Sustainable Development: A "Win-Win" for Licensing and for the Environment

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"Sustainable development" has become the organizing principle for sound management of the environment both within the U.S. and around the world in the 1990's. The "sustainable development" movement marks a significant departure from environmental movements in the past, which often evoked negative images of activists with little concern if not outright disdain for technology and business. Technology and business were (and even among a small group of environmental activists today, still are) perceived to be part of the environmental problem -- not part of the solution. But for sound scientific and economic reasons, the picture is changing. In November 1994, **Forbes Magazine** ran a special supplement on "Commercializing Emerging Technologies: Forging Business Alliances for a Better Environment." The lead article in the Winter 1995 issue of **Technology Transfer Business** focuses on environmental technology development in Federal labs. Its title? "Going Green." According to **Forbes**, it is "generally accepted that long-term profits are inextricably linked with environmentally sustainable industrial practices." Last April, an LES-sponsored conference was held at Franklin Pierce Law Center entitled "The Greening of Technology Transfer: Protection of the Environment and of Intellectual Property". This international conference, which brought together licensing professionals and environmentalists for the first time, has set the stage for LES members to become part of the environmental solution. The next five to ten years will usher in a new focus for LES: how licensing can promote sustainable development and how sustainable development will come to depend upon licensing.

What do environmentalists mean by "sustainable development" and why are "sustainable technologies" well suited for licensing? Briefly, as defined in the 1987 Report prepared by the Brundtland Commission on Environment and Development, sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Other explanations are somewhat less fuzzy and more accessible. "Previously, it's been low-tech or consumer kind of products that have made money in the environmental area. It's now an ascendance of technology -- applying advanced technologies -- better, faster, cleaner, cheaper technologies to solve environmental and competitiveness problems." So states Jeffrey Leonard, President of the Global Environment Fund, a venture fund with a special focus on emerging environmental technologies. "Better." "Faster." "Cleaner." "Cheaper." Technologies which reduce per capita environmental impact. An example of the shift in the application of an environmental technology which illustrates the business strategy of moving from consumer goods to industrial goods (and back) is described by Alan Miller, one of the Franklin Pierce conference participants and Director of the Center for Global Change at the University of Maryland, in his recent book, *Green Gold: Japan, Germany, and the U.S. and the Race for Environmental Technology*. (1994) "Calculators, watches, and many other consumer products quickly began appearing on the market powered by tiny solar photovoltaic units which, in every way other than size, are identical to those that would be used at massive central power stations. `Americans laughed when we started development of solar cells for consumer products,' recalled Dr. Yukinori Kuwano, head of Sanyo's development... First calculators, later power plants." p.161 Photovoltaic cells are an example of an innovation developed in an industrial field being successfully commercialized in a consumer field, where the technology then was able to gain an economic foothold.

Licensing can also foster the diffusion of environmental technologies to other geographical markets which desperately need them but which remain beyond the reach of the technology developer. In 1992, following the U.N. Rio Conference on Environment and Development, the U.N. Commission on Sustainable Development [CSD] was established. "Technology transfer is the key to sustainable development," states the former Chair of the CSD, Tan Sri Razali. Sustainable development is *the* business of licensing professionals.

In fact, developing countries and emerging economies, because they do not yet have well-established environmental technology infrastructures in place, may be competitively positioned for quantum leap improvements in their environmental technology base; and they will need the assistance of licensors to achieve those improvements. These economies may be able to bypass the incremental advantage to their environments from adopting "faster, better, cleaner, cheaper" technologies which prevail in economies (such as the U.S.) where environmental standards and the technologies which comply with them are already fully installed and consequently, difficult to dislodge. Rather, they may be in a position to adopt fully sustainable closed loop systems, innovative from the ground up, which bring waste management, resource conservation and recycling into the technological design process itself. According to this view, environmental considerations in the design process are not a mere afterthought, but a major factor in the technological innovation process from start to finish. Integrated manufacturing processes can allow for the waste products of one process to be "designed" to be used in a different manufacturing process. Going beyond the imperative of producing less waste, closed-loop systems address the imperative of producing no waste which cannot be recycled.

The convergence between the business interests of environmental technology innovators and the economics and politics of the environmental movement is accelerating as the new global economy, plunges headlong into the 21st century. Parallel developments in the licensing and environmentalist communities and in national and international government agencies have important implications for licensing professionals. Understanding the vocabulary of sustainable development is a necessary first step in seeking to tap the growing opportunities for licensing emerging environmental technologies.

Post-War Economics of Natural Resources:
The Fable of "The Golden Goose"

Theories of economic development and the relationship between economics and the environment after World War II ran the gamut from the most optimistic or "cornucopian" models, which saw basically no limits to the economic growth potential of human societies on the one hand, to radically ecocentric "zero-growth" models which deemed every human advance into the non-human realm an encroachment on the earth, on the other.

