

From: [Monica Zazueta](#)
To: [Jenna Kay](#)
Subject: Steve Keen: "On the Origins of Energy Blindness" | The Great Simplification 1 hour 32 minute video <https://youtu.be/lrMWSkzrMYg?si=P8AxGIsI3zw7gCe8>
Date: Saturday, February 17, 2024 2:47:18 PM

THE TRUTH ABOUT ENERGY

The basic truth is that the output is fundamentally energy transformed into a useful form. If you take a look at the rate of growth of energy, in the rate of change of energy, and the rate of change of GDP at the global level, you find a correlation coefficient for them of 0.7 roughly, and the relationship between change in GDP and change in energy is change in GDP is 0.97 times change in energy.

So, in other words, fundamentally what GDP is, is energy transformed into useful work.

Nate:

And so the core flawed assumption, which has built upon some basic flawed assumptions, and changed over centuries. It's almost like there's been a supernova the last two centuries of energy use, and wealth and productivity, and people are just trying to scramble in real time putting math equations on that, and increasingly divorced from the truth, because the supernova keeps growing. And so, the energy blindness is that adding more energy, particularly energy dense fossil energy to the whole thing every year, that itself, that little addition of more energy, is a big explainer of our productivity.

Steve:

It's the fundamental explainer, and therefore what we've really done over time is developed machines which can handle more and more energy, more and more precisely. That's where our wealth has come from. And economists have been blind to that by having this, first of all, introduction by Adam Smith to throw out the physiocrats and say, "Labor's the source of value." And then you have the neoclassical saying, "It's labor and capital." Then you had Cobb and Douglas saying, "It's 0.7 and 0.3," which means that the contribution of labor to change in output is 70%, and the contribution of capital is 30%. That then gets locked in by Solow, to turning their empirical non-discovery into an assumption, and then putting it all in technological change which becomes disembodied from capital itself, but also hides them from the fact that the relationship doesn't hold up on the data anymore anyway. And now, when they come bring energy, they just tack it on as a third factor and give it a coefficient based on the percentage of energy in GDP, which is trivially low, and therefore say energy has almost no role in production, which is complete bollocks.

Nate:

And part of the reason is, that the energy input into our machines, and into our economy, is only the cost of energy that it is to extract, plus a little profit for the oil company or whatever. It's not the value that it provides, which is four, five years of my physical labor.

Steve:

In each barrel of oil.

Nate:

Yeah. Seriously, this is Nobel Prize sort of observation, I think, because it's so decoupled from what people say at high positions of authority in our world.

A MESSAGE TO YOUNG ECONOMISTS

Nate:

Anyone listening to this who has a Ph.D. in economics, or maybe someone who's in grad school getting a master's or a PhD in economics, listening to this program, is their initial reaction going to be one of critical rejection, "Steve doesn't know what he's talking about?"

Steve:

Oh, yeah, absolutely.

Nate:

Because it affects their identity, or because they know otherwise in their research?

Steve:

It affects their identity. A younger one might actually go, "Oh, hang on, that's surprising." You'll get a few who might react that way and change, but the old ones are locked in their ways.

Nate:

Okay, so speak to the young ones right now. If they're curious about this, and something doesn't sit right with what they've been told, and what they've just heard, what would you recommend that they do to get clarity on the truth?

Steve:

The main thing is to realize that economics can't be derived from the laws of thermodynamics, but it can't be inconsistent with them either. And what you are being taught, with your production functions and so on, is leaving out the role of energy in an absolutely critical way. Now, if you go and want to do it empirically, you go and take a look at what is the relationship between energy and production, drive it empirically, and you'll find that it's somewhere in GDP, is 0.7 to 8.9597 as I've got in that particular Excel regression of the value of change in GDP. So the fundamental insight from a thermodynamical point of view within economics is that the first approximation, GDP is energy turned into useful work. And then that means that the whole argument you were taught in neoclassical economics that, "The wage reflects the marginal of product of labor," is completely wrong. The wage and the return to capital for that matter, have nothing to do with their contribution to production. What labor and capital do, is harness energy successfully in factories, to produce output. And that will normally be done with machines. The machines have very fixed ratios of per workers, per machine, and energy throughput per machine. So fundamentally, you get a fixed ratio. And that sense, the Leontief as an empirical observation, we now have an explanation for. That explanation is that the Leontief production function is actually, "Output is equal to machinery, multiplied by the efficiency with which machines turn energy into useful work."

Nate:

Neoclassical economists, back when I was in school, are among the smartest people in my class. And smart people can be fooled, but they're not dumb. So really, it still today boggles my mind how neoclassical economists can totally neglect energy, given anyone with three minutes on the internet, can find that a barrel of oil has 5.7 million BTUs in it, which is a lot of energy, relative to the 0.6 kilowatt hours that I do per day. So do they really think this?

