouse gas reduction than further attempts to reach an international consensus on how responsibility for tackling climate change should be allocated.⁴¹

Some consideration was given in the climate change negotiations following the 17th Conference of Parties to the Convention at Durban in 2011 to including provisions on options for decarbonising energy in a future agreement. Bruce mentions that renewable energy was contemplated in early

³⁸ Byrne, R., Smith, A., Watson, J., and Ockwell, D., ‘Energy Pathways in Low Carbon Development: the Need to Go Beyond Technology Transfer’ in Ockwell, D., and Mallett, A. (eds) *Low Carbon Technology Transfer: From Rhetoric to Reality* (Routledge, 2012), 123, 124-7; Verbeken, A-M., ‘Low Carbon Technology Transfer under the Climate Change Convention: Evolution of Multilateral Technology Support’ in Ockwell, D., and Mallett, A., (eds) *Low Carbon Technology Transfer: From Rhetoric to Reality* (Routledge, 2012), 143, 150-1 and 160.

³⁹ FCCC (n 7), art 4.1(c).

⁴⁰ Kyoto Protocol (n 8), art 2(1)(a)(iv).

⁴¹ See n 22 above.

discussions “as an option to increase the ambition of existing pledges and ‘supplementary’ measures to reduce emissions before 2020”.⁴² Citelli refers to the inclusion of provisions making reference to renewable energy and energy efficiency in the draft negotiating text annexed to the decision of the 20th Conference of the Parties to the Convention known as the Lima Call for Climate Action.⁴³ Paragraph 53 of the section of the text under the heading ‘sources of finance’ includes a proposal for the establishment of “an international renewable energy and energy efficiency bond facility”.⁴⁴ It also proposes that parties should employ other measures for levelling the playing field between fossil fuel energy and alternative energy sources including a tax on oil exports from developing to developed countries and a ‘phasing down’ of high carbon investments and fossil fuel subsidies.⁴⁵

It is unsurprising in view of the usual reluctance of states to make commitments that would surrender their control over decision-making on the contents of energy supplies that these proposals do not survive in the final text of the Agreement. The only reference of any kind to energy is made in the preamble to the decision of the Conference of Parties adopting the Agreement (hereafter ‘the Paris Decision’) which acknowledges “the need to promote universal access to sustainable energy in developing countries, in particular in Africa, through the enhanced deployment of renewable energy”.⁴⁶ The Paris Decision also contains a statement recognising the important role of providing incentives for emission reduction activities including tools such as domestic policies and carbon pricing, but lacks any substantive commitment concerning alternative energy forms.⁴⁷ As a result, the Agreement fails to provide any positive stimulus for the growth of renewable energy consumption. Its effectiveness for promoting investment in renewables is reliant on its ability to steer energy sector

⁴² Bruce, ‘International Law and Renewable Energy’ (n 22), 32.

⁴³ Citelli, M., ‘Generating Renewable Energy for the Material Realization of Sustainable Development: What Do We Need From Multilateral Cooperation, the Climate Change and the International Trade Regimes?’ in Mauerhofer, V., (ed) *Legal Aspects of Sustainable Development* (Springer, 2016), 380.

⁴⁴ UNFCCC, Report of the conference of the parties on its twentieth session, held in Lima from 1 to 14 December 2014, “Lima Call For Climate Action”, Decision 1/COP 20, FCCC/CP/2014/10/Add.1 of 5 Feb 2015, para 53.

⁴⁵ Ibid.

⁴⁶ UNFCCC, ‘Decision 1/CP.21 Adoption of the Paris Agreement (29 January 2106) FCCC/CP/2015/10/Add.1 (Paris Decision), preamble, 16th para.

⁴⁷ Ibid., para 136.

investment and state support for this away from fossil fuels, and to hold contracting parties to commitments made to support renewable energy in their NDCs.

4. Deterring Investment in Fossil Fuel Energy

Signals sent by the Convention and Protocol have been too weak to alter the behaviours of the fossil fuel sector and its supporters. All states have an obligation to “[f]ormulate, implement, publish and regularly update...programmes containing measures to mitigate climate change”, but its effectiveness is undermined by the lack of a basis for judging whether or not proposed state actions are sufficient to achieve the Convention’s objectives or to discipline contracting parties if they are not.⁴⁸ The principal reason for this is a failure to link the Convention’s goal to avoid dangerous anthropogenic interference with state obligations to combat climate change. The only direction is that developed states should aim to reduce their emissions to 1990 levels by 2000, but no trajectory is proposed for reductions beyond this less than exacting staging post.⁴⁹ Moves to further clarify responsibilities for mitigating climate change were initiated by a provision of the Convention itself, reflecting the perception of its guidance on mitigation as being inadequate even by those who drafted the document.⁵⁰ Unfortunately, the negotiating model adopted for what became the Kyoto Protocol of setting emission targets for specified periods with no mechanism for raising them thereafter apart from through further agreement also fails to provide the long term signal required to promote disinvestment from fossil fuels.

The Convention and the Protocol are even less illuminating about the decarbonisation pathway to be followed by developing states. License is provided for them to increase greenhouse gas emissions in connection with meeting their “social and development needs”, whilst Article 4(7) advises that the extent to which they will effectively implement their commitments “will take fully into account that the economic and social development and poverty eradication” are their “first and overriding

⁴⁸ FCCC (n 7), art 4(1)(b).

⁴⁹ *Ibid.*, art 4(2)(b).

⁵⁰ *Ibid.*, art 4(2)(d).

priorities”.⁵¹ Developing countries are not given carte blanche to pursue fossil fuel driven growth without constraint. It would not have made sense for them to take on obligations to mitigate if this were the case. However, no direction is given on the emissions trajectory that they should follow. The predictable consequence is that emissions from developing world countries have increased dramatically since 1992 with China having become the largest single state emitter in that period.

Opinions on whether the Agreement signals more strongly the international community’s commitment to decarbonisation than its predecessors are hard to reconcile. Kinley regards it as sending a clear message that “the era of fossil fuels is ending” and that “[r]eal transformation of the energy sector is the will, and undertaking, of all of the world’s governments, including fossil-fuel exporters”.⁵² In contrast, Spash lambasts an agreement that makes no comment on fossil fuel use.⁵³ In making this criticism he alludes to the continued lack of provisions providing active support for the development of a low carbon energy sector under the international climate change regime.⁵⁴ If considered in isolation, the formal requirements that the Agreement places on parties for reducing emissions do not represent a significant advance from the position under the Convention and Protocol. The express obligation on developed states to achieve emissions cuts is replaced with a non-binding statement of expectation that they will do so. Instead, all states take on a lowest common denominator obligation of self-determining their contribution to mitigation efforts.⁵⁵ Article 4(2) echoes the obligation to communicate and implement programmes of measures to mitigate climate change under Article 4(1)(b) of the Convention by requiring each party to “prepare, communicate and maintain successive nationally determined contributions that it intends to achieve”. This provision could even be said to place a lower level of expectation than the Convention on contracting parties in that it requires them only to “pursue domestic mitigation measures with the aim of achieving the

⁵¹ Ibid., preamble 3rd para and art 4(7).

