

Abstract

CalPERS is only one of many investors who face major challenges in finding and evaluating truly sustainable investments. Cheap fossil fuels create a strong monetary bias against stable secure steady-state investment in basic needs, while aggravating the climate change which makes sustainability a key goal. Cheap fossil fuels also offer unprecedented size and power to large, hierarchical, centralized, and authoritarian organizations that are ill-suited to human nature and historical culture. Some innovative perspectives, approaches and criteria for success in meeting these challenges are described and discussed. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2222988

Sustainable Investment Means Energy Independence *From* Fossil Fuels

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CalPERS faces substantial challenges in making successful and truly sustainable investments. Although CalPERS' ROI requirements are constrained by contracted pension liability, a key principle is that satisfying the real goal of pensions—modest and secure stipends for those who have become less capable—calls for an economy that is healthy and stable, unlike the current one on its present course.

A challenge for CalPERS, as for all sustainable investors, is grappling with the price signals of the dysfunctional monetary-fossil-fueled system, and nonetheless managing to achieve the wildly different character of a sustainable investment.

Climate change is obviously another huge challenge for CalPERS in selecting investments so as to maximize stability and security for pensioners and for the economy they live in. Some decision-makers are now planning how to “adapt” to climate change, but unfortunately they usually mean adapting the planet to our current lifestyles rather than adapting ourselves to the planet. The changes in energy use which are wisest are also mostly about adapting ourselves to the planet, but are typically least rewarded by the monetary, all-growth-is-always-good model on which CalPERS' ROI expectations depend.

The best and most sustainable investments will continue to be in longterm, basic, traditional, appropriate and stable technology and infrastructure such as traditional crafts and trades, permaculture and eco-villages rather than in transitional projects such as PV, big windpower, electric cars, or ‘smart’ computerized buildings. While these latter may at times be helpful, they are

inconsistent with and cannot guarantee long-term sustainability and so should never be a first priority for investment.

Investments in truly sustainable projects only need to be made once, whereas investing first in transitional projects just means more resources will be required for two or more investment stages rather than just one. While more investment stages may yield more short-term paper profits, they will require more real work, including the work (and carbon emissions) of fossil fuels.

The best way to prioritize investments for maximum sustainability is with a goal-oriented global criteria for efficiency:

**clean air and water, healthy food,
comfy shelter, plus plenty of sleep
& exercise**

**Efficiency = -----
energy & resources**

Investing so as to transform our overdeveloped economy into one which produces optimal health and happiness can best be leveraged by focusing on real variables such as our true physical needs: clean air and water, healthy food, sound shelter, and plenty of sleep and exercise. It's these physical needs which are most relevant to the issue of physical energy sources. All of these needs are (and have always been) available without any of the fossil fuels—coal, oil, natural gas—and nuclear. It's only recently that we have gotten addicted to these jackpot fuels. It should also be noted that all mining and refining currently (and practically) require fossil fuels. Perhaps unless extraction falls a million fold or more.

The path to truly renewable steady-state sustainability has few benchmarks or milestones. One of them is the idea of the 2000 watt society, an academic idea for an energy diet. The rate of 2000 watts was then (1998) the approximate global per-capita average energy use, and the Swiss were using about 5000. (Their estimates indicate that a substantial proportion of energy use is societal rather than strictly individual, so a market-dominant policy approach risks misallocation.)

Concerns exist that such modest amounts (1/6 of the U.S. average) of energy use promise deprivation and discomfort, but there are many reasons to think this is not necessarily so. However, it's not easy to find information relating an individual's energy use to global average temperatures, so it's difficult to be sure what kind of an 'energy diet' might be truly sustainable in the sense of actually reducing climate changing emissions and temperatures. But I'm certain it's less than 2000 watts.

Another useful parameter for evaluating an investment's sustainability is the energy price of human muscles, or biofuels grown with no fossil fuel input. As a rule of thumb the price of humanpower is about \$800/gallon, at least in the U.S. In other words, it takes a healthy and energetic person approximately 100 hours to provide the work we can now get for about \$4/gallon. While insisting an investment meet such a stringent criterion may seem daunting, it is possible and will require only the one stage of design and investment.

For example, rearranging habitation patterns so that people's needs for producing food and water could be met within walking or bicycling distance (as was traditional until 100 or 200 years ago) would be a very efficient way to adapt to climate change so as to reduce greenhouse gas (GHG) emissions substantially and cost-effectively. Concerns about and plans to provide *mobility* should be reframed for the goal of *access*. Judicious and widespread removal of asphalt would be very effective when replaced by local and intensive neighborhood farms. Similarly, supporting education in traditional methods of producing and preserving food, as well as fiber,

wood, cloth, pottery, and other basic artifacts would be a very reliable long-term investment for providing a basic typical standard of living plus reducing GHG emissions while minimizing discomfort and real economic deprivation.

