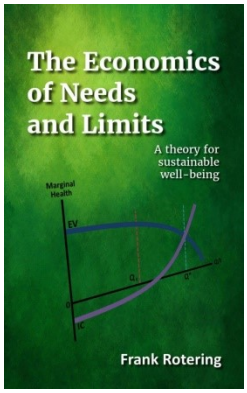


An Introduction to The Economics of Needs and Limits (ENL)

Revision: April/2019

All complex economies are guided by an *economic logic* that determines the economy's main outcomes. These include the types and quantities of its outputs, the associated flows of resources and wastes, the resulting habitat destruction, and the population level. Capitalism is guided by an economic logic that rapidly increases the economy's output rate and ignores natural limits. Because the result is ecocidal expansion, I have developed a sustainable alternative called the Economics of Needs and Limits, or ENL.

ENL is an analytical framework based on the following ethical principle: *all human beings, present and future, are of high and equal worth*. As explained further below, this means that people within the geographical scope of analysis (either a specific region or the globe as a whole) are treated equitably with respect to the distribution of outputs, labor, and wastes.

The assertion that all human beings are of high worth implies that their well-being should be maximized. The assertion that they are of equal worth implies that the economy should be equitable, as just noted. And the fact that these assertions apply to both present and future humankind implies that the biosphere should be protected for the well-being of our descendants.

These three implications – maximum well-being, economic equity, and environmental sustainability – are collectively called *sustainable well-being.* This is the goal of an ENL-guided economy, which is intended to supersede today's capitalist economies.

ENL is fully described in my book *The Economics of Needs and Limits*. A free PDF version of this book is available here. A broad overview of ENL is available here. The present document is an extended introduction.

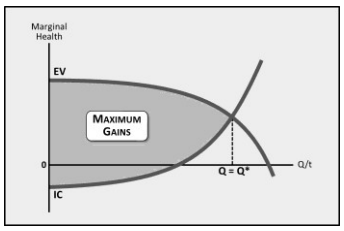
PRELIMINARY COMMENTS

ENL is an independent framework that permits analysts to establish rational economic objectives based on the goal of sustainable well-being. It is independent in the sense that it is rooted in the core realities of humankind and nature, and therefore has no ties to a specific economic system such as capitalism. If a similar framework had been developed earlier in history, it could have guided human economies for hundreds or even thousands of years.

A framework such as ENL is indispensable for the development of a sustainable economy because it provides a firm conceptual foundation for the required economic transformation. Numerous thinkers, such as John Ruskin and E.F. Schumacher, have given us useful insights and nuggets of wisdom about rational economic guidance. ENL goes further by giving such contributions formal expression so they can be rigorously developed and effectively applied.

ENL is not intended to replace economic thought as a whole. It is exclusively a *guiding framework*. The framework allows analysts to establish rational objectives, but it says nothing about an economy's detailed operations. Another mode of economic thought, called a *functional framework*, must be employed for this purpose.

Please note that graphs provided are for example purposes only.
Additional graphs and detailed descriptions are available in the published book.



ENL Production Decisions

Once the economy is no longer guided by capitalist logic, society will require a rational method for determining which outputs, and how much of each output, to produce. Rationality in ENL is tied to sustainable well-being, so the question becomes: which outputs, at what quantities, will equitably maximize well-being while respecting environmental constraints? This question has several elements and cannot be answered in a single step, but at its core is the notion of well-being. How is this term defined?

Well-being in ENL is a combination of two components: a human being's objective state, as measured by physical health, and the satisfaction of subjective but unmanipulated desires. Well-being must have an objective side so that analysts can empirically gauge the economy's performance in meeting people's shared requirements. It must also have a subjective side so that people can satisfy their individual preferences for entertainment, fun, pleasure, and the like.

