

Renewable but Finite

Editor's Note: Renewable energy sparks debate and discussion well beyond the industry itself. Given this broad and rich cultural context, *Defining Renewables* offers thought leaders from outside the industry an opportunity to express how they view and think about renewable energy. Our contributor this issue is Carl Stein, principal in the New York City-based architecture firm Elemental Architecture LLC.

Renewable energy supply is limited by the energy in sunlight, by solar-driven phenomena (wind, rain, biomass) and by heat from the earth's core available to devices which capture and convert that energy into useful forms. More importantly, it is limited by the rate at which these devices

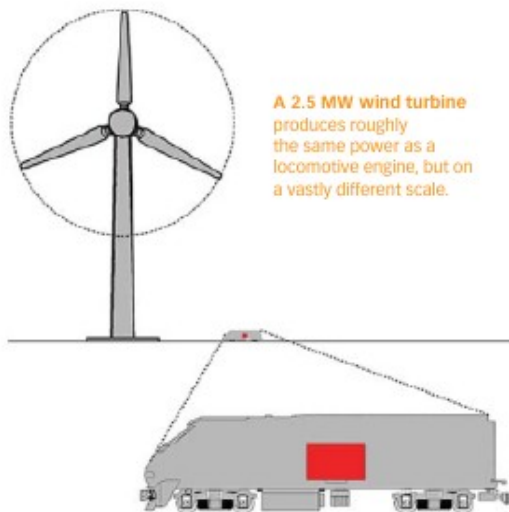
are manufactured and deployed. Given the magnitude of both U.S. and global annual demand for fossil fuel, (1.9x10⁹ and 10.0x10⁹ metric tonnes of oil equivalent respectively) it is unrealistic to expect that renewable resources will completely eliminate the need for non-renewables in the foreseeable future.

The misconception that transitioning to renewable energy allows continuation of our current end use consumption patterns—economies and lifestyles based on expanding resource consumption—is unfortunate for at least two reasons.

First, it severely undercuts the potential for renewables to support strategies leading to a sustainable future, a future with minimal dependencies on fossil fuels. Second, it forecloses the reconsideration of authentic experience as being paramount to the quality of life. The first of these issues is quantitative. Although obvious, it is worth stressing that as long as any significant portion of our energy supply derives from fossil sources, incremental changes—whether increases or savings—can and should be applied to these non-renewables. A reduction in electric usage by a wind power customer will allow that unused capacity to partially offset the need to burn coal or oil. Wasting hydroelectric energy will place an unnecessary burden on fossil fuel generators.

Less obvious but equally important, a shift to renewable energy is an opportunity to expand the public understanding of the implications of energy use, and to have that understanding inform the appreciation of authentic place, artifact and history.

Whether they be the product of human endeavor such as the cathedral at Chartres, the gardens of Suzhou or the pueblos at Mesa Verde, or natural conditions like the Grand Canyon, the cliffs at Dover or Mount Fuji, real is vastly supe-



A 2.5 MW wind turbine produces roughly the same power as a locomotive engine, but on a vastly different scale.

rior to simulation; yet authentic experience is increasingly compromised by the proliferation of manufactured alternatives, replica culture, pseudo cities, copies of landmarks all of which contribute to experiential background noise, to cultural entropy.

The upcoming worldwide demand for the devices to capture renewable energy coupled with the expanding need for other essential products (including infrastructure, shelter, and health and educational facilities) will sharply curtail the casual commitment of finite resources to trivial uses; however, unlike the general preconception that constraint leads to a lowered quality of life, the selectivity necessary to realize a sustainable future will enhance experience.

The capacity for communication intrinsic to renewable energy technologies is due in large part to the scale of the collection elements necessary to capture the relatively diffuse renewable energies. For example, a contemporary 2.5 MW (approximately 3,350 horsepower) wind turbine has a rotor diameter of about 100 meters—roughly the same as the height of a 30-story building. The center of this circle may be at the top of a 100-meter-tall tower placing the top of the rotor's arc 150 meters above the ground. This is nearly half the height of New York City's Chrysler Building.

Compare the visual impact of this device to a locomotive's diesel engine having similar power and dimensions of about 5 meters long by 2½ meters tall. Or consider the



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DEFINING Renewable



South Jamaica Branch Library, designed by **Elemental Architecture** and the first building completed under New York City's High Performance Building Program. It received the first American Institute of Architects National "Earth Day Top Ten" award.

Grand Coulee Dam which is, in itself, a commanding structure; however, to begin to understand its potential to produce energy, it must be seen with the 130-square-mile Franklin D. Roosevelt Lake which supplies it. Even this is dwarfed by the rainwater catchment area serving the dam, reported by the U.S.

Department of the Interior as 74,100 square miles or about 2½ percent of the land mass of the contiguous 48 states.

This is, in no way, an argument against the transition to renewable energy sources, but rather a suggestion that the inherent capacity of these technologies to communicate be actively pursued.

Remaining dependent on fossil fuels is completely unsustainable. It is just 150 years since the drilling of the Drake oil well, generally considered the beginning of the commercial extraction of petroleum. Related to the history of human culture, it is essentially irrelevant whether oil will run out in 25, 50 or 100 years. The Paleolithic cave paintings in Lascaux, France have been dated to approximately 14,000 BCE. Sumerian written culture began about 5,500 years ago with intensive agriculture starting nearly 2,000 years earlier. The beginnings of the Xia dynasty in China are about 4,000 years old. The Greco-Roman traditions of art and architecture started more than 2,500 years ago, yet much of contemporary western culture is the current manifestation of a continuous evolution from these foundations. This is to say, the petroleum era is a brief blip on the timeline of the human species.

With remarkable shortsightedness, we have come to believe that the petroleum-era paradigm which was made possible by the availability of plentiful, cheap energy represents the natural order. In fact, it is not sustainable and is tending toward catastrophic results. The shift to renewable energies as our primary resources will reconnect us to the cultural/ethical continuum of humankind; a new paradigm. ■