The Curious Use of Stimulus for Constraint

promoting growth to slow resource depletion

© P. F. Henshaw

Scientist, HDS systems design science, 680 Ft. Washington Ave. New York NY 10040

w: **www.synapse9.com** e: **eco@synapse9.com** t: 212-795-4844

bio

Philip F. Henshaw's innovative systems science work goes back to 1970's, evolving into a fairly practical new general method, using physics principles as diagnostic tools, for investigating complex natural systems that develop by growth. Such systems can be associated with the cell of self-reinforcing complex internal processes by which they develop, and considered as individuals with a closed boundary(Henshaw 2011) allowing them to be defined as common subjects of both physics and empirical systems sciences such as economics. There are no formulas for complex systems, but there are things they do simply, and useful distinct differences between their complex organization and the simple conceptual models an observer can manage. That makes information models and their physical subjects separate subjects of study, and allows attention to go back and forth with answerable questions(Henshaw 2010b). That learning process opens a new window on the world of non-deterministic systems, stemming as a practice and method of general systems science. How nature is observed doing complex things simply opens the door to questions that are answerable with high confidence, independent of prior theory, prompted only by the conservation laws and similar principles. The author lives in New York City. He has a B.S in physics from St. Lawrence University, an MFA in environmental design from the Univ. of Pennsylvania, and a substantial accumulated body of original research and publication. He does consulting, research and writing as *HDS systems design science*. Further information is on his website www.synapse9.com

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Abstract

It helps expose the distinct duality of nature and perception to find simple behaviors of the global economy that directly conflict with popular and professional belief. Different scientific interpretations of the properties of complex environmental systems, interpreted using different explanatory principles, may not be connect and fail to resolve such views of reality. A case of great interest and critical importance is raised by the observation of Stanley Jevons 150 years ago that improving production efficiency accelerates resource use and depletion for the economy as a whole. Just such a relation between overall economic efficiency and rising energy use is clearly evident in the best economic data, and so a fact of nature to explain. The worldwide general belief and public policy for economic sustainability is based on the opposite view, though, seemingly developed from some other than a global view of the economy. What's surprising is that on such a critical world issue, beliefs that both don't account for the behavior of the whole, and directly conflict with observation, remain unquestioned as the basis for world government policy. It presents a kind of deranged physical science as the world standard for environmental policy. Here the question is approached somewhat backward, starting from the clear behavior of the world economy as "the proof", followed by a search for theories connecting various inside and outside views, a kind of forensic systems science approach. How the two languages developed apart is explored with help from principles of energy conservation and budgets to pose the critical questions.

KEYWORDS: efficiency effect, Jevons, whole systems, whole effects, costs, productivity, growth, language gaps, scientific methods, sustainability science, natural systems

1. Introduction

By all counts the sustainability science and policy communities around the world should be in turmoil, but aren't, due the increasing evidence that using efficiency to reduce resource use and depletion has the opposite effect. Environmentalists and policy groups have long ignored clear physical evidence that efficiency does more to expand economies than reduce the resource use of economic processes. Apparently the popular view developed through social agreements about common local views of work and business practices, projected to the world economy by presumption and never studied. So common wisdom differs greatly from the direct and clear evidence of how the economy as a whole behaves. To some the question is "which is right", the explanations we know or the phenomenon we see (Figure 1.). The real dilemma seems to be that whenwhen whole languages for interpreting our complex world are constructed separately, and disagree, there's not common language to connect them for resolving the difference. To find how to connect the separated languages an intentional learning process of going back and forth between popular cultural views of the parts, the physical science view of the whole, while exploring the physical system as the subject in common. It leads toward discovering bridges of connection for the differing facts in question, for each language, making them meaningful to the other. A fairly loose conversational approach to doing that is used here.

