RECONCILING THE CARBON MARKET AND THE HUMAN RIGHT TO WATER: THE ROLE OF SUPPRESSED DEMAND UNDER CLEAN DEVELOPMENT MECHANISM AND THE GOLD STANDARD

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Carbon credits are being used to fund a multitude of development projects. Recently, they have been approved by the Gold Standard and the Clean Development Mechanism, two carbon credit approval bodies, to fund clean water household water treatment and safe storage (HWTS) projects under a theory known as suppressed demand, in which credits are largely based on assumed carbon emissions rather than actual carbon emissions. These projects seek to promote alternative methods of purifying drinking water other than boiling it, which contributes to greenhouse gas emissions through burning wood or other biomass. Proponents argue that suppressed demand creates greater equity in carbon markets because countries that have contributed the least to greenhouse gas emissions would not otherwise be able to take advantage of carbon funding designed to promote sustainable development. Critics counter that because suppressed demand is not based on actual carbon emissions, the funded projects do not reduce greenhouse gases.

This article analyzes the theories underpinning suppressed demand and considers its relationship to the human right to water. The "good practices" criteria outlined by the United Nations Special Rapporteur for the Human Right to Safe Drinking Water and Sanitation provide an analytical tool for assessing the effectiveness of projects funded via suppressed demand. The primary conclusion is that while suppressed demand-funded water projects are consistent with the human right to water, they do not guarantee that all essential criteria of the human right to water are fulfilled; at best, they address concerns about water quality and affordability while not focusing on questions of availability, accessibility and acceptability. While the suppressed demand approaches used by Gold Standard and CDM attempt to address some aspects of the "cross-cutting" human rights criteria, i.e., non-discrimination, participation, accountability, impact, and sustainability, significant room for improvement exists. If suppressed demand is to be used as a carbon credit funding mechanism for water purification projects, then potential drawbacks need to be considered

and the methodologies revised accordingly. Only then can carbon credit funded HWTS projects relying on the suppressed demand carbon credit approach be seen as an important ally in reducing carbon emissions and in aiding LDCs struggling to implement the human right to water.

I. INTRODUCTION

Reconciling the unequal impacts of climate change, while simultaneously enabling the least developing countries (LDCs) to develop, is one of the greatest challenges facing the global community. Countries that have contributed the least to greenhouse gas (GHG) emissions are those that are most vulnerable to the impacts of a changing climate.[1] Yet, because these countries have historically had low emissions, they have not been able to take advantage of funding available through the carbon markets.[2] A new approach has been pioneered in the carbon market to foster development toward cleaner, low-emissions technology in LDCs and to improve the standard of living for millions of people who lack access to basic services, such as clean energy and water. The approach, known as suppressed demand, makes certain projects in LDCs more attractive to the carbon market by imputing a higher level of baseline emissions on the theory that greenhouse gas emissions would be higher if demand for a minimum level of services were not 'suppressed' by poverty.[3]

The suppressed demand approach was first used to obtain carbon finance for clean energy projects like cookstoves and solar panels but it has recently been promoted as a tool for bringing household water treatment and safe storage (HWTS) projects to the developing countries with the highest needs.[4] These projects seek to promote alternative methods of purifying drinking water other than boiling, which contributes to greenhouse gas emissions through burning wood or other biomass.[5] Through suppressed demand, a higher emissions baseline is assumed in certain cases on the theory that even if the recipients are not currently boiling their water, they

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1 Wendy Koch, *Study: Climate Change Affects Those Least Responsible*, USA TODAY, Mar. 7, 2011, http://cdkn.org/2012/04/suppressed-demand-in-climate-change-negotiations/ (last visited July 21, 2013).

2 Thanakvaro De Lopez et al., *Clean Development Mechanism and Least Developed Countries: Changing the Rules for Greater Participation*, 18 J. ENV'T & DEV. 436, 438–42 (2009).

3 Phillip Gwage, *Suppressed Demand: Unlocking Climate Finance for Africa*, CLIMATE & DEVELOPMENT KNOWLEDGE NETWORK (Apr. 18, 2012), http://cdkn.org/2011/07/postcard-from-marrakesh-using-%E2%80%98suppressed-demand%E2%80%99-to-increase-africa%E2%80%99s-share-of-the-carbon-market/ (last visited July 21, 2013).

4 Alexandrina Platonova-Oquab et al., *CDM Reform: Improving the Efficiency and Outreach of the Clean Development Mechanism Through Standardization*, THE WORLD BANK, May 2012, at vii, *available at* http://siteresources.worldbank.org/INTCARBONFINANCE /Resources/CDM_Reform_final.pdf. The Gold Standard, *Worlds First Carbon-Financed Sustainable Water Programme Helps Millions in Africa* (Mar. 9, 2012), http://www.cdm goldstandard.org/worlds-first-carbon-financed-sustainable-water-programme-helps-millions-in-africa (last visited July 21, 2013).

5 *Id.*

would if they had access to the natural or financial means to do so.[6] This article assesses the extent to which the use of the suppressed demand to facilitate carbon financing of clean water projects in poor countries is consistent with the human right to safe drinking water and the goal of environmental sustainability.

In 2010, the United Nations (U.N.) General Assembly[7] and the U.N. Human Rights Council[8] recognized a human right to safe drinking water and sanitation, highlighting the urgency of the global water and sanitation crisis.[9] The human right to water requires that everyone have access to adequate amounts of safe, accessible, affordable, acceptable water.[10] In recognizing the right, the General Assembly resolution expressed concern that "approximately 884 million people lack access to safe drinking water" and also expressed alarm "that approximately 1.5 million children under five years of age die and 443 million school days are lost each year as a result of water- and sanitation-related diseases."[11] It also called upon "[s]tates and

6 Carbon Market Watch, *Suppressed Demand in the CDM*, http://carbonmarketwatch.org/category/additionality-and-baselines/suppressed-demand/ (last visited July 21, 2013), *See id.*; Gwage, *supra* note 3.

7 The Human Right to Water and Sanitation, G.A. Res. 64/292, U.N. Doc. A/RES/64/292 (Aug. 3, 2010), *available at* http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/64/292; Press Release, General Assembly, General Assembly Adopts Resolution Recognizing Access to Clean Water, Sanitation as Human Right, by Recorded Vote of 122 in Favour, None Against, 41 Abstentions, U.N. Doc. GA/10967 (July 28, 2010), *available at* http://www.un.org/News/Press /docs/2010/ga10967.doc.htm.

8 Human Rights and Access to Safe Drinking Water and Sanitation, U.N. Human Rights Council Res. 15/9, at 2–3, U.N. Doc. HRC/RES/15/9 (Oct. 6, 2010), *available at* http://www.un.org/waterforlifedecade/pdf/human_right_to_water_and_sanitation_milestones.pdf.

9 W.H.O. & UNICEF, PROGRESS ON DRINKING WATER AND SANITATION: 2012 UPDATE 36 (2012), *available at* http://www.wssinfo.org/fileadmin/user_upload/resources/JMP-report-2012-en.pdf. The need for improved sanitation is dire, especially in light of recent evidence that the world has failed to achieve the sanitation-related Millennium Development Goals. *Id.* at 2. However, as of yet, the right to sanitation has not been linked to the carbon market. Consequently, this article focuses exclusively on the human right to water and its incorporation into the "suppressed demand" carbon credit methodology.

10 U.N. Econ. and Soc. Council [ECOSOC], Comm. on Econ., Soc. and Cultural Rights, *Substantive Issues Arising in the Implementation of the International Covenant on Economic, Social and Cultural Rights*, ¶ 2, U.N. Doc. E/C.12/2002/22, (Jan. 20, 2003), *available at* http://www.unhchr.ch/tbs/doc.nsf/0/a5458d1d1bbd713fc1256cc400389e94/$FILE/G0340229.pdf; U.N. Human Rights Council, *Report of the Independent Expert on the Issue of Human Rights Obligations Related to Access to Safe Drinking Water and Sanitation, Catarina de Albuquerque, Addendum: Progress Report on the Compilation of Good Practices*, ¶¶ 19, 22, 23, 30, 34, U.N. Doc. A/HRC/15/31/Add.1 (July 1, 2010), *available at* http://www2.ohchr.org/english/bodies/hrcouncil/docs/15session/A.HRC.15.31.Add.1_en.pdf [hereinafter *de Albuquerque, Progress Report on the Compilation of Good Practices*].

11 G.A. Res. 64/292, *supra* note 7, at 2. The recent statistics from the Millennium Development Goals suggest that nearly eight hundred million people lack access to improved water and 2.5 billion lack access to improved sanitation. W.H.O. & UNICEF, *supra* note 9, at 2. However, the definition of "improved" does not mean that the water and sanitation facilities are safe, affordable, acceptable, and available in adequate amounts, or otherwise meet human rights criteria. *See* The Secretary-General, *Human Rights Obligations Related to Access to Safe Drinking Water and Sanitation, Report of the Independent Expert on the Issue of Human Rights*

international organizations to provide financial resources, capacity-building and technology transfer, through international assistance and cooperation, in particular to developing countries, in order to scale up efforts to provide safe, clean, accessible, and affordable drinking water and sanitation for all."[12]

The most recent report on the Millennium Development Goals (MDG) indicates that the world has already met its 2015 target for halving the number of people without access to improved water.[13] An improved water source is defined by the WHO/UNICEF Joint Monitoring Program for Water Supply and Sanitation as one that "by nature of its construction or through active intervention, is protected from outside contamination, in particular from contamination with fecal matter."[14] Although the world may have met its MDG water targets, access to "improved" water sources—the standard used to measure compliance with MDG targets—does not necessarily mean that the water is clean and safe to drink.[15] Instead, due to the methodological challenges of testing water quality, "improved" has been used as a proxy indicator.[16] "Improved" water sources include piped water, public tap or standpipe, tubewell or borehole, protected spring, protected dug well, and rainwater collection.[17] However, because of the way the statistics are reported, an "improved source" could ironically include access to broken tap stands without flowing water.[18] Thus, while it is estimated that approximately 780 million lack access to "improved" water sources, in reality, significantly more lack access to safe water.[19]

The global imperative to improve access to safe drinking water is without question. In the forty-eight countries designated LDCs by the UN, the majority of people lack access to proper water facilities.[20] Current MDG statistics suggest that in LDCs, 10% of the people rely on surface water, a high-risk "unimproved" water source for drinking and household use.[21] However, building networks of piped infrastructure to provide safe water is

Obligations Related to Access to Safe Drinking Water and Sanitation, Catarina de Albuquerque, ¶¶ 25–26, *delivered to the General Assembly,* U.N. Doc A/65/254 (Aug. 6, 2010), *available at* http://www.europarl.europa.eu/meetdocs/2009_2014/documents/droi/dv/201/201101/20110124_303mdgreport_en.pdf [hereinafter *de Albuquerque Report*].

12 G.A. Res. 64/292, *supra* note 7, ¶ 2.

13 W.H.O. & UNICEF, *supra* note 9, at 4.

14 W.H.O. & UNICEF, *Joint Monitoring Programme (JMP) for Water Supply and Sanitation,* http://www.wssinfo.org/definitions-methods/introduction/ (last visited July 21, 2013).

15 W.H.O. & UNICEF, *supra* note 9, at 4.

16 *Id.* ("Systematically testing the microbial and chemical quality of water at the national level in all countries is prohibitively expensive and logistically complicated; therefore, a proxy indicator for water quality was agreed upon for MDG monitoring.").

17 *Id.* at 33.

18 *See* Ned Breslin, *Few Celebrating MDG Success in Water*, HUFFINGTON POST, Mar. 14, 2012, http://www.huffingtonpost.com/ned-breslin/clean-water-millennium-development-goal_b_1343292.html (last visited July 21, 2013).

19 W.H.O. & UNICEF, *supra* note 9, at 2, 4 (noting that "it is likely that the number of people using safe water supplies has been over-estimated" because some of the improved sources "may not be adequately maintained and therefore may not actually provide 'safe' drinking water").

20 *Id.* at 28.

21 *Id.* at 28, 33.

often not feasible in many parts of the world. HWTS offers an important interim solution, but one of the biggest challenges in alleviating this problem is how to finance HWTS projects in LDCs.[22]

The challenge of making clean water available in poor countries is exacerbated by global warming, which places a disproportionate burden on LDCs.[23] Although LDCs contribute little to global warming's causes,[24] LDCs are less able to finance adaption policies essential in helping to remediate anticipated impacts of global warming.[25] For example, climate change-related drought can reduce water resource availability, while flooding can lead to contamination of water supplies by fecal matter or other pollutants.[26]

This article explores the relationship between the human right to water and "suppressed demand," a carbon credit approach being used to fund clean water projects in developing countries.[27] The primary conclusion is that although suppressed demand-funded water projects are consistent with the human right to water, they do not guarantee that all essential criteria of the human right to water are fulfilled; at best, they address concerns about water quality and affordability while not focusing on questions of availability, accessibility, and acceptability.

Part II provides a brief overview of the carbon market, which allows developed countries to meet global greenhouse emission caps through various carbon emission reduction projects.[28] It focuses on the Clean

22 THOMAS F. CLASEN, WORLD HEALTH ORG., SCALING UP HOUSEHOLD WATER TREATMENT AMONG LOW-INCOME POPULATIONS 56 (2009). The United Nations Social and Economic Council identifies LDCs according to the following criteria: "A gross national income per capita under US $750; Human Assets Index (nutrition, health, education, and adult literacy); Economic Vulnerability Index (instability of agricultural production and exports, limited manufacturing and modern services, export concentration, economic smallness, population displaced by natural disasters); A population under 75 million people." De Lopez et al., *supra* note 2, at 438.

23 SALEEMUL HUQ ET AL., INT'L INST. FOR ENV'T & DEV., MAINSTREAMING ADAPTION TO CLIMATE CHANGE IN LEAST DEVELOPED COUNTRIES (LDCS) 12 (2003).

24 *Id.*

25 *Id.*

26 *Id.*; ROBERTO LENTON ET AL., U.N. MILLENNIUM PROJECT, HEALTH, DIGNITY, AND DEVELOPMENT: WHAT WILL IT TAKE? 127 (2005), *available at* http://www.unmillennium project.org/documents/WaterComplete-lowres.pdf.

27 While carbon credit programs may have great promise for funding clean water projects, many valid criticisms exist, and much has been written about carbon offset programs, both positive and negative. *See, e.g.*, Nathanial Gronewold, *CDM Critics Demand Investigation of Suspect Offsets*, N.Y. TIMES, June 14, 2010, http://www.nytimes.com/cwire/2010/06/14/14climate wire-cdm-critics-demand-investigation-of-suspect-63522.html (last visited July 21, 2013); Robert H. Frank, *Carbon Offsets: A Small Price to Pay for Efficiency*, N.Y. TIMES, May 30, 2009, http://www.nytimes.com/2009/05/31/business/31view.html (last visited July 21, 2013). Nevertheless, this paper does not take a position on the merits of the carbon credit programs, but instead bases its analysis on the fact that carbon credit programs exist and suppressed demand is an accepted carbon credit methodology for qualifying clean water projects in certain carbon markets.

28 *See infra* Part II. The carbon market is aimed at reducing all greenhouse gases or GHGs. However, the literature frequently uses GHG and carbon, the largest source of GHG emissions, interchangeably. This paper does the same. *See, e.g.*, ARNAUD BROHÉ, NICK EYRE & NICHOLAS HOWARTH, CARBON MARKETS: AN INTERNATIONAL BUSINESS GUIDE 68 (2009).

Development Mechanism (CDM), one of the flexibility mechanisms created by the Kyoto Protocol,[29] and the Gold Standard, an independent carbon credit certification scheme that operates in the Kyoto Protocol's carbon market as well as in the voluntary carbon market that was created by a coalition of NGOs led by the World Wildlife Fund.[30] It examines how the carbon markets have been criticized for not promoting more sustainable development in LDCs that would enable them to "leap-frog" to cleaner technology.