Recent estimates are that fully 50 percent of the output of the earth's environment is now in some way utilized by humans. Some, such as the Georges Bank fisheries, are being overused. Thus, assertions that natural resources waiting to be tapped for human use are fathomless are no longer credible to the scientifically and technologically literate public; and by the sheer logic of continued economic growth, these assertions become ever less so. According to Miller, the unrealistically low costs of transportation and energy in the U.S. reflect the fact that this realization has not yet taken as much hold in the U.S. political realm today as it has in Germany and Japan, for example, because what sustainable technology developers are perceived to be selling may not necessarily be what licensees want to buy. What they are buying is just compliance. But more and more U.S. corporations are coming to recognize that development of environmental technology is not just a hindrance to their business strategy but a challenge and an opportunity as well. Those who are ahead of the curve will be better off in the long run.

Conversely, those "ecocentrists" who place an intrinsic value on the environment which either has no relationship to its human uses or for whom the value of the environment is superior to the value of those uses have given environmentalism a bad name and, moreover, done it a disservice. They give it a bad name by ignoring both the benefits of a rational distribution of environmental resources for human welfare and the demands of decent, struggling human beings in developing societies for a material basis sufficient for human welfare. And they do environmentalism a disservice by decreasing its political acceptability. Calls for a return to a "simpler society" and for an embrace with the values of pre-modern "indigenous peoples" have nothing to offer a world population which is rapidly leaving the land and the home town and becoming urbanized and industrialized, or to rural economies which may depend for their very existence on the exploitation of natural resources.

Between the extremes of untrammeled growth and no-growth are the voices of sustainable development. The focus is on "throughput": the amount of natural resource inputs shoveled into an economy and the amount of waste (exhausted or non-reusable resource) outputs dumped back into the natural environment. "Sustainable development" means a reduction in throughput -- by increment or quantum leap.

As growth systems and support systems in the human environment become more and more interdependent, there are viable trade-offs between consumption of resources and technological progress. Here is where licensing of "faster, better, cleaner, cheaper" technologies and the development of fully sustainable closed-loop systems can play a role. When natural resources are used at rates less than equal to the natural rate at which they can regenerate, non-renewable resources are used efficiently, and waste products are produced at a rate lower than the maximum rate at which the natural environmental sink can assimilate them, we have "sustainable development." To the extent that development requires ever greater extraction of non-renewable resources, consumption of renewable resources at a rate greater than they can renew themselves (causing the resource to become diminished or even to collapse), and waste production in excess of the ability of the environmental sink to assimilate it, development is "unsustainable". In the rustic language of the fable, more enjoyment is squeezed from the golden eggs without killing the goose which lays them.

Global thinking: Local action

Part of the challenge in dealing with the environmental movement is in giving its terms some sense of reference. The phrase "think globally, act locally" coined by the early activist and Rockefeller Institute microbiologist, Rene Dubos, (1901-1982) is enlightening in this regard. "Global warming", "ozone depletion", "overgrazing", "desertification", "acid rain"; "clean air", "clean water", "biodiversity", and "rain forest conservation." Who do you know who is in favor of the former or against the latter? All the catchwords have the familiar ring of the environmental movement but are little help in establishing useful terms of reference for action.

For some -- if not all -- of these concepts however, there are other, more instrumental ways of looking at the issue at hand. "Global warming"and "acid rain" can be seen as extrapolations of the air quality problems of mega-cities such as Sao Paulo, Mexico City, Beijing, Calcutta, and Jakarta (not to mention a few closer to home like L.A.) Of course, other causes, such as the burning of rain forests and power generation, and other effects, such as rising sea levels, exist as well. But the local "fact of life" is that the widespread adoption of automotive transportation imposes a heavy cost burden on the inhabitants of these urban environments. Multiply the consequences by the fact that some of these mega-cities will concentrate more than 25 million people in a single constricted area less than 10 years from now and the additional fact that vehicles more than 10 years on the road which predominate in these countries belch out greater emissions than newer cars, buses, and trucks by at least one order of magnitude. How are the megacities to reduce emissions? Expel populations? Limit auto usage? Build mass transportation? The most humane and cost-effective solutions all require transfer of environmental technologies -- some of which may already exist in the U.S. today.