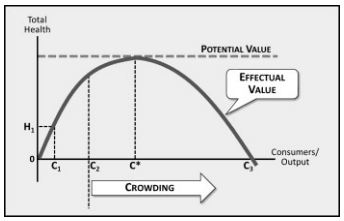
Corresponding to this definition, production decisions are made in two stages. The first is to determine which outputs and quantities will best meet a society's health requirements. The second stage is to decide which outputs and quantities will satisfy their preferences. ENL supports the first stage through the concepts of value and cost, and through several analytical tools. It supports the second stage by providing guidelines for social decisions about the satisfaction of subjective desires.

ENL employs a considerable number of new terms, including several that permit unambiguous discussion about production decisions and related issues. When such terms are defined, they are printed in ***bold italics***.

Two basic terms, which reflect the two-sided nature of production decisions, are needs and wants. A ***need*** is a consumption desire that increases health when it is satisfied. When you eat bread, stay warm in a house, or protect your feet with shoes, you are meeting your needs. This concept is used to address the objective side of well-being. A ***want*** is any consumption desire that does not significantly increase health when it is satisfied. When you watch a movie, take a plane to a vacation spot, or drink beer, you are satisfying your wants. This concept is used to address the subjective side of well-being.

A fundamental distinction between needs and wants is that need satisfaction is inherently limited by the health capacity of the human body, whereas want satisfaction is limited only by desires and imagination. Wants, in other words, are potentially limitless, and an economy that strives for sustainability must treat them with extreme care. For this reason, ENL distinguishes between authorized wants, which are those that society has decided to satisfy, and unauthorized wants, which society has decided to reject.

For the remainder of this introduction I will largely ignore wants in order to focus on the heart of ENL's analysis – meeting humankind's economic needs in a sustainable and equitable manner. For the sake of simplicity I will also ignore the distinction between final outputs, which are directly consumed, and intermediate outputs, which are used in the production of final outputs. The term "outputs" below thus refers to final outputs alone.



ENL VALUE CONCEPTS

There are two types of value in economic thought: exchange-value and use-value. Exchange-value, which is closely related to price, is necessary to understand how an economy operates. It is therefore a key component of a functional framework such as standard economics or Marx's explanatory model for capitalism. Because ENL is exclusively a guiding framework, it does not require this concept and employs use-value alone.

Use-value, or utility, is the usefulness of an object or service to human beings, where "usefulness" is broadly construed. An apple, a bicycle, and a pop song all have use-value: the apple because it provides nourishment, the bicycle because it provides transportation, and the pop song because it provides entertainment. However, a critical distinction must be made between an output's potential benefits and the actual benefits achieved in consumption. For example, the production of a bicycle creates a potential means of transportation, but if it is destroyed soon after it leaves the factory, or if it is left unused in a garage, this potential will not be realized.

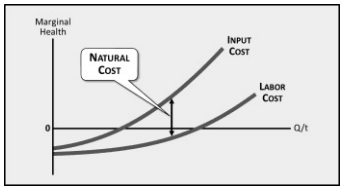
The first thinker to carefully consider this distinction was John Ruskin. In *Munera Pulveris* he used the term "intrinsic value" to refer to an output's potential usefulness, and "effectual value" to refer to the usefulness it actually achieves through consumption. This distinction is of the utmost importance because it allows us to analytically address the waste, loss, misuse, and maldistribution of outputs – issues that are crucial for rational economic guidance. Unfortunately the term "intrinsic value" is already used for several purposes. I have therefore replaced it with "potential value". The term "effectual value" is not widely used and has therefore been retained.

Potential value, when it is positive, is the maximum capacity of an output, over the duration of its useful existence, to increase health. Some outputs with positive potential value are houses, vegetables, and orange juice. If an output instead has the capacity to decrease health, its potential value is negative. Some examples are cigarettes, fatty foods, and harmful drugs. Based on the assumption that consumers can always be found to extract an output's full health effects, potential value is the same at any output quantity. Potential value is used in ENL to judge the quality of the outputs resulting from production.