The Gold Standard, and more recently the CDM, have approved an approach to carbon accounting known as suppressed demand to address the inequitable distribution of the carbon market benefits.[31] As explained in Part III, the suppressed demand approach to carbon accounting is premised on the assumption that carbon emissions from LDCs would be substantially higher if people within those countries had better access to carbon fuel sources, i.e., if demand for such fuel was not suppressed. Suppressed demand was first employed for clean energy projects,[32] and more recently, the approach has been applied to household water treatment and storage (HWTS) projects.[33] For HWTS projects, the carbon credits are calculated based on the amount of wood or other biomass that would have to be burned to purify a minimum level of drinking water.[34] In other words, the methodology increases the baseline for calculating carbon emissions by imputing to individuals a minimum entitlement to a basic level of energy-related goods and services.[35] Part III goes on to describe the Gold Standard and CDM guidelines for approving HWTS projects. The Gold Standard, which pioneered the approach, has registered two HWTS projects to date.[36]

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29 Kyoto Protocol to the United Nations Framework Convention on Climate Change art. 12, Dec. 10, 1997, 37 I.L.M. 22, U.N. Doc FCCC/CP/1997/7/Add.1, *available at* http://unfccc.int/resource/docs/convkp/kpeng.pdf [hereinafter Kyoto Protocol].

30 THE GOLD STANDARD FOUNDATION, CDM EXECUTIVE BOARD CALL FOR PUBLIC INPUT ON THE INCLUSION OF CO-BENEFITS AND NEGATIVE IMPACTS IN CDM DOCUMENTATION 1, *available at* http://cdm.unfccc.int/public_inputs/2011/sustainability_benefits/cfi/YO7AGC7N4U4EO0LLKTS1UCWMU3Z3E9; The Gold Standard Foundation, *Who We Are*, http://www.cdmgoldstandard.org/about-us/who-we-are (last visited July 21, 2013).

31 THE GOLD STANDARD, THE GOLD STANDARD IN AFRICA: DRIVING INNOVATION THROUGH CARBON FOR DEVELOPMENT 3 (2011), *available at* http://www.cdmgoldstandard.org/wp-content/uploads/2011/09/Africa-White-Paper.pdf.

32 *See, e.g.*, C.D.M., SIMPLIFIED PROJECT DESIGN DOCUMENT FOR SMALL SCALE PROJECT ACTIVITIES 4–6 (2005), *available at* http://cdm.unfccc.int/EB/020/eb20repan14.pdf (describing how a suppressed demand approach raised the baseline level, and thus secured funding, for a project designed to improve household access to energy in South Africa using solar and compact fluorescent technologies) [hereinafter CDM PROJECT DESIGN DOCUMENT].

33 Press Release, The Gold Standard and Vestergaard Frandsen, Worlds First Carbon-financed Sustainable Water Programme Helps Millions in Africa (Mar. 9, 2012), *available at* http://www.cdmgoldstandard.org/wp-content/uploads/2012/03/Carbon-For-Water-Press-Release-09.03.12.pdf [hereinafter Carbon for Water Press Release].

34 *See id.*

35 *See infra* Part III.A.

36 These two programs are the "Carbon for Water" program sponsored by Vestergaard Frandsen and the Paradigm Healthy Cookstove and Water Treatment Project sponsored by

The article focuses on the first such project, the Water for Carbon program by Vestergaard Frandsen,[37] with the goal of highlighting some of the challenges of implementing the concept of suppressed demand.

Part IV discusses some of the equity-based rationales for suppressed demand and examines how the concept could be considered normatively consistent with human rights. The rights to enjoy the benefits of scientific progress, to an adequate standard of living, and to health are briefly considered before turning to a more thorough analysis under the human right to water. The "Good Practices" criteria developed by the U.N. Special Rapporteur for the Human Right to Safe Drinking Water and Sanitation is the framework of analysis.[38] The thrust of this examination is that while carbon-financed HWTS projects could contribute to the realization of the human right to water, they have significant drawbacks and limitations as well. The projects are not necessarily developed to account for all the content of the human right to water, which requires that water be available, safe, accessible, affordable, and acceptable.[39] However, the Gold Standard requires that its projects meet a series of sustainable development criteria, which are consistent with many elements of a human rights-based approach to development.[40] CDM is currently exploring similar requirements.[41] But given that the suppressed demand approach to carbon accounting may not lead to actual carbon reductions, it can be critiqued from the standpoint of environmental sustainability. By threatening the underlying environmental integrity of the carbon market, projects based on suppressed demand could undermine the carbon markets.

The suppressed demand approach to carbon accounting holds great promise for enabling LDCs to gain access to the carbon markets for HWTS projects, but valid criticisms exist.[42] In addition, although the concept of suppressed demand is in many ways consistent with a human rights perspective, it does not necessarily mean that all small-scale water projects

Impact Carbon and The Paradigm Project. *See* Carbon for Water Press Release, *supra* note 33; Press Release, Impact Carbon & the Paradigm Project, Impact Carbon and The Paradigm Project Issue Emissions Reductions from the First Project to Combine Safe Drinking Water, Efficient Cookstoves, and Carbon Finance (Apr. 16, 2012), *available at* http://www.cdmgold standard.org/wp-content/uploads/2012/04/Impact-Paradigm-Press-Release-Kenya-Multi-Technology-Project.pdf.

37 *See* Carbon for Water Press Release, *supra* note 33.

38 CATARINA DE ALBUQUERQUE, U.N. SPECIAL RAPPORTEUR, ON THE RIGHT TRACK: GOOD PRACTICES IN REALISING THE RIGHTS TO WATER AND SANITATION (2012), *available at* http://www.europarl.europa.eu/meetdocs/2009_2014/documents/droi/dv/201/201101/20110124_303mdgreport_en.pdf.

39 U.N. WATER DECADE PROGRAMME ON ADVOCACY & COMMC'N & WATER SUPPLY & SANITATION COLLABORATIVE COUNCIL, THE HUMAN RIGHT TO WATER AND SANITATION MEDIA BRIEF 1, *available at* http://www.un.org/waterforlifedecade/pdf/human_right_to_water_and_sanitation_media_brief.pdf.

40 *See infra* notes 91–93 and accompanying text.

41 *See infra* note 95 and accompanying text.

42 *See, e.g.*, Harro van Asselt & Joyeeta Gupta, *Stretching Too Far? Developing Countries and the Role of Flexibility Mechanisms Beyond Kyoto*, 28 STAN. ENVTL. L.J. 311, 337–42 (2009).

fulfill all aspects of the human right to water. At the same time, by bringing much-needed technology to the poor in LDCs, the concept of suppressed demand has the potential to address a long-standing criticism of the carbon markets and improve access to clean drinking water for millions of people.

II. THE COMPLIANCE AND VOLUNTARY CARBON CREDIT SYSTEMS

The Kyoto Protocol, an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCCC)[43] that was adopted in 1997 and entered into force in 2005, laid the foundation for greenhouse gas emissions trading.[44] Under the Kyoto Protocol, participating industrialized countries are obliged to reduce their carbon emissions from their established baseline by at least 5% from 1990 levels between 2008 and 2012.[45] The Kyoto Protocol allowed for implementating emission reduction targets through market mechanisms, though the operational details of the trading mechanisms were only agreed to in November 2001 with the Marrakesh Accord.[46]

The Kyoto Protocol established three "flexibility mechanisms" that allow developed countries (called Annex I parties) to meet their emission reduction obligations through the trade and transfer of carbon credits.[47] The three mechanisms are known as Emissions Trading, Joint Implementation, and the Clean Development Mechanism.[48] These measures, plus other regional and voluntary approaches,[49] comprise what is commonly referred to as the "carbon market."[50] Under the Emissions Trading (ET) mechanism,[51] an Annex I country can meet its domestic targets by purchasing credits from

43 Kyoto Protocol, *supra* note 29.

44 *Id.* art. 3; BROHÉ, EYRE, & HOWARTH, *supra* note 28, at 60–65; *see also* PAUL COLLIER, THE PLUNDERED PLANET: WHY WE MUST—AND HOW WE CAN—MANAGE NATURE FOR GLOBAL PROSPERITY 239 (2010) ("The conventional, top-down approach led by international cooperation between governments is for a global assignment of rights to . . . emit carbon, matched by the creation of a global market in which these rights can be traded between countries.").

45 Kyoto Protocol, *supra* note 29, art. 3.1.

46 JONAS MECKLING, CARBON COALITIONS: BUSINESS, CLIMATE POLITICS, AND THE RISE OF EMISSIONS TRADING 58–59 (2011).

47 Kyoto Protocol, *supra* note 29, art. 3; Cameron Hepburn, *Carbon Trading: A Review of the Kyoto Mechanisms*, 32 ANN. REV. ENV'T & RESOURCES 375, 379 (2007).

48 Kyoto Protocol, *supra* note 29, arts. 6, 12, 17 (Article 6 sets forth the basis for Joint Implementation, Article 12 the basis for Clean Development Mechanism, and Article 17 the basis for Emissions Trading); Hepburn, *supra* note 47, at 379.

49 Jeffery R. Williams, Siân Mooney & Jeffrey M. Peterson, *What Is the Carbon Market: Is There a Final Answer?*, 64 J. SOIL & WATER CONSERVATION 27A, 27A (2009) (describing voluntary and regional initiatives); *see also* ANJA KOLLMUSS ET AL., HANDBOOK OF CARBON OFFSET PROGRAMS: TRADING SYSTEMS, FUNDS, PROTOCOLS AND STANDARDS 141–205 (2010).

50 MECKLING, *supra* note 46, at 58; BROHÉ, EYRE, & HOWARTH, *supra* note 28, at 68 (noting the Kyoto Protocol recognizes six gases—CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride SF_6, and to ensure comparability the global warming potential of each gas is converted into carbon units).

51 Kyoto Protocol, *supra* note 29, art. 17.

other Annex I countries that have exceeded their targets.[52] Under the Joint Implementation (JI) mechanism,[53] a developed country can invest in emission reduction projects (referred to as "Joint Implementation Projects") in other countries with binding targets as an alternative to reducing emissions domestically.[54] Under the Clean Development Mechanism (CDM),[55] Annex I parties can implement projects in non-Annex I countries that reduce carbon emissions or absorb carbon.[56] While ET is a "cap-and-trade scheme," JI and CDM are described as "baseline-and-credit trading" mechanisms[57] or as "project-based offset mechanisms."[58] Most carbon credit trading takes place within the cap-and-trade framework;[59] within the offset mechanisms, CDM accounts for approximately 90% of projects, while JI and voluntary markets account for 5% each.[60] This article focuses solely on the CDM because it is the only mechanism in which suppressed demand is used as a carbon accounting method.[61]

52 *Emissions Trading*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/kyoto_protocol/mechanisms/emissions_trading/items/2731.php (last visited July 21, 2013). ("Emissions trading, as set out in Article 17 of the Kyoto Protocol, allows countries that have emission units to spare—emissions permitted them but not 'used'—to sell this excess capacity to countries that are over their targets."); Hepburn, *supra* note 47, at 379; van Asselt & Gupta, *supra* note 42, at 332 ("International emissions trading can be classified as a 'cap-and-trade' system, where a certain emission cap is set, and a fixed number of emission allowances are distributed."); MECKLING, *supra* note 46, at 58–59 (providing a concise summary of emissions trading and observing that the name of this trading instrument leads to "terminological confusion, since the other two mechanisms are also a form of emissions trading").

53 Kyoto Protocol, *supra* note 29, art. 6.

54 U.N.F.C.C., *Joint Implementation*, http://unfccc.int/kyoto_protocol/mechanisms/joint_implementation/items/1674.php (last visited July 21, 2013) ("The mechanism known as 'joint implementation,' defined in Article 6 of the Kyoto Protocol, allows a country with an emission reduction or limitation commitment under the Kyoto Protocol (Annex B Party) to earn emission reduction units (ERUs) from an emission-reduction or emission removal project in another Annex B Party, each equivalent to one tonne of CO2, which can be counted towards meeting its Kyoto target."); MECKLING, *supra* note 46, at 60 (noting the "JI mechanism is a hybrid between cap-and-trade and baseline-and-credit schemes, because it allows project-based emissions reductions and the transfer of permits within an international cap-and-trade scheme"); KOLLMUSS ET AL., *supra* note 49, at 59–65.

55 *See* Kyoto Protocol, *supra* note 29, art. 12.

56 BROHÉ, EYRE, & HOWARTH, *supra* note 28, at 79–96 (providing an overview of CDM); MECKLING, *supra* note 46, at 59 ("Created by article 12 of the Kyoto Protocol, the CDM allows industrialized nations (annex I parties) to earn credits, or so-called certified emissions reductions, by implementing emissions-reduction projects in developing countries (nonannex I parties)."); KOLLMUSS ET AL., *supra* note 49, at 47–59 (providing an overview of CDM).

57 MECKLING, *supra* note 46, at 58.

58 KOLLMUSS ET AL., *supra* note 49, at 6.

59 Williams, Mooney & Peterson, *supra* note 49, at 27A.

60 KOLLMUSS ET AL., *supra* note 49, at 10; *see also* Edwin Woerdman, *Implementing the Kyoto Protocol: Why JI and CDM Show More Promise than International Emissions Trading*, 28 ENERGY POLICY 29, 31 (2000) (discussing calculation of emissions reductions in JI and CDM projects).

61 U.N.F.C.C.C., CDM Exec. Bd., *Guidelines on the Consideration of Suppressed Demand in CDM Methodologies*, ¶ 1, E.B. 68 Rep. Annex 2 (2012), *available at* http://cdm.unfccc.int/

The CDM has two primary goals: mitigating carbon emissions and encouraging sustainable development in developing countries.[62] These goals reflect that Annex I emitters and a few middle-income countries, which together emit the vast proportion of carbon emissions, benefit largely from the carbon markets.[63] In contrast, for the most part LDCs are not responsible for global warming yet they suffer even more from the effects of global warming. However, LDCs are disadvantaged in their ability to access carbon credit funding from the regulated carbon markets because investment conditions are more favorable in the middle-income developing countries.[64] As its name suggests, CDM seeks to promote "clean development."[65] One objective of the CDM is to transfer technology and resources from Annex I emitters (i.e., developed countries) to countries not included in Annex I (i.e., developing countries), resulting in cost-effective emission reducing projects.[66] Described as a "powerful mechanism for mobilizing capital,"[67] CDM enables Annex I emitters to financially support projects that provide essential services and also reduce carbon emissions in developing countries.[68] In return, the Annex I emitter receives certified emission reductions (CERs) that offset its excess emissions at home.[69] Every CDM project must be certified by the CDM Executive Board, an independent body under the UNFCCC that develops methodologies and guidelines and issues the CERs.[70] Moreover, CERs can only be issued if the reductions are additional to any that would otherwise occur if the certified project activity did not take place. [71]

Reference/Guidclarif/meth/meth_guid41.pdf [hereinafter *CDM Suppressed Demand Guidelines*].

62 *See* Adam G. Bumpus & John C. Cole, *How Can the Current CDM Deliver Sustainable Development?*, 1 WILEY INTERDISC. REV.: CLIMATE CHANGE 541, 542 (2010) (describing the twin goals of the CDM as "the integration of a clean development component into existing patterns of infrastructural development" and "a broader 'sustainable' development program").

63 *See id.* at 544 (discussing need "to redefine and attend to current unequal terms of the carbon trade resulting from the information asymmetries between project developers and [developing nations]").

64 *See id.*; THE WORLD BANK, UNFINISHED BUSINESS: MOBILIZING NEW EFFORTS TO ACHIEVE THE 2015 MILLENNIUM DEVELOPMENT GOALS 8–9, (Sept. 2010), *available at* http://www.worldbank.org/mdgs/MDGPaperFINALSeptember102010.pdf.