The problem seems first to be one of recognizing that our firm cultural beliefs don't match what our whole natural world is quite simply doing, as immediately seen in Figure 1. Historically both economic efficiency and energy use have been continually multiplying. That's evidence that people live with at a dual reality, a meaningful cultural view that is not occurring, and a clear picture of how the world physically works that isn't meaningful to most people. Going back and forth between languages and the subject, exploring question by question to make each meaningful to the other, needs to leave time for digestion. Languages are not changed by logic but by arriving at new questions. The systems science approach here was first presented in relation to making timely response to irreversible progressions of change(Henshaw 2010b). Here it's presented in relation to discovering independent languages for the same complex system that conflict and how to reconnect them. It's a physical science approach to complex systems science, with the scientific method organized around a practice of systems learning and engagement. That makes it fall more within the practice methods among the systems science disciplines than within the mathematical modeling disciplines (Henshaw 2010a).

2. Initial discussion

Some caution is needed when discussing evidence of popular and professional confusion. There's the risk of pushing people to adapt to unfamiliar realities faster than they are culturally able to. The "denialist" cultures that arose around discussing climate change seems to be disrupting societal learning, for example. There are also stubborn scientific cultures clinging to abstract theoretical conceptions of nature, pushing people to adapt to ever faster change without end, that part of the very same "denialist" problem too. It's a major problem to have such major societal forces at complete odds with each other. Both seem to be acting quite naturally, as people confronting environments they are not adapted to, and so stiffening their resistance to change rather than widening their view of it. More pressure on them would *not* be the lubricant needed.

Our whole economy is designed to change in scale by %'s, and so increase the complications people need to adapt to by ever larger steps. It's the process of maladaptive change that continuing economic growth beyond its comfortable limits is speeding up, and that the use of efficiency to slow it down, is also speeding up. What we face seems aptly termed “radical change” that gets more radical the longer we don’t find the right way to respond. Successful change only occurs, though, following learning curves allowed by the learning rates achievable (Henshaw 2010b).

The literature on the effects of economic efficiency is genuinely inconclusive, with approaches from different directions reaching different conclusions. Most often the differences are all treated as legitimate perspectives (Madlenera, Alcot 2009) . One difference in the approach here is that it starts from the clear evidence of how the economic system behaves, taken as definitive “proof” of a missing assertion, i.e. doing science a little “backwards”. To find a theory one goes back and forth between the view of the subject as a whole and what we understand of the parts, finding connections and developing questions to answer.

The mentally challenging part of it is comparing outside and inside views of a whole complex environmental system, like the world economy. It’s similar to connecting outside and inside views of your own body, behaviors on different scales in different environments, realizing that a “cell’s eye view” would tell you remarkably little about what doing, and the reverse. The outside view shows how nature herself integrates the parts, that no observer could see from either inside or out. Our cultural ideas of the economy come from our separate inside views being integrated into our culture of common agreements, a kind of separate whole system of the economy. It’s that cultural system and the physical system that seem to disagree.

This approach is somewhat “discursive” as needed to discuss complex systems in an exploratory way, considering different views of the same whole subject. Internal views concern how parts, with their own internal environments, relate to the whole as their external environment. External views concern behaviors of the whole in relation to both its internal and external environments. Different views of complex systems may call for quite separate languages of description, like for inside and out. That is what gives the appearance of the one subject involving two or more “separate realities”. Whether they connect or not depends first on whether they refer to the same physical subjects. The world economy, for example, has the same natural boundary whether considered from the experience of an individual or from the collected measures and stories representing the system as a whole. One thing that can be used to connect them is how they can all be investigated using the conservation of energy as an explanatory principle. That is used here as somewhat of a “Rosetta stone” for connecting meanings with features for which meanings need to be found. What makes things clear in the end is the work of finding the special questions that can be simply answered.

