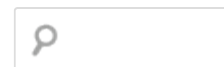




# Surplus Energy Economics

The home of the SEEDS economic model – Tim Morgan



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THE CHALLENGE

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## #250: The Surplus Energy Economy, part 5

### WHAT HAPPENS NEXT?

#### Introduction

Right from the outset, it was likely that the multi-article synopsis of *The Surplus Energy Economy* would extend to a fifth instalment on the subject of ‘what happens next?’

What most of us probably want to know is whether the economy is destined for gradual decline or sudden collapse.

The indications on this issue are contradictory. On the one hand, **the economy** itself is subject to trends which, whilst adverse, are essentially gradual. On the other, **the financial system** has been managed (meaning *mis-managed*) in w

Following

which seem to eliminate any possibility of managed decline.

The plan here is to start by examining, in brief, these two, seemingly-contradictory conditions, and then turn to what some of the implications of this asymmetry might be.

## 1. The material economy

As we know, the economy is a system for the supply of material products and services to the public. The resulting aggregate is calculated by the SEEDS economic model and is known here as *prosperity*. The deduction of necessities supplies a second SEEDS metric known as *PXE* (prosperity excluding essentials).

The economy thus described is a **product of the use of energy**. The vast and complex economy of today can be traced directly to that point in history at which we discovered a means of converting *heat* into *work*. The date usually attached to this discovery is 1776, when James Watt completed the first truly efficient steam engine. This discovery enabled us to harness the vast reserves of energy contained in coal, oil and natural gas.

Quite naturally, we have always accessed lowest-cost resources first, leaving costlier alternatives for later. **This ‘later’ has now arrived.** Over a lengthy period, the fossil fuel energy supplied to the economy has been getting steadily more expensive. The cost referenced here isn’t financial, but energetic – it’s the percentage of accessed energy which, being consumed in the access process, is not available for any other economic purpose.

This ‘consumed in access’ component is known here as the Energy Cost of Energy. All-sources ECoEs are on a long-established and relentless uptrend, having risen from 2% in 1980 to 10% now. You might like to think of this as a five-fold increase in the material cost of energy to the economy. This process is continuing, and ECoEs are likely to reach 13% by 2030, and 17% by 2040.

**No economy, as currently conceived, can cope with these levels of ECoE.** Complex Western economies have been experiencing (though *not admitting to*) deteriorating prosperity since the early 2000s, when ECoEs were between 4.2% (in 2000) and 5.7% (in 2008). Less complex EM (emerging market) economies, by virtue of their lower systemic maintenance costs, are better equipped to cope with rising ECoEs, but their prosperity, too, has started to contract now that ECoEs have reached double digits.

It is widely supposed that we can overcome the effects of deteriorating fossil fuel economics – and simultaneously minimise environmental and ecological harm – by switching to renewable energy sources (REs), principally wind and solar power. These, we are told, can not only support current lifestyles, but deliver “sustainable growth” as well.

This favourable outcome is, in fact, **extremely implausible**, for two main reasons. First, scale expansion of the magnitude required would demand vast quantities of concrete, steel, copper, lithium, cobalt and many other inputs which, even where they do exist in the requisite quantities, could only be accessed and put to use using correspondingly vast amounts of energy. Since this could only come from fossil fuels, there is an ‘umbilical link’

between the ECoEs of renewables and those of fossil fuels.

The second obstacle is even more fundamental. It is that *renewable energy is less dense than fossil fuels*. The economy operates by using energy to convert raw materials into products, a process whose thermal counterpart is the conversion of energy from dense into diffuse forms, the latter being waste heat. The lesser density of renewables lies at the heart of the practical obstacles to transition – these obstacles include conversion efficiency limitations, intermittency, and the problem of storage.

These considerations mean that, whilst a sustainable economy might be *possible*, it would be *smaller than the economy that we have now*. Simply stated, “sustainability” is feasible, but “sustainable growth” is a pipe-dream.

Our problems with adjusting to the practical and psychological challenges of economic contraction are compounded by the problem of *material leverage*. Essentially, the economic resources made available by the use of energy are deployed in three ways. The first of these is the provision of *essentials*. The second and third, which are the residuals in this equation, are *investment* in new and replacement productive capacity, and the provision of *discretionary* (non-essential) products and services to consumers.