Effectual value is the actual health effect of an output's consumption. Like potential value, it can initially be positive or negative. Unlike potential value, it tends to decrease at the margin, largely due to satiation, but also due to waste and other losses. Thus, effectual value that is initially positive may become negative as consumption proceeds. For example, drinking orange juice in moderate quantities will increase health in a normal person. Drinking excessive quantities, however, will cause decreasing and eventually detrimental health effects. Effectual value is used in ENL to judge satiation as well as an economy's output distribution and output losses.

The phrase "at the margin", as used above, is extremely important and deserves a brief explanation. In economic thought the margin refers to the next unit or increment, such as an additional glass of juice. If the first glass provides you with ten units of health and you consume a second glass that provides six more units, the total health effect is 16 units, but the marginal effect is six units.

Economists often focus on marginal rather than total effects because this tells them when an activity should logically stop. Marginal value tends to decline, whereas marginal cost tends to rise. When the two are equal, it would be irrational to continue the activity because cost would exceed value for the next unit, resulting in a loss. In standard economics this principle is used to determine a corporation's profit-maximizing production level. In ENL it is used primarily to determine an output's health-maximizing quantity. This method, which is called marginal analysis, is indispensable and constitutes one of great contributions of standard economics to economic analysis.



Cost Concepts

In our daily lives cost is a trivial concept – it is the amount of money we must spend to obtain a desired output. In economic theory, however, it is a subtle issue that was not resolved until the 20th century. What, after all, does the money you shell out actually represent? Is it the labor-time required in production? Is it the disutility (pain and suffering) endured by workers? Is it something sacrificed by capitalists in their efforts to produce and sell? Or is it some combination of these and possibly other factors? The solution that standard thinkers finally came up with is "opportunity cost". I begin with this concept because it is much admired, highly influential, and deeply deceptive. ENL's cost concepts were formulated largely to counter the extraordinary falsehood that underlies this idea.

The core concept is simple: opportunity cost is the sacrifice that accompanies a choice. If I choose to spend an hour writing, I can't spend that same hour watching television. Thus, watching television is the opportunity cost of my choice to write. Conversely, if I choose to spend an hour watching television, I can't spend that hour writing. Thus, writing is the opportunity cost of my choice to watch television.

In economics this concept is applied primarily to production choices. If resources such as labor, equipment, and raw materials are used to build a bridge, these same resources are unavailable for building a dam. If the dam is the best alternative use of these resources, it constitutes the opportunity cost of the bridge. A standard economist would therefore say that the cost of the bridge is the unbuilt dam. Concisely stated, opportunity cost refers to the forgone benefits of the best available alternative when a production choice is made.

This train of thought appears to be logical and correct, and it is. Opportunity cost is a perfectly rational approach to resource allocation. The problem is that it applies *only* to allocation, and completely ignores what follows: production. Workers could be injured or killed in building the bridge, but because this has nothing to do with allocation, it is not counted as a cost. Water could be polluted and fish could be wiped out in the construction process, but again allocation is not involved and such damage is therefore deemed irrelevant to cost. Briefly stated, opportunity cost is deceptive because it is presented as a comprehensive cost concept, whereas it applies exclusively to the initial phase of the production sequence: resource allocation.

Although it may seem implausible, standard economics does not include a formal cost concept that relates to production. Worker injuries, for example, are treated as an unfortunate part of the labor process – a factor that each worker should take into account when considering a dangerous job at a specified wage. Injuries are thus seen as personal considerations, not economic sacrifices. Environmental damage is treated as an externality – a social cost perhaps, but not a cost that is inherently part of capitalist production decisions.

The fact that opportunity cost neglects the harm to people and nature in production is kept extremely well hidden. It was never mentioned in the numerous economics lectures I attended at university, and only a single text on my shelves acknowledges this reality. All the others, either through ignorance or ideological intent, engage in a conspiracy of silence on this fraudulent aspect of the standard cost concept.