3. The source of conflicting views

Different explanatory languages for the same thing need not connect at all, of course. Economists have long considered efficiency for all factors of economic production synonymous with growth and expansion (Abramovitz 1973). They work hand in hand with environmental scientists and policy advocates who treat efficiency as having the opposite effect. It appears they don’t mention it to each other because they don’t see a need for their separate languages to connect. Economists study a theory of money, environmental scientists study practical ecology. Neither checks with the physical evidence of the whole economy for which neither has a theory. Absent any definitive science to resolve such questions both are happy if a separate theory of ecology predicts the “externalities” frustrating economists will be reduced by the same means as economists accelerate growth, using the popular “pervasive assumption” (Tainter, 2008) that efficiency is a constraint on resource consumption. As it conflicts with that pervasive assumption, the contrary behavior of the world economy goes unmentioned in the main stream popular and professional journals and press. Since the finding 145 years ago (Jevons 1885) various scientists considering the economy as a physical system have long held what appeared to be a well founded conclusion opposite the popular consensus, included Greenhalgh (1990), Saunders (1992), Hall (2004, 2007), Alcott (2005), Polimeni et al. (2008), Madlenera and Alcot (2009) and Henshaw (2009). (Annila & Salthe 2009)

The connection between GDP and energy clear, but not cause and effect. Cause appears to be the development process that organizes the system, using the investment cycle to build new features partly in response to marketability of their products. This view is distinctly different from the more common physical system explanation for economies as driven by thermodynamics Georgescue Roengen

A whole system view of necessity omits many features of the internal organization and complexity of a system. Equally, inside views omit a great many features of the whole. For either to complete the picture they need to make up their own ideas of what they can't see, and arrive at a mutual agreement with others by discussion. Part of the cognitive error here is that the two communities, working together on different aspects of the same problem, did not see the value of connecting their separate projections of how the other's world was supposed to work. They just let the easily visible differences pass.

From an inside view there seem to be two good reasons for a natural bias toward believing efficiency generally reduces resource use. That is usually the immediate object and purpose of being more efficient is one. Projecting that effect to the whole economy is no more difficult than other ways people habitually project personal experiences to the rest of the world, though those are as often mistaken too. The second reason is that when combined in a work place, efficiencies a worker uses are very profitable and rewarding, and so directly increase the resources available to their work. So, they both save resources on one hand and give themselves more resources as a reward on the other. One needs a kind of "perverse" mind to question a sure little formula for success like that. How it adds up for the whole system, however, is that one of those two effects is a constraint and the other a stimulus. Without a whole system view you might simply never have the "perverse" thought that the stimulus effect might dominate.

The most overlooked hint of the whole system behavior from a small scale view is the universal concentration of businesses on investing in efficiency. They use efficiency to expand their businesses, competing for advantages by offering better and cheaper products through the open markets, the networks that serve as the main structure of the global economy. They don't use efficiency to shrink. Finding the combination of efficiencies to make a better product for less cost, creates the floods of sales at the heart of the economic growth process. [rate of use?] That winning product saves customers money at the same time it better serves their needs, with the effect of enabling them to both do more and have more to spend on other things.

Investor choices are the steering mechanism of the economy as a whole, taking the profits of one business to build even more profitable businesses to maximize growth and resource use, to earn greater profits to continue the cycle. The most valuable efficiencies tend to be those that increase the use of many other resources and have the effect of removing "bottlenecks" in a whole system of production. Some anecdotal examples help fill out the picture, of how reducing the use of one thing can increase the use of others:

1. *Greater fuel efficiency lets you drive further (York, 2006) making commuting more affordable so people can live further apart and in bigger homes.*
2. *Computer designed architecture makes it easier to replicate designs so fewer people can build more buildings at less cost and further expand development.*

3. Water saving appliances let developers build larger sub-divisions and drip irrigation creates larger farming communities in the desert (Fountain, 2008).

4. Connecting with the outside view

This general approach to explaining the connections between efficiency improvement and accelerating resource consumption was first presented to the 2009 BioPhysical Economics meeting (Henshaw, 2009). That talk also covered a range of other effects of efficiency on natural systems at different stages of their growth and development. Optimizing any complex system for one purpose tends to make it ever less suitable for any other, for example. That creates increasing dependencies on having an unchanging environment, for example. That's one of several systemic effects of using efficiency for growth to consider that can be discussed from an outside view of a whole economic system and appreciated from an inside view as well.

