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GES REPORT CONCLUDES RENEWABLES NOT UNIQUELY ABUNDANT, NATURAL, BETTER NOR FREE

(Arlington, VA — February 4, 2000) Greening Earth Society has posted on its "sister site" on the World Wide Web (www.fossilfuels.org) science advisor Mark P. Mills' report examining the four tenets that are the basis of renewable energy's appeal to the environmental community: That renewables are abundant, natural, better, and free.

Mills' report, *Renewable Energy and the Laws of Nature*, is a web-only posting by Greening Earth Society stimulated by the rhetoric of the EarthDay 2000 website (www.earthday.net).

According to Mills, a central theme of the EarthDay 2000's event concerns using the sun, wind, and other renewable sources to generate energy in order to end dependence on fossil fuels. "Despite Leonardo DiCaprio's fresh, new face on the event," Mills writes, "it's an old familiar refrain."

Beginning with the notion that renewable energy sources are somehow more "natural" than are fossil fuel resources, Mills points out that *all energy sources are natural*. "The coal, oil and natural gas below the surface of the earth are as natural as the sunlight that strikes earth's surface, the trees that grow on it, and water that runs across it," he writes. "Fossil fuels are the product of the long and natural conversion of plants and animals that have been concentrated and converted into a useful form over millennia."

Mills points out that it is no easier to power a computer or TV in rural India using "natural" dung or wood than it is to use "natural" wind or sun in Manhattan for the

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same purposes, or "natural" coal in Wyoming or West Virginia, for that matter. "The primary natural resource must be converted into an unnatural one: the kilowatt-hour. And transforming basic natural resources into electricity arguably is one of the most important engineering feats in all human history," he contends.

Even though renewable energy is abundant, Mills dismisses the point as irrelevant. "All energy in nature— whether renewable or fossil – is abundant. It's a simple physical reality," he says. "Environmentalists don't tout fossil fuels' natural abundance as an opportunity. They see it as a problem. In reality, the enormous scale of natural energy sources is so vast that it doesn't matter whether it is *renewable* or not. The measure of whether or not a resource is useful is what matters, and that depends on a number of factors."

Concerning the EarthDay 2000 Article of Faith that renewable energy is better, Mills notes that both renewables and fossil fuels require conversion from their largely useless "natural" form into something more useful, like electricity. "What makes using renewable energy resources worse – not better – is that they require vastly more intensive land-use than do fossil fuels. Using renewable energy on a mass scale will increase total land-use for energy by factors that will cause concern for urban sprawl to pale in comparison," Mills found.

He finds himself particularly taken with the claim that sunshine knows no boundaries, that it's the toll-free, tax-free, energy source. "This surely is the silliest among the four renewable resource tenets," he writes. "Yet it is the most widely and oft-repeated. It is a notion that bumps headlong into the Laws of Physics."

"Of course there is no inherent cost in the fact there is abundant sunlight in Nevada, wind blowing in the Dakotas, water rushing to sea, or trees growing in the Pacific Northwest," Mills scoffs. "But then, similarly, there is no inherent cost in the abundantly rich veins of coal underlying the Powder River Basin in Montana and Wyoming, or the abundant deposits of oil and natural gas in the Gulf of Mexico. In this

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way all energy resources are free. Making an energy resource *useful* – now that's another matter."

Mills' report explains how putting energy resources to use entails an energy cost (not to mention an economic cost) associated with all of the activities and technologies required to convert the resource into useful work. In physics, energy is literally defined as *the potential to do work*. Whether one thinks in terms of physical or human systems, potential, he says, literally is just a beginning.

"The issue is not whether engineers can make renewable sources work. We already know they can and that they do," Mills writes. "The central issue is whether there is something different – something truly special – about renewable energy sources. One needs look not to engineering and economics, but to something more basic – the physics of energy – to answer that question."

"No matter where one ranges along the energy food chain," he says, "materials, fuel, and equipment are required to access energy resources and to convert them into something useful – whether it be heat, light, motion or food. Clearly, a primary energy resource that requires more energy to tap than it can yield is a loser. And renewables are losers."