ENL retains the valid aspect of opportunity cost, which is the sacrifice made in allocation. However, because it reserves the word "cost" for the sacrifices made in production, the term itself is avoided. An allocation sacrifice is instead called ***forgone health.*** This is the health that is forgone, or sacrificed, when resources are allocated to a particular output instead of its best alternative. Allocation is rational, or health-maximizing, when forgone health is minimized. To address the element that is missing from standard economics – the sacrifices made in production – ENL employs the concept of ***input cost***. This refers to the effects of production activities on human health. Input cost is the sum of two components: labor cost and natural cost.

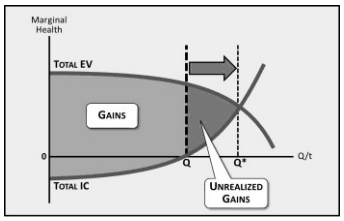
Labor cost is defined as the health effects of labor on workers. It can initially be either positive or negative, and like all costs it tends to increase at the margin. Note that a mental flip is required to understand "positive" and "negative" in this context. Cost refers to something detrimental. A positive cost is therefore a detrimental effect, whereas a negative cost is a beneficial effect. For this reason, labor cost is positive when labor decreases health, and negative when it increases health. Thus, if a worker contracts mesothelioma from inhaling asbestos fibers on the job, this is a positive cost of production. If a worker gains vigor and strength from healthful outdoor activities, this is a negative cost of production.

Natural cost is defined as the global health effects of the environmental changes caused by production. Like labor cost, natural cost can initially be positive or negative, and it tends to increase at the margin. Of course, the same mental flip applies: natural cost is positive when production degrades the environment so that health is adversely affected; it is negative when production creates a cleaner or more habitable environment, resulting in improved health. Thus, if a factory generates pollution that causes health degradation, this effect will increase the natural cost, and thus the input cost, of the products produced there.

Two key points must be made about natural cost. The first is that it measures the effects of production on people, not nature. The environment is of course critical for ENL, but it is protected by respecting natural constraints, as discussed below. Although it might seem reasonable to treat natural damage as a cost, this doesn't work.

The problem is a fundamental one in economic thought: damage to people is *incommensurable* with damage to nature. What this means is that they are essentially different and therefore cannot be measured by the same standard. The second point is that natural cost applies to everyone worldwide. The environmental effects of production are construed in ENL as a global responsibility: if automobile production in Germany causes climate change that results in droughts and starvation in Africa, then these deaths must be counted among the natural costs of the German automobile industry.

To summarize: labor cost refers to the direct health effects of production on workers through the labor process, whereas natural cost refers to the indirect health effects of production on the global population through environmental damage. The sum of labor cost and natural cost is input cost, which captures the total health effects of production. To address the benefits that are sacrificed when resources are allocated to a specific output, ENL employs the concept of forgone health. This is similar to opportunity cost in standard economics.



An Output's Optimum Quantity

Assume you are in charge of a simple economy and must determine how much bread should be produced. If you accept ENL's ethical principle, how would you proceed?

This problem, it turns out, must be solved in two discrete steps. The first is to examine value and cost to provisionally determine the rational output quantity in the absence of environmental constraints. That is, purely human criteria are applied, and the environment is ignored. The second step is to take the environment into account and to adjust the preliminary conclusion accordingly.

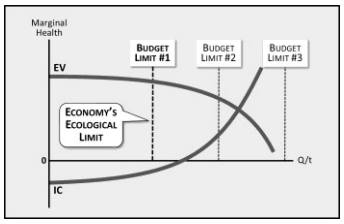
When you take the first step through the use of marginal analysis, you discover that, at a certain point, the next loaf of bread to come out of the ovens would lose more health in its production than would be gained from its consumption. Based on the health criterion, producing this loaf would be irrational, and bread production should therefore stop at this point.

What you have done is to determine the bread's ***optimum quantity***. This is the production rate that, under prevailing economic conditions, achieves the maximum health for society as a whole. Establishing this quantity is the starting point for ENL's economic guidance. The key point is this: unless economic conditions change, there is no conceivable reason for producing an output at a higher rate. The optimum quantity thus establishes the ***economic limit*** to production.