The most direct evidence of the connection between efficiency and growing energy use is Figure 1. It shows 35 years of IEA data on world GDP, Energy use, and Efficiency (GDP/Energy), all smoothly growing exponentially at constant relative rates, as one system. These graphs are scaled to their growth rates, to show the constant relation of their growth rates, with the GDP curve indexed to 1.0 for 1971. Clearly GDP is growing faster than energy use or efficiency, but their proportional rates of change are constant, with each having a constant rate of growth as in Equations 1 & 2. World GDP has had a steady doubling rate of 22 years, energy use and its effects a steady doubling rate of 37 years, and efficiency a steady doubling rate of 56 years.

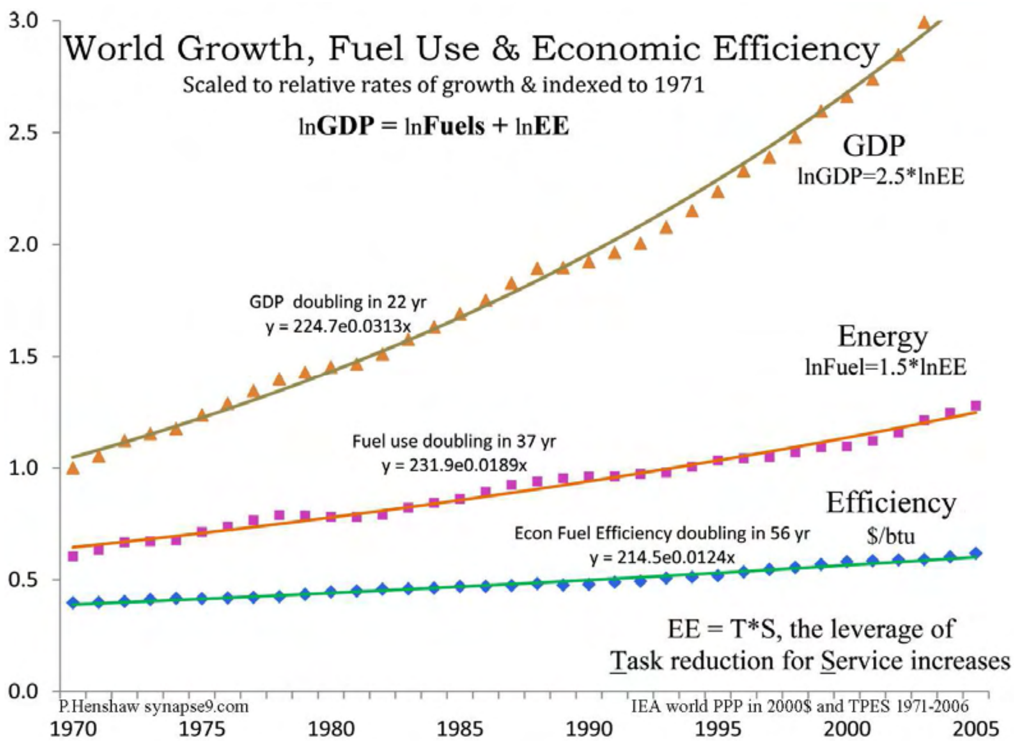


Figure 1

World GDP, fuel use and economic efficiency. IEA world data 1971-2006: Economic product (GDP in 2000$) compared to World Fuel use (TPES in Quad btu's) & Economic efficiency ($/btu), scaled by their relative growth rates in proportion to GDP = 1 in 1971.

The equations in Figure 1 show that "how the world has worked" is for 1 unit of energy savings to accompany 2.5 units of GDP expansion, using 1.5 times the proportional amount of energy in total. The 1.5 units of energy use increase combine the stimulus and constraint effects. This is the direct implication of the growth rates. It does not explain how such smooth progression in economic efficiency and growth come about through business and investor choices to maximize efficiency. Some more hints of how that occurs are below. What is shows is that behavior of the whole and the consistent motive of the larger parts are the same. This approach of '*working backwards*' by starting from the proof to look for its meaning from other views takes trying to stretch your thinking about both to get it fit, and like fitting a glove to a hand, making sure it's a comfortable fit.