Steve:

They really do. And the trouble is, this is where your mind gets set by your training. So, if you get trained on the idea that production is a combination of technology, labor, and capital, and energy doesn't even turn up there, you don't even think about energy, and you can be completely energy blind in the sense that I lead that book with, that humans know as much about energy as fish do about water. They simply take it for granted. And then you see this when neoclassicals actually come to pose themselves the question of, "What is the role of energy in production?" So this is again, this is from the paper by Bachmann and Co. about the impact of the loss of Russian energy on German output. And they to take the Cobb-Douglas production function and differentiate it with respect to the inputs, and then we can say what's going to happen to GDP from a change in energy, and here's a quote from the paper. "Therefore, for example, a drop in energy supply of minus 10%, reduces production by 0.4%, which shows that production is quite insensitive to energy as expected."

Production is quite insensitive to energy as expected by neoclassical economists.

Nate:

It's a tautology of sorts.

Steve:

It's a tautology. They think that energy has a trivial role because it has no role in their production function.

Nate:

Why aren't there people calling them on this like a prime minister, or a senator, or a CEO..

Steve:

Well, I am.

They all do one unit of economics. They all get the idea of labor and capital producing output and the production function if they go that detailed in first year. But fundamentally, they get taught the whole idea that we get paid our factor products. And that actually ideologically is very reinforcing for a CEO, because it says, "My enormous weight per salary, is because of my huge contribution to production." So it ends up having an ideological role, and that blinds them to the physical reality that you simply don't have that impact on production. If you come down to the nuts and bolts of it, it's energy which is producing the output and you are getting a share of it, an overblown share given your system and the power structure of capitalism.

Nate:

So if we truly defined energy correctly in the production function, that giant gift from nature might not all be funneled to the top the way it is now.

Steve:

And that, of course, leads to one of the reasons why people continue being energy blind because it enables them to be blind to their outsized share of the wealth of the civilization that goes their way.

Nate:

And also continues to indicate why we're blind to the waste component as well. Because if you include that, that reduces.

Steve:

Yeah. The other side of the production function is waste. And when I do the Leontief function, which makes sense. So with the logical reinterpretation of the empirical regularity of Leontief, that output is capital divided by capital output ratio, becoming output is capital times the efficiency with which machines turn energy into useful work. That coefficient is going to be less than 0.5, substantially less than 0.5. So it means most of what we produce is waste energy. They can quantify it and say, "If the efficiency with which machines turn energy used for work is about roughly 0.2 or 0.25, then 0.8 to 0.75 of energy input produces waste." And that's what we dump into the environment. And that, of course, feeds back and damages our capacity to produce output. If we had that insight 50 or 60 years ago, we would never have got to the conundrum we are in now of relying so much upon fossil fuel energy for our production today.

Steve Keen: "On the Origins of Energy Blindness" | The Great Simplification
1 hour 32 minute video

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~You must always be willing to truly consider evidence that contradicts your beliefs, and admit the possibility you may be wrong. Intelligence isn't knowing everything, it's the ability to challenge everything you know. Let's all give up our fear as a justification for not to take action because we are the creators of our reality.

Sending healing vibes
Monica Zazueta
Concerned Mum

360-723-7707

Sharing energy,

1.

Doughnut Economics 7 Ways to Think Like a 21st Century Economist
by Kate Raworth

Free digital copy of the book,

<https://fenix.tecnico.ulisboa.pt/downloadFile/845043405579281/Raworth%20%282017%29%20Doughnut%20Economics.pdf>

2.

29 minute video explaining Doughnut Economics

"How radical ideas can turn into transformative practice. Stockholm impact week 2023"

<https://youtu.be/qwyzsAWRMcw?si=Hut8czYBLqAjOBpb>

3.

Nate Hagens: "Episode 100 - The Great Simplification"

<https://youtu.be/GocuMZX3hIs?si=impadsCjN-aGZzk0>

On Fri, Feb 16, 2024, 5:49 PM Jenna Kay <Jenna.Kay@clark.wa.gov> wrote:

Thank you!

From: Monica Zazueta <zazuetamonica0813@gmail.com>
Sent: Friday, February 16, 2024 5:41 PM
To: Jenna Kay <Jenna.Kay@clark.wa.gov>
Subject: Re: The Doughnut for Urban Development - A Manual (1).pdf

EXTERNAL: This email originated from outside of Clark County. Do not click links or open attachments unless you recognize the sender and know the content is safe.

I'm not sure if the PDF went through so here is a link to the toolkit on the website,

<https://doughnuteconomics.org/tools/235>

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On Fri, Feb 16, 2024, 5:37 PM Monica Zazueta <zazueta_monica0813@gmail.com> wrote:

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