65 Kyoto Protocol, *supra* note 29, art. 12.

66 *See id.* ("The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.").

67 WILLIAM BATTYE, SUPPRESSED DEMAND: A STAKEHOLDER PERSPECTIVE 3 (2011), *available at* http://cdm.unfccc.int/methodologies/Workshops/cdm_standards/s3_geres.pdf.

68 De Lopez et al., *supra* note 2, at 437; *see also* BROHÉ, EYRE, & HOWARTH, *supra* note 28, at 79.

69 BROHÉ, EYRE, & HOWARTH, *supra* note 28, at 79; *see also* De Lopez et al., *supra* note 2, at 437.

70 MECKLING, *supra* note 46, at 59; BROHÉ, EYRE, & HOWARTH, *supra* note 28, at 79–80.

71 BROHÉ, EYRE, & HOWARTH, *supra* note 28, at 81 (stating that under the additionality criterion, "project developers must, from a business as usual scenario, show that their project will result in GHG emissions reductions that would not occur otherwise"); *see also* MECKLING,

Despite its noble goals, the CDM framework has numerous critics.[72] Some critics believe that it incentivizes the wrong approaches to carbon emission reductions by allowing, and even encouraging, Annex I emitters to buy their way out of making difficult changes that are necessary for mitigating climate change.[73] Others contend that the carbon market encourages developing countries to continue to use, and even build new factories based on outdated and highly polluting technology for the sole purpose of qualifying for profitable carbon credit funding.[74] Still others maintain that the carbon market detrimentally diverts limited funds that should be used instead for adaptation to inevitable global warming.[75] The most relevant criticism against the CDM market germane to this paper's focus is that it has historically failed to promote sustainable development projects in LDCs.[76]

For reasons of value and efficiency, the CDM market has favored large, cost-effective projects that offer the greatest value in emission reductions per project.[77] As a result, in its early phases, CDM funded projects were primarily built or implemented in middle-income countries with higher carbon emissions baselines.[78] This is demonstrated by the fact that 82% of

supra note 46, at 59 (noting that additionality has been a "highly controversial issue in generating credits").

72 *See* van Asselt & Gupta, *supra* note 42, at 344 ("The main criticism can be summarized as follows: the CDM focuses too much on ensuring that Annex B countries achieve their targets in a cost-effective fashion, and too little on ensuring sustainable development in non-Annex B countries."); BROÍHE, EYRE, & HOWARTH, *supra* note 28, at 90–96 (providing a summary of "five frequent criticisms of CDM projects").

73 *See* van Asselt & Gupta, *supra* note 42, at 338.

74 *See, e.g.*, MICHAEL LAZARUS & CHELSEA CHANDLER, STOCKHOLM ENV'T INST., COAL POWER IN THE CDM: ISSUES AND OPTIONS 3 (2011), *available at* http://carbonmarketwatch.org/wp-content/uploads/2011/11/SEI-WP-2011-02-Coal-in-CDM.pdf; Gronewold, *supra* note 27; Elisabeth Rosenthal & Andrew W. Lehren, *Profits on Carbon Credits Drive Output of a Harmful Gas*, N.Y. TIMES, Aug. 8, 2012, http://www.nytimes.com/2012/08/09/world/asia/incentive-to-slow-climate-change-drives-output-of-harmful-gases.html (last visited July 21, 2013).

75 David Zetland, *The Big Impacts of Zero Value Carbon*, AGUANOMICS, http://www.aguanomics.com/2011/11/big-impacts-of-zero-value-carbon.html (last visited July 21, 2013). Credible allegations have been made that some companies have gamed the carbon trading system by producing greenhouse gases only so that they can be paid through carbon offset funding to destroy the same gases. *See, e.g.*, Gronewold, *supra* note 27.

76 *See* De Lopez et al., *supra* note 2, at 436.

77 Zetland, *supra* note 75 ("In sum, a lot of money invested in low-carbon, renewable energy, carbon capture, carbon offsets (and so on) is going to give a lower return, result in more 'stranded assets,' and leave less money for more important projects—such as preparing for the damages that will result in a world that's 5C/9F hotter (on average) and has MUCH MORE variable weather."); Frank, *supra* note 27 (describing Cheat Neutral, a British website that is devoted solely to parodying carbon offsets and that offers cheating offsets to those who have cheated on their partners which are used to pay others who remain faithful; "[t]he site's founders say they wanted to use humor to demonstrate why the market for carbon offsets is a moral travesty").

78 Ann Danylkiw, *CDM for the Everyman Ecopreneur: Reforming the Carbon Credit Process*, INSIDECLIMATE NEWS, Mar. 16, 2010, http://insideclimatenews.org/print/4272 (last visited July 21, 2013).

the proposed and approved CDM projects as of 2009 were in only four countries—China, India, Brazil, and South Korea.[79]

For LDCs, which characteristically lack an industrialized economy and have a comparatively low carbon emissions baseline, the benefits from carbon markets are negligible.[80] Although LDCs desperately need essential services and infrastructure projects, they face significant hurdles in accessing the CDM market. Potential projects in LDCs are small, difficult to implement, and require more risky investments.[81] Additionally, the inherent favoritism toward large and more financially lucrative projects in the CDM market means that more difficult sustainable development projects in LDCs are not prioritized.[82] As a result, the CDM has been criticized for not enabling a more equitable form of sustainable development that would foster growth in LDCs.[83] For example, some have observed that:

> [F]rom a host country's perspective, the risk of a CDM activity not complying with its objectives does not consist of the failure of the project to deliver emission reductions but of its potential failure to provide sustainable development benefits that can be captured by local populations. GHG emission reductions, though they may be beneficial in terms of local pollution control, have little immediate and direct impacts on the welfare of the host country's society. . . .[84]

In response to some of the perceived inadequacies with the compliance carbon market, several voluntary carbon markets have also emerged.[85] The voluntary markets have focused on projects that are not large enough to attract CDM funding.[86] Being much smaller than the regulated carbon market, the voluntary markets do not contribute significantly to reducing

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79 De Lopez et al., *supra* note 2, at 437. "Another imbalance of the CDM market has been the concentration on hydrofluorocarbons (HFCs) and nitrous oxide (NO_2) in industrial processes, which account for 44% of expected emission reductions by 2012 but only 4% of projects." *Id.* at 438.

80 *Id.* at 439–40.

81 International Monetary Fund, *Africa: IMF Sees Strong Growth, Lingering Risks in Low-Income Countries*, http://allafrica.com/stories/201305031365.html (last visited July 21, 2013). "In many poor regions, the low level of historic emissions, with disregard for latent demand for energy and other services, results in insignificant creditable emission reductions such that carbon finance revenue has a negligible impact." *Suppressed Demand Emissions*, ENERGY & ECODEVELOPMENT (Helio Int'l, Paris, Fr.), Autumn 2011, at 4.

82 *See* De Lopez et al., *supra* note 2, at 437 ("[T]he economic argument is that it makes sense to achieve [emissions reductions] where they are the least costly."); BROHÉ, EYRE, & HOWARTH, *supra* note 28, at 93–94 (highlighting the fact that large projects in industrialized countries represent the majority of credits issued).

83 De Lopez et al., *supra* note 2, at 438–39.

84 *Id.* at 446.

85 *See* ANJA KOLLMUSS, HELGE ZINK & CLIFFORD POLYCARP, MAKING SENSE OF THE VOLUNTARY CARBON MARKET: A COMPARISON OF CARBON OFFSET STANDARDS 12–13 (2008), *available at* http://sei-us.org/Publications_PDF/SEI-WWF-ComparisonCarbonOffset-08.pdf.

86 *See id.*

carbon emissions.[87] Moreover, they are not without their critics, for example, concerns have been raised over the quality of the carbon credits distributed in some of the voluntary carbon markets.[88] Nevertheless, the voluntary markets play a critical role in shaping the rules that ultimately govern the regulated compliance market and CDM, serving as a "testing field for new procedures, methodologies and technologies."[89] As one carbon market expert has noted, some voluntary markets have evolved to the point where they "are even writing the rules for regulated [compliance] carbon markets."[90]

The most prominent voluntary certification scheme is the Gold Standard, which was established in 2003 by a group of NGOs led by the World Wildlife Fund to heighten the quality of offsets in both the Kyoto and voluntary markets.[91] It explicitly measures social and environmental benefits by restricting project eligibility to recoverable energy and energy efficiency projects and by incorporating conservative accounting standards.[92] It has played a major role in advancing new methodologies to support sustainable development, such as the pioneering use of suppressed demand in various projects.[93] Since 2011, Gold Standard has relied on the suppressed demand methodology to certify two programs that use carbon credit funding to support HWTS projects in LDCs.[94] Following suit, the CDM has also recently approved use of the suppressed demand approach, although as of the writing of this article (winter 2012–13) it had not yet registered any projects.[95] By registering water projects that apply the suppressed demand carbon accounting method, the Gold Standard, and now CDM, are attempting to remedy perceived inequities in the carbon market by making such projects more feasible and financially viable in LDCs. The next section

87 *Id.* at 12.

88 Adam G. Bumpus & Diana M. Liverman, *Accumulation by Decarbonization and the Governance of Carbon Offsets*, 84 ECON. GEOGRAPHY 127, 136 (2008) (citing concerns about the additionality of emissions offsets, accounting of actual emissions reductions, and double counting of carbon credits as some of the key criticisms of voluntary carbon markets).

89 KOLLMUSS, ZINK, & POLYCARP, *supra* note 85, at 6.

90 Steve Zwick, *Special Report: Governments Worldwide Embrace Voluntary Carbon Offset Market*, ECOSYSTEM MARKETPLACE, Mar. 1, 2012, http://www.ecosystemmarketplace.com /pages/dynamic/article.page.php?page_id=8922&section=news_articles&eod=1 (last visited July 21, 2013) (quoting Molly Peters-Stanley, Ecosystem Marketplace Manager).

91 The Gold Standard Foundation, Who We Are, *supra* note 30.

92 *Id.*; THE GOLD STANDARD, WHY GOLD STANDARD DIFFERS?, *available at* http://www.cdmgoldstandard.org/footers/brochures (click link "Postcard: Why Gold Standard Differs?").

93 The Gold Standard, *The Gold Standard: Expanding the Carbon Market in Under-Represented Regions Through Innovation, Influence and Innovation*, *available at* http://www.cdmgoldstandard.org/wp-content/uploads/2011/10/CaseStudy_-_BMU.pdf; Press Release, *supra* note 33.

94 Press Release, *supra* note 33.

95 *See* U.N.F.C.C.C., CDM Exec. Bd., *Work Programme on Suppressed Demand*, ¶¶ 1–3, E.B. 63 Rep. Annex 30 (Sept. 29, 2011), *available at* http://cdm.unfccc.int/Reference/Notes/meth/meth_note09.pdf (discussing the guidelines' adoption and development).

provides an overview of how the suppressed demand approach works for HWTS projects.

III. UNDERSTANDING THE THEORY BEHIND SUPPRESSED DEMAND

A. Defining Suppressed Demand

The suppressed demand approach is premised on the assumption that carbon emissions from LDCs would be substantially higher if people within those countries had better access to carbon fuel sources.[96] Suppressed demand refers to the unmet latent demand for basic services, such as clean water, cooking energy, or lighting,[97] which individuals in developing countries cannot access because of poverty or resource unavailability.[98] Put another way, suppressed demand is applied when the "minimum service level to meet basic human needs" are not currently being met.[99] As a result, when a person's access to energy services is "insufficient to meet their human development needs (suppressed demand), the baseline emissions may include emissions that would result from meeting this suppressed

96 *Boosting CDM Projects in LCDs: An Introduction to Suppressed Demand*, CDM WATCH (Carbon Mkt. Watch, Nature Code, Ctr. of Dev. & Env't, Brussels, Belg.), Sept. 2011, at 11, *available at* http://carbonmarketwatch.org/wp-content/uploads/2011/09/newsletter_cdmwatch_201109_small.pdf; LDC ENV'T CTR, TAKING ACTION ON SUPPRESSED DEMAND 4, *available at* http://cdkn.org/wp-content/uploads/2012/04/CDKN-policy-Paper.pdf ("Suppressed demand is a desire to consume a product or service but due to barriers this desire is not met. In simple language suppressed demand is the unmet demand.").

97 MARINA GAVALDÃO ET AL., SUPPRESSED DEMAND AND THE CARBON MARKETS: DOES DEVELOPMENT HAVE TO BECOME DIRTY BEFORE IT QUALIFIES TO BECOME CLEAN? 3 (2012), *available at* http://factsreports.revues.org/2175.

98 Harald Winkler & Steve Thorne, *Baselines for Suppressed Demand: CDM Projects Contribution to Poverty Alleviation*, 5 S. AFRICAN J. ECON. & MGT. SCIENCES 413, 415–16 (2002) ("The suppressed demand situation would be where the budget constraint lies below any utility level considered to meet basic needs.").

99 *CDM Suppressed Demand Guidelines*, *supra* note 61, ¶ 9; *see also* THE GOLD STANDARD, INDICATIVE PROGRAMME, BASELINE, AND MONITORING METHODOLOGY FOR IMPROVED COOK-STOVES AND KITCHEN REGIMES 32 (2010), *available at* http://www.cdmgoldstandard.org/wp-content/uploads/2011/11/V02_08-02-10_GS_Cook-stove_Methodology.pdf ("Where a group of people are deprived of a reasonable level of human development in comparison to their peers, and the opportunity to achieve a satisfactory level of service is available through carbon financing calculated from the baseline level of service of their peers or from the project level of service achievable, then the appropriate adjustment to baseline can be made.") [hereinafter GOLD STANDARD INDICATIVE PROGRAMME FOR KITCHEN REGIMES].

demand—that is, emissions resulting from an increase in energy use to satisfy basic human development needs (satisfied demand)."[100]

Carbon credits are normally determined by calculating the "before project" emissions (baseline emissions) and then subtracting the "after project" emissions (project emissions).[101] As discussed previously, generally LDCs do not benefit from the carbon markets because their current baseline emissions levels are too low. The concept of suppressed demand increases LDC baseline emissions to reflect the carbon emissions a project area would have if the people were able to burn an amount of biomass sufficient to meet their basic needs. In other words, it is a theoretical projection of what carbon emissions would be if basic energy needs were met. Suppressed demand also accounts for what economists would call an "outward shifting supply curve," which takes place when a project supplies an additional good such as electricity, heat, or clean water, causing demand for it to rise.[102]

The suppressed demand approach was first employed for clean energy projects. For example, in a project approved in 2005, carbon credits were used to provide key energy services—water heating, space heating, and lighting—to poor households in South Africa.[103] The supporting documentation defined suppressed demand and its role in the project as follows:

> Suppressed demand for energy services refers to a state where current levels of access to energy services—before any CDM intervention—are inadequate because of income or infrastructure constraints, thus not reflecting real demand for energy services by energy poor households. The CDM project will eliminate part, but not all, of the suppressed demand by decreasing the cost of energy services, thus increasing access to energy services whilst allowing energy poverty to decline.[104]

Although suppressed demand was first employed by the Gold Standard, it has a basis in the rules of the CDM that were negotiated in the UNFCCC process, which allowed for the baseline to "include a scenario where future anthropogenic emissions by sources are projected to rise above current levels, due to the specific circumstances of the host Party."[105] In a July 2012 meeting, the Executive Board of the CDM noted that at the Meeting of the Parties to the Kyoto Protocol in Durban, it had been asked to "accelerate the

100 The Gold Standard, *Indicative programme, baseline, and monitoring methodology for Small Scale Biodigester* 4, http://www.cdmgoldstandard.org/wp-content/uploads/2011/11/GS_Methodology_Biodigester.pdf (last visited July 21, 2013).