For a Constraint effect of 1.0, the Relative stimulus = lnGDP/lnEE = 2.5 (1)

Net consumption Stimulus effect of efficiency = 1.5 = (2.5 – 1.0) (2)

It's actually the smoothness of the curves that probably tells the most about what is going on inside the system. It shows "liquidity" as the system efficiently equalizes stresses with the parts filling each other's gaps like fluids. It indicates that energy is being efficiently allocated in response to differences in efficiency. That universal profit maximization would have this effect is not "illogical" at all, but what is supposed to happen. It's just surprising to see it so clearly, especially in contrast to the diversity of changes and diversity of business cultures and their varying success one hears about in the news. [[I call sometimes call it "ESP" (or "equal stress principle") for how global markets provide liquidity. It's also referred to as "homeostasis", the property of variations returning to a norm and indicating the presence of a system to do it. ?]]

Even national economic accounts show widely varying movements in energy use, GDP and efficiency, (Hall, 2007; Gupta, 2009). Only the smooth regularity of the global data shows that the local variations compensate for each other. The only plausible reason is that the world market mechanism is being efficient in allocating its resources to optimize the growth of the whole. Having a system of parts that move in complementary ways, like waking smoothly with alternating steps, is one of the things it means to be "part of a system". It's an exceedingly common phenomenon in complex systems, that I sometimes call "ESP" (or "equal stress principle") as the parts respond to each other. It's also referred to as "the invisible hand" and closely related to "homeostasis" the property of internal compensation that describes stable states in organisms and cultures.

5. The fine detail

Another indication of active coordination between efficiency improvement and economic growth is the regular alternation between periods of faster increase in energy use and faster increases in energy efficiency. As seen in Figure 2 they go back and forth as if taking alternating steps in one process. The small scale waves in energy use and efficiency are 180° out of phase, as if part of the same process.

What is shown is that increasing energy use slows when efficiency improvements accelerate, and the reverse. That would be quite logical if pauses in growth were times when inefficient parts of the economy were being discarded to be replaced by more efficient ones. That "learning cycle" of taking ideas to the limit then making the next model to work better describes growth as repeatedly pausing to reorganize and retool for faster growth. So each period of slowing growth in energy use could be seen as a time of reorganizing the economy to be efficient for its next environment, allowing the next little growth spurt. It's a nice image of the economy "inching along" as it explores its changing world. It adds to the impression of close coordination between increases in GDP, efficiency and energy use too. Seeing it as working by a stepwise learning and reorganizing process could either be taken to suggest there are no limits to growth, or that learning is constantly running into them.