The bread example makes an implicit assumption: that the effectual value of the first loaf is higher than its input cost. This is what makes the first loaf worth producing, and why we have to track the output's declining marginal value and rising marginal cost to know when to stop. In some cases, however, this assumption is false. For example, an economy's first batch of cigarettes, if consumed as intended, would result in negative effectual value, which means that this value would likely be lower than its input cost. This tells us that that the optimum quantity for cigarettes is zero, which means they should not be produced at all.

Cigarettes and similar products are known in ENL as ***irrational outputs***. Determining which outputs are irrational is critical because it allows us to avoid health-destroying production. Its broader economic significance is that it helps us establish the economy's rational output mix. In a sustainable economy, irrational outputs would be removed from the mix as soon as this is socially feasible. This would both increase aggregate health and reduce the economy's ecological impact. Conversely, outputs that are not currently being produced, but that should be produced based on ENL's criteria, would be quickly added to the output mix.

Let me now proceed to the second step in determining an output's rational quantity: the consideration of environmental constraints.



An Output's Ecological Limit

In developing ENL's environmental concepts I found it necessary to adopt a substantial number of new terms. I apologize for this profusion, but I believe it is better to include them in this introduction than to employ vague and general statements that might mislead the reader.

Let me start with some background terms. A ***natural flow*** is defined as any interaction between the economy and nature. Natural flows are divided into four categories: habitat destruction, the utilization of renewable resources, the expulsion of wastes, and the utilization of nonrenewable resources. Because the first three directly impact the biosphere they are called ***biological flows***.

The distinction between biological and nonrenewable flows is highly significant. Biological flows can directly damage the environment, for example through excessive pollution and the over-exploitation of fish stocks, whereas nonrenewable flows do not have this effect. High rates of oil, coal, or uranium depletion will rob future generations of these resources, but this depletion – not to be confused with the damaging extraction process – will not harm ecosystems. For this reason, biological flows are used in ENL to set environmental limits, whereas nonrenewable flows are ignored for this purpose. This distinction, however, does not affect the concept of ***ecological efficiency***. In ENL this applies to any natural flow, whether biological or nonrenewable, and measures the economy's success in minimizing the flow in production and consumption.

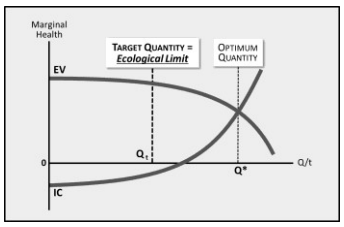
ENL's approach to ecological limits is based on environmental budgets. An ***environmental budget*** is the maximum rate of a biological flow that does not cause ecological degradation. Thus, it refers to the maximum rates of habitat destruction, utilization of renewables, and expulsion of wastes that avoid cumulative or destructive effects in the environment. A fundamental ENL principle is that *an economy may not violate its most restrictive environmental budget*.

To apply this idea to individual outputs, two new concepts are needed. The first is ***budget share***, which is the portion of an economy's environmental budget that is allotted to a specific output. This allotment is based on the output's actual or prospective contribution to health, relative to the other outputs that require this flow. For example, if houses are among the outputs that cause CO2 emissions, and if houses provide 10% of the health achieved by these outputs, they will be allotted 10% of an economy's CO2 budget. This portion thus constitutes the budget share for houses with respect to this waste.

The second new concept is ***share limit***, which is the maximum output quantity possible within the constraints of a budget share, at the current level of ecological efficiency. If the 10% budget share for CO2 is exhausted after 10,000 houses have been built annually, then this quantity is the current share limit for houses in this economy.

A complex output like a house will typically have numerous biological flows associated with it, and therefore numerous budgets shares and share limits. To simplify matters, assume that house construction utilizes only three such flows: CO2 into the atmosphere, paint solvents into waterways, and habitat destruction due to lumber production. Assume further that the share limits are 8,000 houses for the paint solvents and 45,000 houses for the habitat destruction. As noted above, the CO2 limit is 10,000 houses. We must therefore consider three share limits, or environmental restrictions.