⁵² Richard Kinley, ‘Climate change after Paris: from turning point to transformation’ (2016) *Climate Policy*, 2 [in press].

⁵³ Clive L. Spash, ‘This Changes Nothing: The Paris Agreement to Ignore Reality’ (2016) *Globalizations*, 4 [in press].

⁵⁴ Ibid.

⁵⁵ Paris Agreement (n 6), art 4(2).

objectives of” their NDCs rather than the unqualified requirement under the Convention to implement the programmes of measures communicated by them periodically.⁵⁶

Where the Agreement does differ from its predecessors is in its clear expectation that parties’ contributions will become progressively stronger from the starting point of their initial NDC. Article 3 advises that “[t]he efforts of all Parties will represent a progression over time”. Article 4(3) similarly advises that each party’s NDC “will represent a progression beyond the Party’s then current nationally determined contribution and reflect its highest possible ambition”. In addition, Article 4(4) advises developing country parties that they should “continue enhancing their mitigation efforts”, and that they are “encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of different national circumstances”. These provisions make normative statements rather than imposing legally binding obligations. The legal position is therefore no different to that under the Convention with parties having no formal obligation to improve their climate change responses. Even so, it is clear that states are expected to strengthen their contributions regularly unless justification can be provided for not doing so.

The sense of commitment by the international community to addressing climate change is further reinforced by the Agreement’s direction on the expected contribution of developing country parties to achieving its goal of holding the increase in global average temperatures to less than 2°C, and by the inclusion for the first time in the international climate change regime of an endpoint for mitigation efforts by reference to which the efforts of parties can be assessed. In common with the Convention, the Agreement recognises that the emissions of developing country parties are likely to increase initially. Article 4(1) notes that it will take longer for developing countries to reach a point where their growth in emissions peaks. Similarly, they are only encouraged “to move over time towards economy-wide emission reduction or limitation targets” in contrast to developed states who the Agreement

⁵⁶ Ibid.

advises should reduce overall emissions as their default approach.⁵⁷ The Agreement does differ from the Convention however in envisaging that developing states will work towards a point where their total emissions will start to decline. It is implicit in the observation that it will take longer for the emissions of developing countries to peak that this is something which they should aim for.⁵⁸ No indication is given as to how quickly this should occur, but the unabated growth of developing country emissions is unlikely to be compatible with the Agreement's goal of achieving a balance between global emissions by source and removals by sinks during the 21st century even if developed countries are able to transition to low carbon economies during the coming decades.⁵⁹ This goal does not envisage a complete withdrawal of greenhouse gas emitting actions which may leave some scope for the continued use of fossil fuel energy to the extent that the carbon released can be offset by sinks. The very flexible timescale for achieving the goal also detracts somewhat from any sense of urgency that the inclusion of a destination may provide. Even so, the international community has given a clear indication that the licence given for developing states to pursue a fossil fuel driven expansion is not open-ended. Its agreed position is that all contracting parties should reduce emissions from their energy sectors to levels below what sinks can absorb during this century.

The intent shown by the Agreement is striking when compared to its predecessors' lack of vision, but its ability to alter investment patterns and to prompt withdrawal of support for fossil fuels is impaired by four factors which weaken its message. First, the Agreement allows states to reflect their common but differentiated responsibilities and respective capabilities in the light of different national circumstances when preparing their NDCs and determining the extent to which updated submissions should improve upon their prior position.⁶⁰ The possibility remains open therefore for developing states to justify lower levels of contribution than what they are capable of on grounds that the lion's share of responsibility for exposing the world to risks of dangerous climate change still lies with

⁵⁷ Ibid., art 4(4).

⁵⁸ Ibid., art 4(1).

⁵⁹ Ibid.

⁶⁰ Ibid., arts 2(2) and 4(3).

developed states because of their historic actions or that developed states have not provided sufficient financial and technological support for their mitigation efforts. It is also conceivable that developed states may lower their own ambition if developing states are not thought to be pulling their weight. Parties may come under peer pressure to improve their positions due to the greater transparency under the Agreement.⁶¹ The wording ‘in the light of different national circumstances’ also reinforces the message that parties should reappraise and by implication strengthen their climate change mitigation activities in line with economic growth and increasing responsibility in the present for consuming what is left of the ‘safe’ climate space.⁶² Even so, the fact that states are permitted to make proposals falling short of what they are capable of by reference to their perception of what others should be contributing weakens the impetus provided by requirements for mitigatory efforts to be escalated periodically.

Second, states are not legally bound to enhance their contributions at each five yearly resubmission. The extent to which they respond to the Agreement’s several normative expectations depends, in the absence of political will to do so voluntarily, on the presence of the following three elements: compliance by states with their obligations to provide information under the Agreement’s transparency mechanism; the preparedness of other states to impose peer pressure on parties whose contributions fall short of what might be expected; and how states subject to this pressure respond. A failure to provide the information needed to support this process can also only be rectified by peer pressure itself as the Agreement does not establish a mechanism for enforcing compliance by parties with their obligations.⁶³ The many variables undermine the confidence that can be drawn from the Agreement itself that decarbonisation will proceed inexorably and following a reasonably predictable trajectory to the goal of balanced net emissions and temperature increases held below 2°C.

⁶¹ Ibid., art 13.

⁶² Ibid., arts 2(2) and 4(3).

⁶³ The Implementation and Compliance Mechanism established at Article 15 is described as being “facilitative in nature and function in a manner that is transparent, non-adversarial and non-punitive”.

A third consideration is that parties are not obliged to implement their NDCs to the letter. Their obligation, as mentioned above, is only to pursue domestic mitigation measures with the aim of achieving the objectives of their NDCs.⁶⁴ The Agreement implies that NDCs are meant to be taken seriously with parties being required to provide information necessary to track progress made by them on their implementation, and with this information being made subject to a technical expert review, the role of which is to comment and identify areas of improvement in a facilitative non-intrusive non-punitive manner.⁶⁵ Again however, the ability of this process to affect the behaviour of states depends on their susceptibility to peer pressure with no fall-back position if parties prove immune to external opinion. The likely combined effect of the non-enforceability of NDCs and the absence of an enforcement mechanism even for the general obligation that parties do possess to effect commitments that they have made independently will be to render the NDC process ineffective for altering investor behaviour.

