Heun Review of old Chapter 2 now 3

IN your list of symbols R and S are given as mass but often used (I think) as energy flow ..please make sure OK

P. 22 In Chapter 1, we put forward the idea that economies are like organisms, using energy derived from outside the system to construct, maintain and grow the system itself. This chapter…

Building, as we introduced in chapter one and use in other chapters, from a one-sector economy up to examples of both two- and three-sector economies.

??add at end of first para in 2.1 “..throughout this book.” On a more philosophical front, a biophysical theory is desirable because it starts from an energetics basis and unites economics with the natural sciences.

2.11

and the time derivative d/dt , or the dot over a)

as waste (in the apple core or garbage)

where are green lines in figure 2.1 OR ITS LEGEND??? Maybe black lines??? No that is capital goods.

Maybe you need to say that energy is not represented but accompanies all flows or something??

What us stored in birdcage symbol? Explain in legend OK iguess in next paragraph. Green ine is confusing in legend)

P 26 the resource inflow (crude oil) is literally embodied<< no,except for processing energy, it is contained in the chemical bonds …. within the out-flowing

Likewise as coal – it is indeed embodied in electricity but not contained --embodied means used in past to build, as Marx’s embodied labor in a chair

P 27 the resource inflow (crude oil) is literally embodied CONTAINED within the out-flowing IT IS EMBODIED

since the coal is not physically contained [NO >> embodied] in the electricity and leaves the economy (in the form of carbon dioxide

and ash) as part of flow S˙ 10. Some of the coal is destined for metallurgical processes

because the carbon in the coal ends up physically [NO ….Yes>>] embodied within the steel in flow ˙P1

\*\*\*\*\*\*\*\*2.26 I Like this kind of explanation of final equations as you do here: GOOD!!!! Do more of???

“ Equation 2.26 tells us that depletion of natural resources

\_

􀀀

dR0

dt

\_

are used within society in order to:

\_ build up societal capital stock

\_ dK1

dt

\_

,

\_ provide short-lived goods and energy to run society (S˙ 11), and

\_ overcome depreciation (K1K1). “

p. 32 I assume you got all your math/subscripts right

Fig 2.4 As I have said before I like the energy symbol to the left most, but probably too late for that…;

2.5 Materials in the US auto industry

“ Throughout the book, we shall be applying the methodology that has been outlined

through the examples to the real-world case of the US auto industry.” AGAIN PLEASE MAKE THE CASE, (IF TRUE THAT YOU ARE USING THE AUTO INDUSTRY FOR AN EXAMPLE BECAUSE YOU HAVE THE (approximate) DATA FOR IT. DO YOU? DO YOU HAVE I-O DATA WHY DO YOU HAVE THE DATA FOR THAT INDUSTRY? IF NOT WHY DO YOU USE THIS INDUSTRY?

I GUES S YOU TRY TO ANSWER THAT QUESTION IN THE NEXT FEW PARAGRAPHS BUT IT SEEMS TO ME THAT YOU DANCE AROUND IT – CAN YOU/DID YOU DERIVE THEM ATERIAL FLOWS FROM MONETARY FLOWS OR NOT? WHAT DID YOU DO WITH THE EUROPEAN DATA? Or ARE YOU TALKING BOUT WHAT MIGHT BE DONE. VERY FRUSTRATING.

“We categorized the types of materials used to produce

automobiles, but found that industry-level data are difficult to obtain.” So did you in chapters three and four? Can you say that despite these difficulties we made a first approximation in chapters three and four? Or what? This would help to tie the book together very much. We need less ass covering and more directional charge.

“

HEUN Review of chapters 3-9

Need to reset chapter numbers….

p.n48 We begin by noting that direct energy travels with material through an economy (and opposite to money flow).

XX Fig. 3.1 Energy content (˙E ) of material flows (˙R, ˙ S , and ˙K) from Figure 2.1. Where is energy itself? No green lines. Tht has to be most of these flows. And the rest? So the direct energy in capital goods might be the combustable energy in , say, a wooden desk (a piece of capital equipment)? I think you need to make it very clear what you mean with examples. Would this be the energy in the input of e.g. forest products?

Xx Maybe say direct energy flows ignored for moment? But that does not make sense either. Figure 3.2 clarifies things a little maybe,

Fig. 3.1 Energy content (˙E ) of material flows (˙R, ˙ S , and ˙K) from Figure 2.1.

Add (Energy flow symbols from Howard Odum).

49 the direct energy associated WITH flows of steel

xxFig 3,3 Green line barely shows up. Can you make it thicker??

EQU. 3.4 WHERE IS FLOW 01 ON DIAGRAM?

LIKEWISE e1 FROM BIOSPERE???

