II. Defining Green Technology

A. Green Technology

1. What is Green Technology?

The nomenclature of 'green' technology can be nebulous, with different terms being used interchangeably. One example is clean technology, or 'cleantech'. Covering four main sectors, *i.e.*, energy, transportation, water and materials,[9] this typically refers to a "product, service, or process that delivers value using limited or zero non-renewable resources and/or creates significantly less waste than conventional offerings."[10] As cleantech gains popularity among venture capitalists, cleantech investment tends to be motivated by performance-based purchasing whereas environmental or green technology is often driven by regulation.[11]

MEAs frequently use the term 'environmentally sound technologies' (ESTs). Environmental soundness is a relative and normative concept.[12] ESTs "protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes"[13] and produce low or zero waste or end-of-pipe technologies.[14] Rather than separate technologies, these are total systems that include "know-how, procedures, goods and services, and equipment, as well as organizational and managerial procedures".[15]

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9 *E.g.*, James Nurton, *Get Ready for the Clean Tech IP Boom*, 182 Managing Intell. Prop. 40, 40-47 (2008) (stating that the main cleantech sectors are (i) power generation including wind, hydro, wave, geothermal and solar power and fuel cells; (ii) alternative types of fuel, such as biofuel, biomass and synfuels; (iii) technologies to capture and store carbon; (iv) environmental technology including water purification and treatment, recycling and waste treatment and desalination; (v) transportation including batteries and hybrid electric vehicles; and (vi) information technology and other systems to make energy storage and distribution more efficient, reduce unnecessary usage and facilitate emissions trading).

10 Ron Pernick, Clean Tech Revolution: The Next Big Growth and Investment Opportunity 2-5 (HarperCollins Publishers 2007).

11 *E.g.*, *Cleantech Definition: Clean is More than Green*, http://cleantech.com/about/cleantechdefinition.cfm (last visited Sept. 14, 2010).

12 Cristina Tébar Less and Steven McMillan, *Achieving the Successful Transfer of Environmentally Sound Technologies: Trade-Related Aspects* 7 (OECD Trade and Environment, Working Paper No. 2005-2 COM/ENV/TD(2004)33/FINAL, 2005).

13 U.N. Conference on Environment and Development, Rio de Janeiro, Braz., June 3-14, 1992, *Agenda 21*, Chapter 34, U.N. Doc. A/CONF.151/26/Rev. 1 (Vol.I), Annex II (1993) [hereinafter Agenda 21].

14 *Id.* at Chapter 34.2.

15 *Id.* at Chapter 34.3.

The United Nations Framework Convention on Climate Change (UNFCCC) contemplates mainly two types of technology: adaptation and mitigation.

Adaptation is defined as "adjustment in nature or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities."[16] In other words, adaptation concerns taking measures to reduce the negative effects or to exploit positive ones by making appropriate adjustments. Adaptation technologies include 'soft' forms such as crop rotation patterns and traditional knowledge, 'hard' forms like irrigation systems and drought-resistant seeds, and combinations of both such as early-warning systems.[17]

Mitigation involves finding solutions to reduce emission of greenhouse gases, or to capture or to absorb them in some kind of carbon repository. Marketable or close to marketability technologies include, *e.g.*, renewable energy options (solar panels, wind turbines, biofuels, biomass and hydro-power generation), carbon capture and storage, hybrid vehicles, animal waste management, clean coal technologies, and green buildings.[18]

Green technology embraces a variety of technical fields lowering the adverse impact of climate change. The patent system may provide practical assistance on what constitutes green technology, for example, through its classification system. Current efforts to prioritize and categorize green technology within the patent system are discussed in Chapter IV.

2. Facts and Trends in Green Patent Filing

Barton observes that the basic technical solutions of climate change have long been "off-patent," but that "specific improvements or features" are usually patent-protected.[19] This is in contrast with the pharmaceutical sector where an individual

16 UNFCCC, *Glossary of Climate Change Acronyms*, *at* http://unfccc.int/essential_background/glossary/items/3666.php (last visited Jan. 17, 2011).

17 *See generally* UNFCCC, Technologies For Adaptation To Climate Change (2006).

18 UNFCCC, *Fact Sheet: Why Technology Is So Important*, http://unfccc.int/press/fact_sheets/items/4989.php (last visited Sept. 14, 2010). *Also*, *supra* note 16 (explaining that mitigation in the context of climate change is "a human intervention to reduce the sources or enhance the sinks of greenhouse gases. Examples include using fossil fuels more efficiently for industrial processes or electricity generation, switching to solar energy or wind power, improving the insulation of buildings, and expanding forests and other "sinks" to remove greater amounts of carbon dioxide from the atmosphere").

19 John H. Barton, Intellectual Property and Access to Clean Energy Technologies in Developing Countries: An Analysis of Solar Photovoltaic, Biofuel and Wind Technologies 13 (ICTSD 2007).