A fourth weakness lies in the lack of obligation for parties to communicate how the long-term goals of the Agreement will be achieved.⁶⁶ Parties are strongly encouraged to “formulate and communicate long-term low greenhouse gas emission development strategies”, but are not obliged to do so.⁶⁷ Instead, the requirement to reconsider national contributions to the global climate change effort every five years is likely to introduce short-termism to parties’ thinking informed by the status of climate negotiations at that time, by domestic political circumstances, and by individual perception of the adequacy of contributions made by others with no guarantee of forwards movement at each stage of review.⁶⁸ Clear statements of pathways towards decarbonisation and of what a decarbonised future would look like would assist with redirecting finance away from fossil fuels and towards renewable energy if proposed timescales for action are sufficiently exacting to place future cost

⁶⁴ Paris Agreement (n 6), art 4(2).

⁶⁵ *Ibid.*, art 13(11).

⁶⁶ *Ibid.*, art 2.

⁶⁷ *Ibid.*, art 4(19).

⁶⁸ *Ibid.*, art 4(9).

recovery for investment in the present at risk or if the possibility of a renewables dominated future is sufficiently compelling to attract actors looking to benefit from first mover advantage. In contrast, five yearly snapshots may give rise to a 'wait and see' attitude amongst investors with a consistent practice of emissions cuts amongst the largest state consumers of carbon emitting energy sources being required to prompt a change of course.

In summary, the international community has sent a strong signal in the Agreement that it recognises the need to decarbonise, but its ability to influence investment and support for fossil fuel energy is impaired by the significant leeway for states to react to or ignore standards which the Agreement invites them to observe, and by the lack of legal underpinning for parties' NDCs. For all its positive noises on tackling the causes of climate change, the Agreement's main contribution is to create a structure for on-going negotiations that may lead to stronger commitments by parties in the future. It provides no basis in itself for creating investor confidence that the fossil fuel era will definitely conclude within an identifiable timescale, and therefore that financial support should be directed to renewables and other low carbon energy sources.

5. Placing a Price on Greenhouse Gas Emissions

5.1. Market Mechanisms under the Kyoto Protocol

The Protocol allows parties to meet their targets by using allowances purchased through international emissions trading to offset emissions exceeding their targets.⁶⁹ This has not proved to be a significant driver for renewable energy as parties' targets were not exacting enough to create demand for unit transfers from other parties.⁷⁰ Parties with targets under the Protocol are also able to use credits earned through project development in other states when calculating whether they have complied with their targets. Joint implementation (JI) permits a party with a target to derive the benefit from

⁶⁹ Kyoto Protocol (n 8), art 17.

⁷⁰ Pflieger, G., 'Kyoto Protocol and Beyond' in Freedman, B., (ed) *Global Environmental Change* (Springer Netherlands, 2014), 517, 520.

emissions reducing projects in another party with a target under the Protocol.⁷¹ This mechanism has made little contribution to the spread of renewable energy with end of pipe emission reduction projects being preferred because credits can be earned at lower expense than through developing renewable energy infrastructure.⁷² The Clean Development Mechanism (CDM) enables parties with targets to earn credits by undertaking projects in non-target (developing) states that result in long-term additional emissions reduction over the baseline level that would have pertained without the project.⁷³ In contrast to JI, 71% of the 8500 CDM projects as at October 2016 have involved renewable energy production.⁷⁴ This striking difference is due in part to the requirement that projects under the CDM should contribute to sustainable development in the host country.⁷⁵ The mechanisms have seen higher levels of use, despite the lack of demand by states for meeting international targets, due to allowance for credits to be used as offsets under the EU's Emissions Trading System.⁷⁶

The CDM has been the most obviously successful element of the international climate change regime for promoting renewable energy, but there are grounds for arguing that it has not been as effective as such a mechanism could have been for driving low carbon energy development in the developing world and that the results achieved are unlikely to be long-lasting. First, some aspects of the mechanism detract from the appeal of renewable energy developments compared to alternative means of earning credits. The requirement that emissions savings should be demonstrably additional to those that would have occurred on a business as usual basis is harder to demonstrate than for 'end of pipe' projects that reduce greenhouse gas emissions from existing facilities (e.g. capturing methane

⁷¹ Kyoto Protocol (n 8), art 6.

⁷² UNEP DTU Partnership, 'JI Projects', available at <<http://cdmpipeline.org/ji-projects.htm>> (accessed 24 October 2016). 18.3% of the 761 projects under the mechanism were for renewable energy as at 1 October 2016.

⁷³ Kyoto Protocol (n 8), art 12.

⁷⁴ UNEP DTU Partnership, 'CDM Projects by type', available at <<http://cdmpipeline.org/cdm-projects-type.htm>> (accessed 24 October 2016).

⁷⁵ Kyoto Protocol (n 8), art 12(2).

⁷⁶ Streck, C., Keenlyside, P., and von Unger, M., 'The Paris Agreement: A New Beginning' (2016) 13 *Journal for European Environmental and Planning Law*, 3, 17.

from landfill sites).⁷⁷ Such projects are also often more attractive for investors as they can realise very large volumes of credits at much lower cost.⁷⁸ The fact that funding is only available for operational projects adds to the appeal of projects presenting a lower risk of loss.⁷⁹

Second, the mechanism has proved poor for overcoming barriers to renewable energy in the least developed countries of the developing world due to limited capacity for supporting low carbon development. 75% of CDM projects are located in China, India, Mexico and Brazil, all of which have well-established capacities for technological innovation.⁸⁰ In contrast, less than 3% of projects are located in Africa and less than 1% in the least developed countries due, in large part, to an inability to attract and support private investment.⁸¹ CDM has also proved to be a weak vehicle for technology transfer with the ability of a project to support technological development in the host state not being a condition for the issue of credits.⁸² As the *raison d'être* for the mechanism is to promote economic efficiency by developed states in meeting their targets, it is unsurprising that its participants should focus on opportunities for obtaining the maximum credits for the least outlay rather than on enhancing capacities for energy innovation in developing states.

⁷⁷ Gaines, 'International Law and Institutions', (n 34), 45; Wilder Am and Drake, 'International Law and Renewable Energy', (n 36), 366.

⁷⁸ Citelli et al, 'Renewable Energy in the International Arena', (n 23), 25; Wilder Am and Drake, 'International Law and Renewable Energy', (n 36), 366.

⁷⁹ Newell, P. and Bulkeley, H., 'Landscape for change? International climate policy and energy transitions: evidence from sub-Saharan Africa' (2016) *Climate Policy*, (in press) 8; Wilder Am and Drake, 'International Law and Renewable Energy' (n 36), 366.

⁸⁰ Ferrey, S., 'The Failure of International Global Warming Regulation to promote needed Renewable Energy' (2010) 37 *Boston College Environmental Affairs Law Review*, 67, 86; Gaines, 'Internal Law and Institutions', (n 34), 45; Thompson, A., 'The Global Regime for Climate Finance: Political and Legal Challenges' in Carlane, C., Gray, K. and Tarasofsky, R., (eds) *Oxford Handbook of International Climate Change Law* (Oxford University Press, 2016), 138, 145.