101 CDM WATCH, *supra* note 96, at 11; LDC ENV'T CTR., *supra* note 96, at 5 (describing a certified emission reduction as "the difference between baseline and project emissions, including leakage emissions associated with the activities of the project").

102 Adam Millard-Ball & Leonard Ortolano, *Constructing Carbon Offsets: The Obstacles to Quantifying Emission Reductions*, 38 ENERGY POC'Y 533, 540 (2010) (discussing suppressed demand and outward-shifting supply curve in the context of transportation projects).

103 CDM PROJECT DESIGN DOCUMENT, *supra* note 32, Part A.

104 *Id.* at 2.

105 *CDM Suppressed Demand Guidelines*, *supra* note 61, ¶ 1.

implementation of guidelines on suppressed demand in baselines and monitoring methodologies, prioritizing those that are more applicable to the LDCs, small island developing states, African countries and countries underrepresented in the clean development mechanism."[106] As a result, it is likely that the suppressed demand approach will continue to expand to other projects.

For HWTS projects, the suppressed demand carbon accounting approach is based on the assumption that in LDCs, many people use biomass, such as wood or agricultural waste, to boil water as a means of purifying it, or that they would use it if it were available.[107] However, boiling is not common in all parts of the world, and some studies show that even where biomass is available, people do not consistently boil their drinking water.[108] For example, in a research study from Kenya, only 25% of households reported that they boiled their drinking water the prior day.[109] Even in those households that claimed to boil drinking water, the researchers found that both adults and children also frequently drank un-boiled water.[110] A recent survey of sixty-seven countries revealed that 21% of households used boiling as a method of home water treatment.[111] The research showed that "[b]oiling is most prevalent in the Western Pacific region (58.7%) and least prevalent in the Eastern Mediterranean (4.0%) and African (4.5%) regions."[112] In some cases, the suppressed demand approach overcomes these empirical hurdles by calculating carbon credits based on the assumption that people would consistently boil a sufficient amount of drinking water if they could.[113]

106 *Id.* ¶ 4.

107 GOLD STANDARD INDICATIVE PROGRAMME FOR KITCHEN REGIMES, *supra* note 99, at 35.

108 DANIELE S. LANTAGNE, INVESTIGATION OF THE POTTERS FOR PEACE COLLOIDAL SILVER IMPREGNATED CERAMIC FILTER, REPORT 2: FIELD INVESTIGATIONS 14 (2001), *available at* http://www.sswm.info/sites/default/files/reference_attachments/LANTAGNE%202001%20Investigation%20of%20the%20Potters%20for%20Peace%20Colloidal%20Silver%20Impregnated%20Ceramic%20Filter%20-%20Report%202%20Field%20Investigations.pdf; R. H. Gilman & P. Skillicorn, *Boiling of Drinking-Water: Can a Fuel-scarce Community Afford it?*, 63 BULL. WORLD HEALTH ORG. 157, 157 (1985).

109 MICHAEL KREMER ET AL., SPRING CLEANING: RURAL WATER IMPACTS, VALUATION AND PROPERTY RIGHTS INSTITUTIONS 8 (Nat'l Bureau of Econ. Research, Working Paper No. 15280, 2010) *available at* http://www.nber.org/papers/w15280.pdf?new_window=1.

110 *Id.*

111 Ghislaine Rosa & Thomas Clasen, *Estimating the Scope of Household Water Treatment in Low- and Medium-Income Countries*, 82 AM. J. TROP. MED. HYG 289, 291 (2010).

112 *Id.* ("Boiling is almost universal in Indonesia (90.6%), Mongolia (95.2%), Uzbekistan (98.5%), and Viet Nam (91.0%), and it is widely practiced in Tajikistan (80.3%), Timor-Lester (73.4%), Kazakhstan (67.6%), Azerbaijan (69.5%), and Ecuador (61.4%). Although boiling is relatively rare in Africa (4.5%), there were African countries reporting significantly higher rates, including Uganda (39.8%) and Zambia (15.2%).").

113 *See supra* Part I.

B. Suppressed Demand Carbon Accounting Approach for Household Water Treatment and Storage Projects

The suppressed demand guidelines for HWTS projects under the CDM and Gold Standard guidelines are similar. Both have methodologies that project developers must follow to calculate all relevant parameters, including the project baseline and the estimated emissions reductions.[114] The methodologies and applicable rules for certifying a project in CDM are difficult to understand.[115] Suppressed demand adds to this complexity by allowing adjustments to be made to the baseline emissions.[116]

1. Suppressed Demand under the CDM

In the CDM, the relevant starting place is the guidelines for "low greenhouse gas emitting water purification systems to provide safe drinking water," which were first adopted in April 2011 and have since been revised twice in response to public comments.[117] The third and latest version, adopted in September 2012, set forth two different scenarios in which suppressed demand may be incorporated into projects.[118] The "Case 1" scenario applies to projects "implemented in rural or urban areas of countries with proportion of rural or urban population using an improved drinking-water source equal to or less than 60%," which must be confirmed by official statistics or survey methods.[119] The CDM Guidelines incorporate the JMP definitions of an improved and unimproved drinking water source.[120] In these projects, suppressed demand can be used to establish the baseline emissions because "it is assumed that fossil fuel or non-renewable biomass (NRB) is used to boil water as means of water purification in the absence of

114 *See* KOLLMUSS, ZINK & POLYCARP, *supra* note 85, at 9, 55 (noting that new calculation methodologies can be submitted if one does not already exist).

115 van Asselt & Gupta, *supra* note 42, at 341 ("After the adoption of the Kyoto Protocol, an extensive rulebook has developed on international emissions trading and the CDM. It is a daunting task for anyone to understand the detailed, and often complicated, rules and procedures.").

116 Millard-Ball & Ortolano, *supra* note 102, at 542–43.

117 U.N.F.C.C.C., C.D.M. Exec. Bd., *Low Greenhouse Gas Emitting Water Purification Systems*, E.B. 60 Annex 19 AMS-III.AV (Apr. 15, 2011), *available at* cdm.unfccc.int/UserManagement/FileStorage/CDM_AMSCPNY9OV6Y2NK5KV5AZVQ9832Y4SBP2 [hereinafter *CDM Guidelines Version 1*]; U.N.F.C.C.C., C.D.M. Exec. Bd., *Low Greenhouse Gas Emitting Water Purification Systems*, E.B. 62 Annex 11 AMS-III.AV (July 15, 2011), *available at* http://cdm.unfccc.int/UserManagement/FileStorage/7G3SNTEVUZDI62540XJL8AQFBHCR9K [hereinafter *CDM Guidelines Version 2*]; U.N.F.C.C.C., C.D.M. Exec. Bd., *Low Greenhouse Gas Emitting Safe Drinking Water Production Systems*, E.B. 69 Annex 22 AMS-III.AV (Sept. 13, 2012), *available at* cdm.unfccc.int/UserManagement/FileStorage/8QPUVMR1K6N9J43LIOCZ07DS5WTAYF [hereinafter *CDM Guidelines Version 3*]. *See also CDM Suppressed Demand Guidelines*, *supra* note 61, ¶ 8 (noting that AMS-III.AV "[l]ow greenhouse gas emitting water purification systems" is an approved methodology that employs suppressed demand).

118 *CDM Guidelines Version 3*, *supra* note 117, § 3.

119 *Id.*

120 *Id.*

the project activity."[121] The baseline calculation only includes purified water used for drinking, which is capped at 5.5 liters per capita per day (lpcd).[122] Guidelines for other factors that are relevant for calculating the baseline, including the amount of nonrenewable biomass used to boil water, the specific energy consumption and the emissions factor, are also described.[123]

"Case 2" projects are any projects that do not fall within Case 1 criteria, i.e., they are in countries where over 60% of the population has access to "improved" drinking water.[124] Case 2 projects require that the project proponents demonstrate "through documentation or survey that the practice of water purification would have been water boiling."[125] The survey must be carried out ex ante to "determine the proportion of total population attended by the project that is serviced at households/buildings where water boiling would have been the purification practice."[126] In addition, Case 2 projects require follow-up surveys to be conducted every two years to verify the number of people receiving purified water through the projects.[127] The current guidelines for Case 2 projects, i.e., Version 3, appear to limit the use of suppressed demand. Versions 1 and 2 required project proponents to demonstrate through "documentation that the *common practice of water purification is or would have been water boiling*."[128] This language had been interpreted to include suppressed demand.[129] However, the revised language in Version 3 arguably requires a greater degree of proof that boiling would in fact have been the method of purification if not for the project and in the absence of suppressed demand.[130]

Comparing Case 1 and Case 2, it is clear that by requiring that 60% of all people lack access to "improved" drinking water, Case 1 projects are

121 *Id.* § 5.

122 *Id.* §§ 5–6.

123 *Id.* at 2–4.

124 *Id.* § 3.

125 *Id.*

126 *Id.* § 6.

127 *Id.*

128 *CDM Guidelines Version 1*, *supra* note 117, at 3 (emphasis added); *CDM Guidelines Version 2*, *supra* note 117, at 3.

129 *See, e.g.*, ANJA KOLLMUSS, NICOLAS MÜLLER & RANDALL SPALDING-FECHER, INPUT TO THE EB ABOUT THE NEW METHODOLOGY SSC-III.AV "LOW GREENHOUSE GAS EMITTING WATER PURIFICATION SYSTEMS" 1 (2011), *available at* http://cdm.unfccc.int/public_inputs/2011/eb60_02/cfi/Q3N2R M579K9WNSI2RE52NZ61WNJSM9 (discussing suppressed demand in case 1 and case 2 in context of efficacy of boiling more than 5.5 liters per person per day).

130 This is because Version 3 is slightly more specific. While all three versions require documentation regarding boiling of water when determining the capped quantity of water under case 2, only Version 3 ties this documentation to specific buildings as opposed to the population generally. *Compare CDM Guidelines Version 1*, *supra* note 117, at 3 (documentation must be obtained showing entire population served by project that would have boiled water) *and CDM Guidelines Version 2*, *supra* note 117, at 3 (documentation must be obtained showing entire population served by project that would have boiled water) *with CDM Guidelines Version 3*, *supra* note 117, at 3 (total project population must be calculated and adjusted by fraction of population served by project at each household or building that would have boiled water according to documentation or a survey).

targeted to LDCs, where demand for basic human needs such as clean water is most suppressed.[131] According to the latest JMP statistics, only 63% of people in LDCs have access to "improved" water supplies.[132] The vast majority are in sub-Saharan Africa, where only 61% have access to "improved" water.[133] According to JMP statistics from 2010, Case 1 projects could be developed in fewer than twenty countries, including Afghanistan (where 50% of the population has access to "improved" drinking water), Angola (51%), Chad (51%), Democratic Republic of Congo (45%), Ethiopia (44%), Kenya (59%), Madagascar (46%), Mauritania (50%), Mozambique (47%), Niger (49%), Nigeria (58%), Papua New Guinea (40%), Sierra Leone (55%), Somalia (29%), Sudan (including what is now South Sudan) (58%), Tanzania (53%), and Yemen (55%).[134] However, given the recent study discussed above, where only 4.5% of households in Africa were found to boil water consistently, it is not clear whether this assumption is an accurate one from the standpoint of greenhouse gas emission reductions.[135]

As of the writing of this article, it appeared that no projects for HWTS have yet been certified under CDM using the suppressed demand approach.

2. Suppressed Demand under the Gold Standard

Under the Gold Standard, the suppressed demand approach was adopted for water treatment project activities in guidelines promulgated in August 2010.[136] To establish the baseline standard of living and determine the extent to which boiling is used to purify water, the Gold Standard requires that a "kitchen survey" be conducted prior to the start of the project and on a quarterly basis thereafter.[137] The kitchen survey "involves observations and questionnaires undertaken by an expert survey team visiting kitchens" to

131 Fourth U.N. Conference on the Least Developed Countries, May 9–13, 2011, *Programme of Action for the Least Developed Countries for the Decade 2011–2020*, U.N. DOC. A/CONF.219/3, at 28 (May 11, 2011), *available at* http://www.ipu.org/splz-e/ldciv/action.pdf ("Significant portions of the populations in the least developed countries lack access to safe drinking water and basic sanitation, which are fundamental to health, poverty eradication, environment protection, growth and development. Increasing access to safe drinking water and basic sanitation through prioritizing integrated water and sanitation strategies is of significant importance in this regard.").

132 W.H.O. & UNICEF, PROGRESS ON DRINKING WATER AND SANITATION, *supra* note 9, at 4.

133 *Id.*

134 *Id.* at 39–55.

135 Rosa & Clasen, *supra* note 111, at 292–93 (finding that boiling is almost universal in Indonesia (90.6%), Mongolia (95.2%), Uzbekistan (98.5%), and Viet Nam (91.0%), and it is widely practiced in Tajikistan (80.3%), Timor-Leste (73.4%), Kazakhstan (67.6%), Azerbaijan (69.5%), and Ecuador (61.4%). Although boiling is relatively rare in Africa (4.5%), there were African countries reporting significantly higher rates, including Uganda (39.8%) and Zambia (15.2%)).

136 GOLD STANDARD INDICATIVE PROGRAMME FOR KITCHEN REGIMES, *supra* note 99, at 34–38. ("V.02 of this methodology has been updated to allow the eligibility of project activities that reduce the amount of fuelwood consumed by changing kitchen practice from water boiling as a purification technique to the introduction of new zero emission technology that treats water (e.g. gravity household water filters).").

137 *Id.* at 36.

develop a more precise understanding of how adoption of the technology impacts fuel consumption and GHG emissions.[138] The project only allows for emission reductions for those households that actually boil water.[139] However, "[t]o account for . . . suppressed demand and reflect a more satisfactory level of service, the baseline is defined as the total amount of treated water for consumption per person per day."[140] The amount is capped at 7.5 liters per capita per day, which is an amount that is intended to reflect the amount that the World Health Organization (WHO) has indicated is needed to meet "basic needs" for drinking.[141]

To summarize, Case 1 of the CDM Guidelines uses suppressed demand to impute boiling to all households without any independent verification of the practice, such as through surveys. In contrast, both Case 2 of the CDM Guidelines and the Gold Standard approach require the use of surveys to document that households in fact use boiling as a technique to purify water.[142] Once that is established, then the emission reductions (and corresponding carbon credits) are calculated based on the amount of purified water provided through the project technology (i.e. a filter), plus any remaining boiling water, which is capped at 5.5 or 7.5 liters per capita per day (lpcd), respectively.[143] This latter estimation is where suppressed demand comes into effect because it allows an assumption to be made that this is the amount of water that would otherwise be boiled.

Since 2011, Gold Standard has certified two HWTS projects using the suppressed demand methodology: the Carbon for Water Program developed by Vestergaard Frandsen (VF), a Swiss based corporation, and the Paradigm Healthy Cookstove and Water Treatment Project developed by Impact Carbon and sponsored by the Paradigm Project. [144] At the time that the VF project was approved by Gold Standard, the suppressed demand methodology required the project developer to conduct survey data to establish boiling rates in the local community. This part briefly discusses the VF Carbon for Water project with the goal of highlighting the potential benefits and drawbacks of the current methodological approach.

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138 *Id.* at 8, 36 (describing the "kitchen survey" for fuel-stove projects in a Methodology section that is incorporated by reference in the Annex describing clean water projects).

139 *Id.* at 37.

140 *Id.* at 35.

141 *Id.* at n.31 and accompanying text.