The U.S. Clean Air Act Amendments of 1990 set out as a major policy principle reducing U.S. SO^2 emissions by 10 million tons below 1984 levels. Improved local air quality is the means to that end. The regulatory mechanism is one of forcing technological improvement in the aggregate. Average emissions per vehicle must be reduced to specific target levels. Emission technologies which may not quite meet the rigorous air quality standards of U.S. environmental regulations may yet be super-clean or super-efficient by Third World standards. A market for environmental technologies which may not exist in the U.S. due to rigorous EPA standards for compliance may still be viable or even "hot" in the less restrictive regulatory regimes of developing countries. Studies of possible facilitating mechanisms for licensing environmental technologies such as air emissions technologies from countries with high environmental standards to developing countries who need the technology most are under study by international organizations and financing institutions such as the UN Development Programme [UNDP], the Global Environmental Facility [GEF], and the World Bank. For example, the World Bank's Clean Technology Initiative includes clean production in China, pollution

prevention and control in the Philippines, resource recovery from industry in India, and waste minimization in Sri Lanka. Licensing opportunities will no doubt exist exist for a multitude of air and water emission, cleaner industrial process, solid and toxic waste storage and treatment, soil decontamination, energy efficiency, resource extraction, resource reclamation (recycling) and biosafety technologies.

Local action produces local results; and as a by-product, a global problem is alleviated. Alleviating air pollution in Mexico City improves the quality of life (not to mention reducing mortality and health costs) for its residents, and ameliorates global warming at the same time. By contrast, "ozone depletion" is a problem in the aggregate without a local correspondent. Every molecule of CFC has an environmental impact, but the effect of that molecule on the earth's ozone screen is not manifested until it corkscrews its way slowly (but surely) into the stratosphere. Fortunately (or unfortunately, so it seems) the human health and safety consequences of the aggregate problem of ozone depletion and uv-penetration of the atmosphere are so serious that non-depleting alternatives are becoming economically viable because the depleting chemicals are being banned outright. Regulatory mechanisms for problems in the aggregate such as ozone depletion may differ from those with local variants and require different responses. The Industry Cooperative on Ozone Layer Protection [ICOLP] comprised of electronics and aerospace companies is an example of a single-issue response by multinational industries which have a direct bearing on the economic viability of CFC-alternative technologies not just in developed countries, but in developing nations where the regulatory regimes may be weak and ineffective as well. Still, and for the most part with but a few egregious exceptions, "global thinking" is but the recognition of the global ramifications of what are necessarily local environmental problems.

This is not to say that complex aggregate environmental problems without a local manifestation or which are not probable but merely possible can be ignored. "Prediction is being replaced by precaution in waste sink use." Princen, *Toward a Theory of the International Political Economy of Sustainability*19 **Int'l Studies Newsletter** No. 3, p.41 (1994) "As our knowledge of the global system increases, so does our uncertainty about the long-term implications of present economic activity. Combined with the uncertainty caused by the rapid pace of change in resource use technology, this suggests that the increasing flow of information does not in fact give more complete information. The problem for decision makers does not get easier. Not only is the perceived range and severity of the possible environmental effects of economic activity expanding, so is the gestation period. Perrings, "Reserved Rationality and the Precautionary Principle" in Costanze (ed.) *Ecological Economics* (1991) In other words, "better safe than sorry."

Risks and Rewards for Licensees

The risks associated with the adoption of new technological solutions may vary from one environmental problem to another as well, with the result that for some environmental problems, technologies with enormous potential for positive economic and environmental impacts may not be adopted or licensable because they entail a degree of risk not found with older technologies. For example, new soil decontamination technologies may languish because less efficient but tried-and-true technologies entail less liability exposure to the small enterprises who need to comply with the Resource Conservation and Recovery Act of 1976 (42 U.S.C. Sec. Sec. 6901ff.). Interactions between regulatory mechanisms which ascribe liability and market mechanisms which promote a safer, healthier environment by fostering adoption of the most innovative, cost-efficient technologies require a closer degree of cooperation between regulators, innovators, capital markets, non-governmental and community organizations. Some headway is being made. The U.S. Environmental Protection Agency now has the "Site Program", which allows for the installation of innovative technologies on Federal facility sites which, because they are not well tested, may have difficulty meeting state standards for reliability. The Site Program is run out of the EPA's Cincinnati office. [Contact: Annette Gatchett 513-569-7697.] Its four working groups address mixed waste, munitions, mining, and military base clean-ups.

Permit processes must become more predictable. Potential investors or large-scale licensees may shy away from exciting technologies still at the demonstration stage which do not have a proven track record of success. This is

a exacerbated by the lack of uniformity in permit requirements. The 22 member states of the Western Governors Association have signed a Memorandum of Understanding with the U.S. EPA and Departments of Interior, Defense and Energy to make information submission requirements for permits more uniform. The EPA's Environmental Technology Initiative has now established a program entitled ENTICE (Environmental Technology Innovation, Commercialization, and Enhancement) with eight pilot programs underway for verification, incubation, and diffusion of environmental technologies. The California State EPA's Department of Toxic Substance Control now publishes guidelines for technology certification in California. The Department of Defense has the National Environmental Leadership Program [NELP], and also runs the Environmental Security Technology Certification Program [ESTEC]. Such government initiatives are designed to reduce the likelihood that innovative technologies will run up against the permit barrier which can doom a potential license agreement.