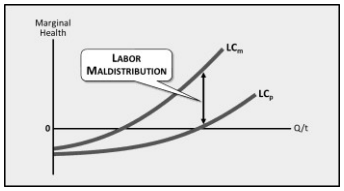
Because an economy may not violate its most restrictive environmental budget, no output can be permitted to violate its most restrictive share limit. This means that the maximum permissible level of house production, at current ecological efficiencies, is the lowest of these three figures: 8,000 houses. This is the output's ***ecological limit***. If all outputs adhere to this limit, the economy will be sustainable. If all economies show this restraint, sustainability will be achieved for the globe as a whole.



AN OUTPUT'S TARGET QUANTITY

Two output restrictions have been defined: the optimum quantity or economic limit, and the ecological limit. Producing an output at a rate higher than its optimum quantity makes no human sense because health would be lost rather than gained. Producing an output at a rate higher than its ecological limit makes no environmental sense because this would contribute to environmental damage. Because neither restriction can be violated, the rational rate at which an output should be produced is the lower of these two numbers. This rate, which is called the output's ***target quantity***, allows us to squeeze the greatest amount of health from an output without endangering the environment. Achieving target quantities for all outputs is therefore a primary objective for an ENL-guided economy.

Target output quantities are important in another respect: they indirectly establish the rational rates for natural flows. Once we know how much of each output to produce, we can determine how much of the various biological and nonrenewable flows they require, given current ecological efficiencies.

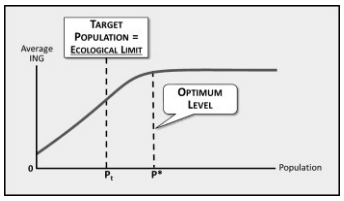


Economic Equity

Economic equity refers to outcomes that are consistent with ENL's ethical principle that all human beings are of equal worth. Because the framework is based on this principle, applying its concepts will in many cases achieve equitable results automatically. Take output distribution as an example. If Mary has consumed three apples today and Cheryl has consumed none, who should get the next apple plucked from our orchards? Mary is fully or partly satiated with respect to apples, so the effectual value of the next one she consumes will be low. Cheryl has experienced no satiation, so the effectual value of the next apple she consumes will be high. An ENL analyst would therefore conclude, even without considering equity, that Cheryl should receive the next apple because this will achieve more effectual value and will thus contribute more to society's total health.

To formalize this idea, ENL defines ***maldistribution*** as any distribution that fails to maximize aggregate health. This concept applies to outputs, labor, and wastes. ***Output maldistribution*** occurs when the distribution of outputs does not maximize a society's aggregate effectual value. Similarly, ***labor maldistribution*** is any distribution of labor that fails to minimize aggregate labor cost, and ***waste maldistribution*** is any distribution of wastes that fails to minimize aggregate natural cost. Based on these three concepts, economic equity in ENL is defined as the absence of output, labor, and waste maldistribution.

A difficult issue in economic thought is the conflict that can arise between equality and well-being. Say, for example, that a society with zero maldistribution can achieve a maximum average health level of 200 units, but that one with a moderate amount of maldistribution can achieve 300 units. Should the inequality be permitted in order to achieve the greater health benefits? ENL's answer is that it should be permitted if three conditions are met: no-one loses health for the health gains of others, the specified level of inequality is necessary to achieve the additional health benefits, and society determines that the perceived decline in fairness will not produce unacceptable levels of envy, conflict, criminal behavior, etc. If these conditions are satisfied, the result is deemed to be equitable and the inequality is deemed to be justified.



Population

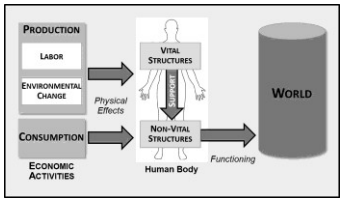
Population is a key factor in sustainability and is thus addressed by ENL. The framework ignores many of the conventional reasons for raising a society's population, such as increased military strength and greater economic influence, and also rejects the capitalist reasons – more workers and consumers to spur profits. Instead it aims for the population level that sustainably maximizes the average level of health.