Note that ˙E 1 is the gross direct energy production rate of society. For example,

firms extract crude oil (a component of ˙E01) and refine it into petroleum products (a

component of ˙E1) that are consumed by society. The direct energy consumption of

extraction and refining firms is a component of ˙E11 ??All this needs to be made clearer relative to diagram

Eq 3.11 ref 3 EROI should not be attributed to Ayers but Hall (e.g.1986)

Fig 3.5 Energy module should be moved to LEFT of goods and services as it must come first

(OK chicken and egg, but conceptually)

The First Law of Thermodynamics around APPLIED TO ? the biosphere (0)

The First Law around APPLIED TO the goods and services sector (3) i

Table 3.1 Can you add in KJ for each component??? As a separate column?

Chpt 4

xx Chapter 4

Embodied energy flows I think this should be:

Chapter 4

Embodied anhd total energy flows I was confused by the T in e.g. figure 4.2 & 4.3

In Chapter 3, the First Law of Thermodynamics accounted direct energy (˙E ) flowing

among sectors of an economy. In this chapter, we will adapt the First Law to account

FOR THE embodied energy in the material flows of an economy.1

p. 58 Total energy (T) is defined as the sum of direct energy (E, see Chapter 3) and embodied

energy (B).DEFINE EMBODIED ENERGY

xx again energy flow is defined as a green line here but you do not use it, confuisng me considerably

59 bottom: waste heat is ignored when accounting for total energy ????? It is in equations

60

The final term ( ˙Qout) is a proxy for all direct energy (˙E) consumed (i.e. turned into heat)

within the sector.

Fig. 4.2 Total energy flows (T˙ ) in a one-sector economy.(see fig 3.3 ).

dBK;1

dt = ˙B11 􀀀 ˙B1 􀀀 ˙B10 + ˙Q10: (4.21)

>>>>>Add In words this say that the change in the embodied energy etc etcc I think o be perf3ectly clear you should give the final equation in words each time !!!!!!!!!!!!!!

p. 64 The term ˙B10 in Equation 4.21 represents the disposal rate of embodied energy from

Society (1) to the Biosphere (0). (i.e. dumps etc). …depreciated physical <<<<assets.

Fig 4.4 see comment fig 3.5

Chpt 5

Could say “The monetary flow is an easy and logical (if hardly perfect ) l proxy for the value of the material and energy flows. At least most ordinary humans accept that as fo we for this chapter”

Fig. 5.1 Flows of value (˙X ) for a single sector. The value flows are associated with each of the

dfferent material and energy flows outlined in previous chapters. ----------I do not see a green flow

Why are the/re not dashed lines indicating money (value) ??? How are we connecting to title of chapter???

Fig. 5.1 Flows of value (˙X ) for a single sector. The value flows are associated with each of the

diferent material and energy flows outlined in previous chapters. ??? is value flowing in opposite direction?? Maybe say : in fact the money flows in the opposite direction as the material/energy.

xxFig. 5.2 Aggregated flows of value (˙X ) for a single sector. Distinction is made between value

flows that enter the sector and are accumulated (i.e. capital goods) and value flows that are not

accumulated. Within the sector there is destruction of value ˙Xdest, represented by the downward

arrow flowing into the black sink and generation of value, represented by the arrow flowing out of

a source. >>>>In general the value is increased by processing within each sector of the economy as work is done on raw materials and intermediate goods .

The contrast between THE BIOPHYSICAL REAL) FLOWS OF Figures 2.2 and 3.3, on the one hand, and THE USUAL ECONOMIST’S DEPICTION OF Figure 5.3, on the other, is striking <<<<<<<NOTE HOW I AM TRYING TO HIT THE READER OVER THE HEAD …

Fig. 5.3 Flows of value (˙X) for a one-sector economy. <<<NOW IS ThIS THE ECONOMISTS VIEW?? (yes) Or what? Link with what comes before

The next 2? sections are representing the economists’ view of value. Be explicit when you are representing economists when your biophysical perspective

5.2.2 Value generation INCLUDING BIOPHYSICAL INPUTS (˙Xgen) <<TELL THE READER YOU ARE SHIFTING PERSPECTIVES…

Fig. 5.4 Flows of ??BIOPHYSICAL?? value (˙X) within a two-sector economy. AGAIN I AM CONFUSED. THE RROWS ARE SHOWING THE FLOW OF BIOPHYSICAL VALUE (UPGRADED STUFF) BUT THE FLOW OF M0NEY IS OPPOSITE. (DOTTED LINES). YET YOU SAID YOU WERE VALUING VALUE IN MONEY, WHICH YOU ASRE NOT SHOWING FLOWING. MAYBE IT’S THE FLOW OF BIOPHYSICAL VALUE….ALSO FIG 5.5

5.5 Value in the US auto industry

To estimate value flows through the automobile industry (ONE OF THE FEW SECTORS OF THE US ECONOMY WITH N ADEQUATE DATA BASE) , we use publicly..