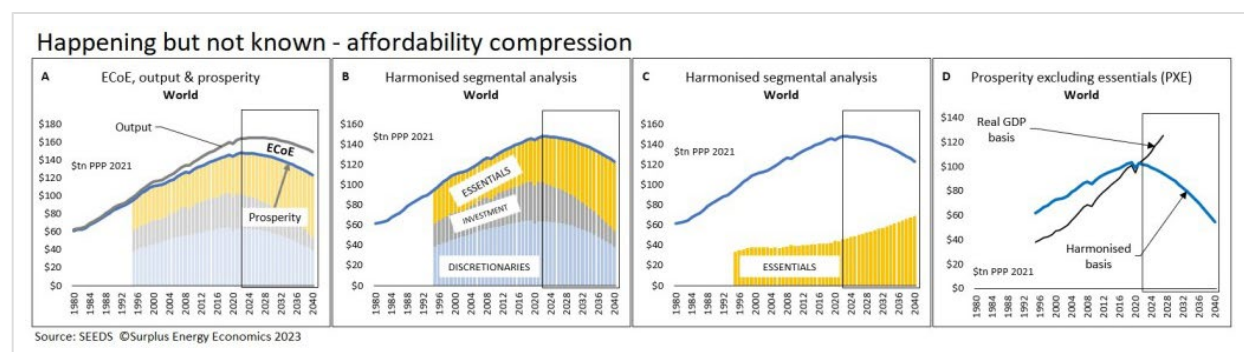
The leverage issue involves the energy-intensive character of essentials. What this means is that, just as prosperity is being driven downwards by rising ECoEs, energy deterioration is driving the real costs of essentials upwards.

These issues are summarised in the charts in **Fig. 16**, which are harmonised and, like all charts shown here, can be opened in another tab for improved visibility.

The first chart (Fig. 16A) shows how energy deterioration is being experienced, not just in output (shown in grey), but also in the ECoE effect on prosperity (blue). The second chart shows segmental allocations between estimated essentials, capital investment and discretionary consumption.

The third and fourth charts illustrate the compression effect created by the simultaneous decline in prosperity *and* rise in the cost of essentials. The purpose of the fourth chart, Fig. 16D, is to compare the SEEDS trajectory for PXE (in blue) with *what you might anticipate* if you relied on orthodox economics and its promise of infinite growth (black).

**Fig. 16**



## 2. The financial impasse

As we have seen, then, the economy **has already entered** a contractionary process, and it's important to emphasise that visible trends in the material economy, whilst adverse, and even daunting, are essentially gradual.

ECoEs haven't jumped from 2% to 10% overnight, but over four decades. Energy supply itself is likely to be driven downwards by deteriorating economics, but – except in certain instances, such as American shales – rates of decline in fossil supply are likely, once again, to be comparatively gradual, and the overall decrease in energy availability can be mitigated, though not reversed, by increases in supply from other sources, including wind, solar, nuclear and hydroelectric power.

There are two problems, though, with any possibility of gradual or *managed* economic decline. One of these is the financial system, and the other is a *collective and absolute refusal* to accept and plan for **any** possibility other than the mythical (and utterly illogical) prospect of 'infinite growth on a finite planet'. These, of course, are flip-sides of the same coin.

We have discussed, in previous articles here, the illogicality of conventional economics, which, by insisting on an entirely *monetary* interpretation of the economy, dismisses any possibility that there might be *material* limits to economic activity. What the orthodoxy is pleased to call the "laws" of economics are, in reality, no more than *behavioural observations* about the human artefact of money, and are in no way analogous to the laws of science.

Despite abundant evidence of economic deceleration, stagnation and contraction, decision-makers *still* put their faith in an orthodoxy that is being disproved by events. There has, indeed, been a **Thirty Years' War** between orthodoxy and experience, and we are entitled to wonder about the sheer tenacity of mistaken theories about the economy. Why, for example, do decision-makers *still* pay heed to this outdated orthodoxy?

There are two answers to this question. First, any orthodox convention that has established itself in systemic thinking can be extremely difficult to dislodge. Second, decision-makers like the orthodoxy because *they like the results that it produces*.

In fairness to political leaders, it has to be said that any authoritative acknowledgement of economic contraction would, *at the very least*, crash the markets. They have good reasons, then, for not talking about economic decline. But they have no excuses whatsoever for failing to plan for it, *or for making the situation worse*. The latter is what they have been doing, and it's important that we trace this process through its grim and depressing history.

This story begins in the 1990s, when the phenomenon of "secular stagnation" – a non-cyclical fall in growth – started to attract attention. We, of course, know that what was happening back then was caused by a relentless rise in ECoEs, but no such explanation was countenanced by an orthodoxy which insisted that all economic developments have monetary causes, and can be tackled using monetary tools. By putting together various things that Adam Smith and John Maynard Keynes hadn't actually said, the chosen 'fix' was credit expansion.

This, of course, didn't work, **because it can't**. Whilst GDP increased by 50% between 1997 and 2007, debt expanded by 77% over this same period. Essentially, each dollar of incremental GDP was being bought with \$2.40 of net new debt, whilst 54% of reported "growth" was the cosmetic effect of credit expansion. This led directly to the global financial crisis (GFC) of 2008-09, an event caused by a combination of breakneck liability expansion and the proliferation of dangerous financial practices.