It is important to note that aggregate health is irrelevant in this context. Under given economic conditions, a population of two million will have twice the aggregate health of a population of one million. However, the people themselves are not better off. The point is that it is illogical to increase an abstract total; what must be done instead is to maximize the health of society's individual members.

The procedure for establishing a target population level is similar to that for finding an output's target quantity: an optimum level and an ecological limit are defined, and the lower of these is chosen. The ***optimum population*** is the level that maximizes a society's average health based on *scale effects*. These are opportunities for specialization and exchange that tend to increase as more people participate. A population's ***ecological limit*** is the maximum level that can be supported by an economy that respects ENL's ecological constraints. The lower of these two limits is a society's ***target population***.

An important point is that a society's optimum population varies directly with its chosen level of technological complexity. A technologically simple society will quickly reach its optimum population because relatively few people are required to develop and operate its economy. The scale effects are therefore minimal. Extensive specialization, for example, is not required when only basic tools and a small variety of outputs are being produced. A technologically complex society, by contrast, will reach its optimum level much more slowly because the scale factors operate with full force. Sophisticated computers call for highly specialized knowledge and a broad range of administrative functions, neither of which is available in a small population.

This relationship is important because it presents a promising option for achieving sustainability. If a society decides to decrease its technological complexity, this would provide a compelling rationale for decreasing its population. Such a step would greatly reduce environmental impact and the attainment of a sustainable future.



Core ENL Principles

To summarize this introduction, the following are ENL's core principles:

1. ***Value*** is the objective effect of consumption on human beings, and is measured by physical health.

2. ***Cost*** is the objective effect of production on human beings. Because cost must be the converse of value for commensurability, it is also measured by physical health.

3. The ***optimum quantity*** for an output is reached when the rising marginal cost of its production equals the falling marginal value from its consumption.

4. An economy's ***environmental budgets*** are set by the maximum rates of habitat destruction, waste generation, and utilization of renewables that do not result in environmental degradation.

5. An output's share of an environmental budget, called its ***budget share***, is established by its relative contribution to aggregate health.

6. An output's ***ecological limit*** is reached when the output has exhausted its lowest budget share.

7. An output's ***target quantity*** is the lower of its optimum quantity and ecological limit.

8. A ***population's target level*** is the lower of its optimum level and ecological limit.

9. Subjective consumption desires, which are potentially limitless and thus ecologically dangerous, are divided into ***authorized wants*** (those society has decided to satisfy), and ***unauthorized wants*** (those society has decided not to satisfy).

CONCLUDING COMMENTS

This introduction to ENL will suffice for most people who are interested in an alternative to capitalist logic. Those who choose to read *The Economics of Needs and Limits* will find that additional topics are covered there. These include various efficiency measures besides ecological efficiency, an examination of labor productivity and trade, and a rudimentary physical health index that quantifies individual health for measurement purposes.

One point from the chapter on labor productivity deserves mention here. Based on ENL's principles, I draw a conclusion that differs from both capitalist and Marxist thinking on this topic. The capitalist view is that increased labor productivity is always a positive development, purportedly because it improves the "standard of living", but in reality because it enhances competitiveness and profits. The Marxist view is that increased productivity *will* invariably be a positive factor once the capitalist mode of production has been superseded. Both viewpoints reject the idea that technology *per se* could be harmful to humankind.

The ENL framework on the contrary indicates that, beyond a certain point, technology applied to labor productivity will be detrimental to workers, irrespective of the social relations that govern the labor process. Once increased labor productivity has been fully exploited to increase aggregate health in production, further technical developments will cause health to decline. At this point the machine itself becomes the enemy of humankind, and must therefore be "destroyed". Thus, a modern form of Luddism could eventually be justified.

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