142 *See supra* note 125 and accompanying text; *see supra* notes 137–38 and accompanying text. It is not clear how rigorous these surveys are. For example, a survey that asks respondents "do you boil your water?" may lead to an over-estimation of actual boiling if phrased in a leading way or if the respondent knows that a "yes" answer will result in the distribution of a free filter. Moreover, because the kitchen survey methodology only requires quarterly verification through a random sampling of 25 households, there is an assumption that if a household sometimes boils, it always boils. GOLD STANDARD INDICATIVE PROGRAMME FOR KITCHEN REGIMES, *supra* note 99, at 22. The CDM Case 2 requires biennial surveys. *CDM Guidelines Version 3*, *supra* note 117, at 6.

143 *CDM Guidelines Version 3*, *supra* note 117, at 3; GOLD STANDARD INDICATIVE PROGRAMME FOR KITCHEN REGIMES, *supra* note 99, at 34–35, n.31.

144 Press Release, Impact Carbon & the Paradigm Project, *supra* note 36.

VF became well known in the humanitarian industry for manufacturing mosquito nets with long lasting insecticides that are highly effective tools in preventing malaria.[145] VF entered the clean water industry with LifeStraw, a device that allows clean water to be extracted from polluted sources by sucking water through a straw-like filter device.[146] It later developed a gravity-fed model, called the LifeStraw Family, with the idea that the whole family could share the product.[147] The gravity-fed devices cost $25 per unit, and retail from somewhere between $50 – $70 per unit.[148] VF was challenged with a way to profitably distribute the LifeStraw Family to the people it was intended to aid—the poor in developing countries who would be unable to afford purchasing the LifeStraw Family device.[149]

To overcome this challenge, VF sought and obtained Gold Standard approval to distribute the LifeStraw Family for free in Kenya, and in exchange, receive funding through carbon credits.[150] In the press release announcing the Gold Standard accreditation of the VF LifeStraw Carbon For Water campaign, the Gold Standard CEO, Adrian Rimmer, stated:

> This is a blueprint for how climate finance projects should look—because it moves beyond a pure focus on carbon. Buyers of Gold Standard credits recognize the need for sustainable development to be delivered alongside emissions reductions, and because The Gold Standard uniquely provides assurances of this, they are prepared to pay a higher price that makes these projects viable.[151]

VF has heavily promoted the project in its "Carbon for Water" campaign, which has received much publicity.[152] VF asserts that the Carbon for Water project is "ambitious and visionary."[153] In the spring of 2011, the project distributed 877,500 LifeStraw Family units to homes in the western

145 *See* Rachel Cernansky, *Profit for Good: Carbon Credits Bring Clean Water to Rural Kenya*, TREEHUGGER, June 28, 2011, http://www.treehugger.com/corporate-responsibility/profit-for-good-carbon-credits-bring-clean-water-to-rural-kenya.html (last visited July 21, 2013); Tina Rosenberg, *Clean Water at No Cost? Just Add Carbon Credits*, N.Y. TIMES OPINIONATOR, Nov. 15, 2010, http://opinionator.blogs.nytimes.com/2010/11/15/clean-water-at-no-cost-just-add-carbon-credits/ (last visited July 21, 2013).

146 Vestergaard Frandsen, *LifeStraw: Introduction*, http://www.vestergaard-frandsen.com/lifestraw/lifestraw (last visited July 21, 2013).

147 *Id.*

148 Kevin Starr, *Thirty Million Dollars, a Little Bit of Carbon, and a Lot of Hot Air*, STANFORD SOCIAL INNOVATION REV., June 16, 2011, http://www.ssireview.org/blog/entry/thirty_million_dollars_a_little_bit_of_carbon_and_a_lot_of_hot_air (last visited July 21, 2013).

149 *See* Vestergaard Frandsen, *How Carbon for Water Works*, http://www.vestergaard-frandsen.com/carbon-for-water/how-it-works.html (last visited July 21, 2013).

150 *Id.*

151 Carbon for Water Press Release, *supra* note 33.

152 *See, e.g.*, Kevin Starr, *Another Look at "Carbon for Water" in Western Kenya*, STANFORD SOCIAL INNOVATION REV., Mar. 12, 2012, http://www.ssireview.org/blog/entry/another_look_at_carbon_for_water_in_western_kenya (last visited July 21, 2013).

153 Vestergaard Frandsen, *How Carbon for Water Works*, http://www.vestergaard-frandsen.com/carbon-for-water/how-it-works.html (last visited July 21, 2013).

province of Kenya that lack access to safe water, thus reaching 90% of households within the province.[154] VF is investing $30 million into the project: $25 million toward "purchasing" the filters and $5 million towards logistics and staff involved in implementing the product distribution.[155] VF is a for-profit company stating that its "'profit for a purpose' approach has turned corporate social responsibility into its core business of creating life-saving products for the developing world."[156] It has been reported that VF expects a return "many times over" its initial $30 million investment.[157]

The project, which VF claims will address four of the eight U.N. Millennium Goals[158] and provide clean drinking water to 4,500,000 people,[159] has obtained registration from the Gold Standard.[160] The voluntary carbon market issued the credits after VF completed the validation and verification process.[161] According to VF, carbon financing through the Gold Standard provides a strong incentive to ensure that the filters work and that residents are educated about the project and consistently use the devices.[162] This is because credits are only awarded if the project actually achieves emissions reductions.[163] As such, every six months an independent accredited auditor reviews the project and verifies that the filters are used and that the emission reductions are accurate.[164] Furthermore, VF has established thirty-two repair and replacement facilities[165] to "employ several hundred local people and ensure all units are functioning, at no cost to the end user, throughout the duration of the project."[166] The project is estimated to reduce emissions by more than two million tons per year, which represent 25% of all credits generated in the voluntary market.[167] As of 2011, it is the largest project ever registered in the Gold Standard voluntary market.[168]

Critics are quick to highlight the weaknesses of LifeStraw's inclusion in the Gold Standard. They point out that the distribution of LifeStraw through the Carbon for Water Program does not realize meaningful carbon emissions

154 *Id.*

155 *Id.*

156 *Id.*

157 Fast Company, *Fighting Water-Borne Disease In Africa, And Making Millions In The Process*, CO.EXIST, http://www.fastcoexist.com/1677938/fighting-water-borne-disease-in-africa-and-making-millions-in-the-process (last visited July 21, 2013).

158 Vestergaard Frandsen, *How Carbon for Water Works*, http://www.vestergaard-frandsen.com/carbon-for-water/how-it-works.html (last visited July 21, 2013).

159 *Id.*

160 *Id.*

161 *Id.*

162 *Id.*

163 *Id.*

164 *Id.*

165 *Id.*

166 *Id.*

167 *Id.*

168 *Id.*

reductions because it is based on suppressed demand.[169] In other words, while the project will lead to some GHG reductions, the reductions will not be comparable to the number of CERs issued.[170] Additional concerns are that the program is too costly, does not improve water accessibility, and does not address the need for sanitation and hygiene.[171] Critics also note that the 71% boiling rates used by VF in its suppressed demand calculations far exceed the actual boiling rates of 29% in a survey cited by VF.[172] As one bluntly stated:

> This scheme is so wrong on so many levels that I don't know whether to laugh or cry . . . Projects like Carbon for Water make a mockery of the effort to prevent carbon emissions, and as a physician, it's especially depressing to see a loopy funding scheme paired with a lousy public health solution. The social sector has got to escape this pattern of bogus idea, hyperventilating media, and eventual, invisible failure.[173]

Much of the praise for the LifeStraw Family mistakenly heralds the actual carbon reduction benefits of the LifeStraw program. As one reporter comments, the LifeStraw program being financed through carbon credits is "a seemingly perfect trifecta—making money, preserving Kenya's lush forests, and cleansing water that people need to survive."[174] While some people may use less wood for boiling water as a result of LifeStraw, it is critical to remember that the Carbon for Water campaign is based on suppressed demand, which imputes a consistent level of burning based on initial survey data.[175] As a result, if people were not consistently boiling their water prior to the program, then the distribution of the LifeStraw Family would not have a significant impact on Kenya's forests.

As the critiques of the VF program suggest, the concept of suppressed demand may be simple, but it is challenging to implement effectively.[176] Many of these difficulties arise because, at its core, suppressed demand allows certain factual assumptions to be made so that the carbon emissions and the

169 *Kenya, Western Province: Lifestraw's "Carbon for Water" Program is "Bogus" Says Kevin Starr*; WASH NEWS AFRICA, July 13, 2011, http://washafrica.wordpress.com/2011/07/13/kenya-western-province-lifestraws-carbon-for-water-project-is-bogus-says-kevin-starr/ (last visited July 21, 2013) [hereinafter *"Carbon for Water" Program is "Bogus"*].

170 *See Id.*

171 *Id.*; Starr, *supra* note 148.

172 *"Carbon for Water" Program is "Bogus," supra* note 169.

173 Starr, *supra* note 148.

174 *LifeStraw: Kenyans Receiving Clean Water Through Carbon Credits* (ABC News broadcast May 24, 2011), *available at* http://abcnews.go.com/Health/video/lifestraw-clean-water-carbon-credits-13675636; Fast Company, *supra* note 157.

175 *"Carbon for Water" Program is "Bogus," supra* note 169.

176 Indeed, as the website for the CDM Methodologies handbook aptly declares: "The function of [CDM] methodologies is easy to grasp, but the methodologies themselves can be quite complex." *CDM Methodologies, Prior Notification on the Introduction of the New Procedure*, http://cdm.unfccc.int/methodologies/index.html
(last visited July 21, 2013).

resulting available credits can be ascertained.[177] Given the inferences about the amount of biomass burned, it is not certain that projects relying on suppressed demand actually result in carbon reduction. The recognition of the difficulties inherent in the implementation of suppressed demand has led some to argue that the carbon market should focus primarily on carbon mitigation.[178] At the same time, the suppressed demand approach and its factual assumptions makes clean water projects in LDCs attractive to the carbon markets. The next part attempts to place these criticisms in context by analyzing the suppressed demand methodology for HWTS projects from a human rights and sustainability perspective.

IV. SUPPRESSED DEMAND & HUMAN RIGHTS

A. Equity and Human Rights Considerations

Greater equity within the carbon credit market is at the heart of the suppressed demand approach. It seeks to facilitate the mobilization of capital via the carbon markets to LDCs that would not otherwise have a high enough carbon emissions baseline to attract significant projects.[179] By raising the baseline emissions level and enabling LDCs to gain access to financing through the carbon market, suppressed demand is intended to enable LDCs to "leap-frog" over traditional and presumably dirtier technologies.[180] The methodology attempts to respond to the key criticisms of CDM, i.e., that it does not promote an equitable form of sustainable development.

Significant inequality in access to basic energy infrastructure exists. It is estimated that 20% of the world's population lacks access to electricity;[181] that 40% rely on biomass for cooking;[182] and that the poorest three quarters of the world's population use only 10% of global energy.[183] Many development

177 A presentation by the World Bank Carbon Finance Unit in June 2011 to the UNFCCC suggested minimum service levels for suppressed demand should be determined by looking at existing literature; with respect to clean water, the presentation cited the Millennium Development Goals. FELICITY SPORS, SUPPRESSED DEMAND: DEFINITION AND CONSIDERATION OF DIFFERENT APPROACHES TO ADDRESS IT IN CDM METHODOLOGIES 10 (2011), *available at* http://cdm.unfccc.int/methodologies/Workshops/cdm_standards/s3_wb.pdf.

178 ANJA KOLLMUS, CDM WATCH, SUPPRESSED DEMAND: AN NGO PERSPECTIVE (2011), *available at* http://cdm.unfccc.int/methodologies/Workshops/cdm_standards/s3_cdmwatch.pdf.

179 LDC ENV'T CTR., *supra* note 96, at 5–6 (arguing that suppressed demand is an important way for CDM projects to help overcome the income, technology, and infrastructure barriers that constrain consumption in low-income countries).

180 Harald Winkler & Steve Thorne, Baselines for suppressed demand: CDM projects contribution to poverty alleviation, 5 S. AFRICAN J. ECON. AND MGT. SCIENCES 416 (2002) (arguing that suppressed demand is important because "credit should be given to development paths that 'leap-frog' to cleaner technologies, without first getting dirty"); LDC ENV'T CTR., *supra* note 96, at 6 (suggesting that without suppressed demand "CDM projects reward polluters rather than those who take action to avoid emissions").

181 GAVALDÃO ET AL., *supra* note 97, at 2.

182 *Id.*

183 *Id.*

experts believe that providing access to modern forms of energy is the critical first step in poverty elimination and that there is a direct connection between lack of access to modern forms of energy and the lack of provision of clean water, sanitation, and healthcare.[184] Agenda 21 of the 1992 UN Conference on Environment and Development in Rio de Janeiro, Brazil, noted that "energy is essential to economic and social development and improved quality of life,"[185] and the recent Rio+20 Conference on Sustainable Development identified "Sustainable Energy for All" as a key theme.[186] Increasing attention has also been paid to the role that access to energy plays in meeting the MDG, because "energy services have a multiplier effect on health, education, transport, telecommunications, safe water, and sanitation services, and on investments in and the productivity of income-generating activities in agriculture, industry, and tertiary sectors."[187] Although there is no right to energy recognized under international law, it has been suggested that "realizing the right to access clean energy services may evolve into a standard over time, especially given that this norm fits in with existing normative frameworks and has eager promoters."[188]

Human rights have been invoked as a rationale to support suppressed demand.[189] The concept of suppressed demand can be understood as consistent with the rights that have been specifically enumerated in the Universal Declaration of Human Rights (UDHR).[190] Although the UDHR was not created to have independent legally binding force, it articulates human rights principles and standards, which subsequently have been codified into international treaties and documents, such as the International Covenant on Economic, Social, and Cultural Rights (ICESCR).[191] This part briefly explores the normative relationship between suppressed demand theory and the human right to share in scientific advancement and its benefits, the human right to an adequate standard of living, and the human right to health, before

184 *Id.*

185 U.N. Conference on Environment & Development, Rio de Janeiro, Brazil, June 3–14, 1992, *Agenda 21*, § 9.9, *available at* http://www.un.org/esa/sustdev/documents/agenda21/english/Agenda21.pdf.

186 Rio+20: UN Private Sector Forum: Access to Energy For All, *available at* http://www.uncsd2012.org/rio20/index.php?page=view&type=13&nr=384&menu=29.

187 VIJAY MODI ET AL., ENERGY SERVICES FOR THE MILLENNIUM DEVELOPMENT GOALS 2 (2005), *available at* http://www.unmillenniumproject.org/documents/MP_Energy_Low_Res.pdf.

188 William Moomaw & Mihaela Papa, *Creating a Mutual Gains Climate Regime Through Universal Clean Energy Services*, 12 CLIMATE POLICY 505, 520 (2012); *see also* Adrian J. Bradbook & Judith Gail Gardam, *Placing Access to Energy Services Within a Human Rights Framework*, 28 HUMAN RIGHTS Q. 389, 389–392 (2006) (developing the normative basis and content of a right to energy under international human rights law).

189 GAVALDÃO ET AL, *supra* note 97, at 3; GOLD STANDARD INDICATIVE PROGRAMME FOR KITCHEN REGIMES *supra* note 99, at 35–36.

190 *The Universal Declaration of Human Rights*, art. 25, http://www.un.org/en/documents/udhr/index.shtml#a25 (last visited July 21, 2013).

191 *International Covenant on Economic, Social and Cultural Rights*, http://www.ohchr.org/EN/ProfessionalInterest/Pages/CESCR.aspx (last visited July 21, 2013).

turning to a critical analysis of suppressed demand using the criteria of the human right to water.

1. Right to enjoy the benefits of scientific progress

The use of suppressed demand to increase access to small-scale technologies could be seen as advancing Article 27(1) of the UDHR, which states: "Everyone has the right freely . . . to share in scientific advancement and its benefits."[192] This idea is specifically enumerated in Article 15 of the ICESCR, which states that everyone has the right "to enjoy the benefits of scientific progress and its applications."[193] It could be argued that suppressed demand promotes everyone's ability, even those living in LDCs, to partake in scientific advances in technology, such as clean water filters and fuel-efficient stoves.