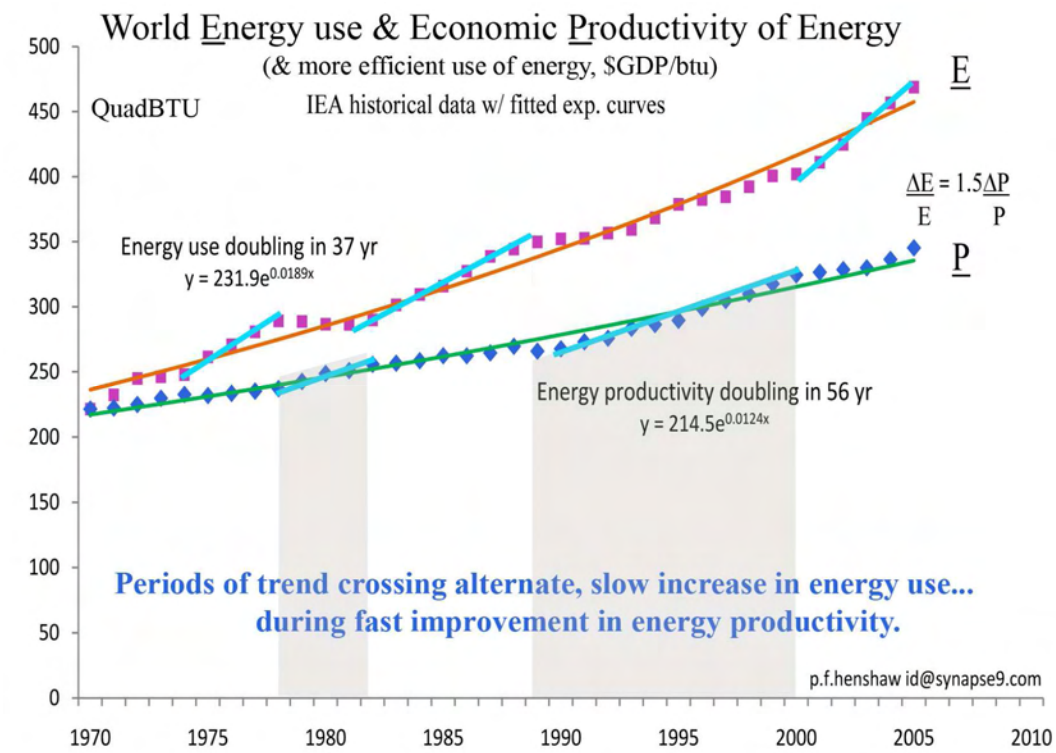


Figure 2

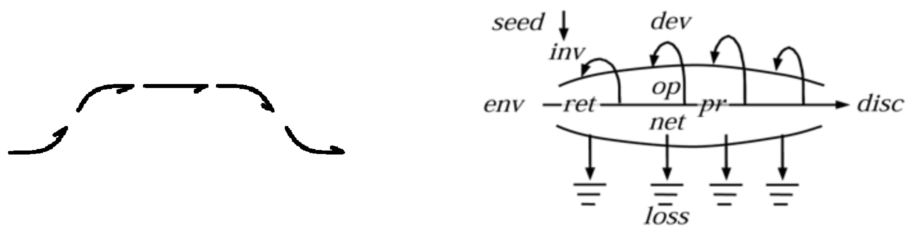
Alternating periods of faster world energy use and efficiency gains. [Same data as Fig. 1, presented with Energy Efficiency/Productivity indexed to 1971 value of Energy Use]

6. Making budgets for the business of nature

If moving energy is the 'business' of nature, where one draws an accounting boundary defines what you are accounting for. Any boundary can be considered as a question of what's available outside, what's crossing the boundary, or what happens inside. Sustaining energy resources inside a boundary is the same arithmetic for either your home or the global economy. In either case energy is not created or destroyed, and takes both building and using wasteful processes to get it and use it. As affordable environmental resources become scarce you could either improve ways to bring energy in, or reduce what you use. If the boundary encloses a growth system then neither of those solutions work, except momentarily perhaps. Increasing use of resources that are increasingly costly as you use them becomes absolutely unaffordable with abrupt natural limits as the cost exceeds returns. For complex environmental systems one has no exact equations, though one might improve on the above verbal equations, but all you really need is to measure the totals. Then you can watch to see how nature integrates the behavior of the whole, and be sure of having the correct accounting. If you can't add up everything crossing the boundary then "total" is undefined, and so are "change", "direction of change" and "acceleration".

One of the new feature of energy accounting that comes from studying individual systems is the seemingly obvious energy cost of first building an energy flow process (Henshaw, 2010b). The general narrative of change for energy systems is development from small beginnings leading to small ends, involving assembly and disassembly of the process as the first stage of development (Figure 3a). In time series data that appears as growth and decay, generally found confined within a definite boundary as a network "cell" of complex processes. Narrative is a necessity for complex systems science, as an aid to exploratory investigation, requiring care in collecting "just the facts" as a precedent to studying how to fit them together (Allen et. all. 2001). What is presented here is a "just the facts" approach to identifying and studying individual complex energy systems. To trace their energy flows is like "follow the money" for detective work, locating the coordination of energy and self-organization that animating the physical processes.