⁸¹ Gaines, 'International Law and Institutions', (n 34), 45; Hedger, M., 'Stagnation or Regeneration: Technology transfer in the United Nations Convention on Climate Change' in Ockwell, D., and Mallett, A., (eds) *Low Carbon Technology Transfer: From Rhetoric to Reality* (Routledge, 2012), 211, 219; Newell and Bulkeley, 'Landscape for Change', (n 79), 8.

⁸² Ferrey, 'The Failure of International Global Warming Regulation', (n 80), 76; Gaines, 'International Law and Institutions', (n 34), 45; Shabalala, D., 'Technology transfer for climate change and developing country viewpoints on historical responsibility and common but differentiated responsibilities' in Sarnoff, J., (ed) *Research Handbook on Intellectual Property and Climate Change* (Edward Elgar, 2016), 172, 181-2.

Third, a stable price at a high enough level for credits is required to attract investment in renewables by creating confidence that the high initial development costs will be recouped. The value of the CDM has collapsed, and with it has gone its ability to attract investment in renewables.⁸³ The fact that the second commitment period of the Kyoto Protocol, already blighted by the lack of emission reduction targets for the world's largest emitters, has not yet entered into force removes international demand.⁸⁴ Requirements for credits from the EU ETS have also declined substantially due initially to restrictions of the use of credits from certain gas destroying end of pipe projects because of doubts over their credibility and latterly due to a requirement that offsets must derive from projects in least developed countries.⁸⁵

5.2 Market Mechanisms under the Paris Agreement

Article 6 of the Agreement identifies two ways in which parties may implement their NDCs through voluntary cooperation in addition to their own efforts. These are: the use of 'internationally determined mitigation outcomes' derived from cooperation in meeting their NDCs;⁸⁶ and a mechanism, bearing some resemblance to the CDM, allowing all parties to earn emission credits by supporting actions to mitigate greenhouse gases and support sustainable development in other states.⁸⁷ In addition, it 'defines' a framework for non-market approaches to assisting with the implementation of NDCs in "the context of sustainable development and poverty eradication".⁸⁸

The first point to make when considering whether these vehicles for collaboration are likely to be more effective for supporting renewable energy development than mechanisms under the Protocol is that it is very difficult to determine how any of them will operate from the texts of the Agreement and

⁸³ Hedger, 'Stagnation or Regeneration', (n 81), 220; Newell and Bulkeley, 'Landscape for Change', (n 79), 8-10; Wilder Am and Drake, 'International Law and Renewable Energy', (n 36) 366.

⁸⁴ Gaines, 'International Law and Institutions', (n 34), 27; Thompson, 'The Global Regime for Climate Finance', (n 80), 146.

⁸⁵ Emissions-EUETS.com, 'CERs and ERUs market as from 2013', available at <<http://www.emissions-euets.com/cers-erus-market-as-from-2013>> accessed 24 October 2016.

⁸⁶ Paris Agreement (n 6), arts 6(2) and 6(3).

⁸⁷ Ibid., art 6(4).

⁸⁸ Ibid., arts 6(8) and 6(9).

Decision.⁸⁹ The details and modalities have been left to bodies operating under the Convention to prepare, and it is eminently possible, the inclusion of market mechanisms having been viewed with scepticism and opposed by some parties, that agreement on how they should operate will not be reached.⁹⁰ Despite this, some observations can be made about support that the mechanisms may provide for overcoming barriers to the diffusion of renewable energy.

The first is that there is no international emissions trading mechanism of the type established under the Protocol as parties do not have legally binding targets under the Agreement.⁹¹ However, the allowance for all states to include “internationally transferred mitigation outcomes” (ITMOs) amongst national actions for mitigating climate change in their NDCs preserves the possibility for those supporting decarbonisation through renewable energy development to agree on an ad hoc basis with states that are less well-placed to decarbonise energy supplies to transfer resulting emission reductions to them for a financial consideration. It could also expand significantly the possibilities states have to meet their contributions to climate change mitigation by undertaking emission reduction projects in other states.⁹² In particular, it may incentivise the establishment and linking of domestic emission trading schemes if allowances to emit issued under them and transferred between them are accepted as ITMOs for the purposes of preparing and implementing NDCs.⁹³ The expansion of mechanisms that place a price on carbon could assist with levelling the playing field for renewable energy globally, but only, as noted above, if it results in the prospect of high enough carbon costs to incentivise investment in renewables by making them a financially preferable alternative. The spread of emissions trading would not be beneficial for the renewable energy sector if a rush to link with

⁸⁹ Marcu, A., ‘Carbon Market Provisions in the Paris Agreement (Article 6)’, (CEPS Special Report No. 128, January 2016), available at <<https://www.ceps.eu/publications/carbon-market-provisions-paris-agreement-article-6>> accessed 15 September 2016.

⁹⁰ Ibid., 1-3; Streck et al, ‘The Paris Agreement’ (n 76), 14-15.

⁹¹ Ibid., 5-6.

⁹² Ibid., 5-7; Obergassel W, Arens C, Hermwille L, Kreibich N, Mersmann F, Ott H and Wang-Helmreich H, ‘Phoenix from the ashes: an analysis of the Paris Agreement to the United Nations Framework Convention on Climate Change – Part I’ (2015) 27 *Environmental Law and Management*, 243, 253.

⁹³ Jevnaker and Wettstad, ‘Linked Carbon Markets’ (n 27), 142. The Convention’s Subsidiary Body for Scientific and Technical Advice is requested by paragraph 36 of the Paris Decision (n 46) to prepare guidance on the transfer of ITMOs for adoption by the first conference of parties to the Paris Agreement.

schemes offering lower cost opportunities for covering emissions were to depress the carbon price. It may also be to the detriment of the renewables sector if subsidies, although they are frequently essential for early stage commercialisation and to support more expensive renewable technologies, are removed to prevent support external to the trading system from impairing its economic efficiency by giving rise to unused units for reasons other than that investing in renewable energy is the most economically rational way to proceed.

Second, the fact that the Sustainable Development mechanism was proposed by Brazil as an improved version of the CDM (describing it as CDM+) suggests that it will be expected to provide a vehicle for trading units representing avoided emissions, and, in doing so, for leveraging private investment in relevant projects.⁹⁴ Direction in the Agreement that the mechanism should “incentivize and facilitate participation in the mitigation of greenhouse gas emissions by public and private entities...” and in the Paris Decision that the mechanism should build on “[e]xperience gained with and lessons learned from existing mechanisms and approaches adopted under the Convention and its related legal instruments” reinforces this impression.⁹⁵ Accordingly, it appears that arrangements of the type that proved successful for involving private actors with renewable energy projects under the Protocol will be continued, although much further detailing of how the mechanism will operate is required to confirm this.⁹⁶ For example, a new means of allocating credits for emission reductions will need to be developed in the absence of set targets that can more easily be subdivided into allowances.