A case can be made that, under the shot and shell of the GFC, the authorities were justified in using QE, ZIRP and NIRP to steady the ship. These, though, did not turn out to be the "temporary" expedients claimed at the time of their introduction. Even conventional economics would have counselled that negative real rates, reckless credit expansion and the creation of a gigantic "everything bubble" in asset prices could only end badly.

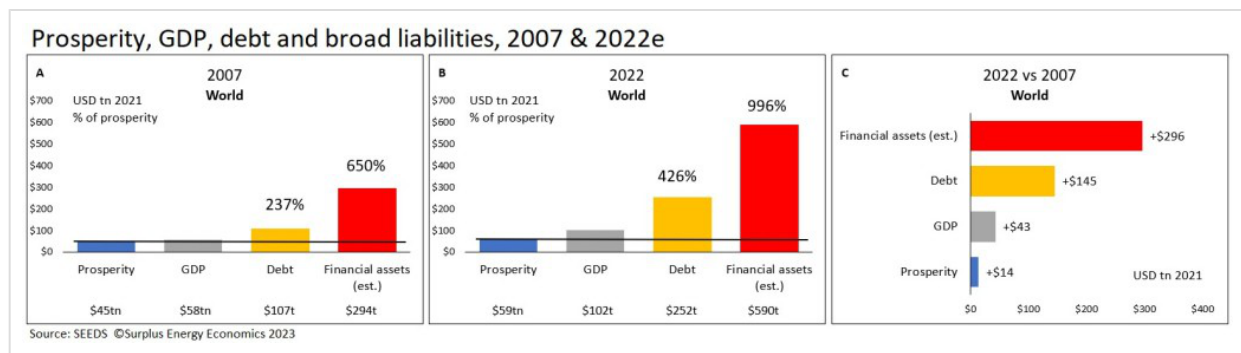
We may never know why 'the powers that be' persisted with these utterly irresponsible practices – perhaps they were enjoying the ride as the financial system careered towards the cliff-edge, and perhaps they believed that people (well, the richest ones) really were getting wealthier as purely paper asset values implied.

The latter, of course, isn't even true, in any lasting sense, because inflated asset values will crash when the "everything bubble" bursts. It has **been reported** that the world's wealthiest 218,000 people lost 10% of their wealth, or \$10 trillion, over the past year, and this may be just a foretaste of what will happen when discretionary sectors start to implode, and defaults start to cascade through the world's ludicrously over-stretched ecosphere of interconnected liabilities.

This time around, the leverage effects have been even worse, with each dollar of "growth" between 2007 and 2021 bought with \$3.60 of borrowed money, and reported "growth" has been even more cosmetic, with fully 64% of it ascribable to credit expansion. More worryingly still, broad liability expansion averaged an estimated \$7 for each dollar of "growth" between 2007 and 2021. Much of this can be ascribed to the non-bank financial intermediary (NBFI) or "shadow banking" sector, which is very largely unregulated.

The final chart in this five-part series, **Fig. 17**, endeavours to put this into context by comparing output, debt and estimated broad liability data stated at constant dollar values. Estimated broad liabilities now stand at almost 10X prosperity, and even this doesn't include enormous "gaps" that have emerged in the adequacy of pension provision.

**Fig. 17**



### 3. So what next?

On the basis of what we know, we have strong reasons to fear that the realities of economic contraction will continue to be ignored and that, in consequence, any lingering possibility of managed retreat will be rejected.

At present, central banks are showing a commitment to taming the inflation that their own policies have created. They have, thus far, shown no inclination towards the “pivot” that many are urging upon them. The best near-term expectation is that current monetary and fiscal policies will continue **until the reality of fracture becomes undeniable**.

We can, in the meantime, attach high levels of probability to two processes. One of these is contraction in discretionary sectors, and the other is cascading defaults, commencing at the outer perimeters of the financial system and then travelling inwards towards the regulated banking sector.

A personal view is that the authorities will find themselves forced into trying to counter these trends by a reversion to expansionary monetary policies. Despite the very real downwards pressures created by economic contraction, it’s likelier that we face an inflationary rather than – or rather, *as well as* – a hard default resolution to over-inflated capital markets and ludicrously unsupportable levels of liabilities.

These, of course, are purely *economic and financial* trends, and I’m sure that readers will have their own views on the broader implications between economic decline and financial chaos.

Before handing this over to readers for comment, it’s worth asking ourselves what is the worst thing that can happen, *in economic terms*, in this kind of nightmare scenario. The answer would seem to be the destruction of the purchasing power of money. We may, then, find ourselves needing to find a new medium of exchange. That could be one of the most difficult tasks that we have ever been compelled to undertake – and we’re likely to find ourselves tackling it under very chaotic conditions.

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