

The Economics of Renewable Energy

- an opportunity cost too far?

Brian P Woods BSc, MSc, BA, MSc (politics)

this presentation is dedicated to the memories of :-

Nicholas Georgescu-Roegen (1906 - 1994)

and,

Albert Allen Bartlett (1923 - 2013)

I shall discuss (briefly) three topics ...

1: some practical basics of economic policy decision making ...

2: the nature of the Rate-of-Growth, hegemonic economic paradigm ...

3: some neglected issues of economic growth theory ...

-these three topics will be discussed within the general framework of our ongoing political campaign to increase our use of wind-generation and reduce our economic dependence on carbonaceous fossil fuels

Part 1: some political science basics of economic policy making

there is a tri-angular relationship between 'ideas', 'intentions' and 'organizations' ...

our 'organizations' are legacy bound - and have structures and operational modes congruent with our hegemonic, economic paradigm which they support, promote and maintain ...

our organizations will only 'accept' and 'process' those 'ideas' that are congruent with the 'intentions' of the 'agents' who currently populate the organizations ...

agents' ideas about economic outcomes shape their intentions and their intentions shape the outcomes - hence economic outcomes will be a function of economic ideas ...

economic policy is (normally) made under conditions of 'uncertainty as risk' - the situation is known, understood, hence the probability of known outcomes may be estimated - uncertainty is reducible ...

'idea' - reduce our dependency on carbonaceous fossil fuels - "They're dirty!"

'intention' - build-out our wind-generating capacity - "Its clean!" ...

'organizational response' - "Great idea and intention - but we need to 'incentivize'" ...

-why - are there investment constraints? - what is the level of investment by the producer? how is 'investment' being funded?

-what proportion of the overall investment is by way of fiscal assistance? is this from tax revenues or from borrowings? - are all the costings published?

-the opportunity costs? - might conservation protocols and voluntary reductions be a more efficient, long-term economic proposition?

-who 'pays' for all this? - at what cost might consumers balk - and reduce demand?

however, our fossil energy mitigation policy is made under conditions of 'Knightian uncertainty' - that is, the overall situation is highly complex, not fully understood, and is 'in a high degree, unique' - policy mistakes are inevitable ...

-wind-generation requires a non-reducible minimum of oil - so how secure is that supply?

-wind-generated energy is intermittent - its reliably un-reliable - what's the 'backup'?

-if we 'need' N turbines to satisfy our intended capacity replacement - how many more turbines might we need if we insist on 'growing' our economy - at an exponential rate?

-what are the economic costs associated with maintenance, repairs, renewals?

-at what point might environmental and fiscal constraints prevent the construction of additional turbines?

Part 2: *Permagrowth* - our hegemonic, economic paradigm

- the Rate-of-Growth $\frac{\partial Y}{\partial t}$ economic growth paradigm, is an exponential, continuously compounding rate of economic activity ... like compounding interest!
- so when we use the term 'growth' - as in economic growth, do we understand it to mean - linear function - as in plant growth?, or ...
- exponential function - as in bacterial growth?

Is this obvious mathematical difference actually obvious when you hear or see the term 'growth' being used?

Permagrowth, our hegemonic, economic paradigm ...

-consumes raw materials and energy sources in an exponential manner ...

-is now 17 years into its 7th, 23-year doubling-time iteration ...

-its major nutrients, carbonaceous fossil fuels and fiat credit are - inexpensive? accessible?

-its long-term rate-of-growth is in decline, from 3% toward 1% - political implications of this?

-its major economic effluent, debt, is increasing exponentially - is demand affected? ...

-so, "Lets increase the amount of fiat credit - that'll stimulate demand!" Duh!

Part 3: neglected issues of economic growth theory

economic growth models use assumptions that do not acknowledge that ...

- the Rate-of-Growth paradigm is an exponential function ...
- the Rate-of-Growth paradigm occurs in a finite physical system ...
- the Rate-of-Growth paradigm consumes finite resources ...
- oil, an economically essential carbonaceous fossil fuel, has no economic substitute ...
- the Thermodynamic Laws impose absolute constraints on the generation and use of economic motive power ...

The Thermodynamic Laws - are not acknowledged by economic growth models

- these three laws set absolute limits on the performance of any power generating (or consuming) technology ...
- there are critical interface points where these laws interdict economic activity ...
- 1: the generation of electric and motive power from a raw energy source ...
- 2: the consumption of electric and motive power to drive economic 'growth' ...
- 3: 'frictional' losses within energy transmission networks ...
- in summary: energy losses* are high - hence, economic efficiency is reduced ...
- * no energy is ever actually lost - it simply dissipates into an un-recoverable, low-level state

finally, what's the take-away here?

- economic policy making in respect of wind-generation is occurring within a 'closed-loop' organizational structure - but, in an uncertain and complex situation ...
- the hegemonic Rate-of-Growth economic paradigm is not physically sustainable ...
- contemporary economic growth models fail to incorporate key factors which exert direct and negative impacts, on economic activity...

"Thanks and appreciation to the DEW 2014 organizers!"