Fortuitously, many manufacturing and consumption processes which are now powered by fossil fuels can be revised to use muscle power instead. The classic example is the electric can opener, but there are many more processes now performed by devices powered by engines or motors that could be accomplished with manually operated mechanisms. Good candidates for such substitution include leafblowers, lawnmowers, washing machines for clothes and dishes, blenders, sewing machines, cars, and many carpentry tools.

Since sustained 1/10 hp power output is possible for many people, investing in manual (and pedal) mechanical devices to replace the many existing machines that can operate in that range can offer very attractive real returns while reducing GHG emissions and offering handy, less-is-more innovations. The simplicity and potential of ergonomically adroit, human-scale mechanical designs is widely underappreciated, in my engineering opinion.

Usually there is a traditional tool or design already available that accomplishes the same purposes without using any fossil fuels except perhaps in the initial construction. And creative designs could expand the number of processes that can be re-manualized, developing new mechanisms which leverage our own strength (not to mention that of unemployed young men). Moreover, many traditional trades and craft processes have multiple benefits, such as providing healthy exercise while simultaneously growing and preparing healthy food or constructing energy-neutral buildings which can serve as both residences and workshops.

Even more fortuitously, reducing the many unhealthy aspects of excessive fossil use can dramatically reduce both costs and externalities. We know fossil fuels are themselves toxic, and their extraction is becoming increasingly so, not to mention all the costly 'side effects' of fossil fuel technology (in addition to climate change), from

fracking contamination of ground water and addiction to drugs such as sugar, to ocean dead zones and collapsing bee colonies. Investing for a healthy planet would put fossil fuel investments dead last. For example, it would be better to invest in a bicycle than in a bus, better to build a solar cooker than buy a microwave oven, and better to have composting privies than low-flush toilets.

What's an economy for anyway? Maslow's hierarchy identifies 5 basic levels of a well-rounded human: Self-actualization, Esteem, Love/belonging, Safety, and Physiological. The most basic, physiological level corresponds to 'clean air and water, healthy food, affordable shelter, and plenty of sleep and exercise.' There is evidence that people usually experience life on all these levels even during scarcity. Thus, a modest sufficiency of physical needs suffices for the pursuit of happiness. And fossil fuels really only pertain to the first, physiological level; beyond that, we just need each other (and the world). But fossil fuels have warped our lives and culture so that all levels of needs and wants (aka 'economic demand') are now more or less larded with unnecessary energy consumption that tends to distract or even block us from living as we were evolved (or created) to live.

Could it be enough, could everyone adequately meet their real needs without any fossil fuels? Is there enough land for everyone to live and thrive by traditional means? That depends in large part on how much more land we trash, and how soon and widely we begin healing it instead. People fear widespread disasters, famines and floods. But what parents would not sacrifice their lives to save their child if attacked in a home invasion? How can this be different?

Chambers of commerce can be expected to cry the blues at the prospect of dropping the growth-at-all-costs ideology and of the withdrawal pains of kicking our fossil fuel addiction. But the growth model leads to the boom-and-bust, manic-depressive system that caters to the comfortable and whacks the meek at every downturn. We need a model that favors the basic survival priorities that pertain to physical energy and thus to fossil fuels' inevitable role. Businesses often express anxiety about unpredictability in the economy;

they should instead take comfort from the likelihood that a stable, steady-state, no-growth economy would be reassuringly sustainable and predictable, once we get it set up.

GNP as the indicator of economic health is obsolete, but people can't seem to get out of the habit of using it. In addition to the global efficiency equation above, various goal-oriented 'happiness' and 'welfare' indicators are also available, such as Gross National Happiness, the Human Development Index, the Green GDP, the Genuine Progress Indicator, and not least the ecological footprint score.

The bottom line is that money can never be the independent variable. The real independent variables that are the highest priority are: clean air and water, healthy food, comfy shelter, and plenty of sleep and exercise. Money is simply one of the interdependent means to these particular ends, ends which are the most relevant ones when the issue is physical energy sources. Money is just a symbol, the 'poker chips' we have all 'agreed' to use to play the life game. And it's an artifact only humans can control.