2. Right to an adequate standard of living

Suppressed demand arguably seeks to advance the "right to an adequate standard of living." The UDHR states at Article 25(1) that:

> Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.[194]

Article 11(1) of the ICESCR states:

> The States Parties to the present Covenant recognize the right of everyone to an adequate standard of living for himself and his family, including adequate food, clothing and housing, and to the continuous improvement of living conditions. The States Parties will take appropriate steps to ensure the realization of this right, recognizing to this effect the essential importance of international co-operation based on free consent.[195]

The background documents to the ICESCR ("travaux préparatoires") make clear that the concept of an adequate standard of living was meant to have a broad and general meaning.[196] The specific references to clothing, housing, and food were intended to be exemplary,[197] as the recent recognition by the U.N. of the human right to safe drinking water and

192 *Universal Declaration of Human Rights*, *supra* note 190.

193 *International Covenant on Economic*, Social and Cultural Rights, *supra* note 191.

194 *Universal Declaration of Human Rights*, *supra* note 190.

195 *International Covenant on Economic, Social and Cultural Rights*, *supra* note 191.

196 MATTHEW C. R CRAVEN, THE INTERNATIONAL COVENANT ON ECONOMIC, SOCIAL, AND CULTURAL RIGHTS: A PERSPECTIVE ON ITS DEVELOPMENT 301 (1995).

197 *Id.* at 302–06.

sanitation suggests.[198] As a result, the human right to an adequate standard of living could be conceptually consistent with the premise of suppressed demand theory, which allows LDC baseline emissions to be increased to reflect the carbon emissions a country would have if its people were able to burn an amount of biomass sufficient to meet their basic needs. In other words, suppressed demand is based on the idea that people have an entitlement to a minimum amount of services.[199]

By making carbon financing more available to LDCs that have historically been underrepresented in the market, the suppressed demand methodology underscores the recognition in Article 11 of the ICESCR of "the essential importance of international co-operation based on free consent" to realizing the right to an adequate standard of living.[200] By targeting carbon financing for LDCs, suppressed demand methodology could be interpreted as a mechanism for increased international cooperation, which has been essential to the Kyoto Protocol, to the work of the UNFCCC, and to creating and maintaining the compliance and voluntary markets.[201]

3. Right to health

Devoting capital from the carbon markets to reduce reliance on burning biomass for cooking and boiling water could also be understood as consistent with the right to health. Article 12 of the ICESCR recognizes "the right of everyone to the enjoyment of the highest attainable standard of physical and mental health."[202] Significant negative health effects are associated with burning biomass fuel, such as asthma,[203] and with lack of clean drinking water, such as diarrhea.[204] Imputing minimum baselines into the suppressed demand methodology can help alleviate the negative health impacts associated with living without access to those minimum service levels.

By enabling LDCs to "leap-frog" over antiquated dirty technology, the suppressed demand methodology could arguably be seen as promoting an intergenerational approach toward realizing the right to an adequate

198 G.A. Res. 64/292, *supra* note 7.

199 *CDM Suppressed Demand Guidelines*, *supra* note 61, at 2 ("A suppressed demand situation is applicable when a minimum service level to meet basic human needs, as defined above, was unavailable to the end user of the service prior to the implementation of the project activity.").

200 *International Covenant on Economic, Social and Cultural Rights*, *supra* note 191.

201 *See, e.g.*, *Climate Change: International Climate Partnerships*, http://www.epa.gov/climatechange/EPAactivities/internationalpartnerships.html (last visited July 21, 2013).

202 *International Covenant on Economic, Social and Cultural Rights*, *supra* note 191.

203 Majid Ezzati & Daniel M. Kammen, *The Health Impacts of Exposure to Indoor Air Pollution from Solid Fuels in Developing Countries: Knowledge, Gaps, and Data Needs*, 110 ENVTL. HEALTH PERSP. 1057, 1057 (2002).

204 Benjamin F. Arnold & John M. Colford, *Treating Water with Chlorine at Point-of-Use to Improve Water Quality and Reduce Child Diarrhea in Developing Countries: A Systematic Review and Meta-Analysis*, 76 AM. J. TROP. MED. HYG. 354, 354 (2007).

standard of living, as well as the right to health.[205] Under current circumstances, an increase in the standard of living is correlated with an increase in a country's GDP, which in turn is correlated with an increase in energy consumption and carbon emissions.[206] This correlation presents the critical challenge of how to provide LDCs with adequate energy and basic services while simultaneously reducing global carbon emissions.[207] By reducing the negative environmental and health impacts of burning biomass, suppressed demand could enable an improvement in health and standards of living not only for the current generation, but also for future generations.

4. Right to water

The recently recognized right to safe drinking water has also been a motivating factor for using the suppressed demand methodology in carbon-financed HWTS projects. For example, the Gold Standard recognizes that "access to safe water is a basic human right."[208] In recognizing the right to water and sanitation in 2010, the UN General Assembly called upon "States and international organizations to provide financial resources, capacity-building and technology transfer, through international assistance and cooperation, in particular to developing countries, in order to scale up efforts to provide safe, clean, accessible and affordable drinking water and sanitation for all."[209]

The next part analyzes carbon market-financed water projects from a human rights and sustainability perspective an effort to highlight potential areas where the methodology and monitoring could be improved. The analysis is organized using the "Good Practices" framework developed by the UN Special Rapporteur for the Human Right to Safe Drinking Water and Sanitation.[210] The first five Good Practices criteria focus on normative outcomes relating to the quality of the drinking water and sanitation services: 1) availability, 2) quality/safety, 3) acceptability, 4) accessibility and 5) affordability.[211] These five normative criteria align with the legal basis for the right to water as expressed by the UN Economic and Social Council: "The human right to water entitles everyone to sufficient, safe, acceptable,

205 *See, e.g.*, EDITH BROWN WEISS, IN FAIRNESS TO FUTURE GENERATIONS: INTERNATIONAL LAW, COMMON PATRIMONY, AND INTERGENERATIONAL EQUITY 21 (1989) (proposing a theory of intergenerational equity that "focuses on the inherent relationship that each generation has to other generations, past and future, in using the common patrimony of natural and cultural resources of our planet").

206 GAVALDÃO ET AL., *supra* note 97, at 5.

207 *See id.* at 5.

208 GOLD STANDARD INDICATIVE PROGRAMME FOR KITCHEN REGIMES, *supra* note 99, at 35–36.

209 G.A. Res. 64/292, *supra* note 7, at 3.

210 U.N. Human Rights Council, *Report of the Special Rapporteur on the Human Right to Safe Drinking Water and Sanitation, Catarina de Albuquerque, Addendum: Compilation of Good Practices*, 23, U.N. Doc. A/HRC/18/33/Add.1 (June 29, 2011), *available at* http://www2.ohchr.org/english/bodies/hrcouncil/docs/18session/A-HRC-18-33-Add1_en.pdf [hereinafter *de Albuquerque, Compilation of Good Practices*].

211 *Id.* ¶ 2.

physically accessible and affordable water for personal and domestic uses."[212] The next five Good Practices criteria are considered cross-cutting because they apply to all human rights: 1) non-discrimination, 2) participation, 3) accountability, 4) impact and 5) sustainability.[213]

B. Normative Content of Human Right to Water

1. Availability

The human right to water entitles each person to have access to water that is continuously available and of sufficient quantity to meet individual needs of drinking water, personal hygiene, and other personal and domestic uses, such as cooking, food preparation, dish and laundry washing and cleaning.[214] Notably, "sufficient quantity" is not explicitly defined in terms of volume under international human rights law. Sufficient quantity is context-specific and a universal amount for individual minimum water needs cannot be established.[215] Individual water needs can vary "for instance due to climatic conditions, level of physical activity and personal health conditions."[216] This approach is consistent with the one taken toward all economic and social rights, where international law sets forth the normative content but leaves States with the obligation to establish specific benchmarks and parameters.[217]

The World Health Organization has established guidelines for the amount of water required to meet drinking, hygiene, and other basic needs.[218] The report illustrates the four basic levels of access: 1) "no access" is below 5 lpcd; 2) "basic access" is 20 lpcd; 3) "intermediate access" is 50 lpcd; and 4) "optimal access" is 100 lpcd.[219] In the context of disaster response, 15 lpcd of water is considered to be the absolute minimum for survival, but even this amount "raises health concerns, as it is insufficient to meet hygiene requirements, and must not be understood to correspond to the full realization of the right to water."[220]

Under the suppressed demand guidelines, carbon credits are calculated based on the entitlement of a certain amount of drinking water per day

212 ECOSOC, *supra* note 10, ¶ 2.

213 *de Albuquerque, Compilation of Good Practices*, *supra* note 210, ¶ 2.

214 ECOSOC, *supra* note 10, ¶ 2.; *de Albuquerque, Progress Report on the Compilation of Good Practices*, *supra* note 10, ¶ 19.

215 de Albuquerque, Compilation of Good Practices, *supra* note 10, ¶ 19.

216 *Id.*

217 *See* CRAVEN, *supra* note 196, at 288–301.

218 GUY HOWARD & JAMIE BARTAN, WORLD HEALTH ORG., DOMESTIC WATER QUANTITY, SERVICE LEVEL AND HEALTH 22 (2003), *available at* http://www.who.int/water_sanitation_health/diseases/WSH03.02.pdf; *see* ECOSOC, *supra* note 10, at 5.

219 HOWARD & BARTAN, *supra* note 218, at 22.

220 *de Albuquerque, Progress Report on the Compilation of Good Practices*, *supra* note 10, ¶ 19.

imputed to every person.[221] As described above, the amount is 7.5 lpcd under the Gold Standard,[222] and 5.5 lpcd under CDM.[223] In describing its rationale for using the suppressed demand methodology in HWTS projects, the Gold Standard refers to the human right to water as well as to the World Health Organization guidelines for determining what constitutes an acceptable minimum service level.[224] It allows projects to attribute up to 7.5 lpcd on the theory that this is the amount of clean water that a person would drink if the barriers to boiling water were removed.[225] The Gold Standard explains that it has adopted this amount because "the definition of peer in relation to water should be the 'developed' world global peer as access to safe water is a basic human right."[226] CDM employs a similar rationale.[227]

Compared to the World Health Organization standards, both the Gold Standard and CDM impute extremely conservative figures for water consumption under suppressed demand methodology.[228] Part of the reason for this approach may be that while the human right to water includes water for drinking, household use and hygiene, the carbon-financed HWTS projects only address drinking water. Some contend that the 5.5 lpcd baseline is too low and that the baseline should be increased to 20 lpcd. Other critics suggest that the allowance of 5.5 liters per day is not conservative at all and should be reduced.[229] The rationale is that it would be detrimental to the environmental integrity of water purification projects to grant credits for water in excess of 5.5 lpcd.[230] In other words, it is unrealistic to assume that stakeholders would boil more than 5.5 lpcd and credits should not be

221 *See CDM Guidelines Version 3*, *supra* note 117, at 2–3.

222 THE GOLD STANDARD, TECHNOLOGIES AND PRACTICES TO DISPLACE DECENTRALIZED THERMAL ENERGY CONSUMPTION 35 (2011), *available at* http://www.cdmgoldstandard.org/wp-content/uploads/2011/10/GS_110411_TPDDTEC_Methodology.pdf [hereinafter GOLD STANDARD, TECHNOLOGIES AND PRACTICES].

223 *CDM Guidelines Version 3*, *supra* note 117, at 2–3.

224 GOLD STANDARD, TECHNOLOGIES AND PRACTICES, *supra* note 222 at 37–38.

225 *Id.*

226 GOLD STANDARD INDICATIVE PROGRAMME FOR KITCHEN REGIMES, *supra* note 99, at 35–36.

227 *See* Evan Thomas, Alison Hill, & Matt Spannagle, CDM: FORM FOR SUBMISSIONS ON SMALL SCALE METHODOLOGIES AND PROCEDURES 2 (Version 3, 2007), *available at* http://cdm.unfccc.int/UserManagement/FileStorage/SOAQ9NBUTFM6X8D7YR5342IHLVZGCE (stating, "Should the average volume of drinking water currently consumed per person per day by the population exceed 5.5 liters per person per day, the project proponent will apply a value of 5.5 to this parameter."); *CDM Guidelines Version 2*, *supra* note 117, at 6 (noting that if a water purification project has a distribution system that could generate emissions, the CDM guidelines stated that "only the first few litres of purified water would qualify the NRB/fossil fuel baseline and a different baseline would apply to the remaining quantity of water (e.g., "emissions associated with a public distribution system")).

228 *See supra* text accompanying notes 219–23.

229 Evan Thomas, Manna Energy Limited, Response to Call for Public Inputs on the Expansion of the Usability of the Small Scale Methodology AMS-III.AV "Low Greenhouse Gas Emitting Water Purification Systems", *available at* http://cdm.unfccc.int/public_inputs/2011/eb60_02/cfi/M4OU0ZF3W1KYSYPXKON7MYEMRFDU3K. In claiming that the baseline be increased to 20 liters per person per day, Thomas does not distinguish between drinking water and water that is used for hygiene and cooking purposes. *Id.*

230 *Id.*

granted for quantities in excess of that baseline amount. In contrast, others contend that the 5.5 lpcd baseline is too low and that the baseline should be increased to 20 lpcd.[231]

Although the amount of water that should be imputed under the suppressed demand methodology can be disputed, there is no doubt that the methodology correlates with the idea of a human right to water—both assume every person should have access to a minimum amount of clean drinking water for survival and human dignity.[232] The theory of suppressed demand makes more clean water potentially available in LCDs by providing funding for HWTS projects that otherwise may not be developed.

Figure 1. Excerpt from the World Health Organization publication, "The Right to Water" 233 (2003).

Service level	Distance /time	Likely volumes of water collected	Needs met	Intervention priority and actions
No access	More than 1 kilometre/ more than 30 minutes round trip	Very low (often below 5 litres per capita per day)	Consumption cannot be assured Hygiene practice compromised Basic consumption may be compromised	**Very High** Provision of basic level service
Basic Access	Within 1 kilometre/ within 30 minutes round trip	Average unlikely to exceed approximately 20 litres per capita per day	Consumption should be assured Hygiene may be compromised Laundry may occur off-plot – i.e. away from home	**High** Hygiene education Provision of intermediate level of service
Intermediate access	Water provided on-plot through at least one tap (yard level)	Average of approximately 50 litres per capita per day	Consumption assured Hygiene should not be compromised Laundry likely to occur on-plot – i.e. within confines of the household	**Low** Hygiene promotion still yields health gains Encourage Optimal access
Optimal access	Supply of water	Average of 100-200 litres per capita per	Consumption assured	**Very Low** Hygiene

231 *Id.* In claiming that the baseline be increased to 20 liters per person per day, Thomas does not distinguish between drinking water and water that is used for hygiene and cooking purposes. *Id.*

232 *See supra* note 224 and accompanying text.

233 W.H.O., THE RIGHT TO WATER 13 (2003), *available at* http://www.who.int/water_sanitation_health/en/righttowater.pdf.

	through multiple taps within the house	day	Hygiene should not be compromised Laundry will occur on-plot	promotion still yields health gains

2. Quality/safety

Because suppressed demand theory seeks to expand access to clean water technology, it is also consistent with the human right to water's requirement that each person have access to water that is safe and clean to drink.[234] The CDM requires that water treatment technologies meet either WHO guidelines or the relevant national standards or guidelines.[235]

Both the Gold Standard and CDM require that water treatment technologies adhere to drinking water purity standards established by the country where the project is to be located.[236] If no relevant water quality standards exist, the most recent standards/guidelines by WHO or EPA may be utilized.[237]

3. Acceptability

Water must also be acceptable in appearance, odor, and taste to comply with the human right to water. Good practices relating to the acceptability of drinking water involve "a high degree of consultation with intended users to fully understand their definitions of 'acceptable.'"[238] The challenge with HWTS systems is that they require user participation; what is acceptable in one region or one household may not be acceptable in another.