Third, the basis for operation of the Sustainable Development mechanism set out in the Paris Decision requires that proposals for activities should be able to demonstrate the ‘additionality’ of emissions savings that they are expected to realise over a business as usual scenario.⁹⁷ It proved harder for new build renewable energy projects to satisfy a similar requirement under the CDM (e.g. that the project

⁹⁴ Marcu, ‘Carbon Market Provisions’ (n 89), 13.

⁹⁵ Paris Agreement (n 6), art 6(4)(b); Paris Decision (n 46), para 37(f).

⁹⁶ Para 38 of the Paris Decision requests the Subsidiary Body for Scientific and Technological Advice of the Convention to develop rules, modalities and procedures for the Sustainable Development mechanism for adoption by the Conference of Parties to the Paris Agreement.

⁹⁷ Paris Decision (n 46), para 38.

displaces carbon-emitting energy development) than for projects involving emissions reductions from existing plant.⁹⁸ Further conditions are included in the Agreement that the mechanism should both “contribute to the reduction of emission levels in the host Party” and “deliver an overall mitigation in global emissions”.⁹⁹ It is not clear what is meant by the latter condition, but the impression is that the use of credits to offset emissions exceeding a party’s commitment will be frowned on.¹⁰⁰ This would be beneficial for emissions reductions, but may also lead to continued favouring of ‘end of pipe’ projects for which it is easier to demonstrate that overall emission reductions have been achieved. Both conditions would also limit the extent to which the mechanism is capable of driving renewable energy development and related technology transfer in the least developed countries as they have fewer emissions to reduce than other states.

Fourth, the scope of activities that would be regarded as ITMOs and that would fall under the sustainable development mechanism requires further definition,¹⁰¹ but arguably encompasses not only the individual projects supported by the JI and CDM mechanisms, but also the implementation of policies, plans and programmes.¹⁰² A broad understanding of supported activities could allow very large numbers of credits to be earned from sector-wide interventions. The allowance for all parties to transfer ITMOs and to undertake activities under the Sustainable Development mechanism also expands possibilities for states to support renewable energy development in other states including for technologically literate developing country parties such as China and India to benefit from supporting poorer developing countries.¹⁰³

⁹⁸ Wilder Am and Drake, ‘International Law and the Renewable Energy Sector’, (n 36), 366.

⁹⁹ Paris Agreement (n 6), art 6(4)(d).

¹⁰⁰ Marcu, ‘Carbon Market Provisions’ (n 89), 19-20.

¹⁰¹ Mansell, A., International Centre for Trade and Sustainable Development, ‘What’s ahead for carbon markets after COP21?’, February 2016, available at <<http://www.ictsd.org/bridges-news/biores/news/what%E2%80%99s-ahead-for-carbon-markets-after-cop21>> accessed 24 October 2016.

¹⁰² Obergassel et al, ‘Phoenix from the ashes’ (n 92), 253; Bodansky, D., ‘The Paris Climate Change Agreement: A New Hope?’ (2016) 110 *The American Journal of International Law*, 288.

¹⁰³ Obergassel et al, ‘Phoenix from the ashes’ (n 92), 253.

Finally, it is not clear what purpose the non-market approaches are intended to serve.¹⁰⁴ It is implicit from references to sustainable development, poverty eradication, finance, technology transfer and capacity-building that they are meant to facilitate the performance of developed state obligations to support mitigation and adaptation efforts. This could be beneficial if it assists with addressing problems discussed in section 7 below. However, the proposed institutional development has the appearance of something agreed to smooth ruffled feathers in negotiations (in this case those of Bolivia and other developing states that opposed the inclusion of market mechanisms in the Agreement) rather than because it would clearly enhance global mitigation efforts. The perennial risk with responding to difficulties by adding institutional layers, as seen with climate finance, is that the resulting complexity will make it harder rather than easier to achieve the objectives that the new institution is intended to promote.

In summary, it can be surmised from the rough outlines of cooperation mechanisms in Article 6 of the Agreement that they may, depending on how they are fleshed out by the Conference of Parties to the Paris Agreement, maintain and build on incentives provided under the Protocol that enjoyed some success with supporting renewable energy development. It can also be noted in advance of further details of the outlined mechanisms being provided that they potentially expand the range of renewable-energy related projects from which benefits may be derived through cooperation, but that they also fail to remedy some weaknesses of the CDM and JI for supporting renewables (e.g. additionality), and may also add to them by requiring that activities should reduce existing emissions in the host state and contribute to an overall global mitigation to be eligible under the sustainable development mechanism. In addition, it should be borne in mind that the success of the CDM for supporting renewables was largely due, as noted in section 6.1 above, to demand for units under the EU emissions trading system. This will not be replicated unless emissions trading schemes in the EU and elsewhere allow international units to be used under them as offsets or alternatives to domestic

¹⁰⁴ Ibid., 20-1; Streck et al, 'The Paris Agreement' (n 76), 17.

emission reduction. There is no guarantee without this demand that the price of credits under the sustainable development mechanism (and in connection with ITMOs if a market is established for them as some pro-emissions trading actors have called for)¹⁰⁵ will be sufficient to attract investment in renewable energy projects. In this regard, intended nationally determined contributions submitted before the Paris Conference of Parties showed limited appetite for purchasing units from other parties.¹⁰⁶

6. Supporting Renewable Energy Production in the Developing World

6.1. Climate Finance and Technology Transfer under the Convention

Several difficulties have been experienced with realising the potential of arrangements for climate finance and technology transfer under the Convention and Protocol to enable low carbon energy development and the growth of renewable energy as part of this in the developing world. First, what developed states are required to do to comply with their obligations is unclear from the vague wording of the relevant provisions of the Convention and Protocol.¹⁰⁷ The expenditure covered by the obligation to meet the “agreed full incremental costs” of measures by developing states to implement their obligations under the Convention is not defined.¹⁰⁸ The amount of support to be provided and how the burden for financing this should be shared amongst developed states are not specified. The parties made a belated attempt to clarify the position at the Copenhagen Conference of Parties in 2009 by agreeing that developed states should mobilise \$100 billion funding annually by 2020, but this agreement is also difficult to effect due to a lack of guidance on how responsibility for raising this amount should be allocated.¹⁰⁹ Implementing the Convention’s technology transfer provision has similarly been made difficult by uncertainty over what actions the obligation to “promote, facilitate

¹⁰⁵ Marcu, ‘Carbon Market Provisions’ (n 89), 6-7;

¹⁰⁶ Streck et al, ‘The Paris Agreement’ (n 76), 17-18; Obergassel et al, ‘Phoenix from the Ashes’ (n 92), 253.

¹⁰⁷ Thompson, ‘The Global Regime for Climate Finance’, (n 80), 141.

¹⁰⁸ FCCC (n 7), art 4(3).