A third major challenge facing sustainable investing is the structure and governance of existing corporations and jurisdictions. Most if not all of the standard investments now available to any investor are structured for paper profits from global commerce, an economic activity that would change radically if deprived of its fossil-fuel inflation. And as multinational corporations have evolved, they have been warped and corrupted by the power of fossil fuels, just as have multi-ethnic political empires.

Corruption is usually thought of as bribes, whether small or large, paid to someone who is in a position to cut corners for the buyer, often in the context of dealing with some large bureaucracy that has decision-making power in some market and/or governmental matter. But that is just the tip of an iceberg of dysfunctional institutional structure that befuddles us.

The picture that emerges from Maurice Punch's 1996 report of his research into corruption and white-collar crime, is of large hierarchical organizations such as corporations and

government agencies (or their components) which over time develop an internal culture and a feeling that they understand their mission and operation better than does the outside world. Moreover, strict, by-the-book hierarchical function is not really the way human nature works, and it can also be very cumbersome in a large organization.

Thus, the people who operate an organization cut corners, mostly small and innocuous ones, in order to make things work. Punch sums up the situation thusly: "The organization is the villain; our inability to control it is the essential message of this book and that represents a substantial challenge for society."

Based on a review of the literature and notable case studies, Punch defines 6 types of corruption:

- informal rewards to individuals – perks, often non-monetary
- work avoidance/manipulation – webcruising at work, gossip at the water cooler...
- employee deviance against the organization – absenteeism, theft, sabotage, fraud...
- employee deviance for the organization – fudging the law for profit or political leverage
- organizational deviance for the organization – letting marketing trump engineering
- managerial deviance against the organization - embezzlement

Thus, corruption is not one simple obvious thing but rather a continuum of departures from law, regulation, and/or policy that range from harmless to lethal. Ken Silverstein reports in detail (in Harper's as well as in "Turkmeniscam") on facts which create a picture of corruption among Washington lobbyists and Congress. Corruption is also endemic to the criminal justice system, notably in law enforcement's code of silence, but also in the plethora of plea bargains. Law enforcement and the military are particularly susceptible to the corruption that follows when the ends are used to justify the means. And of course investment bankers.

Accountability is widely hallowed, but whistleblowers who break a group's code of silence and cause embarrassment are rarely appreciated. When scandals do become public, it's often those lower in the hierarchy who take the rap

for the organization while top leadership may not even get a slap on the wrist. Fear of public embarrassment and of loss of reputation and trust often motivate organizational tendencies toward excessive secrecy. And subordinates whose survival depends on their jobs feel understandably reluctant to share inconvenient truths with top leadership who rarely want to hear them.

Punch also addresses the tendency of government agencies to prefer to negotiate with regulated and errant industries, rather than sue and apply proportionate penalties which may require mountains of paperwork. This can lead to 'regulatory capture,' especially when the agency has a dual mission of promotion and regulation, such as the USDA or the NRC. Industrial corporations can easily be seen as too essential to risk damaging, even if they may not be too big to fail. After all, many regulated industries provide common basic products as well as jobs. And while the trend of U.S. companies taking up official residence in tax havens may offer more paper profits, it's a legal kind of corruption that weakens the economy in which pensioners reside.

The size of markets and governments and their sub-organizations create distances between producers and consumers, as well as between centralized governments and individual citizens, that make transparency impractical. The misalignment of checks and balances invites moral hazard and rationalization—and PR. Widespread fixation on monetary profit, as well as the passage of time, induce mission creep away from the original non-monetary purpose. When the ends are used to justify questionable means, the latter can be expected to sabotage the former. "The means are the ends in the making."

In a local Sacramento conference in 1991, Garrett Hardin shared with this writer his conclusion that any group of people larger than about 25 would begin to develop cliques among themselves. And prehistorically, traditional tribes and villages tended to remain small, perhaps at most several hundred, being limited by ecological resources and (at times) human wisdom. Thus, the larger organizational sizes seen in the last few centuries, as well as prior exceptions such as Rome, Alexandria, the Aztec and Mayan cities, or

imperial China, are rather different than the experience of the vast majority of humans who have ever walked the earth.

So the large organizations—cities, states, countries, multinational corporations, etc.—which now form the majority of most people's experience, create a political and social environment very very different from the environment in which we arose and where humanity has spent virtually all of its existence. Such large, centralized, hierarchical and authoritarian organizations could never have reached their current degree of power at a distance without cheap fossil fuels.

So what's the solution to the challenge of stepping back from bigness (as well as from those related fossil fuels) and recreating local control and relocalization with the kinds of checks and balances that will minimize cheating and corruption and reliably link rights and responsibilities?