Laws which establish environmental liability for clean-ups must be crafted to contain shields -- albeit limited ones -- for investors and potential licensees to remove the current disincentives to their adopting any new and promising environmental technology, simply because it may yet be unproven and ultimately may not work as well as the outmoded "old reliable" ones. The preferred model is one in which regulators are sold on the potentials of promising technologies before new standards are announced, and some leeway on liability needs to be built into the system. Innovators should not be penalized for taking educated risks.

The Importance of Intellectual Property Protection to Sustainable Development: Creating the Proper Niche for New Technologies

"When the issues of ozone depletion and CFC reduction came to the fore [several] years ago, there was a [great deal] of quick investigation into existing non-CFC alternatives such as ammonia and methane, but most refrigerator producers understood that the answer to the problem was going to require an invention of some sort," noted Neil Lynch, director of compressor product development at Whirlpool, which subsequently won a $30 million "clean refrigerator" incentive competition sponsored by power companies. "What the appliance industry is seeing today...are some breakthroughs and successes in this invention process."

One of the significant, if not surprising findings of the LES "Greening" conference at Franklin Pierce was the broad consensus which exists among participants from the environmental communities that strong IP protection is not only not incompatible with strong environmental protection, but a "key" component of it. Compulsory licensing provisions in environmental legislation are ineffective in promoting transfer of environmental technology, and actually inhibit it. According to the EPA's Office of General Counsel, the mandatory patent license provisions enacted in 1970 in Section 308 of the Clean Air Act (42 U.S.C. Sec. 7608) have *never* been used in over a quarter of a century. Why does Congress insist on maintaining them? Other countries with compulsory licensing provisions in their laws cannot help but note the U.S. practice in this regard and use it as ammunition in their own defense of compulsory licensing in their own intellectual property regimes. Fortunately, NAFTA Article 1709(10) and Article 31 of the new GATT TRIPs Agreement place sharp limits on the imposition of compulsory licensing requirements by the Contracting Parties.

The importance of IP to the sustainable development movement is achieving growing recognition among international organizations and corporate strategists as well. This was clearly indicated in two presentations at the very successful LESI meeting held May 6-9, 1994 in Beijing. Both Dr. Joseph Ben-Dak, Chief of Global Technology at UNDP, in his address entitled "Configuring Sustainable Development and the Productivity of Intellectual Property Rights" and Keizo Yamaji, former President of Canon, in his, entitled "Market Economy and IP Oriented Management", tackled the broad implications of the sustainable development movement for technology business and LES in the 21st century.

Strong intellectual property protection, including trade secret protection and without compulsory licensing, provides the "market niche" licensors and licensees need to make or attract the investment necessary to turn

emerging environmental technologies into commercially viable ones with worldwide adaptability. There is growing recognition that in a sense, economic development is itself a form of adaptation to a changing environment and co-evolves with it. Yesterday's luxuries (a clean river, a refrigerator) become today's necessities -- and vice versa. "Economic development can ... be viewed as a process of adaptation to a changing environment, while itself being a source of environmental change. From this perspective there are three distinct sources of change -- the breakdown of ecological equilibrium (i.e., any combination of a method and a rate of resource use which the environment can sustain for long periods), the demands of technical consistency, and the development of new forms of need as the real costs of living are changed. None of these alone explains all change. {Technological] development is then a process of moving through a succession of ecological niches." Pearce, *Economics of Natural Resources and the Environment* (1990) p. 25.

Technologies, old or new, as components of the overall economy, can only survive within a their own "niche." The "ecological niche" for chlorofluorocarbons is rapidly disappearing, and CFCs as a "species" of refrigeration and insulation technologies may soon become rare, if not "extinct." New technologies to replace the old must be afforded their own "niche." Allowing third parties, late-comers, and friends of the government to have uncontrolled access to clearly patentable environmental technologies through weak intellectual property protection, weak enforcement or compulsory licensing is no less counter-productive to a society than allowing rogue fishing vessels to drag its most valuable fisheries or rogue timber companies to harvest its most pristine rain forests. Innovation which promotes sustainable development by creating environmental technologies which reduce resource throughput is, in this sense, itself a "renewable resource." Given a protected niche in the economic environment, innovative environmental technologies which make development sustainable will take root; denied or deprived of that niche, they will fail. By becoming profitable through licensing into similar or collateral fields and into developing and emerging economies, innovative environmental technologies, themselves become more "sustainable."