Research suggests that HWTS systems are limited by a host of potential challenges that relate to the acceptability of the system. Does a specific system, and the technology upon which it is based, work in a particular

234 *See* ECOSOC, *supra* note 10, at 5.

235 *CDM Guidelines Version 3*, *supra* note 117, at 1 ("It shall be demonstrated based on laboratory testing or official notifications (for example notifications from the national authority on health) that the application of the project technology/equipment achieves compliance either with: i) at a minimum the performance target as per 'Evaluating household water treatment options: Health based targets and microbiological performance specifications' . . . or ii) an applicable national standard or guideline.") (citing WHO, EVALUATING HOUSEHOLD WATER TREATMENT OPTIONS: HEALTH-BASED TARGETS AND MICROBIOLOGICAL PERFORMANCE SPECIFICATIONS (2011), *available at* http://www.who.int/water_sanitation_health/publications /2011/evaluating_water_treatment.pdf).

236 *See* C.D.M. Exec. Bd., 62nd Meeting, Marrakesh, Morocco, July 11–15, 2011, Proposed Agenda and Annotations, § 21, *available at* http://climate-l.iisd.org/news/cdm-executive-board-adopts-guidelines-on-standardized-baselines/.

237 *CDM Guidelines Version 2*, *supra* note 117, at 1, n.3 (noting that the WHO "[p]rotective default performance target is defined by a 2 $\log_{10}$ reduction of bacteria, a 3 $\log_{10}$ reduction of viruses and a 2 $\log_{10}$ reduction of protozoa ('protective'). The reference pathogens shall be C. Jejuni, Cryptosporidium, and rotavirus.").

238 *de Albuquerque, Progress Report on the Compilation of Good Practices*, *supra* note 10, ¶ 28.

area? What maintenance for the specific purification device is required and who will pay for the maintenance? Is the system convenient to use and does it provide a sufficient amount of clean water in a reasonable amount of time? Will it prove feasible over a reasonable duration, or will people stop using it? Does it produce water that has an acceptable taste and odor? These questions and the challenges that they represent are not hypothetical, and have caused many experts to reject the "one size fits all" approach to clean water systems and technologies.[239]

That a HWTS system is distributed either free or at low cost through a carbon financed program does not necessarily mean that it will be appropriate to the local community or that the community members will use it consistently. For example, the VF LifeStraw Family can only hold two liters of water, which takes seven to twelve minutes to filter based on a VF statement that flow rates range from 170–280 mL/minute.[240] Some people may not have the patience to wait that long, especially in a large family. Also, because the reservoir is gravity fed, it needs to be hung at a fairly high point in relation to the filter, making it not very user friendly. It also requires somewhat complex daily cleaning.[241] If the filter is not cleaned properly, it may not function efficiently, which may lead to disuse.[242] As a result, while a project's goal may be to achieve clean water for everyone, it will fail if the system is not adopted and continuously used by the recipients over a long-term period.[243]

239 *See*, *e.g.*, Wolf-Peter Schmidt & Sandy Cairncross, Household Water Treatment in Poor Populations: Is There Enough Evidence for Scaling Up Now?, 43 ENVIRON. SCI. TECHNOL. 986, 986 (2009); DANIELE LANTAGNE, ROBERT QUICK & ERIC MINTZ, HOUSEHOLD WATER TREATMENT AND SAFE STORAGE OPTIONS IN DEVELOPING COUNTRIES: A REVIEW OF CURRENT IMPLEMENTATION PRACTICES (2006), *available at* http://josiah.berkeley.edu/2007Fall/ER275/Readings/DP1-2/Lantagne%20et%20al%202006.pdf (discussing current implementation practices in Zambia, Haiti, Cambodia, Nicaragua, and Indonesia).

240 Vestergaard Frandsen, *Lifestraw—Longevity and Efficacy,* http://www.vestergaard-frandsen.com/lifestraw/lifestraw/longevity-and-efficacy (last visited July 21, 2013).

241 LIFESTRAW, SAFE DRINKING WATER INTERVENTIONS FOR HOME AND OUTSIDE USE 8–11 (2011), *available at* http://www.vestergaard-frandsen.com/component/docman/cat_view/51-product-brochures/57-lifestrawr.

242 *See* WHO, EVALUATING HOUSEHOLD WATER TREATMENT OPTIONS: HEALTH-BASED TARGETS AND MICROBIOLOGICAL PERFORMANCE SPECIFICATIONS 55 (2011), *available at* http://www.who.int/water_sanitation_health/publications/2011/evaluating_water_treatment.pdf ("Technologies with a high user burden, with recurrent costs or that involve substantial behaviour change may be especially susceptible to appreciable declines in use after introduction of the technology.").

243 "Certainly the evidence would support the observation that in a number of studies continued use of the (HWTS) intervention within the target population declines with time, either due to choice, failure of the device, or the inability to purchase replacements." HOUSEHOLD WATER TREATMENT IN DEVELOPING COUNTRIES: COMPARING DIFFERENT INTERVENTION TYPES USING META-REGRESSION - ENVIRONMENTAL SCIENCE & TECHNOLOGY, E, *available at* http://pubs.acs.org/doi/abs/10.1021/es9028217.

4. Physical Accessibility

The human right to water requires that water facilities and services be physically accessible to everyone without discrimination.[244] To be physically accessible, a source of water must be within safe physical proximity to every community member and every community facility, including homes, schools and workplaces. Lack of access to safe water disproportionately impacts women and girls, who globally spend approximately 200 million hours per day collecting water.[245] Moreover, the time spent gathering water presents significant opportunity costs, often discouraging children from attending school or preventing women from engaging in more economically-productive activities. Traveling long distances to gather water has negative health impacts and also exposes women and children to violence and harassment.[246]

To date, carbon financed water projects are focused on providing HWTS systems that eliminate the need to boil drinking water.[247] Neither the CDM nor the Gold Standard guidelines appear to target projects that would improve the physical accessibility to water, such as through the installation of a well or piped infrastructure. Thus, it could be argued that the suppressed demand methodology does not address the physical accessibility component of the human right to water. On the other hand, in certain instances, carbon credit financed water programs could make clean water more physically available. For example, if there is nonpotable water nearby, it could be purified using the technology provided and reduce the need to obtain cleaner water from a location that is further away.

5. Affordability

A fundamental aspect of the human right to water is that water must be affordable to all people, but this does not mean that water must be provided to everyone for free.[248] If people are not able to afford the cost of water charged by the provider, the State must develop appropriate solutions to ensure that each person has access to a reasonable amount of clean water.[249] Carbon financed water projects help ensure that water purification systems are affordable. They are financed by funds derived from carbon credits and are provided to users for free or at low cost.[250] However, at least in their

244 ECOSOC, *supra* note 10, at 6.

245 I.P. Ifabiyi et al., *Productive Time of Women and Water Supply in Ijumu, Local Government Area, Kogi State, Nigeria*, 10 GLOBAL J. HUM. SOC. SCI. RES. 45, 45 (2010), *available at* https://globaljournals.org/GJHSS_Volume10/GJHSS_Volume10_Issue5.pdf.

246 U.N. & W.H.O., HUMAN RIGHTS FACT SHEET NO. 35: THE RIGHT TO WATER 19–23 (2010), available at http://www.ohchr.org/Documents/Publications/FactSheet35en.pdf.

247 PIETRO GALGANI, CARBON FINANCE FOR SAFE WATER PROJECTS 2 (2012), *available at* http://300in6.org/wp-content/uploads/2012/10/Carbon-Finance-Review-Report-FINAL-v2.pdf.

248 ECOSOC, *supra* note 10, ¶ 27.

249 de Albuquerque, *Compilation of Good Practices*, *supra* note 10, at 17.

250 GALGANI, *supra* note 247, at 2–3.

current form, these carbonfinanced water projects do nothing to ensure that raw, untreated water can be obtained from an affordable source.[251]

C. Cross-Cutting Criteria of Human Right to Water

1. Non-Discrimination

The human right to water requires that water facilities and services be accessible to everyone without discrimination.[252] The requirement of nondiscrimination is at the heart of human rights law and comes directly from the ICESCR, which states,

> The States Parties to the present Covenant undertake to guarantee that the rights enunciated in the present Covenant will be exercised without discrimination of any kind as to race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status.[253]

Carbon financed water projects target the marginalized and poor in LDCs, which disproportionately suffer from lack of clean drinking water.[254] As a result, these projects offer the promise of making clean drinking water accessible to these vulnerable populations who are routinely denied fundamental services based on discriminatory criteria, including economic and class discrimination.[255] At the same time, it is not clear from the CDM and Gold Standard guidelines whether there are sufficient project approval guidelines and monitoring in place to ensure that projects are implemented consistently with the principle of nondiscrimination.[256]

2. Participation

Individual and community participation is a key component of the human rights-based approach to development. Participation is important not only because it contributes to human dignity, but also because it can help

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251 *See*, *e.g.*, Peter Harvey, *Cost Determination and Sustainable Financing for Rural Water Services in Sub-Saharan Africa*, 9 WATER POL'Y 373, 374 (2007) ("The presumption that once a new water supply is constructed and 'handed over' to the user community it can be sustained by community financing of operation and maintenance (O&M) is over-simplistic, especially since the long-term O&M costs are neither calculated nor communicated to water users.").

252 ECOSOC, *supra* note 10, at 15.

253 International Covenant on Economic, Social and Cultural Rights, *supra* note 191, Art. 2(2).

254 *See* GALGANI, *supra* note 247, at 3.

255 *See Unequal Access to Clean Water Threatens International Peace*, ACT ALLIANCE, March 22, 2013, http://www.actalliance.org/stories/unequal-access-to-clean-water-threatens-internat ional-peace-and-progress (last visited July 21, 2013).

256 *See* ECOFYS, TUV-SUD & FIELD, GOLD STANDARD TOOLKIT 2.0, 29 (2008), *available at* http://www.cdmgoldstandard.org/wp-content/uploads/2011/11/GSV2_Toolkit.pdf [hereinafter GOLD STANDARD TOOLKIT].

ensure the effectiveness of a program.[257] Participation should go beyond mere consultation, and should be active, free, and meaningful. Women, who often bear the primary burden for collecting and purifying water, should be consulted and given the opportunity to participate in selecting and implementing an appropriate carbon credit financed water program.

Gold Standard has clear guidelines for stakeholder consultations that appear to incorporate many aspects of a human rights-based approach.[258] The goal of the two-step consultation process is to inform relevant stakeholders about the project, provide them with an opportunity to discuss impact, and solicit concerns.[259] The guidelines require that each project developer hold a meeting in the local community where the project will take place.[260] They suggest that the meeting be planned so as not to conflict with work schedules and to ensure maximum participation from women and marginalized groups.[261] The guidelines are flexible, allowing for a number of smaller meetings in place of one large meeting.[262] In addition to community members, they advise that local officials and representatives of nongovernmental organizations also be invited.[263] The meetings are supposed to be held in the local language and conducted in an understandable and nontechnical way, so as to maximize understanding.[264] Once the comments from the initial consultation have been addressed by the project, a follow-up consultation with the relevant stakeholders is to take place.[265]

Under the CDM validation process, a project developer is supposed to ensure that there has been adequate engagement with local stakeholders and that project participants have taken account of any comments received.[266] However, the CDM guidelines are not as detailed as those promulgated through Gold Standard.[267] In 2011, CDM requested input on its validation process.[268] In response, several organizations identified key areas for improvement on the grounds that CDM had historically not provided clear rules and guidelines, which led to inadequate stakeholder consultation.[269] For

257 de Albuquerque, Compilation of Good Practices, *supra* note 10, at 12.

258 *See* GOLD STANDARD TOOLKIT, *supra* note 256, at 45–48.

259 *Id.* at 26.

260 *Id.* at 27, 44.

261 *Id.* at 44.

262 *Id.*

263 *Id.*

264 *Id.* at 44–46.

265 *Id.* at 49.

266 *CDM Rulebook*, *Validation Report, Requirement 8: Local Stakeholder Consultation*, http://cdmrulebook.org/403 (last visited July 21, 2013). The CDM also has a global stakeholder process, but this is distinct; it refers to the public display and receiving of comments on the project design document. *CDM Rulebook*, *Global Stakeholder Process*, http://cdmrulebook.org/761 (last visited July 21, 2013).

267 *See* GOLD STANDARD TOOLKIT, *supra* note 256, at 29.

268 CDM, *Call for Inputs on the Validation Process, July 18 to Aug. 15, 2011*, http://cdm.unfccc.int/public_inputs/2011/eb62_02/index.html (last visited July 21, 2013).

269 International Rivers, *Comments to CDM Executive Board on Stakeholder Consultations*, Aug. 15, 2011, http://www.internationalrivers.org/resources/comments-to-cdm-executive-board-

example, one report noted that numerous projects did not take the participation component seriously: "[I]n at least two documented instances, parts of the information related to local stakeholder consultations were copied and pasted from one PDD [Project Design Document] to another."[270] CDM is currently developing guidelines based on the input received, but the proposed approach has been critiqued as not providing sufficient opportunity for stakeholders who are not project participants to raise comments or concerns.[271]

3. Accountability

Accountability is a critical feature of human rights law.[272] In the context of carbon financed water projects, accountability means ensuring that a project achieves its stated goals. Accountability requires effective monitoring and a viable mechanism for intended beneficiaries of a specific project to provide meaningful feedback, especially dissatisfaction with a project.

The CDM and Gold Standard have mechanisms for soliciting feedback, as discussed above, and also require independent auditing systems.[273] The Gold Standard has a "Monitoring Procedure" to ensure that there is accurate recordkeeping of project activities and customers served and regular monitoring, which in turn informs the calculation of emissions reductions.[274] It also recommends the "employment of an expert 3rd party . . . to accomplish or reinforce some or all of the monitoring tasks."[275]

However, given the concerns raised about the VF project discussed above, it is clear that this independent auditing needs improvement. The carbon market needs to address and respond to the challenges identified in the VF Carbon for Water project by ensuring that the verification and validation mechanisms achieve the stated goals. For example, if the HWTS product is not used consistently, then the local community and the

on-stakeholder-consultations-3067 (last visited July 21, 2013); CLIMATE ACTION NETWORK INTERNATIONAL, CDM EXECUTIVE BOARD CALL FOR INPUTS ON THE VALIDATION PROCESS (2011), *available at* http://www.climatenetwork.org/sites/default/files/CAN_CDM_ValidationProcess_Submission_August2011.pdf; CENTER FOR INTERNATIONAL ENVIRONMENTAL LAW (CIEL) & EARTH JUSTICE, JOINT SUBMISSION ON THE IMPLEMENTATION OF LOCAL STAKEHOLDER CONSULTATION AND GLOBAL STAKEHOLDER CONSULTATION DURING THE VALIDATION PROCESS OF THE CDM (2011), *available at* http://cdm.unfccc.int/public_inputs/2011/eb62_02/cfi/0IF4MXF0OHYLB6444AXOWS729TB0XX.

270 International Rivers, *supra* note 269.

271 CDM Watch, NEW CDM SUSTAINABILITY TOOL (2012), http://carbonmarketwatch.org/the-cdm-sustainable-development-tool-why-highlighting-will-not-deliver-newsletter-20/ (last visited July 21, 2013).

272 ECOSOC, *supra* note 10, ¶ 49.

273 *See* GOLD STANDARD FOUNDATION, WHY GS, http://www.cdmgoldstandard.org/about-us/why-gs (last visited July 21, 2013); *Dedicated Operational Entities*, http://cdm.unfccc.int/DOE/index.html (last visited July 21, 2013).

