



innovation agenda

by Daniel M. Kammen

Retooling the global economy for a low-carbon and environmentally responsible future must begin immediately — and a major new United States initiative in this area is vital. The recent downturn in the economy makes this change all the more necessary: energy efficiency and renewable energy can be an engine of dramatic new economic growth and job creation. It will be up to the incoming president to marshal public and industry sentiment behind such a reinvestment in our future.

We are at last seeing a global explosion of financial and political interest in energy, focused largely — but, ominously, not exclusively — on clean energy, since, in addition, to solar, wind and other low-carbon sources, investments in some of the most CO₂-intensive sources are also on the rise. Innovation is the life-blood of economic growth and renewal. It has been known for decades that the bulk of new growth results from the invention, and re-invention, of new scientific and technological opportunities. Over 50 years ago Economics Nobel Laureate Robert Solow concluded that over 90 per cent of new economic growth results from public and private sector investments in innovation.

Yet energy is very short of investment in research and development (R&D) despite arguably now posing our top environmental and geopolitical security threat. Total investment on R&D in the U.S. as a whole stands at roughly three per cent of the U.S. gross domestic product, but, for energy, it is proportionally only about one-tenth of that level. By contrast, research and development investments in the medical and biotechnology field are roughly 15 per cent of sales — almost a staggering 40 times more than for energy. This argues that, at minimum, energy R&D should be increased to the three per cent national average.

In a recent set of papers, Prof. Greg Nemet, of the University of Wisconsin, Madison, and I, concluded that, as a starting point, federal energy R&D investment should be dramatically increased, five- to ten-fold from its current anaemic level of \$3–4 billion a year. Public-sector spending alone will not solve the energy and climate problem, and a budget increase of this magnitude will need to be carefully ramped up over years, but without a serious federal commitment to ‘prime the pump’, government will not send the right signal to the U.S. and global industry that climate is the top priority.

Public investments of this sort in the United States have been repaid many times over. A well-organized and successful campaign to double the federal medical/biotechnology R&D budget during the 1990s resulted in an eleven- to twelve-fold increase in private sector investment and innovation. Recent investment in nanotechnology is already paying off at a ratio of almost 20 to 1. Innovation is good business.

It is vital that the United States fully embraces this issue, and becomes a global leader. Addressing the risk of significant climate change will require an estimated 80 per cent or more reduction in global greenhouse gas emissions over the next five decades. The U.S. and China together now account for almost half of all greenhouse gas emissions, so clean energy development and deployment work needs to be accelerated in these two countries.

Making clean energy a major national priority will pose political challenges, but no nation is better positioned to adopt a low-carbon energy path than the U.S. It not only has tremendous clean energy resources, but major companies looking to take advantage of a change in federal policy to compete in the global clean energy economy.

The U.S. and China also share a special bond — both good and bad. Each is strongly dependent on coal, but jointly they have the technical capacity to alter that situation. Both have exceptional wind and solar thermal energy resources; indeed, they are the ‘Saudi Arabia and Kuwait of wind power’.

Clean energy is also the best diplomacy. Energy infrastructure is needed around the planet, particularly in the poorest developing nations. Renewable energy and energy efficiency can often be installed and put into operation far faster than traditional fossil fuel facilities, and with far greater flexibility on home, village, town or city scales. The U.S. with the world's most extensive — though historically not always the best funded — international development network could speed the clean energy revolution, putting human rights, gender equality, economic opportunity and environmental quality squarely in the forefront of the priorities of every community and national leader worldwide.

The economic slow-down in the United States highlights the need for a job boom. Clean energy has been shown to generate three to five times more jobs per dollar — or yuan — invested, than comparable investments in fossil-fuels. This can make clean energy and energy efficiency a popular bi-partisan political cause. Politically, global warming and clean energy legislation is big in the U.S.

The new U.S. president and his administration can also build on a number of courageous and critically needed experiments by states and regions in designing carbon cap and trade programmes that can form the basis of needed federal legislation. The Global Warming Solutions Act of 2006 in California is one example. The regional Greenhouse Gas Initiative in the Northeast and Mid-Atlantic States is another. The Midwest is developing what promises to be an aggressive climate policy and has exceptional wind and solar resources.

Already over half of U.S. states have passed requirements for a fraction — generally 15–25 per cent — of all electricity to come from renewable sources by 2020–2025. The American century of clean energy is primed for launch. What we need is a charismatic and motivating leader with the vision and commitment to make it happen. The U.S. must mobilize the world's largest research and development capacity to protect our future and to build a diverse set of new industries. Wouldn't that be a grand and globally welcome American signature for the new century? 