Xx Page 82 “To estimate value flows through the automobile industry, we use publicly available

data from the US Bureau of Economic Analysis (BEA).3 The tables needed

to estimate dynamic value flows and capital accumulation within the economy are

primarily the KLEMS4 Intermediate Use tables and the Fixed Asset, non-residential

detail, table. The KLEMS data tables are based on the Input-Output Tables (I-O),

but are at a lower level of aggregation and the inputs are categorized into three broad

types: Energy, Materials, and Services.” <<< I have been looking for something like this in ev3ry chpter …it should come much sooner ..

It would be interesting to have all flows as (embodied, direct) energies too. Could use 7 MJ/$ (national average ) for a real quick and dirty assessment

p. 92

xx6.5 Energy intensity of the US auto industry <<isn’t it value flow in US auto industry??

Define KLEMS and PERKS

From fig 5.6 I see you are using dollars to represent the biophysical flows…. You are measuring the value of the biophysical flow in dollars

Chapter 6

such that for sector j, (such as tires??)

Define R, S and K after eq. 6.4 as some readers will have forgotten

T jk = "jajk˙Xk: (6.5) : likewise, please define terms first time used in chapter

I guess you Can find each .. I stlill like lots of definitions….

WE ASSUME all goods produced by a sector are produced at the

average energy intensity of that sector.

T jk = "jajk˙Xk: (6.5)

Now give as words

Likewise give eq, 6.11 and 6. 12 in words … I don’t know if you agree but I much prefer to give final equations in words as well as symbols …then you know you are conveying correct info to everyone

Equations 6.15 and 6.16 can be rewritten in vector notation as

8>>><>>>: <<<<Explain why we want to do this and what it means …

Is B embodied anery as before? I assume so . We (you) really need a glossary at beginning of book

with the “Kronecker delta” …explain

YOU ARE WRITING FOR ENGINEERS, NOT MORTALS!!!!!!!!!!! I ASSUME ALL YOUR MATH/NOTATION IS CORRECT !

extension of the algebraic form of the energy intensity equation.

Equation 6.37 provides a means to estimate energy intensity (") of the sectors of

the economy, under the assumption that final consumption (Sector 1) is exogenous

to the economy (Sectors 2: : :n).

BUT WE DO NOT HAVE THE DATA SINCE 1977……….????????? Are you saying that you have th I-O data for the auto industry???

Chapter7

I think you need more of an introduction:

Something like “ In economics the Leontief Input-Output (I-O) method is an approach that allows for the investigation of the economic interdependency o the economy, that is how much economic activity in each main sector of the economy is used to generate a “final demand” product. Energy analysts have extended the method for energy analysis to estimate the energy intensity of economic products,including the energy required “upstream” in the whole economy for their manufacture . “

I think you need to explain why these two different approaches exist: not just how you deal with them .

Let me try:

Two different approaches exist for calculating the energy intensity of ?intermediate and final demand? Economic products: “product based” and “physical accounting”. The first was developed by xxxx Hannon??? in order to yyyy and the second later by ……… frameworks, whether capital stock is included in the

accounting framework, and whether energy input from society to the economy is

included. (See Figure 7.1.)We will end with our suggestion for how best to estimate

" within a materials, energy, and value accounting system.

99

I think then it will all seem less arbitrary

P 101 “because

product-focused accounting systems assign energy embodied in wastes to products ” ???IN fact the diference in method makes relatively little difference in he energy inensity of products. “ ???

p. 102 Bullard and Herendeen [4], following Kirkpatrick [3], added flows of capital

as inputs to each sector [4, Figure 5], and, in so doing, changed Equation 7.5 to

Equation 7.6:103 They assumed INSTEAD that half of the incoming capital went toward replacement

103 -106 I am impressed at how sophisticated the math is compared to the available data! Will we ever get there?

Hence:

redefinition of A and " to include embodied energy on inflows of material, and

\_ use of Equation 7.20 instead of Equations 7.5 or 7.6 for estimating energy intensity

(") of economic sectors within an economy. ADD>>>of course the inclusion or exclusion of any of these flows into our analysis is much less important than the implementation of any such method, which requires an understanding of the importance of undertaking such analyses for good future economic and energy analysis. [Since we are undertaking no such analyses now, at least in US, seems like you need to make a case for doing it…..]

p. 108

Viewing these dimensions through the lens of our framework illustrates

some important points about measures of economic growth and well-being. Which are 1) 2)

7.3 Implications for recycling, reuse, and dematerialization

All of this seems good to try to show the importance of the analyses, should we ever be able to really implement them!

Good to touch on population growth, distribution.

Conclusions seem to be sort of obvious at least based on others who have come to the same conclusions (e.g. Brian Czeck) from a far less sophisticated analysis. You might at least point out that your very sophisticated analysis is consistent with other such analyses.

We found that there are many potential definitions of a

steady-state economy, none of which are fully satisfying when compared against the

ideal of sustainability. -----🡪 so? Can your approach resolve this? You leave us hanging.