¹⁰⁹ UN Doc. FCCC/CP/2009/L.7, 18 December 2009. Thompson, ‘The Global Regime for Climate Finance’ (n 80), 156-7.

and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties” requires developed states to undertake,¹¹⁰ and by failures to define clearly what technology transfer involves or to specify the financial support that should be provided for this.¹¹¹

Second, workable procedures for disbursing funds and for transferring technological knowhow have been slow to develop.¹¹² The World Bank’s Global Environment Facility was chosen as the vehicle for distributing financial support, but its practice of granting support on a discretionary basis has angered developing states who view the provision of financial backing for their mitigation efforts in line with developed state obligations under the Convention as an entitlement.¹¹³ The creation of several funding channels to deal with specific situations and to create alternative providers to the Global Environment Facility have led to what has been described as “a spaghetti bowl” of funding mechanisms whose relationships and relative roles have not been defined.¹¹⁴ This has resulted in high transaction costs for developing country parties and compounds problems caused by poor definition of developed country responsibilities by making it difficult to track financing or to hold parties to account for non-compliance.¹¹⁵ As for technology transfer, it is only recently that a serious attempt has been made to determine how technological support can be delivered through the establishment at the Cancun Conference of Parties in 2010 of a Technology Mechanism.¹¹⁶

Third, insufficient transparency concerning finance and technology have made it difficult throughout the operation of the international climate change regime to establish how much support has been provided, whether claimed support satisfies obligations of developed states with related concerns

¹¹⁰ FCCC (n 7), art 4(5).

¹¹¹ Gaines, ‘International Law and Institutions’, (n 34), 38-40; Shabalala, ‘Technology transfer for climate change’, (n 82), 177-183.

¹¹² Thompson, ‘The Global Regime for Climate Finance’, (n 80), 143, 151-3; Shabalala, ‘Technology transfer for climate change’, (n 82), 182-3.

¹¹³ Shabalala, ‘Technology transfer for climate change’, (n 82), 182-3.

¹¹⁴ Thompson, ‘The Global Regime for Climate Finance’, (n 80), 150-3.

¹¹⁵ *Ibid.*, 151.

¹¹⁶ Gaines, ‘International law and institutions’ (n 34), 46-8; Shabalala, ‘Technology transfer for climate change’, (n 82), 187-194.

that monies provided for different purposes have been relabelled as climate finance, and whether the funding and technological assistance that has been transferred to developing countries has had any positive effect.¹¹⁷ A lack of clarity creates fertile ground for parties to argue about whether or not sufficient support has been provided rather than concentrating on enabling renewable energy development. In the same vein, the fact that developing states are not obliged to identify assistance required by them or to account for what they have received has allowed scope for them to complain that support has been inadequate without being clear about what backing they require for the creation of a renewable energy capacity.¹¹⁸

Fourth, expectations under the Convention and Protocol of transfers purely from a developed North to an undeveloped South do not correspond with changed economic realities.¹¹⁹ Brazil, India and China have become economic powers in their own right and have burgeoning capacities for technological innovation, but are under no obligation to afford financial and technological support to others. Any assistance that they do offer passes under the radar as developing country parties are not required to report on this.

The many uncertainties mentioned above have allowed the serious business of establishing low carbon economies in the developing world to become mired in debate and recrimination. Developing states argue that funding provided has been inadequate whilst developed states attribute problems not to failings on their part but to a lack of the enabling environments required for recipients of support to benefit from it including by attracting private investment.¹²⁰ The perception of inadequate support has been used by developing countries to oppose calls made on them in climate negotiations to take a more active role in mitigating climate change.¹²¹ The resulting effect on the diffusion of

¹¹⁷ Thompson, 'The Global Regime for Climate Finance', (n 80), 151-3; Alexander Zahar, 'The Paris Agreement and the Gradual Development of a Law on Climate Finance', (2016) 6 *Climate Law* 75, 83-6.

¹¹⁸ Zahar, 'The Paris Agreement' (n 117), 86.

¹¹⁹ Ockwell and Mallett, 'Introduction: Low Carbon Technology Transfer' (n 35), 3; Cullet, 'Common but Differentiated Responsibilities' (n 33), 176; Shabalala, 'Technology transfer for climate change' (n 82), 191.

¹²⁰ Thompson, 'The Global Regime for Climate Finance' (n 80), 150; Shabalala, 'Technology transfer for climate change' (n 82), 172-4.

¹²¹ Shabalala, 'Technology transfer for climate change' (n 82), 173, 187-193.

renewable energy technologies has been two-fold: more limited progress with the spread of renewable energy in the developing world than might otherwise have been achieved through developed world support; and a broader weakening of the impetus provided by the international climate change regime for decarbonising energy supplies due to the disengagement of states responsible for an increasing proportion of the world's greenhouse gas emissions and with growing capacities for technological innovation from the global effort to mitigate climate change.

6.2. Climate Finance and Technology Transfer under the Paris Agreement

Negotiations leading to the Agreement afforded an opportunity to improve the effectiveness of climate finance and technology transfer under the international climate change regime by clarifying developed country obligations, improving processes for transferring and applying funds, and increasing transparency over the provision and employment of support. Unfortunately, these nettles have not been grasped fully. The obligation for developed states to provide financial support is no better defined than corresponding provisions under the Convention and Protocol with the developing country call for the expected annual contribution to be stated in the Agreement having met strong opposition.¹²² The \$100 billion mobilisation by 2020 goal is repeated in the non-binding Paris Decision, but does not add detail to the promise made under the Copenhagen Accord or offer guidance on how the responsibility for providing this level of finance or the higher amount which the decision advises should be mobilised from 2025 should be shared amongst contributing states.¹²³ Indeed, the relevant paragraph of the decision leaves it unclear whether the post-2025 burden will fall on developed states alone or will be spread more widely amongst states possessing the capacity to support others.

The provision on technology transfer is enhanced marginally by a very high level vision of what this process is intended to achieve, but still lacks the detail required to pin developed states down to specific commitments or to judge the adequacy of the support provided by them.¹²⁴ The institutional

¹²² Zahar, 'The Paris Agreement' (n 117) 82-3; Obergassel et al, 'Phoenix from the Ashes' (n 92), 257-8.

¹²³ Paris Decision (n 46) para 53.

¹²⁴ Paris Agreement (n 6) art 10.

arrangements introduced at Cancun are endorsed and embellished by the establishment of a Technology Framework, the purpose of which is to provide overarching guidance to the Technology Mechanism's work.¹²⁵ It appears from the description of the Technology Framework in the Paris Decision that its role will be to address some of the weaknesses mentioned in Section 7.1 above with the existing arrangements under the Convention.¹²⁶ It is expected to facilitate not only the identification of developing states' technology needs to enable a more focused approach to technology transfer, but also the "enhanced implementation of their results...through the preparation of bankable projects".¹²⁷ Importantly, its role also includes "the enhancement of enabling environments for and the addressing of barriers to the development and transfer of socially and environmentally sound technologies".¹²⁸ While the Technology Framework may be a valuable addition if it strengthens support for renewable energy development in these respects, it is not clear why an overarching body to give policy guidance on technology transfer is necessary when the existing Technology Executive Committee wing of the Mechanism already has a policy role.¹²⁹ The creation of an additional institution raises concerns that the administrative complexity seen with arrangements for climate finance is being repeated, potentially adding a new problem of uncertainty over relative responsibilities between the various bodies to existing difficulties with technology transfer under the climate change regime.