One can outline a rudimentary energy budget (Equation 3,4)(Figure 3b) to satisfy the conservation of energy and internal needs of system development, products and losses. An energy system needs to sufficient net energy to operate the system, beginning with a *seed* resource to use in starting the system of *inv*esting and *ret*urning greater net energy from the *env*ironment to *devel*op itself and *oper*ate to produce internal *pr*oducts while maintain *net* energy throughout, all of which results in *loss*es and *disc*ards. These energy uses are implied for all energy using systems. Their budgets need to add up and their parts to operate, allowing one to explore how they begins, operate and end. These questions about energy use over time observably apply to most systems and serve as things you can know before knowing how any part works. They are largely necessities implied for systems needing to change organizational scale and maintain energy conservation (Henshaw, 2010b).



a) System life cycle of development b) Energy use in individual system

Figure 3

Simplified Development Cycle and Process Succession diagrams of typical complex systems.

$$Ein = Eseed + Einv + Eret + Edev + Eop + Enet + Eloss + Edisc \quad (3)$$

$$Enet > 0 \quad (4)$$

A whole system's energy budget starts as just a map of missing information about it. Once you locate its boundary you can define the task of coming to an estimate of the totals. One powerful conclusion you get from the total energy entering the system and the total uses you can see, is the total you can't find. That tells you what you are looking for, not just that you don't see it. Further exploration both fills some gaps and creates better questions. Going back and forth between the subject and different views of it maintains the focus on the complex system as an individual physical object. That is what makes this physical science rather than statistical science, about physical subjects that are defined for only how to locate and make measures of them.

Asking inclusive questions allows conclusive answers. For example, one can see in the world energy budget (Figure 1) how the relation between money and energy changes in remarkably regular fashion. That translates to a steady average rate of energy use for every dollar of GDP. “Average” is certain to be a better estimate than zero for the energy used by the economy to deliver a product or service. Any one product or service does actually use widely distributed services throughout the world economy, with all money ultimately being paid to average workers and average investors. Energy is also a universal resource, globally priced, always moved to where it will be worth that price. To adjust estimates of energy use one can adjust for added information about that using the System Energy Assessment (SEA) method but the main thing is having the powerful information about what energy uses to look for that are probably just unseen and very largely embedded in average labor costs.

All combined, average global energy use per dollar is not a farfetched initial estimate, at least. One important direct result is readily apparent. If you account for your own impacts on the earth as being “about average” for every dollar spent, it matters much more what your income is than what you spend it on. On average it seems it would seem to. Add it up and see. That illustrates another way a whole system view starkly contrasts with the popular idea that you can change your environmental impacts by how you shop. It’s actually more a matter of how much you earn and then what you use it for. Accounting for totals puts the meanings in a grounded context, conveying what's important about living in a physical world in which nature adds everything up using the conservation of energy.

Energy assessment is a very effective way to go back and forth between measures of the whole and learning about the parts. The SEA method was developed to account for the energy needed to run whole businesses. In using it to measure EROI (energy return on energy invested) for a wind farm (Henshaw et. all. 2011), it found four times as much energy needed by the business than the standard method would account for. That appears to indicate that measuring business energy use as its technology energy us is fundamentally a mistaken approach. These things will surely take some time to understand, but there's little doubt most businesses would not be using energy at a rate 80% below average per dollar either, as the most common established assessment standard implies. As with any other learning process it starts off wherever you start, and by going back and forth between different views of the real subject you reach a point in your mind where it starts coming together.

Understanding how both the natural costs of energy and our societal energy costs are rising is another way to look at the whole system energy budget. On present trends it seems quite possible the energy available on earth will not continue to be cheap enough to run large parts of the developed economies that were designed for running on cheap energy. Studies on that question were begun by Charles Hall with his work on EROI, the energy returned on energy invested, noting the drop in oil energy return on investment from 100:1 to 15:1 in the last century. One of his interesting recent papers (Hall et. al., 2009) introduces the idea that as our energy resources cost more energy to develop, and our society keeps accumulating more energy costs, there is a theoretical probability of a crossing point where our form of civilization could not physically operate.

