

We need a plan

When times are good, we don't think much about energy conservation, or about the efficiency of our homes or transportation. We do think about such matters during every crisis — the OPEC oil embargo of 1973, the Persian Gulf War in 1991, and a year ago when oil prices suddenly soared — but forget again soon afterwards. We have trouble thinking for the long term.

Part of the problem, perhaps, is that energy policy has become subject to an almost exclusively economic rationale, which embraces the notion that we shouldn't plan; that markets, if we just let them evolve on their own, free of any guidance, will somehow miraculously do wise things. It's a doctrine — sometimes referred to in social science as neo-liberalism — that has come to infect policy-making quite widely. In ecology, major scientific journals find it proper to publish papers estimating the economic value of species diversity or ecosystem stability, because ideas for preserving the environment only get serious policy consideration if they can be defended in monetary terms.

Hence it's refreshing to see the American Physical Society weighing into the debate on energy policy with a long document (<http://www.aps.org/energyefficiencyreport/report/aps-energyreport.pdf>) detailing the value, in more than strictly monetary terms, of energy efficiency for the United States and other nations. Efficiency is desirable, in their view, because it preserves our energy resources, giving us more flexibility in future decision-making, and would be the single most effective means by which we can limit the carbon emissions driving climate change. If there's anything positive to come out of the current financial crisis — which is rapidly turning into the most disruptive economic event in a century — it could be that we find a rare opportunity to actually follow some of the sensible proposals this document describes.

In 1973, after the OPEC oil crisis, US President Richard Nixon signed into law far-reaching plans “set to insure that by the end of this decade, Americans will not have to rely on any source of energy beyond our own.” Even though he was driven from office soon afterwards following the Watergate scandal, these plans had an impressive effect. Between 1975 and 1980, the average weight of US vehicles dropped by nearly 25%. More recently, however, the



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US efficiency record has been appalling. Cars and light vans now weigh as much as they did before 1975 (about 4,000 lb). And while the average fuel economy for US light vehicles doubled between 1975 and 1980, from 14 to 28 miles per gallon, it has not improved at all in the two decades since then.

It is in transportation, the APS report notes, and in the efficiency of buildings, that we stand to make the biggest improvements. Of all energy used in the United States, fully 68% of it is expended in heating or cooling buildings and in transport. These two sectors together also account for roughly 70% of all carbon emissions. Hence, seemingly mundane matters such as regulations for building insulation and fuel efficiency for vehicles are actually matters of prime importance. The report points out, for example, that the weight of vehicles could (again) be reduced by as much as 20% just through better design and by the use of high-strength steel, aluminium and composite materials. Fuel efficiency could be similarly improved by using existing technologies — better internal combustion engines, transmissions and aerodynamics — to give us new light vehicles averaging 50 miles per gallon or more by 2030.

Similarly it's within reason, the report suggests, for the federal government to set a goal for US buildings to use no more primary energy in 2030 than they did in 2008. To achieve this will require 'zero energy' buildings that use no fossil fuels and have an efficient grid connection to some renewable energy source. This is all feasible with long-term investment in R&D for building technologies, even if it sounds a little boring.

Encouragingly, reports like this one have had an important impact in the past. In 1975 the APS produced a similar report on the potential for improving efficiency especially in appliances, heating systems and air conditioning. After that, in the same year, California instituted regulations and incentives to improve electrical-energy

efficiency, which have actually kept the state's per capita electricity use constant for the past 30 years even while its economy has grown faster than that of the United States as a whole.

The report also argues, I think convincingly, that market forces simply cannot be trusted to do the right thing in the long term. Even when technologies exist to reduce energy use, economics often gives few incentives to do so. Building tenants, for example, often pay for utilities and maintenance and, as a result, builders and landlords have no direct incentive to spend extra money on saving energy with new technologies. Vehicle manufacturers have followed the market incentives and individual tastes (often created, at least in part, through marketing) to make ever bigger and more powerful cars.

To actually achieve the possible efficiencies in both transportation and buildings will require significant scientific advances over the span of 20 years or more — much longer than market forces, in the form of financial investors judging returns on a monthly or yearly basis, will wait for a pay-off. It will take long-term planning, not simply markets. And it's clear that such planning makes as much sense for Europe and the rest of the world as it does for the United States.

It's also important to remember that climate change will eventually be driven not only by greenhouse gases but also by the energy we simply spill into the environment as heat, which grows year by year. In the Earth's energy budget, this is currently only about 3% of the contribution from greenhouse gases, and so is negligible. Yet one recent estimate suggests it will start becoming important in about 100 years if our energy use continues to increase in the way it has done in the recent past, which may be a conservative estimate given the industrial rise of China and India. It makes you wonder whether a breakthrough in fusion energy, giving us a virtually inexhaustible supply, would actually be a good thing or a bad thing. Until we can learn to control our collective energy use, I think it may be the latter.

The current economic disruption may be painful for most of us, but it could also be just what we need — a chance to wake up and change our ways before it's too late. □

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