The Agreement strengthens developed country obligations for reporting on climate finance and technology transfer. It does this by incorporating transparency arrangements adopted by the Cancun Conference of Parties within the body of the Agreement.¹³⁰ Developed states are required to report qualitatively and quantitatively every two years on finance provided and mobilised by them.¹³¹ They must also provide information on support provided to developing states for technology transfer and

¹²⁵ Ibid., art 10(4).

¹²⁶ Paris Decision (n 46) para 67.

¹²⁷ Ibid., para 67(a).

¹²⁸ Ibid., para 67(d).

¹²⁹ Gaines, 'International law and institutions' (n 34) 47.

¹³⁰ Zahar, 'The Paris Agreement' (n 117), 83-6.

¹³¹ Paris Agreement (n 6), arts 9(5) and 9(7).

capacity building.¹³² This information will be made subject to a Technical Expert Review.¹³³ Efforts made to comply with financing responsibilities will also be examined by all parties “in a facilitative, multilateral consideration of progress”.¹³⁴ It is made clear that neither review is intended to be intrusive or punitive, but examination of their contributions, combined with the fuller information now required, will make it harder for developed states to conceal inadequate levels of support. The proposed review in a five yearly global stocktake of whether collective finance is compatible with the Agreement’s goal of finance flows that are “consistent with a pathway towards low greenhouse gas emissions” will not comment on each party’s efforts, but further magnifies the focus on the individual contribution of states through the requirement that its results should inform their subsequent updating and enhancing of nationally determined actions and support.¹³⁵

Unfortunately, the potential for enhanced transparency on developed country actions to dispel uncertainty is undermined by a continued lack of obligation for developing states either to provide information on support made available to or received by them or on their needs for assistance.¹³⁶ They are only encouraged to report on these matters or advised that they “should” do so.¹³⁷ The fact that the Agreement expects transparency will make it harder for developing states to argue credibly that the assistance from developed states is inadequate whilst refusing to disclose what they have received and how the support has been employed. Even so, the failure to make reporting on all aspects of the financial and technological transfers mandatory leaves much scope for continued argument over the adequacy of developed state support of the type that have blighted climate change negotiations in recent years.

¹³² Ibid., art 13(9).

¹³³ Ibid., art 13(11).

¹³⁴ Ibid.

¹³⁵ Ibid., art 14.

¹³⁶ Zahar, ‘The Paris Agreement’ (n 117), 86-8.

¹³⁷ Paris Agreement (n 6), arts 9(5), 9(7), 13(9) and 13(10).

With regard to the flow of support, the Agreement is notable for encouraging developing state parties to provide climate finance.¹³⁸ It is also implicit in the failure to place the obligation to provide support for the implementation of the technology transfer provision on developed country parties alone that developing country parties with a capacity to provide technological support may be expected to do so.¹³⁹ Similarly, the description of the new minimum level of climate finance to be agreed before 2025 as ‘collective’ implies that the better off developing country parties as well as developed states may come under pressure to contribute to this.¹⁴⁰ Inclusion of developing state parties within the frame of possible contributors to climate finance and technology transfer represents a significant departure from the bifurcated world of the Kyoto Protocol, but falls short of the express broadening of the donor pool that developed state parties called for in negotiations leading to the Agreement as recognition of changed economic circumstances since the early 1990s.¹⁴¹

Finally, the Agreement makes no reference to the effect of intellectual property rights on technology transfer. Developing country views that the existence of such rights obstruct the transfer of technological knowhow and developed country arguments that other factors, particularly the lack of supportive policy and legal frameworks for technology investment and innovation, are to blame have become proxies for wider discontents over the functioning of the climate finance and technology transfer provisions.¹⁴² The fact that claimed difficulties with transferring technology posed by intellectual property rights are not addressed may reflect tacit recognition that this is not in actuality the major problem it is sometimes presented as, but silence on this issue, as with developing country reporting, leaves continued space for it to be raised as a barrier to low carbon development in future

¹³⁸ *Ibid.*, art 9(2).

¹³⁹ *Ibid.*, art 10(6)

¹⁴⁰ Paris Decision (n 46), para 53.

¹⁴¹ Bodansky, ‘The Paris Climate Change Agreement’ (n 102), 310.

¹⁴² Gaines, ‘International law and institutions’ (n 34), 34; Shabalala, ‘Technology transfer for climate change’ (n 82), 173-174.

negotiations on whether and to what extent developing country parties should take on fuller responsibility for mitigating climate change.¹⁴³

In summary, the Agreement makes some minor contributions to rectifying problems with climate finance and technology transfer under the Convention by strengthening reporting requirements for developed states and creating new institutions (e.g. the Technology Framework) that have the potential to address present weaknesses. Little improvement has been made in most respects however with no further clarification on matters central to the provision of support including the responsibility borne by individual parties and the relationships between and roles of the several institutions responsible for distributing support, and with developing countries having no obligation to provide vital information for the effective functioning of financial and technology transfer provisions. These and other residual difficulties identified in this section are likely to impede the spread of renewable energy in the developing world under the climate change regime, and raise the risk that on-going debate over the adequacy of support will continue to be used both by developed and developing states as grounds for refusing to take on stricter obligations to decarbonise with consequences for the rate of fossil fuel displacement by renewables globally.

6.3. Capacity Building

The preceding sections identify problems with mechanisms for climate finance and technology transfer that have limited their support for renewable energy development. To the extent that support has been provided, its effectiveness is further impaired where confidence is lacking in the ability of states to provide a stable investment destination due to the absence of appropriate policy and legal frameworks and of coherent regulatory frameworks for renewable energy. Private investors may be unwilling to finance projects in such circumstances even when official development aid is

¹⁴³ Gaines, 'International law and institutions' (n 34), 34.

available from the climate change regime's funding bodies.¹⁴⁴ States may also be unable to take advantage of projects involving the transfer of renewable energy hardware to them where they lack the innovation capacity required to adopt and adapt the technology provided to them.¹⁴⁵ Without this, any investments that are made may not enable the host state to achieve long-term sustainability in its energy supplies. The key response to this situation is for states with established capacities for technological innovation to provide developing countries with the long-term support required to cultivate their own capabilities for supporting renewable energy in policy law and for adopting, adapting, manufacturing and deploying technologies made available to them.