I suspect, as do others, that a broad kind of energy bankruptcy like this already occurred. There was an exceptionally high demand for oil and inadequate supply with sharply rising prices that persisted for five years preceding the 2008 economic collapse. The energy companies were not meeting demand as usual (Hamilton, 2009) and the price did not stabilize. That's exactly what the phenomenon discussed as "peak oil" would be expected to cause, inflexible supply and persistently rising price, until someone, as in musical chairs, gives up the share that used to be theirs. There are so many contradictions built into the world economy one can only predict we have little time to make some sensible choices or be fresh out of net free resources to change things. This is a very young science, but raises questions seem rather pointed and appropriate. It's based on powerful new techniques using the most well established principle of physics, and should be followed up.

7. Discussion

It's hard to avoid wondering here whether the real reason our cultural believes efficiencies reduce consumption came from how the productivity they allow us is so profitable. How the whole economy behaves is a bit removed from our awareness, but that our employers are constantly prodding us to be more efficient, and promptly pay us more and give us more resources to use if we are, has to be fairly visible to us. It seems clear the intent to use efficiency to reduce impacts, say by improving car mileage, and opposite effect of how our efficiencies at work gives us more resources to use, do not get connected in normal thinking about it. They should, of course, but it is puzzling how very compartmentalized our thinking apparently is. It looks for all the world like most people promoting environmental restraint are ignoring the fairly clear growing environmental impacts of enhancing their own productivity. How does something that obvious really happen?

Could one realistically say the connection wasn't noticed because of being unaware of how to view the economic system as a whole? Complex energy systems, actually, are all designed by their history, growing from small beginnings. So, it's a fair guess that what are now two separated worlds of thought for us developed separately somehow. Perhaps social manners were involved, that is was a matter of public interest what our personal relationship with the environment were but not a subject of public interest what our personal relationships with our employers were. Maybe the two worlds as they grew just drifted apart. It's really not our personal relationships with the environment that caused our exploding impacts, though, and we need to be free to acknowledge all the facts to have a chance of dealing with them.

The original question of science "I wonder how that works?" was quite undefined, and didn't always produce results, but it sometimes did. What we found here, started with there being evidence of two important human languages and ways of defining reality, that seemed completely disconnected. Now it seems we're discovering than living within complex systems naturally results in different views turning into separate realities for us, unless people go to the effort to connect them, through discovering the physical systems they have in common.

After "I wonder how that works?" comes "What can I say with confidence when I realize I don't know much?" For complex systems that starts with locating a boundary for them, and discovering you already know a list of fascinating possibly answerable questions about them, directly from that. Taking the effort to go through the learning process, going back and forth between views of the common subject and languages to describe them raises new questions and new narratives. True exploration is not something that can run on a schedule, but needs different kinds of focus and reflection. There are so many large scale dilemmas building at once on Earth the opportunity for timely response is clearly long past. People could start thinking of it as a physical problem of languages not connecting, not debating but collaborating. Using a physical system model that mainly asks good questions, rather than follow metaphors often telling us to do the wrong thing, engage with others as smoothly as we know how, and at least get somewhere other than backwards.

It's upsetting to recognize that our purposes and methods got so far out of alignment, and we've all been doing it, but it's also good to notice. Being curious about small things that others leave unexplained, and seem to expect you to avoid thinking about too, perhaps, is another part of how this group of problems was discovered. It's really not trouble, but new hope to find them, exposing new understanding of our real choices. We apparently need to loosen our convictions to see how to reshape them to fit a world that seemingly changed shape while we weren't looking. There's no way to know what we'd find, looking for new purpose like that, needing to explore beyond our usual limits. People would just have to just go and look to see what there is to fine. Though it would surely be some trouble, it could really be worth the trouble. If reality truly seems to have these other shapes we've somehow missing seeing before, it might turn out that exploring the gaps in our understand they expose will hold worlds of opportunity. Perhaps they'll including more of the bridges to understanding each other we have long been wanting to find.

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