One very promising path is offered by Elinor Ostrom and her colleagues in the 8 criteria (below) they have discerned for reliable long-term sustainable management of common-pool resources, which are “natural or man-made resource system[s] sufficiently large as to make it costly (but not impossible) to exclude potential beneficiaries.” A river or a fishery is a common-pool resource. These rules enjoy documented long-term success in achieving and maintaining stable steady-state harvesting systems.

1. Clear and accepted boundaries of the group of users and of the common resource
2. Rules governing use of the common resource match local conditions & needs for labor/money inputs
3. Most of those affected by the rules can participate in modifying the rules
4. Those who monitor the health and harvest of the resource are accountable to the users or are the users
5. Rule violations receive graduated sanctions that depend on seriousness and context
6. Local, low-cost and prompt means are available for dispute resolution

7. Users have long-term tenure rights, and distant centralized authorities respect the rule-making rights of the group of users

8. For common-pool resources that are part of larger systems:

Harvest, use, monitoring, enforcement, conflict resolution and governance are organized in multiple layers of nested institutions.

But bottom-line, people have to tell each other the truth, and first they have to tell themselves the truth. No society, government or economy can thrive without common honesty. The pursuit of happiness is hobbled when cheaters prosper. And obeying the letter but not the spirit of the law is also cheating.

While much of this essay may not be much help to a CalPERS staffer who has to make a specific investment decision next month, the indirect effects of absorbing this global sustainability perspective can be expected to pay off in the medium to long term.

Economics is usually called dismal because it's about making challenging choices in the face of some uncertainty, and afterwards you don't get to count the opportunity cost of what you haven't chosen. The current notion of, and plans for, renewable alternative energy sources as being primarily about PV, big windpower, or even big hydropower—is a first step that is really a detour. It's the type of detour that can be expected to lead to an expediency trap. Beginning with settled agriculture, perhaps even with fire, we have been stepping out on a slippery slope of expediency, using bandaids solutions to problems which have become increasingly complex due precisely to the previous use of bandaids. More recently, we have been squandering the fossil fuel bandaid and crowding out other flora and fauna, 'profitably' shredding the ecological safety net to the point of directly threatening our own welfare, as well as indirectly through generation of greenhouse gases.

Two real problems arise with all these expedient innovations—diminishing marginal returns and unintended consequences. For example, the proportional improvement in standard of living experienced by using fire is much greater than that from, say, knitting, which in turn is greater than

that available from driving to work as a wage slave, let alone the enjoyment of using an electric can opener. But the effort, energy and resources required to produce and use more advanced innovations generally exceed what's needed for simpler and more traditional ones. And more 'side' effects appear.

Achieving basic, stable and secure solutions to basic needs means, I believe, doing things nature's

The chart below offers a broad comparison between these two ways of understanding the world.

Mechanical Logic

Physics

Linear

Digital

Straight lines are the shortest distance

Squares – minimum edges

Big and Fast is most effective

More is better

Economy of scale (of combustion) is large

Higher speeds reach goals sooner

Short-term

Conquer nature & kill the goose

High energy density/intensity

Fossil fuel

Mass & Energy

Profit

Opportunistic

Wants

Bureaucracy

No limits to growth

Capital-intensive

Resistance to change

Separation & Segregation

Mobility

Fear of Scarcity

Entitlement

Analyze & Act

Competition: win-lose

Power over

Centralized

Hierarchy of top-down control

Ego

Objectivity

Mind

Yang

Work hard

Don't just stand there...

way and not our expedient way. How does nature design and invest? Masanobu Fukuoka made a lifetime study of this question, and concluded that less really is more, and that the lazy way of letting go and letting Nature do (almost all) the work, is really the most efficient. So we should study how Nature 'thinks,' so we can learn to think that way rather than in the oversimplified, expedient, mechanical ways that are now common.

Biological Logic

Biology

Holistic

Analog

Curves are the shortest distance

Fractal – maximum edges

Small and Slow (with leverage) is most efficient

Right proportions are best

Economy of scale of metabolism is small and fractal

Steady improvement yields durable change

Long-term

Go with the flow and harvest from abundance

Gentle energy flows & distributed storages

Sun, wind, water, muscles

Life & Evolution

Photosynthesis

Coordinated and Balanced Equilibrium

Needs

Community self-organization

Physical limits; no metaphysical limits

Free and self-winding

Resilience to change

Inclusion & Integration

Access

Love is Enough

Reverence

Observe & Interact

Cooperation: win-win

Power with

Relocalized

Network of control, grounded at the grassroots

Nature

Detachment

Bodyheartmindspirit

Yin & Yang

Work smart

Don't just do something...