Capacity building has been a feature of the climate change regime from its inception.¹⁴⁶ Article 4(5) of the Convention obliges developed country parties to "support the development and enhancement of endogenous capacities and technologies of developing country Parties" in connection with the provision of technological support. However, as with technology transfer itself the parties have been slow to transfer general commitments into detailed programmes for action. A framework for capacity building was established in 2001 by a decision of the Marrakesh conference of parties to the Convention,¹⁴⁷ but the workstream has continued to hold a lower profile than other areas of interstate action under the international regime despite periodic reappraisal of how its status could be enhanced.¹⁴⁸

With this unpromising backdrop in mind, the inclusion of a standalone provision for capacity building in the Paris Agreement may be its most valuable contribution to improving support for renewable

¹⁴⁴ Gaines, 'International law and institutions' (n 34), 43-7; Pueyo, A., Mendiluce, M., Sanchez Naranjo, M., and Lumbreras, J., 'How to increase technology transfers to developing countries: a synthesis of the evidence' (2012) 12 *Climate Policy*, 320, 332-6.

¹⁴⁵ Byrne et al, 'Energy Pathways in Low Carbon Development' (n 38), 124-7; Verbeken, 'Low Carbon Technology Transfer under the Climate Change Convention' (n 38), 150-1 and 160.

¹⁴⁶ UNFCCC, 'A brief history of capacity-building in the UNFCCC process', available at <http://unfccc.int/cooperation_and_support/capacity_building/items/7061.php> accessed 27 October 2016.

¹⁴⁷ UNFCCC, 'Decision 2/CP.7 'Capacity building in developing states' (21 January 2002) FCCC/CP/2001/13/Add.1.

¹⁴⁸ UNFCCC, 'A brief history' (n 146).

energy development in the developing world.¹⁴⁹ The article itself mostly consists of statements recording a consensus on the desirability of support for capacity building to enable climate change mitigation and adaptation action by developing states including by acquiring abilities to facilitate technology development, dissemination and deployment and to access climate finance. Of more significance is the establishment of the Paris Committee on Capacity Building, a new meta-institution with a broad remit to address gaps in and enhance existing efforts in this area in all aspects of the climate change regime for which such support is required.¹⁵⁰ The Committee's terms of reference and its work programme will be developed in subsequent conferences of parties to the Convention and Agreement,¹⁵¹ but the fact that this essential area for low carbon energy development has been recognised and strengthened in the Agreement is a step in the right direction for setting developing states on a low carbon energy pathway.

7. Conclusion

Looked at in isolation, the Agreement does not inspire confidence that it will provide the engine house for an international diffusion of renewable energy. It does not directly promote renewables. It encourages but does not ensure that states will progressively increase their climate change mitigation efforts including by pursuing low carbon energy development. It leaves plenty of scope for argument both over how the burden of responding to climate change should be shared amongst contracting parties and on whether the developed world has atoned for its sins sufficiently by providing financial, technological and capacity building support to derail whatever motive force the Agreement may provide for displacing fossil fuel energy by renewable alternatives. Longstanding problems with arrangements for climate finance and technology transfer, the international climate change regime's main channels for supporting low carbon energy development and innovation in the developing world, have only partially been addressed. Finally, even where states do make strong commitments to

¹⁴⁹ Paris Agreement (n 6), art 11.

¹⁵⁰ Paris Decision (n 46), para 71.

¹⁵¹ *Ibid.*, paras 71 and 76.

support renewable energy in their NDCs, they cannot be forced to stand by them. However, it does at least create a framework for on-going negotiations that may lead to a progressive strengthening of international support for renewables including by allowing public and private actors that have promoted the replacement of fossil fuels with renewable energy to place pressure on contracting parties that prove more reticent to alter their energy-consuming behaviours.

It is clear from the announcement of several major initiatives for advancing renewable energy production globally at the Paris Conference of Parties and from the inclusion of measures to promote renewables in the great majority of parties' Intended Nationally Determined Contributions submitted before the Paris Conference of Parties that it is viewed as one of the principal means by which the Agreement's goals can be achieved.¹⁵² 20 leading economies (including China, India, Brazil, Mexico, Chile and Saudi Arabia, all classed as 'developing' states under the climate change regime) established Mission Innovation under which they commit to enhance significantly their policies and legal frameworks for energy innovation with a view to achieving reductions in the cost of energy production that will enable renewable energy technologies to displace fossil fuels as the cheaper option.¹⁵³ Mission Innovation is complemented by the Breakthrough Energy Coalition, a parallel initiative established by 28 of the world's wealthiest individuals and entrepreneurs (including Bill Gates, Mark Zuckerberg and Jeff Bezos) whose aim is to scale up the public research pipeline by linking it to "patient, flexible investment committed to developing the technologies that will create a new energy mix".¹⁵⁴ Equivalent statements of intent from developing state groups are seen in the establishment of: the International Solar Alliance, a group helmed by India and France with the backing of 120 states which seeks to establish conducive conditions and mobilise financial support for exploiting the vast

¹⁵² Bodansky, 'The Paris Climate Change Agreement' (n 102), 314-5; United Nations Framework Convention on Climate Change, 'Intended Nationally Determined Contributions', internet site, available at <http://unfccc.int/focus/indc_portal/items/8766.php> accessed 3 October 2016.

¹⁵³ Mission Innovation, 'Accelerating the Clean Energy Revolution', Internet Site, available at <<http://mission-innovation.net/>> accessed 3 October 2016.

¹⁵⁴ Breakthrough Energy Coalition, Internet Site, available at <<http://www.breakthroughenergycoalition.com/en/index.html>> accessed 3 October 2016.

solar power potential of the 'sunny south' lying between the Tropics of Cancer and Capricorn;¹⁵⁵ and the Africa Renewable Energy Initiative, an organisation operating under the African Union whose purpose is to assist states on the African continent with addressing barriers to renewable energy development including through capacity building and mobilising finance in order to realise 300GW new and additional generating capacity from renewables by 2030.¹⁵⁶

If the majority of states involved with these actions do not follow through on their commitments then there is little that can be done to bring them to account under the Agreement. Its dependence on the prospect of being named and shamed will hold little fear for contracting parties if the largest greenhouse gas emitters collectively fail to act. However, if they do show the political will to combat climate change by switching to renewable energy then the Agreement provides an environment within which laggards will come under increasing pressure to follow suit. It is through the actions of contracting parties rather than by statements endorsed by them as members of the international community or made by them in their NDCs that the effectiveness of the Agreement's 'voluntary pledging, plus peer pressure'¹⁵⁷ approach will ultimately be judged.

¹⁵⁵ International Solar Alliance, Internet Site, available at <<http://www.intsolaralliance.org/>> accessed 3 October 2016.

¹⁵⁶ Africa Renewable Energy Initiative, Internet Site, available at <<http://www.arei.org/>> accessed 3 October 2016.

¹⁵⁷ Zahar, 'The Paris Agreement' (n 117), 75.