274 GOLD STANDARD INDICATIVE PROGRAMME FOR KITCHEN REGIMES, *supra* note 99, at 22–25.

275 *Id.* at 25.

implementing country may not receive substantial benefits—but the project developer will still receive the expected financial returns. Although surveys are intended to identify the actual usage rate,[276] the results could be skewed as a result of "courtesy bias," which could exist if the participant is trying to please the surveyor.[277] Moreover, "many LDC governments do not have the resources to establish new institutions and procedures to oversee CDM activities."[278]

4. Impact

The "Good Practices" criteria emphasize that projects must go beyond rhetoric and actually lead to impacts by contributing to the realization of the human right to water.[279] Suppressed demand is, in many ways, a strategy that is designed to do just that. By increasing the baseline emissions level, it enables HWTS projects in LDCs to harness additional financing through the carbon credit market.

Nevertheless, a specific project may fail to achieve the desired impact for many reasons: a project may not be successful simply because it was poorly conceived from the onset, or a worthy project may disappoint because it was improperly implemented. For example, as mentioned above, there are numerous reasons why HWTS products may not be used consistently: they may be poorly designed, time-consuming and difficult to use; they may provide culturally unacceptable tasting water; or they may break. As a result, it cannot be (although it frequently is) assumed that simply designing and distributing a water purification product, whatever the product's merits, will lead to increased access to and consumption of clean water.

Gold Standard requires that all project developers undertake a "do no harm" assessment. These assessments are influenced by the safeguarding principles of the United Nations Development Program and the Millennium Development Goals.[280] As excerpted below, the Gold Standard identifies eleven principles that relate to four key areas of concern—human rights, labor standards, environmental protection and anti-corruption:[281]

Human Rights

276 EVAN THOMAS ET AL., PROVING SUSTAINABILITY: THE INTERNATIONAL DEVELOPMENT MONITORING INITIATIVE 2, *available at* http://www.sweetlab.org/wp-content/uploads/2011/05/SWEETSenseOverview_IEEE_GHTC_8.31.11.pdf.

277 *Id.*

278 De Lopez et al., *supra* note 2, at 444.

279 de Albuquerque, *Compilation of Good Practices*, *supra* note 10, at 15.

280 *See Millennium Development Goals: Eight Goals for 2015*, http://www.undp.org/content/undp/en/home/mdgoverview.html (last visited July 21, 2013).

281 GOLD STANDARD TOOLKIT, *supra* note 256, at 39.

The project respects internationally proclaimed human rights including dignity, cultural property and uniqueness of indigenous people. The project is not complicity in Human Rights abuses.

The project does not involve and is not complicit in involuntary resettlement.

The project does not involve and is not complicit in the alteration, damage or removal of any critical cultural heritage.

Labour Standards

The project respects the employees' freedom of association and their right to collective bargaining and is not complicit in restrictions of these freedoms and rights.

The project does not involve and is not complicit in any form of forced or compulsory labour.

The project does not employ and is not complicit in any form of child labour.

The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis.

The project provides workers with a safe and healthy work environment and is not complicit in exposing workers to unsafe or unhealthy work environments.

Environmental Protection

The project takes a precautionary approach in regard to environmental challenges and is not complicit in practices contrary to the precautionary principle. This principle can be defined as: "When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically."

The project does not involve and is not complicit in significant conversion or degradation of critical natural habitats, including those that are (a) legally protected, (b) officially proposed for protection, (c) identified by authoritative sources for their high conservation value or (d) recognized as protected by traditional local communities.

Anti-Corruption

The project does not involve and is not complicit in corruption.

The goal of this self-assessment is to identify potentially negative environment, social, or economic impacts, which could result in the project

not being approved by Gold Standard.[282] The Gold Standard Toolkit provides examples of unintended negative consequences. For example, the provision of solar panels to generate electricity could result in the men of the village watching TV during the day, creating additional work for the women.[283] The project developer needs to create adaptation and mitigation measures, and also ensure appropriate monitoring, to secure approval.[284]

The CDM Executive Board is in the process of developing guidelines to include "co-benefits and negative impacts in the documentation of CDM project activities."[285] Between June 3, 2011 and July 3, 2011, the CDM Executive Board solicited public input and summarized the input from ten stakeholders in a published report.[286] The report recommended that the CDM Board consider "do no harm" measures set forth in Gold Standard.[287] The challenge faced in implementing these projects is discerning between water filter projects that, while not perfect, can be useful interventions and those projects that are fundamentally flawed and not deserving of accreditation.

5. Sustainability

Sustainability is a key component of the "Good Practices" framework and underscores the importance of considering the longer-term positive and negative impacts of projects designed to realize the human right to water.[288]

Gold Standard requires that project developers complete a sustainable development matrix based on environmental, social, technological, and economic indicators.[289] Twelve specific indicators are identified: 1) air quality; 2) water quality and quantity; 3) soil condition; 4) other pollutants; 5) biodiversity; 6) quality of employment; 7) livelihood of the poor; 8) access to affordable and clean energy services; 9) human and institutional capacity; 10) quantitative employment and income generation; 11) balance of payments and investment; and 12) technology transfer and technological self-reliance.[290] For each indicator, the project developer must assess the impact, the mitigation measure, and the relevance to achieving MDGs.[291] In addition, for each indicator the project developer must assess the proposed project's impact, develop a mitigation plan and demonstrate the project's relevance to achieving MDGs.[292] In addition, each indicator is given a

282 *Id.* at 39; THE GOLD STANDARD FOUNDATION, *supra* note 30, at 2.

283 GOLD STANDARD TOOLKIT, *supra* note 256, at 40.

284 *Id.* at 39; THE GOLD STANDARD FOUNDATION, *supra* note 30, at 2.

285 CDM Exec. Bd., *Report on Sustainable Development Co-Benefits and Negatives Impacts of CDM Project Activities*, 1, E.B. 65 Annex 17 (2011), *available at* http://cdm.unfccc.int/UserManagement/FileStorage/ZRSJLH6Q8VFADTGY19OW5P2N7XI04K [hereinafter CDM CO-Benefits Report].

286 *Id.*

287 *Id.* at 1–2.

288 de Albuquerque, *Compilation of Good Practices*, *supra* note 10, at 15–16.

289 GOLD STANDARD TOOLKIT, *supra* note 256, at 41.

290 THE GOLD STANDARD FOUNDATION, *supra* note 30, at 7.

291 *Id.*

292 *Id.* at 4.

negative, positive, or neutral score based on how the project compares to the baseline.[293] Projects that do not comply with minimum scoring requirements are not eligible under the Gold Standard unless mitigation measures are put in place.[294] As of this writing (winter 2012–13) CDM had not yet adopted a set of sustainability criteria, but is currently considering doing so.[295] This part considers the most salient sustainable development criteria for carbon-financed HWTS projects.

i. Environmental indicators

From the standpoint of air quality and carbon emission mitigation, the suppressed demand carbon accounting method complicates the question of environmental sustainability. Because suppressed demand allows the exchange of carbon credits without demonstrating an actual reduction in carbon emissions, some critics argue that the carbon credit approach is a misapplication of the carbon credit program mandate to reduce actual carbon emissions.[296] As discussed above, the suppressed demand carbon accounting method is premised on a theoretical reduction in carbon emissions: the baseline for calculating carbon credits for a HWTS project is determined by estimating the amount of biomass fuel that each person within a community would have to burn to boil a minimum service level of water.[297] It is assumed that more people would boil water if they could.[298] Because the suppressed demand carbon accounting method allows project developers to overcome the hurdle of establishing actual boiling rates, suppressed demand-based HWTS projects cannot be justified by verifiable correlating carbon emission reductions. This also allows for the possibility that a greater number of carbon credits could be allocated than a given project actually deserves to earn. The allocation of a greater number of carbon credits than necessary could drive down the value of carbon credits and subsequently have a deleterious effect on the very carbon markets that fund these HWTS projects. The resulting scenario would lead to an increased supply of carbon credits and thus lower prices and a reduced incentive to invest in HWTS projects.[299] On the other hand, the environmental

293 *Id.* at 7.

294 *Id.* at 3.

295 CDM CO-Benefits Report, *supra* note 285, at 2.

296 *See* Starr, *supra* note 148.

297 *CDM Guidelines Version 3*, *supra* note 117, at 3.

298 *Id.*

299 *See* Enviro Associates, *Latest Carbon Credit News: Suppressed Demand*, http://www.enviroassociates.org.uk/?page_id=392 (last visited July 21, 2013) (explaining the effects of suppressed demand in the carbon credit market); *see also* Dinakar Sethuraman & Natalie Obiko Pearson, *Carbon Credits Becoming 'Junk' Before 2013 Ban Closes Door: Energy Markets*, BLOOMBERG, Dec. 7, 2011, http://www.bloomberg.com/news/2011-12-06/carbon-credits-becoming-junk-before-2013-ban-closes-door-energy-markets.html (last visited July 21, 2013).

benefits of promoting clean water technologies that do not rely on carbon based fuel sources should be valued and promoted.

With respect to water quality and quantity, it is unclear to what degree the CDM or Gold Standard guidelines take into account the long-term sustainability of the local water source, whether it comes from surface water or groundwater. However, given the debate regarding the 5.5 lpcd and 7.5 lpcd cap,[300] it does appear that the CDM and Gold Standard guidelines, respectively, are aware of the need to focus on environmental sustainability. With that said, continued debate and stakeholder participation is necessary to help establish clearer guidelines on sustainability. It is important to note that environmental sustainability also relates to concerns about physical accessibility discussed above.[301] If water becomes scarcer within a region, then to access water, people must often travel further, drill deeper wells, or use contaminated water that would not otherwise be used.

ii. Social indicators

In the context of distributed HWTS projects, human and institutional sustainability refers to the ongoing capacity of the local community to operate and maintain the technology.[302] It is not clear to what degree CDM and Gold Standard guidelines require project developers to train community members, in how to use the product, or how to fix or replace the technology. There is also no requirement specified for the long term availability of necessary replacement parts. However, operational sustainability is at the core of a carbon-financed project because if audits reveal that the products are not being used appropriately, then the profitability of the project is called into question.[303] As a result, there is a strong financial incentive to ensure that products are used and repaired.

iii. Technological indicators

All water-purification products need to be maintained and repaired or replaced after a certain period of time. Even if a project developer indicates that it will repair or replace a product, this arrangement is most likely timebound. Under UNFCCC rules, all projects are eligible either for a seven-year crediting period, with the option of up to two seven-year renewals, or a maximum of ten years with no renewal option.[304] Thus, a project developer might commit to repair or replace a product for the length of the project, but

300 GOLD STANDARD INDICATIVE PROGRAMME FOR KITCHEN REGIMES, *supra* note 99, at 35; *CDM Guidelines Version 3*, *supra* note 117, at 2–3.

301 *See supra* Part IV.B.4.

302 de Albuquerque, *Compilation of Good Practices*, *supra* note 10, at 15.

303 Cernansky, *supra* note 145.

304 THE GOLD STANDARD, THE GOLD STANDARD REQUIREMENTS VERSION 2.2 21 (2012), *available at* http://www.cdmgoldstandard.org/wp-content/uploads/2012/06/GSv2.2_Requirements.pdf.

not indefinitely. Moreover, given that products may not be produced locally, carbon-financed HWTS programs do not necessarily promote technological transfer or technological self-reliance.

V. CONCLUSION

As recognized by the global community, it is imperative that carbon emissions be reduced.[305] The Kyoto Protocol, which governs the world's largest compliance carbon market, was set to expire at the end of 2012.[306] In December 2011, the Conference of the Parties to the UNFCCC met in Durban, South Africa, to negotiate the future for the Kyoto Protocol.[307] The Parties were unable to reach agreement on whether a new commitment period under the Kyoto Protocol would remain in effect until 2017 or 2020; the Parties later agreed to extend the Protocol to 2020 during a conference in Doha the following year.[308] The Parties also agreed to negotiate a new agreement on climate change in the future.[309]

Much of the reported conflict in Durban was over how much responsibility emerging economic countries should have in curbing global carbon emissions.[310] Developed countries like Canada and the United States argued that more responsibility for future emission reduction must be borne by developing countries, especially India, China, and Brazil.[311] In their defense, India, China, and Brazil argued that developed countries—which are primarily responsible for global warming—are hypocritical in requiring emission reductions from countries that are still trying to grow their economies.[312]

With international agreements on carbon emission reductions in limbo, compliance and voluntary carbon markets offer some progress toward carbon emission reduction. Yet, without a theory like suppressed demand and the requisite funding from the carbon market, the carbon market for clean water projects will remain out of reach of most LDCs and perpetuate an inequitable form of sustainable development.

The normative basis of suppressed demand, and its links to human rights principles, makes suppressed demand a compelling option. But this

305 U.N.F.C.C.C., Background on the UNFCC: International Response to Climate Change, http://unfccc.int/essential_background/items/6031.php (last visited July 21, 2013) (describing international efforts to reduce carbon emissions).

306 Kyoto Protocol, *supra* note 29, art. 3.

307 John M. Broder, *Climate Talks in Durban Yield Limited Agreement*, N. Y. TIMES, Dec. 11, 2011, http://www.nytimes.com/2011/12/12/science/earth/countries-at-un-conference-agree-to-draft-new-emissions-treaty.html?_r=1 (last visited July 21, 2013).

308 *Id.*; Regan Doherty, *Doha Climate Talks Throw Lifeline to Kyoto Protocol*, REUTERS, Dec. 8, 2012, http://www.reuters.com/article/2012/12/08/us-climate-talks-idUSBRE8B60QU20121208 (last visited July 21, 2013).

309 Doherty, *supra* note 308.

310 *See* Broder, *supra* note 307; Doherty, *supra* note 308.

311 Broder, *supra* note 307.

312 *Id.*

does not mean that all suppressed demand HWTS projects are consistent with a human rights perspective. The human right to water requires that adequate quantities of safe, acceptable, accessible, and affordable water be available for everyone for drinking and basic needs.[313] Yet, neither the Gold Standard nor CDM suppressed demand carbon accounting methods address all of these criteria. At best, they address concerns about water quality and affordability and are neutral with respect to questions of availability, accessibility, and acceptability.

"Good practices" for the human right to water, as defined by the UN Special Rapporteur on the Human Right to Safe Drinking Water and Sanitation, also require that five cross-cutting criteria are met: non-discrimination, participation, accountability, impact and sustainability.[314] The Gold Standard's sustainable development requirements relating to participation, impact, and the sustainability matrix are generally consistent with these criteria.[315] CDM is currently exploring the possibility of adopting similar criteria.[316] However, as criticisms of the VF Carbon for Water program suggest, even programs that meet the Gold Standard criteria are not perfect. Moreover, because suppressed demand relies on a theory of minimum basic entitlements and does not require empirical evidence of boiling, the net carbon impact is questionable. As a result, the suppressed demand accounting method has been criticized for threatening the environmental integrity of the carbon market,[317] which could have unintended consequences such as the devaluation of all carbon credits.

Suppressed demand offers the promise of reducing carbon emissions and providing clean drinking water to those most in need. Yet the theory of suppressed demand and the reality of its application may be markedly different. If suppressed demand is to be used as a carbon credit funding mechanism for water purification projects, then potential drawbacks need to be considered and the methodologies revised accordingly. Only then can carbon credit funded HWTS projects relying on the suppressed demand carbon credit approach be seen as an important ally in reducing carbon emissions and in aiding LDCs struggling to implement the human right to water.

313 *See supra* Part IV.B.

314 de Albuquerque, *Compilation of Good Practices*, *supra* note 10, at 1.

315 *See* GOLD STANDARD TOOLKIT, *supra* note 258, at 41.

316 CDM CO-Benefits Report, *supra* note 285.

317 Gronewold, *supra* note 27.

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